

\*EnergyPlus\*SPARK\*DOE-2\* EnergyPlus\*VisualSPARK\*DOE-2\*GenOpt\*EnergyPlus\*DOE-2\*GenOpt\*EnergyPlus\*  
 \*VisualSPARK\*DOE-2\*GenOpt\*SPARK\*EnergyPlus\*DOE-2\*GenOpt\*VisualSPARK\*DOE-2 \*GenOpt\*EnergyPlus\*

# Building Energy Simulation ♦ User News

\*EnergyPlus\*SPARK\*DOE-2\* EnergyPlus\*VisualSPARK\*DOE-2\*GenOpt\*EnergyPlus\*DOE-2\*GenOpt\*EnergyPlus\*  
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## Regular Features

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**Find the Big List of FREE! in [section 2 of the User News](#)**

## The Buzz

### *New EnergyPlus Team Member*

*Dr. Michael Wetter has joined the Simulation Research Group as part of the EnergyPlus Development Team at Lawrence Berkeley Lab.*

### *Positions Available*

*The National Renewable Energy Laboratory in Golden, CO, has two new job postings for mechanical engineers! Links on p. 3.*

### *New DOE-2 Consultant*

*[Section 2](#) of this month's newsletter lists Ron Slosberg of L&S Energy Services, Clifton Park, NY, as the newest DOE-2 Consultant. Welcome, Ron!*

### *Online Courses*

*Starting this month, Pacific Gas & Electric will offer on-line energy education courses. Details are on p. 7.*

**Disclaimer:** The Building Energy Simulation User News was prepared as an account of work sponsored by the United States Government (USG). While this document is believed to contain correct information, neither the USG nor any agency thereof, nor the Regents of the University of California (RUC), nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process or service by its trade name, trademark, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the USG or any agency thereof, or the RUC. The views and opinions of authors expressed herein do not necessarily state or reflect those of the USG or any agency thereof or of the Regents of the University of California

## **Release of EnergyPlus 2.0**

### **NEW FEATURES**

#### **DATA SETS**

- New materials data set based on ASHRAE 2005 HOF (replaces legacy DOE-2 and BLAST data).
- Updated solar collector data set from the SRCC adds 55 more collectors for a total of 173.
- Added air change rate to ventilation loads report in StandardReports data set.

#### **INPUT**

- Objects and name lengths can now be 100 characters (previous limit was 60).
- New weather data for 86 locations added: 69 in Australia, 16 in Canada, and 1 in Iran.
- Three new unit ventilator input files created:
  - UnitVent5Zone.idf,
  - UnitVent5ZoneAuto.idf,
  - UnitVent5ZoneFixedOANoCoilOpt.idf.
- Three new thermal storage example input files created:
  - IceStorage-Parallel.idf,
  - IceStorage-Series-ChillerDownstream.idf,
  - IceStorage-Series-ChillerUpstream.idf.
- Example input files created for all new features (More than 225 example files now available)

#### **GEOMETRY • WINDOW • WALLS • SHADING**

- Shadowing Calculations object now allows user to specify maximum figures in shadowing overlaps.
- Phase change materials (PCM) with variable thermal conductivity and a temperature-enthalpy function incorporated in conduction finite difference solution algorithm.
- Basement program now outputs EnergyPlus IDF for wall and floor surface temperatures.
- Users can now enter interzone surfaces once and EnergyPlus will automatically create the mirror interzone surface.

#### **DAYLIGHTING ZONE MODEL**

- Zone Sizing modified to allow standards-type calculation of design outside air flow rates; allows minimum cooling and maximum heating limits on design supply air flow rates.

#### **ON-SITE ENERGY SUPPLY**

- Fuel cell model updated.
- Combustion micro cogeneration model added.

#### **OUTPUT**

- Report Variables and Meter Variables (rdd and mdd) separately reported and output as IDF.
- Meters can now report cumulative value in addition to resetting at reporting time interval.

*Continued on the next page*

## **Release of EnergyPlus 2.0**

### **NATURAL AND MECHANICAL VENTILATION**

- Zone forced air units added to reporting of mechanical ventilation rate and loads.
- Simple Ventilation object now reports air changes per hour.
- New options in UnitVentilator include no coil option and fixed amount for outside air control strategy.
- AirflowNetwork model can now use Zone Exhaust Fan, OnOff supply fan and the DX heating coil objects.

### **HVAC**

- Water-to-air heat pumps now use RegulaFalsi solution technique to improve robustness and to speed up simulation.
- Applicability schedule added to System Availability Manager:Low Temperature Turn Off (to support thermal storage).
- Evaporative condenser option added to existing refrigerated case compressor racks including availability schedule and basin heater with controls.
- Draw-through fan configuration added for furnaces, unitary system and air-to-air heat pumps.
- Different supply air flow rates now allowed for cooling, heating and when no cooling or heating is required in unitary, furnace and air-to-air heat pumps.
- Common Pipe for Primary-Secondary systems provides an alternative to the Connection component object to model Primary-Secondary systems
- Balanced flow desiccant heat exchanger option added for the existing heat exchanger-assisted DX cooling coil object.
- Stratified water heater model added.
- Uniform load distribution option added to plant load range based operation scheme.
- Height-dependent air temperature and wind speed now available for most HVAC systems.

### **UTILITIES**

- New EP-Launch utility tab added where users can launch Basement, CalcSoilSurfTemp, CoeffCheck, CoeffConv, Slab and Weather utilities.
- CSVproc now supported in EP-Launch.
- IDF Editor now preserves the order of user IDFs and includes a large number of other new features.

### **WATER MANAGER**

- Green roof simulation added.

### **DOCUMENTATION AND GUIDES**

- Input/Output Reference and Engineering Reference updated and extended for all new features and updates. Total documentation now exceeds 3300 pages.

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#### **Positions Available**

The National Renewable Energy Laboratory (NREL) in Golden, Colorado, has two job openings for mechanical engineers.

[http://www.nrel.gov/employment/job\\_postings/1575.html](http://www.nrel.gov/employment/job_postings/1575.html) and [http://www.nrel.gov/employment/job\\_postings/1576.html](http://www.nrel.gov/employment/job_postings/1576.html)

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## ENERGYPLUS EXAMPLE FILE GENERATOR – **UPDATED!!!**

[http://www.eere.energy.gov/buildings/energyplus/interfaces\\_tools.html](http://www.eere.energy.gov/buildings/energyplus/interfaces_tools.html)

DOE and NREL are pleased to announce the update of the EnergyPlus Example File Generator. The goal of the Example File Generator is to provide input files for building models that serve as a starting point for using and learning EnergyPlus. This service is free and available at the EnergyPlus web site ([www.energyplus.gov](http://www.energyplus.gov)) under Interfaces & Other Tools.

Web-based forms allow you to input some general information about the building you want to model. The service then automatically creates a complete EnergyPlus input file, runs an annual simulation on NREL's computers, and then sends you an email with the EnergyPlus input file along with a summary of the annual energy results (and a dxf image file). The attached DXF of an EnergyPlus example file was generated in just a few minutes.

Assumptions should be carefully reviewed. There is no guarantee that the models are fully compliant with the energy performance Standards used to generate model details.

The new version has many new capabilities:

- Generates input file for EnergyPlus version 2.0.
- The input files are now completely annotated with the descriptions of the fields for each object.
- Added input boxes on the web page for New footprints for geometry including Rectangle, Courtyard, L-Shape, H-Shape, T-Shape, U-Shape
- Gas appliances
- Fins
- Continuous daylighting
- Addition of over 50 HVAC systems
- Ventilation rates by people and/or area
- Service Water Heating inputs



Give the service a try! If you have questions or feedback, email [ewi\\_support@nrel.gov](mailto:ewi_support@nrel.gov).

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### New EnergyPlus Consultants

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**Ask an EnergyPlus Expert . . .**

**AUTOSIZING ERRORS**

I used autosizing for systems, equipment and plant. The setpoint air temperature was 24C for cooling and 22C for heating, and I had a VAV system serving five zones. When I used autosizing for humid locations (like Portland or Atlanta) the simulated indoor operative temperature for perimeter zones was well within the 25-26C range; however, when I changed the weather file and design day file for dry climates like (Helena or El Paso), the indoor operative temperature in perimeter zones reached from 28-30C.

**Answer**

Operative temperature is a mix of zone air temperature and zone surface temperatures. If zone air temperatures are meeting setpoint, then you should look at the results for mean radiant temperature and the temperature results for the inside face of surfaces. If you have some large windows, then they could be getting hot when in direct sun and will cause operative temperature to be quite high.

If you are concerned about meeting operative temperatures rather than air temperatures, then you can use operative temperature-based thermostatic control. Systems usually autosize to be larger with the operative temperature control.

**WINDOW AC OR UNITARY**

I need to verify EnergyPlus simulation results by taking actual measurements with an anemometer and temperature sensors in a room with an evaporative air conditioner inside the room and an air cooled condenser outside the room. There are examples for both Window AC and Unitary equipment class; which one is more appropriate to this split type of air conditioner?

**Answer**

Both the Window AC and the Unitary System objects use the DX cooling coil object Coil:DX:CoolingBypassFactorEmpirical. This cooling coil object is probably what you will need to use -- cooling only, single stage. It would probably be easiest for you to use the Window AC example. In EnergyPlus, the Window AC object is a piece of zone equipment that is relatively easy to define (see example file WindACAuto.idf). For the Unitary System object, you need to define an air loop which means additional inputs that are probably not needed for what you are doing.

**SET POINT TEMPERATURE**

Are there any standards (or tables) for the set point and set point back of different rooms of a house during the day and night?

**Answer**

These kinds of standards are usually described for a country in that country's energy standards document. The ASHRAE Handbook of Fundamentals may also have some information. You can use the "comfort" reporting of EnergyPlus to determine whether people WOULD be comfortable at set back temperatures.

**Ask an EnergyPlus Expert . . .**

**MULTIMODE HUMIDITY CONTROL ISSUES**

I am trying to model a large unitary system with humidity control. No matter how I try, I cannot get the humidity control portion of the coil to work. Furthermore, I am told that the part-load ratio limits are exceeded. I am totally stumped. What I am trying to do is create a system that delivers air at a consistent temperature of 20C and a wetbulb of 12.5C. The only way I can see to do this is to create a dummy zone, with no loads, that serves as the controlling zone for the humidistat. Is there a better way to do this?

**Answer**

1. If you want the supply air to have a fixed humidity set point, then use Set Point Manager:Scheduled with the control variable set to MAXHUMRAT.
2. The multimode coil in this input has the same performance curves for both "Normal Mode" and "Dehumid Mode." Without different performance for the dehumid mode, the coil cannot do anything special. This option is intended for systems that switch refrigerant flow, such as sub-cool reheat, to achieve a lower SHR in the "dehumid" mode. If I understand correctly, the DX system you are modeling does not operate this way. I am guessing that it uses cool/reheat to achieve the desired supply air humidity. For that, set the DXSystem:AirLoop "Dehumidification Control Type" to CoolReheat.
3. The multimode coil is not necessary for this, but it won't hurt. The extra input will just be ignored.
4. And, finally, add the following report variables for the node leaving the DX coil so you can monitor the setpoints and results:

System Node Temp  
System Node Setpoint Temp  
System Node Humidity Ratio Max  
System Node Humidity Ratio

**FAN COIL UNIT WITH A FRESH AIR HANDLING UNIT**

Will EnergyPlus model a fan coil system with a fresh air handling unit?

**Answer**

A fresh air handling unit that feeds directly into the outside air intake of the fan coil units is not currently supported. However, you can approximate this fairly well by having the pre-treated outside air feed directly into the zone and the fan coil unit will serve the net remaining load. Here's how to do this:

1. Define an AIR PRIMARY LOOP to treat the fresh air and use DIRECT AIR terminal units to feed the zone.
2. In the ZONE EQUIPMENT LIST, set the heating and cooling priorities to 1 for the DIRECT AIR (fresh air system) and 2 for the fan coils.
3. Use a NODE LIST object to specify more than one inlet node for the zone.
4. The fresh air system will need a return air node and a return air path, even if there will not be any return flow, it must be defined.

**Ask an EnergyPlus Expert . . .**

**AIRFLOW NETWORK MODEL**

In the documentation it says that the AirflowNetwork model can calculate multizone airflows driven by wind when the HVAC system fan is off or when no forced air distribution system is specified for the simulation. Yet, I've read the Engineering Reference document for those topics related to advanced calculations of Natural Ventilation, (i.e., AirflowNetwork model considering no HVAC system defined), and it states that I need to "simulate SYSTEM" or "predict SYSTEM capability", etc. How, then, does the process of prediction-correction works if there's no "system to simulate"?

**Answer**

The documentation is correct. The AirflowNetwork model can calculate multizone airflows driven by wind, either the HVAC system fan is off with inputs of forced air distribution, or no forced air distribution system is specified. In addition, the model can calculate multizone airflows driven by wind and forced air through the forced air distribution system when the HVAC system fan is on. In other words, the model calculates multizone airflows with wind only or with wind and forced air together.

Natural ventilation is a way to deal with zoned airflows without including an air distribution system. The alternative way is to use the AirflowNetwork model to calculate multizone airflows driven by wind with the similar approach, excluding air distribution system.

EnergyPlus always calls Predictor and Corrector with and without HVAC systems. The difference is that if there is no HVAC system, the system load in the corrector is zero.

**PURCHASED AND OUTSIDE AIR**

I'm using purchased air to determine annual thermal and cooling loads. And I'm using the infiltration method to handle the constant supplied outside air. Does the infiltration consider the latent gain of the outside air?

**Answer**

Yes, infiltration considers latent gain/loss.

**Question**

I also tried to handle the outside air as part of the purchased:air and not use infiltration. However, whenever the flow drops below the specified outside air flow rate, the system generates an error. How can I solve this?

**Answer**

You cannot solve this. That is why the warning is there. Purchased air is a variable volume device. There will always be a low-load condition at which the flow required to meet the zone load is smaller than the required outside air flow. You must use INFILTRATION or VENTILATION to add the outside air load to the zone when using PURCHASED AIR for an annual simulation.

**Internet-Based Courses from [Pacific Gas & Electric Co.](#)**

ENVELOPE	Jun 26	Title 24: Where We're Headed with the 2008 Standards
H V A C	Jun 19	A Field Perspective on Pump and Fan Applications
TITLE 24	Jun 26	Title 24: Where We're Headed with the 2008 Standards
LIGHTING	Jun 05	Lighting for Profit: Finding Hidden Energy Savings
COMMISSIONING	Jun 19	A Field Perspective on Pump and Fan Applications
RENEWABLES	Jun 08	Solar Water Heating Systems

**Ask an EnergyPlus Expert . . .**

**GENERATE A DXF DRAWING**

I'm trying to build a model with EnergyPlus and have finished inputting the surface geometries. When I tried to create the DXF file using EP-Launch I got an error message. I checked my input file but found no errors, only some warnings. If I can't export the DXF file, does it mean my model is in error?

**Answer**

There are two ways to generate the dxf drawing:

1. Add "report, surfaces, dxf;" to the idf file and run an EnergyPlus simulation. An output file with .dxf extension will be created. This can then be opened using the "Drawing Files" output button, or the DXF button on the quick-open panel in EP-Launch.
2. If the dxf file does not exist (or is older than the idf file), pressing the "Drawing Files" button in EP-Launch will cause WinEPDraw to run and create the dxf output file, and then it will open.

You must have a DXF viewer installed on your computer in order for EP-Launch to open the dxf file. If you do not have one, you can download VoloView Express (an old Autodesk program that is no longer supported) at <http://www.gard.com/vve201setup.exe> . After the viewer is installed, you must use Autofind or Select Drawing Viewer in the file menu in EP-Launch to tell it what program to use for dxf files. That should solve the problem.

**PARTITIONS AND VOLUME**

When an object is modeled as Heat Transfer:Internal Mass, its thermal mass is taken into account in the simulation. But is its volume subtracted from the zone volume in which the object is located? In the case of partitioning, this volume can be negligible but if furniture is being modeled (say filled bookshelves) would EnergyPlus subtract the volume occupied by all the furniture from the zone's total volume? In some cases, the volume occupied by these objects can be significant. I am curious to know if this is taken into account or not by EnergyPlus.

**Answer**

The zone volume that is referred to in various parts of the outputs is not mass, but dimensional. Therefore, it refers to the surfaces of the zone. Internal mass neither adds nor subtracts from the Zone Volume. It does, however, represent mass / thermal mass that should be taken into account during the calculation of the heat balance.

**"AIR" PARTITIONS**

How do I describe the construction of a virtual wall between perimeter zone and interior zone? Should Material:Air be applied? And if so, can light and heat go through the air wall partition? Can I set the thickness of the air wall?

**Answer**

This is a difficult feature to model. Material:Air will not transmit light, it is simply a resistive layer. A window subsurface is required to transmit solar and visible light from the perimeter zone to the interior zone. If the two zones will generally be controlled to the same temperature, then air exchange between the perimeter and interior can be neglected. If a significant temperature difference is expected, then MIXING, CROSS MIXING, or AIRFLOWNETWORK:\* objects are required to model the air exchange. There is currently no method for modeling radiant exchange between surfaces in different zones.



**Ask an EnergyPlus Expert . . .**

**WINDOW AIR CONDITIONER NODES**

I need to simulate a room with a window air conditioner and I am having problems setting the air nodes. Is there an example? The written explanation is there but I didn't understand it very well. Is the scheme for a window air conditioner is similar to that shown in Fig. 87 in the Input/Output Reference (this figure is related to packaged terminal heat pump)?

**Answer**

Yes, Figure 87 for packaged terminal heat pumps is similar to the window air conditioner, except you would omit the DX heating coil and supplemental heating coil. To see how to set the air nodes, look at the example file "WindACAuto.idf."

**ROOM AIR NODE TEMPERATURES IN MUNDT MODEL**

I am sizing a cooling system for a 7-meter tall industrial building by simply using a purchased air system and the Mundt model for a displacement ventilation air pattern. I found that the return air temperature (Mundt Room Air Model Air Node Temp) and the Zone Mean Air Temperature are always about the same, i.e., close to the value of the Cooling Setpoint Temperature, despite the air temperature near the floor being slightly above the Cooling Supply Air Temperature (T~20 C). Could anyone help me understand this?

**Answer**

The Mundt model is a relatively simple model that only predicts a different temperature for the floor air "node." The single-slope air temperature profile from the Mundt model doesn't work well for the top portion of the zone so the other air temperatures are basically the zone mean. The 7-meter height of the building is probably too high a space for the Mundt model and, unfortunately, for the present there is no other room air model in EnergyPlus that would be better. I would suggest assuming a vertical air temperature profile for the space and then modeling the implications using the User Defined Distribution Controls.

**DIRECT OUTSIDE-AIR SYSTEM**

Any hints on how to use EnergyPlus to model a Direct Outside Air (DOAS) system?

**Answer**

EnergyPlus can model DOAS by using an AIR PRIMARY LOOP with DIRECT AIR terminal units to deliver pre-conditioned outside air directly into one or more zones. Then a zone equipment system, such as fan coil or PTAC or PTHP, is used to meet the net zone load. Be sure to list the DIRECT AIR units with priority = 1 in the ZONE EQUIPMENT LIST. Unfortunately, there is no example file (yet).

**UNIT CONVERSION**

Any hints in using ConvertESOMTR to change joules into kWh in the eplusout.eso files ?

**Answer**

The instructions for the use of ConvertESOMTR are in the Auxiliary Programs document on page 175 (pdf page 187). To use ConvertESOMTR use the option under the view menu.

## EnergyPlus Version 2.0

### Support Tools

Support software is listed on the main EnergyPlus website.

### Weather Data

Main weather data site is at

[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 [Meteonorm Files](#)

### Ask an EnergyPlus Expert

Questions from program users are answered promptly via the EnergyPlus User Group at

Yahoo. To join, go to [http://groups.yahoo.com/group/EnergyPlus\\_Support/](http://groups.yahoo.com/group/EnergyPlus_Support/)

Selected questions and answers have been compiled into PDF documents:

for [2002](#), for [2003](#), for [2004](#), for [2005](#), for [2006](#)

### Are you an EnergyPlus consultant?

If you are an EnergyPlus consultant and would like to be listed in this newsletter and on our website, please send details to [klellington@lbl.gov](mailto:klellington@lbl.gov)

### Testing and Validation

Go to <http://www.eere.energy.gov/buildings/energyplus/testing.html> for info.

*EnergyPlus is being developed by University of Illinois and Lawrence Berkeley National Laboratory, 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).*

## DOE-2.1E, Version 124

### Are you a DOE-2 Consultant?

If you would like to be listed as a DOE-2 consultant on our website and in the monthly *User News* Newsletter, please contact [klellington@lbl.gov](mailto:klellington@lbl.gov)

### Get Free DOE-2 Documentation. Download from <http://SimulationResearch.lbl.gov/>

[DOE-2 Basics Manual \(2.1E\) http://gundog.lbl.gov/dirpubs/BASIC/basiclist.html](http://gundog.lbl.gov/dirpubs/BASIC/basiclist.html)

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 2006 2005 2004 2003 2002](#)

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

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

<http://simulationresearch.lbl.gov/dirpubs/VERSIONS.txt>

All changes and bug fixes in a text document.

## Meetings - Conferences - Symposia

### 2007

June 10-14	CLIMA 2007	<a href="http://www.clima2007.org/portal/">http://www.clima2007.org/portal/</a>
June 13-15	Roomvent 2007	<a href="http://www.roomvent2007.org">http://www.roomvent2007.org</a>
June 23-27	ASHRAE Annual Meeting	<a href="http://www.ashrae.org">http://www.ashrae.org</a>
July 7-12	Solar 2007	<a href="http://www.ases.org/solar2007/participate.htm">http://www.ases.org/solar2007/participate.htm</a>
Sept 03-06	Building Simulation 2007 Beijing, China	<a href="http://www.bs2007.org.cn">http://www.bs2007.org.cn</a>
Oct 28-31	Int'l Conference on IAQ, Ventilation and Energy Conservation in Buildings	<a href="mailto:yoshino@sabine.pln.archi.tohoku.ac.jp">yoshino@sabine.pln.archi.tohoku.ac.jp</a>
Nov 16	IBPSA-England Symposium	<a href="http://www.ibpsa-england.org/">http://www.ibpsa-england.org/</a>

### 2008

Aug 17-22	Indoor Air 2008	<a href="http://www.indoorair2008.org">http://www.indoorair2008.org</a>
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## June 2007 Educational Programs

Pacific Gas & Electric Company, San Francisco, California

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

### DAYLIGHTING

Jun 14 [Daylighting in Practice - Lessons from the Seattle Better Bricks Daylighting Lab](#)

### Lighting

Jun 05 [Lighting for Profit: Finding Hidden Energy Savings](#)

Jun 07 [Retail Lighting Case Studies & Tour](#)

Jun 14 [Daylighting in Practice - Lessons from the Seattle Better Bricks Daylighting Lab](#)

### Building Envelope

Jun 26 [Title 24: Where We're Headed with the 2008 Standards](#)

### HVAC

Jun 17 [Critical Tools for the Design and Commissioning Process](#)

Jun 19 [A Field Perspective on Pump and Fan Applications](#)

### Renewables

Jun 08 [Solar Water Heating Systems](#)

Jun 13 [Photovoltaic \(PV\) Site Analysis and System Sizing](#)

### Commissioning

Jun 19 [A Field Perspective on Pump and Fan Applications](#)

### Title 24 Standards

Jun 26 [Title 24: Where We're Headed with the 2008 Standards](#)

### **NREL UPDATES NATIONAL SOLAR RADIATION DATABASE**

The Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) and collaborators have updated the National Solar Radiation Database, a planning tool that provides critical information about the amount of solar energy that is available at any given location. The database, widely used to plan, size and site solar energy systems, provides hourly solar radiation and meteorological data for 1991–2005 for 1,454 stations and features a new hourly 10-kilometer gridded data set for 1998–2005.

The 1991–2005 National Solar Radiation Database is distributed by the National Climatic Data Center; it is also accessible from [NREL's Renewable Resource Data Center Web site](#). An accompanying report, *National Solar Radiation Database 1991–2005 Update: User's Manual*, provides user instructions and information about the database's development and data access. The manual also includes a complete list of stations and a data quality summary for each site ([PDF 14MB](#)).

### **NREL's Geographic Information System (GIS)**

NREL's GIS team analyzes renewable energy resources to determine which energy technologies are viable solutions in the United States and inputs the data into a Geographic Information System (GIS). GIS is a computer-based system used to manipulate, manage, and analyze multidisciplinary geographic and related attribute data. The GIS system is composed of hardware, software, data, and expertise. All information in GIS is linked to a spatial reference used to store and access data. GIS data layers can be recombined or manipulated and analyzed with other layers of information.

<http://www.nrel.gov/gis/maps.html>

Maps -- NREL's GIS team develops maps for renewable resources using [ArcIMS](#).

#### [Solar Maps](#)



Maps of solar radiation resources are available for several photovoltaic collector orientations in the United States. Some of the maps available are: PV Solar Radiation Maps, Direct Normal Solar Radiation Maps, Map of U.S. Solar Measurement Station Locations, and the United States Solar Atlas.

#### [Federal Energy Management Program Maps](#)

Federal energy management program maps showing the market potential for various solar technologies at federal facilities throughout the country.

#### [Biomass Maps](#)



Maps showing the technical biomass resources available in the United States by county. These maps estimate the biomass available from various feedstock categories: crop residues, methane emissions from manure management, methane emissions from landfills and wastewater treatment facilities, forest residues, primary and secondary mill residues, urban wood waste, and dedicated energy crops.

#### [Wind Maps](#)



Maps showing wind resource potential based on wind power density. These maps estimate wind energy resources for the United States and its territories, and indicate general areas where a high wind resource may exist.

#### [Renewable Energy Atlas of the West](#)

The Renewable Energy Atlas of the western United States is an 80-page, full-color presentation of the renewable energy resources in the West, including wind, solar, geothermal, and biomass power.