



U.S. Department of Energy
Energy Efficiency and Renewable Energy



Building Energy Codes

Showcasing DOE Efforts

Heather Dillon

Pacific Northwest National Laboratory

www.energycode.gov



Resource Center

- **Add user feedback?**
- **Footprints**
- **State code Database**
- **Where we have been**



BECP Code Compliance Tools

Prescriptive Approach

- Simple, fast and easy
- Generally most stringent
- Requires minimum input
- Based on climate and WWR
- Uses a prototype building

Residential

1. Prescriptive Tables & Printed Guides

Trade-off Approach

- Trade-off between components
- Provides design flexibility
- Requires area & U/R-factors
- Uses UA calculation (*REScheck*) & regression equations (*COMcheck*)

REScheck

1. *REScheck* desktop software for Windows and Mac with AreaCalc tool

Web-tools

Commercial

1. Prescriptive Tables / Printed Guides

COMcheck-EZ

1. *COMcheck-EZ* desktop software for Windows

Web-tools



Where have we been?

- MECcheck (1995)
- MECcheck 2.0 (1997)
- MECcheck 3.0 (1999)
- REScheck 3.6 1e (2004)

REScheck^T

- COMcheck 1.1 (1997)
- COMcheck 2.0 (1999)
- COMcheck 2.5 1a (2004)

COMcheck-EZTM



RES

COMcheck-WebTM



Where have we been?

➤ REScheck 2.0 (1995)

➤ COMcheck 1.1 (1998)

MECcheck 2.01 / 1995 MEC Building Description: EXAMPLE.CCK

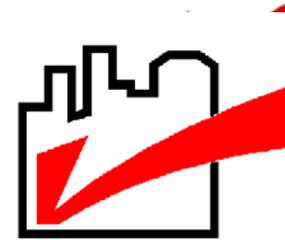
File Project Options Help

Ceilings Walls Glazing Doors Floors Basement Slab Crawl Equipment

MEC Compliance **Passes** Max. UA 468 Your UA 415

	Net Area/ Perimeter	Cavity R-Value	Continuous R-Value	Glazing/Door U-Value	UA
CEILINGS	729	38	0		22
CEILINGS	592	30	0		21
WALLS: Wood Frame, 16" O.C.	1339	13	6		82
WALLS: Wood Frame, 16" O.C.	258	13	0		21
GLAZING: Windows or Doors	204			0.45	92
GLAZING: Windows or Doors	84			0.61	51
DOORS	20			0.54	11
DOORS	18			0.35	6
FLOORS: Over Unconditioned Space	938	19			44
FLOORS: Over Outside Air	32	30			1
SLAB FLOORS: Unheated, 24.0" insul.	82		8		64

Use the buttons at the top of the screen to create a building description.





Where have we been?

- COMcheck
- REScheck



example99.cck - COMcheck-EZ 2.5 Release 1a CODE: Standard 90.1-1999

File Edit View Options Code Help

90.1 ('89) Code
 90.1 ('99) Standard
 90.1 (2001) Standard

1998 IECC
 2000 IECC
2001 IECC

Colorado
 Georgia
 Louisiana
 Massachusetts
 Minnesota
 New York
 Vermont

Project: Env
 Roof Skylight Ex

Project: Roof

Building
 Building
 Roof 1
 Skylight 1
 Exterior Wall 1
 Door 1
 Window 1
 Window 2
 Door 2
 Door 3
 Interior Wall 2
 Basement Wall 1
 Floor 1

Mechanical
 Door Basement Floor

	Concrete Density	Construction Details	Gross Area or Slab Perimeter	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Pr
			6112	ft2	0.0	26.1	0.037	
		Glazing: Tinted,	112	ft2			0.500	0.80
	Medium We	Furring: Metal	6000	ft2	22.0	0.0	0.125	
		Swinging	42	ft2			0.700	
		Glazing: Tinted,	1500	ft2			0.600	0.63
		Glazing: Clear,	56	ft2			0.700	0.72
7		Insulated Metal	288	ft2			0.140	
8		Uninsulated Single-Layer Meta	40	ft2			0.200	
9		Steel-Framed, 16" o.c.	812	ft2	22.0	0.0	0.100	
10		Solid Concrete, 10" Thickness	2000	ft2			0.078	
11		Unheated Slab-On-Grade	160	ft			10.8	

Compliance based on 2001 IECC

Envelope +10% Lighting +21%

Use the View menu to Add Orientation and Daylighting Control Factor Options.

Envelope +1% Lighting +25%



Resource Center

- **Resource Center** (deployment before 10/2004)
 - Content management and portal technology
 - Re-useable content at paragraph and graphic level

- **Technology:**
 - Cocoon (opensource) performs pipeline transformation
 - Lucene (opensource) search engine
 - mySQL (opensource) database for external links, content management, and graphics
 - XML tags for database calls, content (textblocks), and pdf generation
 - ImageMagik (opensource) for graphic transformations



Resource Center

➤ Key Features

- Residential content
- Search navigation
- Browse navigation
- DOE and external materials centrally located
- Generate pdfs for distribution

- Over 700 illustrations and photos
- Over 900 external materials, videos, articles

- Submit your state materials
- Advanced searching



Web-Compliance

- [REScheck Web](#) (live since 2003)
- [COMcheck Web](#) (coming soon)

- [REScheck Package Generator](#) (live since 2003)
- [COMcheck Package Generator](#) (live since 2003)

- **Technology:**
 - Java applications running the common code engine
 - Tomcat servlet based
 - Client side java makes the applications run quickly for slow modems



Web-Compliance

➤ **New Features in REScheck Web**

- State codes for compliance
- New look for compliance report

➤ **Planned Features**

- Delete saved projects



Web-Compliance

- **New Features in COMcheck Web** (coming soon)
 - State codes for compliance

- **Planned Features**
 - Delete saved projects



Web-Compliance

- **New Features in COMcheck Web** (coming soon)
 - State codes for compliance

- **Planned Features**
 - Delete saved projects



Online Permitting

- **In the process of implementation in all the web-applications**
 - Allows compliance to be completely digital
 - Allows jurisdictions to easily collect reports and data
 - Allows users to avoid trips to the office

- **Technology:**
 - XML tags can be distributed via email for a jurisdiction database (user requested)
 - XML is used to generate the pdf compliance reports
 - Digital signatures and PDAs are on the horizon



U.S. Department of Energy
Energy Efficiency and Renewable Energy



Building Energy Codes



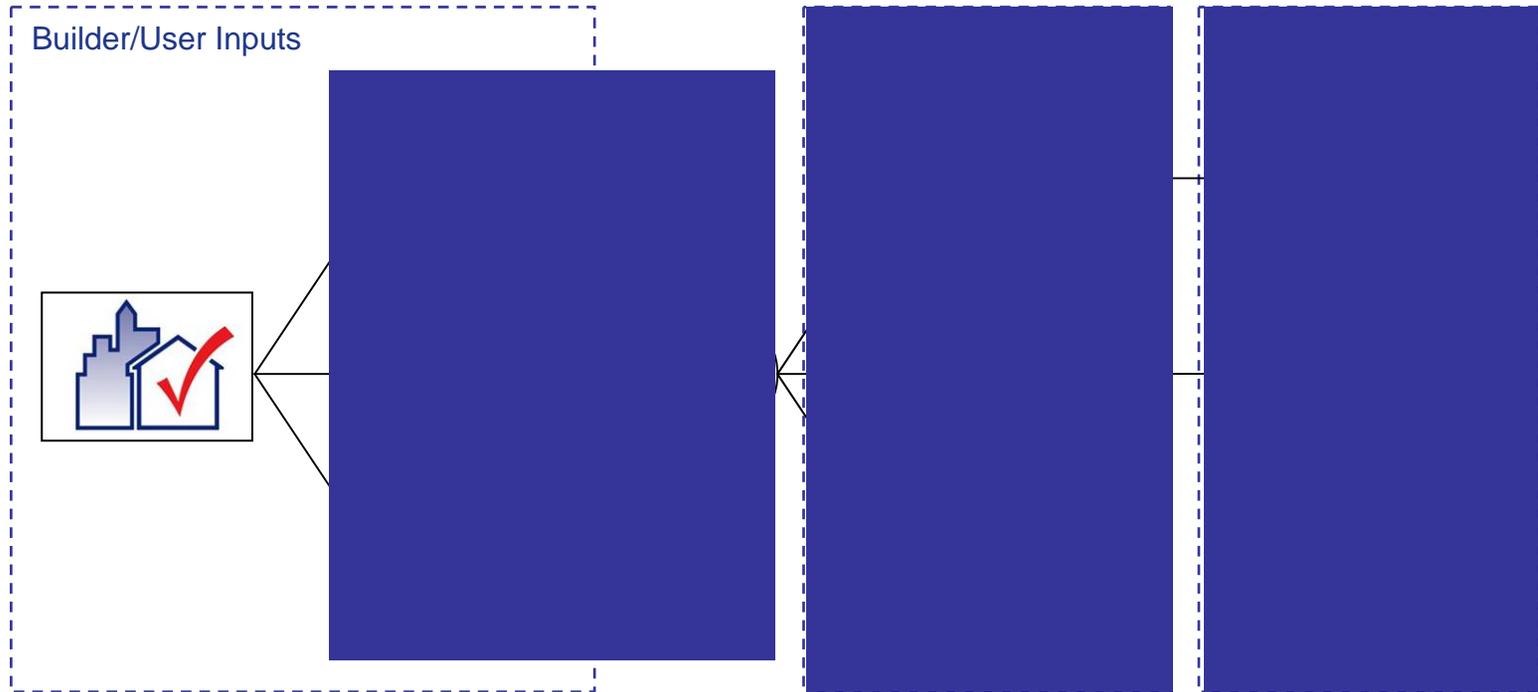
Online Permitting

➤ Key Features

- Requires software registration
- Generates a compliance form
- Emails the (pdf) form of the report to the jurisdiction/code official
- Emails data packet (xml) to the jurisdiction/code official
- May be coupled with state or city website to provide seamless electronic compliance



Builder/Jurisdiction Interaction Paths





Online Permitting

➤ In the future

- Implementation in web-based tools (in progress)
 - REScheck –Web
 - COMcheck -Web
 - REScheck-Package Generator
 - COMcheck-Package Generator
- Implementation in desktop tools
 - COMcheck
 - REScheck



Above Code Advisor

- **In the process of implementation in desktop applications**
 - Allows users to “troubleshoot” independently with the web
 - Enhances user ability to find above code information
 - Toggle option to turn the advisor on/off
- **Technology:**
 - Basic html pages distributed with the application
 - If the user has a live internet connection, application will link directly to articles in the resource center



Above Code Advisor

example.rck - REScheck 3.5 Release 1d
Code: 1995 MEC

File Edit View Options Code Tools Help

Project Envelope Mechanical

Ceiling
Skylight
Wall
Window
Door
Basement
Floor
Crawl Wall

	Component	Assembly	Gross Area or Slab Perimeter		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA	Dept Insul (f
Building									
1	Ceiling 1	Flat Ceiling or Scissor Tru...	729	ft2	38.0	0.0	0.03	22	
2	Ceiling 2	Flat Ceiling or Scissor Tru...	592	ft2	30.0	0.0	0.035	21	
3	Wall 1	Wood Frame, 16" o.c.	1647	ft2	13.0	6.0	0.061	82	
4	Door 1	Glass	84	ft2			0.61	51	
5	Window 1	Vinyl Frame, Double Pane...	204	ft2			0.45	92	
6	Door 2	Solid	20	ft2			0.54	11	
7	Wall 2	Wood Frame, 16" o.c.	276	ft2	13.0	0.0	0.082	21	
8	Door 3	Solid	18	ft2			0.35	6	
9	Floor 1	All-Wood Joist/Truss, Ov...	938	ft2	19.0	0.0	0.047	44	
10	Floor 2	All-Wood Joist/Truss, Ov...	32	ft2	30.0	0.0	0.033	1	
11	Floor 3	Slab-On-Grade: Unheated	82	ft		8.0	0.779	64	2
12	Crawl 1	Click here to select Assem...	0	ft2	0.0	0.0	0.316	0	0

- Solid Concrete or Masonry
- Masonry Block with Empty Cells
- Masonry Block with Integral Insulation
- Wood Frame
- Insulated Concrete Forms
- Other

Compliance Valid Area(s)
Max. UA 467
Your UA 415
11.1 % Better Than Code

Click the Assembly fields to display a list of assembly choices. "Other" assembly types are editable.

Above Code Advisor

Building a water managed crawlspace foundation offers improved moisture and energy benefits.

[See Resource Center Article #118](#)

WATER-MANAGED CRAWLSPACE FOUNDATION



REScheck Energy Star Link

example.cck - MECcheck 3.3 Release 1b CODE: 1995 MEC

File Edit View Options Code Tools Help

Project Envelope Mec

Ceiling Skylight Wall Window

Asse
1 Flat Ceiling or S
2 Flat Ceiling or S
3 Wood Frame, 1
4 Glass
5 Vinyl Frame, Dc
6 Solid
7 Wood Frame, 1
8 Solid
9 All-Wood Joist/
10 All-Wood Joist/
11 Unheated Slab-

Building

- Ceiling 1
- Ceiling 2
- Wall 1
 - Door 1
 - Window 1
 - Door 2
- Wall 2
 - Door 3
- Floor 1
- Floor 2
- Floor 3



Based on your current inputs, you could apply for an Energy Star rating on this home.

See the following articles for more information:

-  [Improve your home sales.](#)
-  [Increase consumer demand.](#)
-  [Expand your business network.](#)
-  [Access preferred financing options.](#)

Would you like to find out more about the energy star program?

Compliance **Passes** Max. UA **467** Your UA **415** **30.1** % Better Than Code



Suite of Compliance Tools Summary

- Resource Center (coming soon)
- Online Permitting (coming soon)
- Above code tools in REScheck (coming soon)

- Web-based applications
 - REScheck-Web
 - COMcheck-Web (coming soon)
 - RES/COM-Package Generator

4,800 registered users	Average 3,000 visits per month
	Coming soon
	Average 1,500 visits per month

- Desktop Applications
 - REScheck
 - COMcheck

47,686 registered users	Average 5,000 downloads per month
31,163 registered users	Average 3,000 downloads per month