

OWENS CORNING COMMERCIAL ENERGY CALCULATOR FREQUENTLY ASKED QUESTIONS

$k = A \cdot \exp(-E_a/R^*T)$
 $Area_{mw} \times [1 - e^{-HP_1(HC-1)}]$
 $(P + \frac{n^2 a}{V^2}) (\frac{V}{n} - b) = RT$
 $\frac{dV}{dt} (\frac{1}{n}) [P + \frac{n^2 a}{V^2}] + \frac{dP}{dt} - 2 \frac{n^2 a}{V^3} [\frac{V}{n} + b] - R \frac{dT}{dt} = 0$
 $\frac{P_1}{2g} + \frac{v_1^2}{2g} = \frac{P_2}{2g} + \frac{v_2^2}{2g} + \dots$





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WHAT IS THE PURPOSE OF THE OWENS CORNING COMMERCIAL ENERGY CALCULATOR (OC-CEC)?

The main purpose of the OC-CEC is to provide a simple way to demonstrate how improving the performance of envelope, lighting and HVAC systems can help a metal building owner qualify for tax deductions under the Energy Policy Act of 2005 (EPAAct 2005). As well, the OC-CEC estimates a simple payback period for any combination of thermal efficiency measures within the metal building.

DOES EPACT 2005 PROVIDE A TAX DEDUCTION OR A TAX CREDIT?*

Commercial building owners can qualify for a tax deduction and not a tax credit. The net value of the tax deduction could be less than the full amount depending on the specific tax circumstances.

WHO CAN TAKE ADVANTAGE OF THE TAX DEDUCTIONS?*

In most cases, the building owner gets the deduction. If the owner is a government agency or non-profit organization, the project designer can take the deduction.

WHAT ARE THE TAX DEDUCTION AMOUNTS?*

EPAAct 2005 allows a \$1.80 per square foot tax deduction for commercial buildings that are at least 50% more energy efficient on an annual energy cost basis than the mandated levels in ASHRAE 90.1-2001.

In addition, EPAAct 2005 allows partial deductions for the envelope, HVAC, and lighting systems of \$0.60 per square foot. A partially qualifying property must save at least 16 2/3% in energy costs through efficiency improvements in any one of the envelope, lighting or HVAC systems.

The OC-CEC uses the Department of Energy (DOE) 2.2 simulation software to determine whether a metal building can meet or exceed the full EPAAct 50% or envelope only 16 2/3% energy cost savings targets based on the metal building location and space-conditioning category.

HAS A THIRD PARTY CERTIFIED THE CALCULATIONS?

Per EPAAct 2005, DOE approved software must be used to complete the building simulation. Currently DOE is reviewing the OC-CEC and we anticipate approval in the later part of 2007. Check our website for updates on approval status.



*While we have made great effort to describe these tax incentives accurately, we cannot provide tax advice and suggest you contact a tax professional with any questions specific to your situation.

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CAN I USE THE OC-CEC PRIOR TO APPROVAL FROM THE DOE?

The tool can be used to estimate energy cost savings and paybacks with and without the tax deduction and in many cases, the payback is attractive without the tax incentive.

However, per EPCAct 2005, only DOE approved software can be used to complete the building simulation for tax purposes. The list of qualified DOE software can be found at the following address:

http://www.eere.energy.gov/buildings/info/qualified_software/

After approval, the OC-CEC will be added to the software list. The OC-CEC should not be used for tax purposes until and unless approved by the DOE.

DOES EPACT 2005 PROPOSE OTHER REQUIREMENTS TO QUALIFY FOR A TAX DEDUCTION?*

Yes. In addition to completing the simulation with the OC-CEC, an inspection must be completed by a "qualified individual" after the building has been placed in service.

Taken directly from the IRS Notice 2006-52, a qualified individual is defined as follows:

1. Is not related (within the meaning of §45(e) (4)) to the taxpayer claiming the deduction under § 179D.
2. Is an engineer or contractor that is properly licensed as a professional engineer or contractor in the jurisdiction in which the building is located.
3. Has represented in writing to the taxpayer that he or she has the requisite qualifications to provide the certification required under section 4 of notice 2006-52 (in the case of an individual providing the certification) or to perform the inspection and testing described in section 4.05 of this notice (in the case of an individual performing the inspection).

For more detail on the building inspection see the following website:

http://www.irs.gov/irb/2006-26_IRB/ar11.html

WHAT ARE THE OBJECTIVES OF THE BUILDING INSPECTION?

Only the systems being used for the tax deductions need to be inspected. There are two objectives for the inspection**:

1. Verify that the taxpayer's building meets the necessary mandatory provisions of Standard 90.1-2001.
2. Verify that the specifications of the energy systems installed in the taxpayer's building used for the tax deductions meet or exceed the performance of the energy systems used in the proposed OC-CEC building model.

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**Per the National Renewable Energy Laboratory (NREL) Energy Savings modeling and inspection guidelines for commercial tax deductions (<http://www.nrel.gov/docs/fy07osti/40228.pdf>).





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WHAT DOCUMENTATION IS REQUIRED AND WHAT MUST THE TAXPAYER DO WITH IT?*

The qualified individual shall use the compliance forms from the Standard 90.1-2001 User's Manual or equivalent forms to document that the taxpayer's building meets the mandatory provisions.

We are in the process of creating equivalent forms in the OC-CEC and anticipate uploading these forms in the later part of 2007. Check the OC-CEC website for the status of these uploads.

A taxpayer is not required to attach the certification to the return on which the deduction is taken. However, § 1.6001-1(a) of the Income Tax Regulations requires that taxpayers maintain such books and records to establish the entitlement to, and amount of, any deduction claimed by the taxpayer. Accordingly, a taxpayer claiming a deduction under § 179D should retain the certification as part of the taxpayer's records for purposes of § 1.6001-1(a) of the Income Tax Regulations. Consult with your tax advisor or other tax professional to discuss other record-keeping requirements.

HOW DO I CLAIM THE TAX DEDUCTION?*

In order to claim the EAct deduction, the tax preparer will need to follow the guidelines as provided by EAct 2005, Section 1331, paragraph 179D. At this time, the IRS has no plans to provide a special form for taxpayers to take this deduction. [Note: These guidelines may change as the legislation is updated - which is anticipated.] This document can be viewed at:

http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109

WHERE CAN I GET COPIES OF THE ENERGY POLICY ACT OF 2005 COMPLIANCE AND GUIDANCE DOCUMENTS FOR COMMERCIAL BUILDINGS?

Latest NREL guidance document - February 2007:
<http://www.nrel.gov/docs/fy07osti/40228.pdf>

IRS Notice 2006-52:
http://www.irs.gov/irb/2006-26_IRB/ar11.html

Energy Policy Act of 2005, Section 1331, paragraph 179D:
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109

Compliance forms from the ASHRAE Standard 90.1-2001 User's Manual:
<http://www.ashrae.org/technology/page/97>



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WHY DOES THE OC-CEC RECOMMEND THE SAME INSULATION SYSTEMS FOR SEMIHEATED AND CONDITIONED BUILDINGS REGARDLESS OF THE BUILDING SIZE, SPACE CONDITIONING CATEGORY OR ZIP CODE?

The initial run of the OC-CEC for any individual building applies different packages of energy efficiency measures to the designed metal building and looks for a package that will exceed the 50% energy cost savings thresholds per the EAct 2005. Hence, the same measures may show up for a “Semiheated” and “Heated and Cooled” metal building.

After the initial run of the OC-CEC for a building, an end user can manually determine whether the metal building can qualify for the tax deduction with alternate envelope, HVAC, and lighting packages by selecting different “Proposed” measures on the results screen of the OC-CEC and hitting the “Recalculate” button.

WHY ARE THERE DEFAULTS FOR SKYLIGHTS AT 3.5% OF THE ROOF AREA AND WINDOWS AT 3.0% OF THE WALL AREA?

The default settings are based on research that indicates the approximate amount of skylights required to provide sufficient natural light in the space to have their artificial lights off during the day and the amount of windows typically found in today’s metal warehouses. An end user can change these values based on the window and skylight percentages for their particular metal building. Acceptable ranges are 0-10% for windows and 0-5% for skylights.

WHY IS IT MORE DIFFICULT TO EXCEED THE EACT SAVINGS THRESHOLD FOR A METAL BUILDING WITHOUT SKYLIGHTS?

Skylights introduce natural light into a metal building. Natural light allows the OC-CEC to reduce the artificial light in the design space through lighting controls, which saves energy.

The annual energy savings estimates for a metal building with upgraded skylights and lighting controls are greater than a building with no skylights and no controls. This increase in energy savings offsets the increase in estimated annual energy costs and leads to a larger percentage of EAct savings for the building.

DO CHANGES IN THE % OF SKYLIGHTS AFFECT THE AMOUNT OF LIGHTING NEEDED - IS THERE A DIRECT CORRELATION?

The % of skylights does not affect the amount of artificial lighting needed as you still need to install sufficient lights to light the building at night. It does influence the how many lights need to be on during the day when sufficient natural light enters the building through the skylight to have the artificial lights off. There is an ideal skylight balance where too much solar heat gain creates a cooling problem.





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HOW DO I PRINT THE RESULTS PAGE?

Select “File” then “Print” on the results page. When the print window appears press the “Preferences” button and select “Landscape”. Press the “OK” button and “Print” button. This should give you a reasonable print out of the results page. You may need to the adjust margins based on your printer.

We are in the process of creating the ability to convert this page into a pdf document. Check the OC-CEC website for the status of these uploads.

WHY ARE THERE NO DOORS INCLUDED IN THE OC-CEC AND HOW WILL THE LACK OF DOOR OPENINGS AFFECT MY RESULTS?

For this early version of the OC-CEC, it was decided not to include doors due to the complexity associated with specifying them. Further, one of the major issues with doors is infiltration, which is fixed for all options in the EAct analysis. This prevents any benefits from being recognized for a good sealing door versus a poor sealing door.

We do not know the impact of including doors on the energy cost savings estimates since doors are not part of the model/simulations. We do anticipate adding doors in a future version. Check the OC-CEC website for the status of these uploads.

CAN YOU PROVIDE SOME ADDITIONAL DETAIL ON THE “SPACE CONDITIONING” CATEGORIES IN THE OC-CEC? WHAT IS THE RIGHT CATEGORY FOR MY METAL BUILDING?

ASHRAE 90.1-2001 specifies different requirements based on the following three enclosed space-conditioning categories:

- Nonresidential Conditioned Space
- Residential Conditioned Space
- Semiheated Space (Note: Must be approved by a building official in climates that exceed 1800 HDD 65)

Table 1 (see page 7) provides some high level guidance for determining the appropriate space-conditioning category for a metal building.*



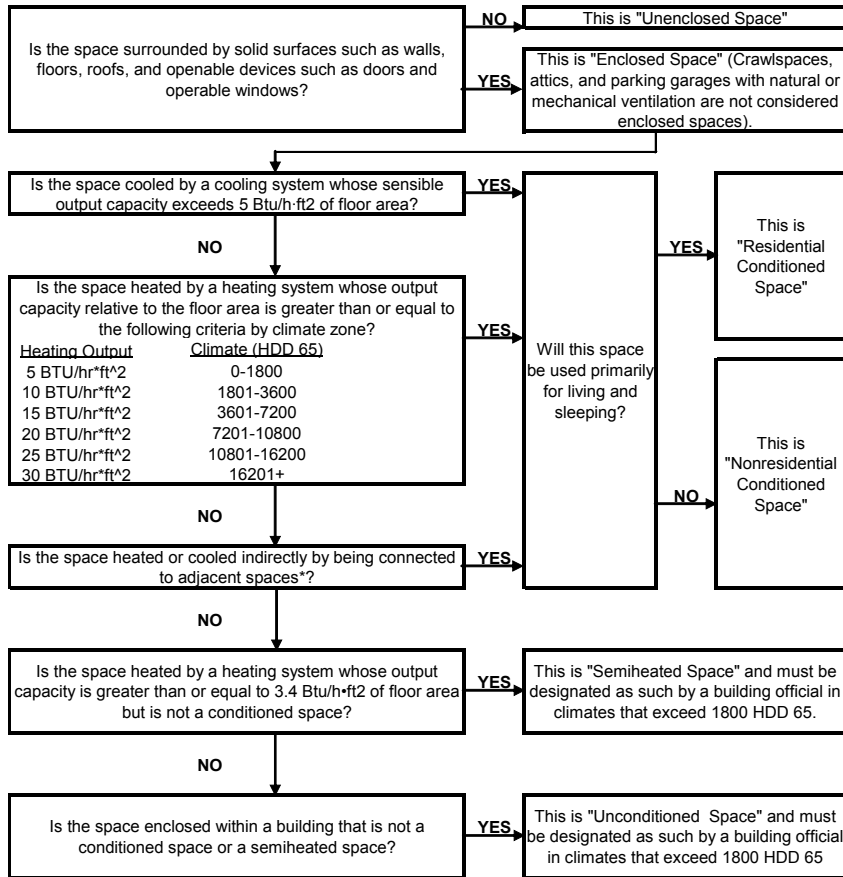
*This table should only be used as a guide and does not guarantee the proper selection of a space conditioning category consult with local code authoring before finalizing design.

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TABLE 1: ASHRAE 90.1-2001 SPACE CATEGORIES GUIDE



There are two “Space Conditioning” categories in the OC-CEC. If the above flow chart indicates the space in your metal building is “Nonresidential Conditioned”, select “Heated and Cooled” from the pull down menu. If the space is “Semiheated”, select “Semiheated” from the pull down menu.

*See ASHRAE Standard 90.1-2001 for a detailed discussion of indirectly conditioned spaced.





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HOW DOES THE OC-CEC TREAT SEMIHEATED SPACES?

The IRS references three standards for the EAct calculation methodology used by the OC-CEC.

- ASHRAE 90.1 2001 – determines the baseline requirements of the interior lighting systems, heating, cooling, ventilation, hot water systems and building envelope.
- ASHRAE 90.1 2004 Appendix G – determines the methods to be used for the baseline performance including specifying what type of HVAC system is used in the baseline and proposed runs
- 2005 California Title 24 Nonresidential ACM – determines the internal loads and schedules of operation including the thermostat set points.

ASHRAE 90.1 2004 Appendix G does not mention semiheated spaces and 2005 California Title 24 Nonresidential ACM dictates that our thermostat set points be 70°F for heating and 73°F for cooling. Hence, the standards require us to use an HVAC system that heats and cools the building to the aforementioned set points for the semiheated EAct runs. In most cases, semiheated metal buildings will exceed the energy cost savings thresholds specified by EAct.

For the annual energy cost saving estimates (which are separate from the EAct calculations), the OC-CEC uses a forced air heating system that consumes natural gas for heating one or several rooms and reduces the design temperature and thermostat set point to 50°F for all hours of operation. The tool specifies a heating capacity of the system to a value that is less than what is required for the space to be considered a fully heated space but larger than 3.4 Btu/hr-ft² required for a semiheated space. This thermostat set point and heating capacity approach is used for both the baseline and proposed runs in the OC-CEC. Regardless what HVAC system is selected, the cooling thermostat set point is set high enough to prevent the cooling system from ever coming on for the semiheated building.

HOW DOES THE OC-CEC TREAT BUILDINGS THAT ARE FULLY CONDITIONED FOR HEAT BUT NOT COOLED?

These buildings are considered nonresidential conditioned space if they meet the criteria specified in Table 1 (see page 7.) The EAct calculations are carried out as if the building was heated and cooled (see the question on treatment of semiheated spaces).

We are in the process of evaluating the addition of heat only HVAC systems in the OC-CEC.



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WHAT IF MY BUILDING HAS TILT UP CONCRETE WALLS?

Tilt up concrete walls are not an option in the OC-CEC. The thermal performance criteria for the metal building walls in the OC-CEC are defined in ASHRAE 90.1-2001 Tables B1-B26. We are evaluating tilt up concrete walls as a new scope modification in the tool.

CAN MY ENVELOPE, LIGHTING OR HVAC SYSTEM BE ADDED TO THE TOOL?

We will evaluate the addition of new systems to the tool on a case-by-case basis. Requests can be made through a registered tool user or an Owens Corning National Accounts manager for metal building insulation.

The next update to the OC-CEC pull down lists will include different levels of slab insulation (R10 and R15), ASHRAE baseline systems for through fastened roofs, and units on the 50% delamping measure (0.6 W / sf).

CAN A RETROFIT METAL BUILDING QUALIFY FOR THE TAX INCENTIVES? WHAT IS THE DEFINITION OF A BUILDING QUALIFYING FROM A DATE STANDPOINT?

Retrofits are within the scope of ASHRAE 90.1-2001 for commercial buildings and can qualify for the tax incentives. The renovations (or building for new construction) must be placed in service after December 31st, 2005 and, before January 1st, 2009.

When considering retrofit applications, keep in mind that EAct rules and qualification for the tax deduction do not change for these structures. A retrofit metal building must demonstrate a 50% reduction in energy cost when compared to a reference building that meets the minimum envelope, HVAC, and lighting requirements of ASHRAE 90.1-2001. The retrofit building as it exists today is not the baseline building for an EAct analysis in the OC-CEC. On the other hand the OC-CEC can be used to estimate the energy cost savings associated with improved energy efficiency measures that are less than 90.1-2001 levels and these modifications may make sense from a payback perspective.

WHAT IS THE PURPOSE OF THE “RE-ENTER DATA” AND “EDIT” BUTTON DO ON THE PROJECT SCREEN?

The “re-enter data” button allows a user to re-enter building information for the project (Length, Width, Average Wall Height, Window %, etc.). Submitting this new building information removes previous run data. Hit the “Calculate” button at the bottom of the screen to rerun the building with the new information.

The edit button allows a user to change the project information. Hit the “Submit Changes” button to save the modification to the project.





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HOW DOES THE TOOL CALCULATE SIMPLE PAYBACK PERIODS?

The tool calculates a simple payback periods with and without the tax deduction. This payback estimate is designed as a guide in the decision making process. Actual payback periods may vary from this estimate based upon assumptions for energy costs and installed costs for various energy efficiency measures. There are two payback estimates in the tool:

1. 'Simple Payback period (yrs)' = Incremental Cost divided by Annual Energy Savings.
2. 'Simple Payback Period (yrs) with EAct' = (Incremental cost – EAct Tax Deduction) divided by Annual Energy Savings.

CAN THE OC-CEC BE USED TO PREDICT ACTUAL ANNUAL ENERGY COSTS?

Actual energy use and cost effectiveness of the envelope, lighting and HVAC efficiency measures may vary from this modeled estimate. The modeled results are based on hourly simulations using the DOE-2.2 computer program. The results are based on certain assumptions including density of occupancy (number of persons), use of the building by occupants, heating and cooling preferences of the occupants or the owner (if applicable), weather patterns and electricity and fuel costs. Since these factors will vary from building to building, from year to year and from occupant to occupant the actual annual energy costs cannot be precisely predicted for any specific building. While the overall "plug load" for the building modeled has been factored into the energy use of the building as mandated by the rules governing the EAct 2005 legislation, the estimated cost effectiveness of envelope, lighting and HVAC measures do not include specific loads for appliances, computers, and other equipment or machinery and therefore the energy use reflected in any actual utility bills, will be different from the modeled building.



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CAN I COMPARE INSULATION SYSTEMS THAT ARE LESS EFFICIENT THAN THE LEVELS SPECIFIED IN ASHRAE 90.1-2001?

Yes. The OC-CEC can be used to estimate the energy cost savings and payback associated with more thermally efficient insulation systems in metal building roofs and walls, even if the specified baseline insulation levels are less than those in ASHRAE 90.1-2001.

As an example, a user can compare the energy cost savings associated with going from an R-10 to an R-19 in a metal building wall for a heated and cooled metal building in zip code 43528, even though R-10 is less than the ASHRAE 90.1-2001 wall baseline level of R-13. This is accomplished on the results screen.

WHAT IF MY INSTALLED COSTS OR ENERGY COSTS DIFFER FROM THOSE DISPLAYED?

Energy costs and installed costs can be adjusted by the end user on a case-by-case basis. Modifying these costs will provide the most accurate payback assessments for a metal building.

WHAT ARE THE DEFAULT CRITERIA FOR THE BUILDING SCHEDULE FOR HOURS OF OPERATION?

The default schedule is:

Monday – Friday: 7am-5pm

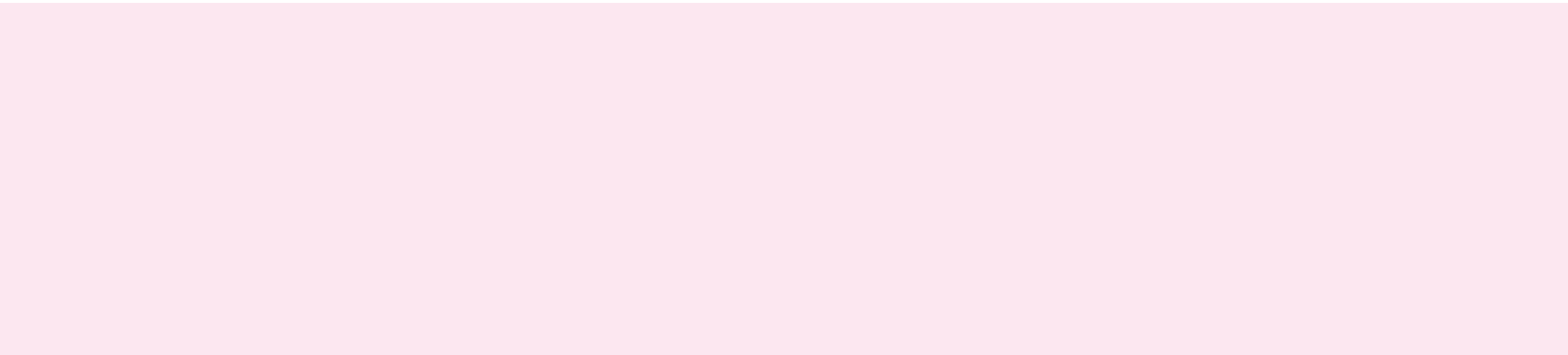
Saturday - Low occupancy 7am-5pm

Sunday & Holidays: Closed

WHO IS “GREEN BUILDING STUDIO”?

Green Building Studio is an architectural, engineering and construction software company and the industry’s leading provider and innovator of web based building energy analysis tools. GBS’s energy engineering service provides world-class green/sustainable building design assistance as well as strategic building product market research. Owens Corning collaborated with Green Building studio for the development of the OC-CEC.





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