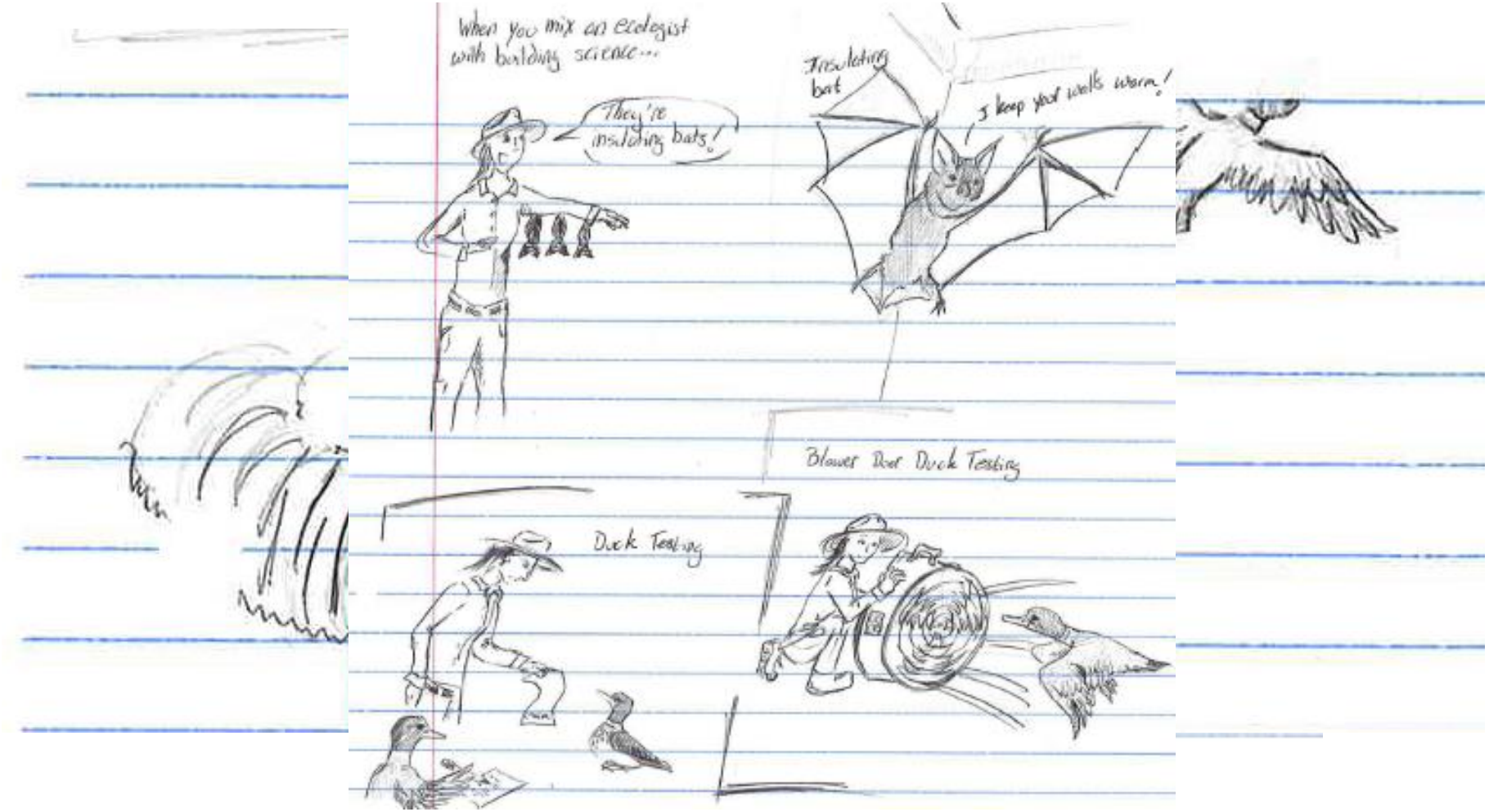
BEYOND THE HERS INDEX

Exploring Data and Marketing Opportunities

Presented by:
Jenna Grygier, RESNET QAD & Trainer, BPI Analyst, and LEED for Homes Green Rater
And
Trevor Donnelly, RESNET QADD and BPI Analyst



BUILDING SCIENCE COMICS

Brought to you by our EarthCraft intern, Rachel Bergman

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DATA EXTRACTION OVERVIEW

BRAINSTORM

What are some questions we can answer using data?

- Average HERS Index / builder, development, program, etc.
- How are we doing compared to the current code?
- How are we doing compared to up and coming code?
- How much money are we saving customers on utility bills?
- What is the environmental impact of the homes?

WHO CAN BENEFIT?

- Researchers
- HERS Raters
- HERS Providers
- Home buyers
- Marketing
- Builders
- Developers
- Real estate agents
- Homeowners
- Administrators

BENEFITS OF DATA EXTRACTION

- Administrative efficiency and ease
- Performance analysis and tracking on many levels
  - project, program, builder, region, and more
- Endless opportunities for research
- Quickly analyze projects, trends, and quantify impact
- Project team feedback loops
- Marketing tools
- Education and awareness
- Online dashboards and portfolios
- Identify opportunities for improvement to meet future goals
- And more, the list goes on!

DISCLAIMER

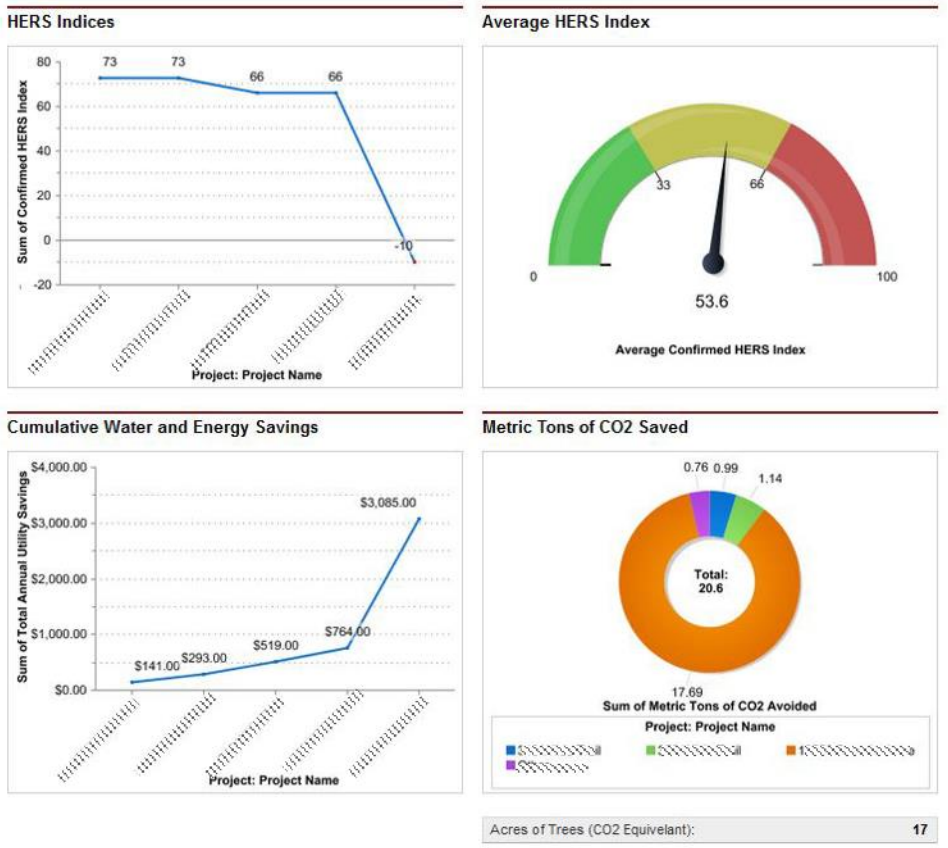
Unless you have direct permission from the builder or other applicable party, data should be **anonymous** and not traceable back to builders, property owners, addresses, HERS Rater, Provider, etc. If you are uncertain of your limitations, please consult RESNET for guidance

DATA EXTRACTION RESULTS

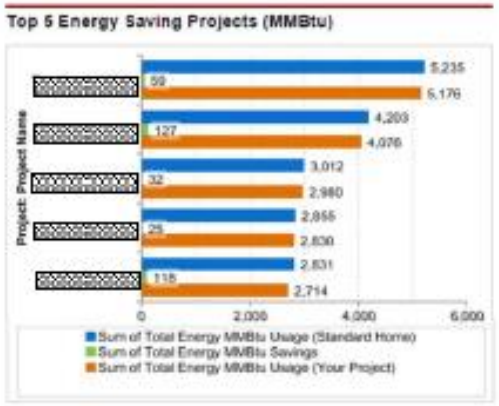
RESULTS

Southface built reports for communicating outcome measures to stakeholders participating in Southface administered programs. Users can view energy, water, and carbon savings for individual projects as well as their entire portfolio of projects.

We also created an online dashboard which tracks program success, available to the public



http://www.southface.org/EPA_Dashboard/pages/Dashboard.html



Displaying the top 7 projects with the highest estimated annual water savings.

Displaying the top 7 projects with the highest estimated annual energy savings.

Total Units Certified

Single and Multifamily Units:	1,374

CO2e Savings

Total CO2e:	257

Water Totals

Total Estimated Water Usage - Standard Home (gal):	95,436,630
Total Estimated Water Usage - EarthCraft Home (gal):	86,719,755
Total Estimated Yearly Water Savings (gal):	8,716,877
Total Estimated Yearly Water Savings ($):	$73,599

Energy Totals

Total Estimated Energy Usage - Standard Home (MMBtu):	37,879
Total Estimated Energy Usage - EarthCraft Home (MMBtu):	36,685
Total Estimated Yearly Energy Savings (MMBtu):	1,195
Total Estimated Yearly Energy Savings ($):	$32,275

RESULTS

A snapshot of our dashboard

MARKETING AND EDUCATION

- Market enhanced performance
- Spread awareness through education
- Benefits sales transaction process
- Pride of ownership
- Transparency and trust
- Motivation to save and consume less
- Access environmental impact

ENERGY, WATER AND CARBON GUIDE

My Home Energy Rating[1]

HERS Index: 59

Property address:
515 Example Lane, Any City, GA 30308

	Comparison and Savings		Your Savings [4,5]
	Standard New Home	Your Home	
Estimated Energy Usage[2]			$966
Electricity (kWh)	34,752	25,838	26%
Gas (Therms)	232	158	32%
Estimated Water Usage[3]			$120
Gallons	148,372	128,145	10%
Estimated Carbon dioxide (savings in tonnes)[6]			7

Your savings will depend on your utility rates and use

2012 EarthCraft certified

Verifier:
Chris Verifier – Verifying Services, Inc.

Builder:
Bob Builder, LLC

QA Provider:
Southface Energy Institute – www.southface.org[7]

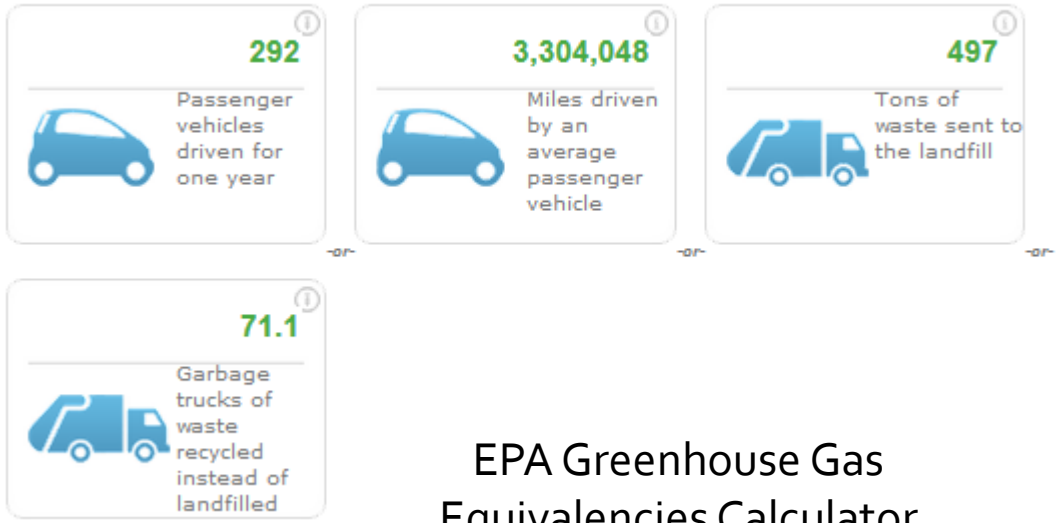
Completion and Certification Date: 11/20/2014

Energy, Water, and Carbon Label Version 1.0

MARKETING AND EDUCATION

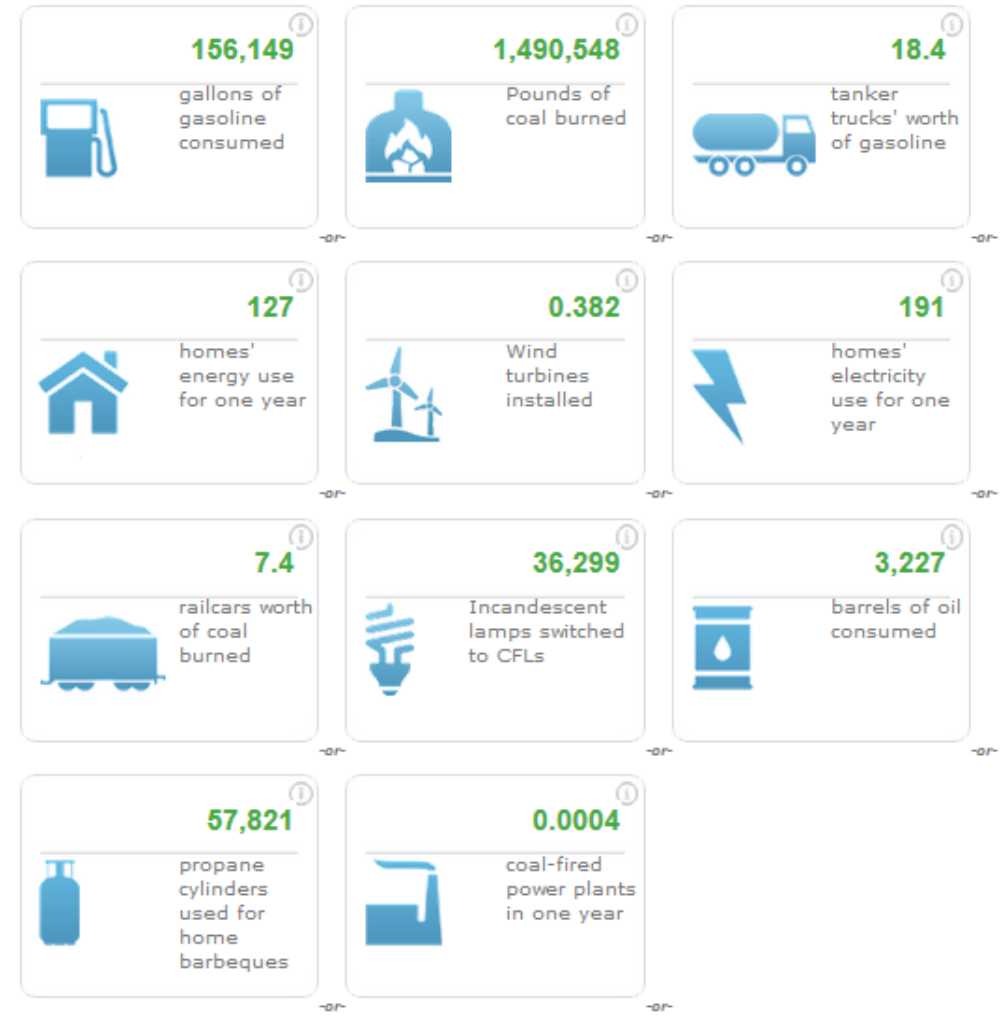
Carbon sequestered by

Greenhouse gas emissions from



EPA Greenhouse Gas Equivalencies Calculator
http://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

CO_2 emissions from



BEHIND THE SCENES: REM/RATE EXPORT TYPES

BEHIND THE SCENES: REM/RATE EXPORT TYPES

REM/Rate creates an "AS-IS," "Reference," and "Design" home for every comparison you want to do

- Example 1: to compare savings against 2009 IECC Code, REM/Rate generates a 2009 IECC Design home and 2009 IECC Code Reference home. The 2009 IECC Design home is set to 2009 IECC assumptions
- Example 2: To compare savings against the HERS Reference home, you would compare the HERS Design home against the HERS Reference home. The HERS Design home is set according to RESNET Standards

BEHIND THE SCENES: REM/RATE EXPORT TYPES

Design homes…

- Have the same geometry, orientation, shape, size, fuel type as the "AS IS"
- Are based off of standardized and code agreed assumptions
- Ensure that the assumptions from the code you are using are set
- Avoid "gaming" savings-setpoints, interior shading, infiltration, etc.

Reference Home Subtleties

Comparing various reports for a single building file will sometimes show what look like inconsistencies at first glance. For example, why would the heating consumption change when you run the Fuel Summary report in 1-building mode versus the same report comparing the Design Home to the IECC Reference Home?

Here's the reason: Reference Homes complicate the picture.

For every building file you create, REM considers 3 basic variations on what you entered:

1. **"As-Is" Home**, which is never really labeled as such, but which is EXACTLY the home as you entered it into REM. This is what you see in the Analysis Pane tab for Energy results, and in any report which does not involve a Reference Home.
2. **"Design" Home**, which is always what you entered but with selected changes that are required to make a fair comparison to the Reference Home (see next). It is always the home that gets compared to the Reference Home. A common change is thermostat setpoints, which must be matched in the Design and Reference Homes.
3. **"Reference" Home**, which is the geometric twin of the house you entered, but with specifications that barely meet the Compliance or Certification program for which you have chosen to run a report, e.g. the 2009 IECC Cost Compliance report.

The distinction between the "As-Is" and the "Design" homes is more subtle than most people care about. This help page is for those who do look closely at the REM reports and notice the discrepancies. Rest assured, you can trust the REM calculations -- but explaining them can sometimes require patience!

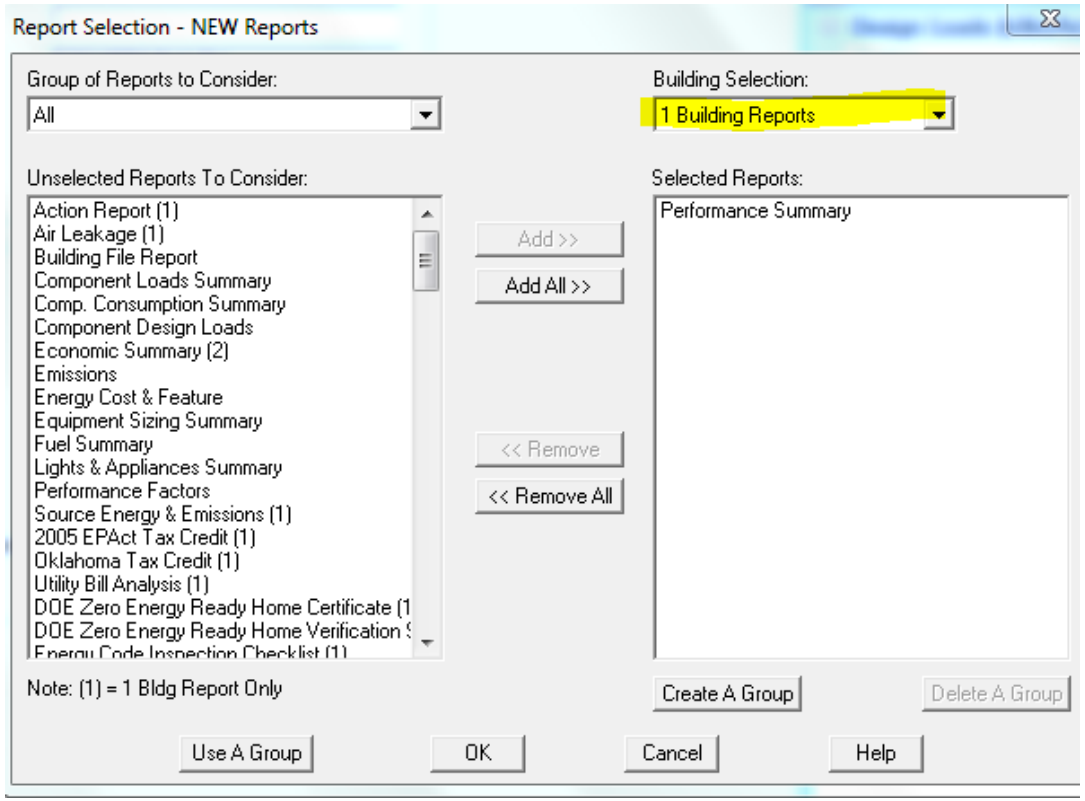
SUMMARY OF EXPORT TYPES

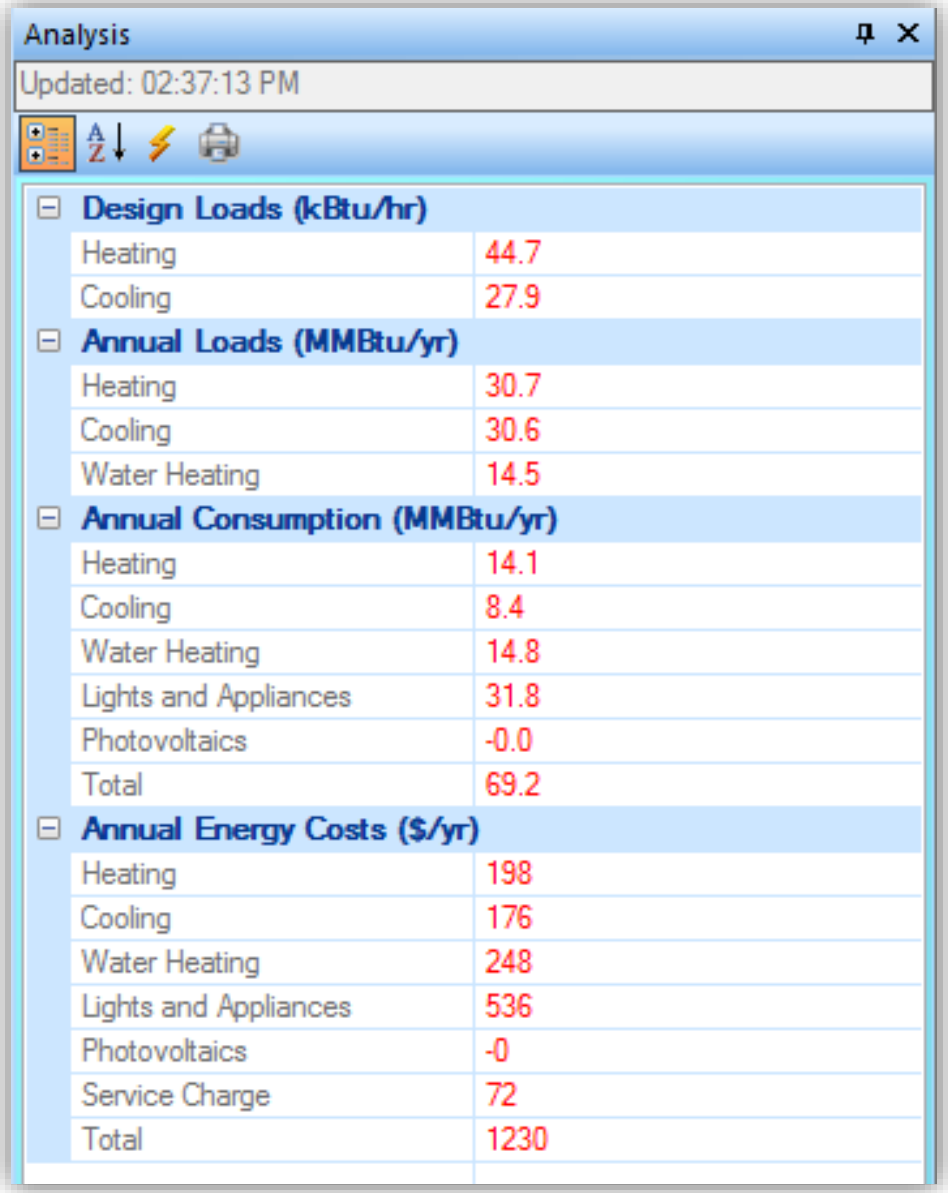
As explained by the REM/Rate Help menu

REM/RATE REPORT OPTIONS

"AS-IS" aka "Export Building"

- To run reports for the AS-IS building, the highlighted Building Selection, "1 Building Reports" (default) will need to be selected
- HERS Index is produced from the "AS-IS" export building





Performance Report

Property
123 HERS Path Rd
Ratertown, GA 30308

Weather:Augusta, GA
Test File 1_HERS 74.blg

Organization
Southface
123-456-7891
Wiley Coyote

Builder
Contruction Time LLC

HERS
Confirmed
01/12/2016
Rater ID:

Annual Load	MWBtu/yr
Heating	30.7
Cooling	30.6
Water Heating	14.5

Annual Consumption	MWBtu/yr
Heating	14.1
Cooling	8.4
Water Heating	14.8
Lights & Appliances	31.8
Photovoltaics	-0.0
Total	**69.2**

Annual Energy Cost	$/yr
Heating	198
Cooling	176
Water Heating	248
Lights & Appliances	536
Photovoltaics	-0
Service Charges	72
Total	**1230**

Design Loads	kBtu/hr
Space Heating	44.7
Space Cooling	27.9

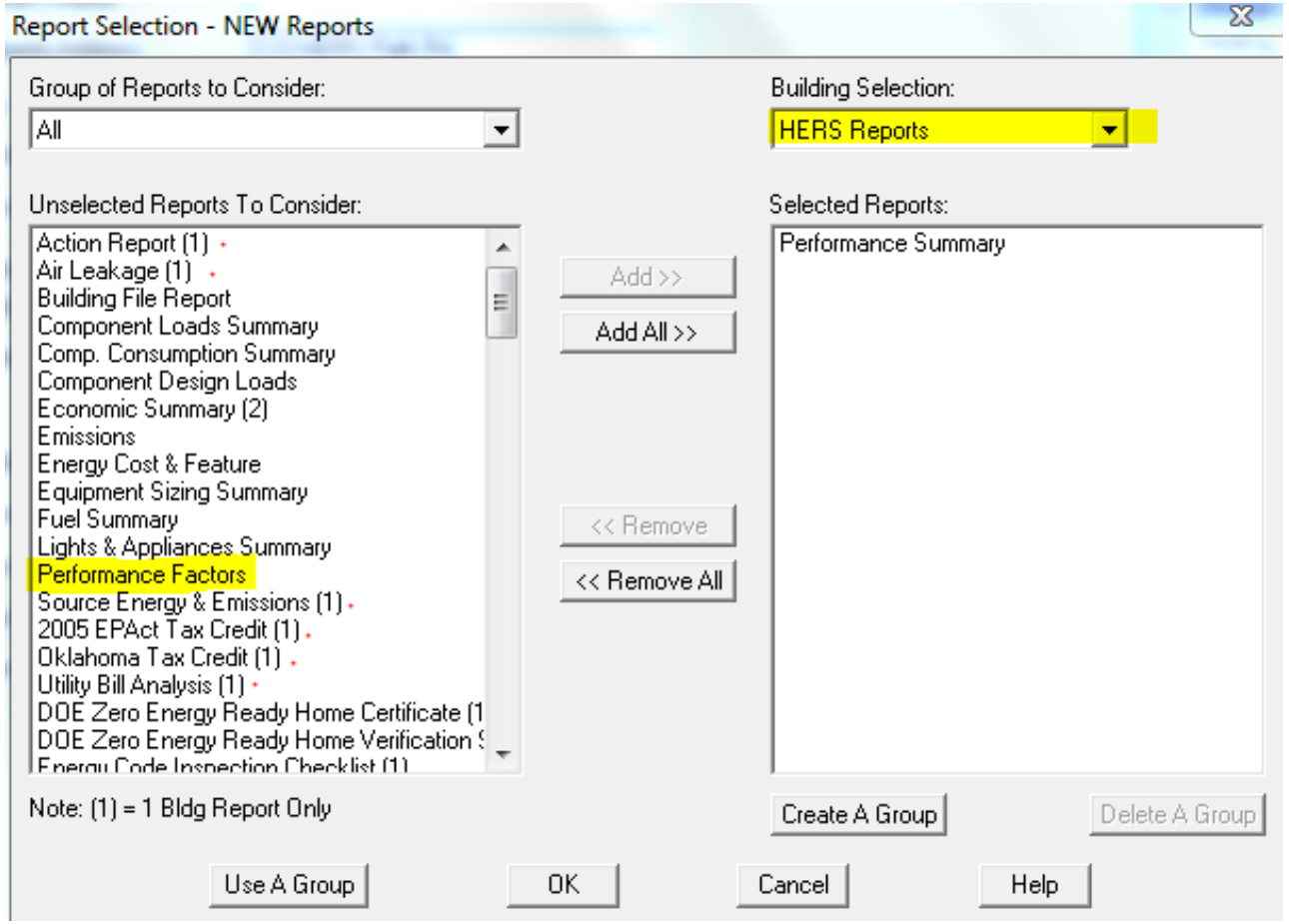
Utility Rates

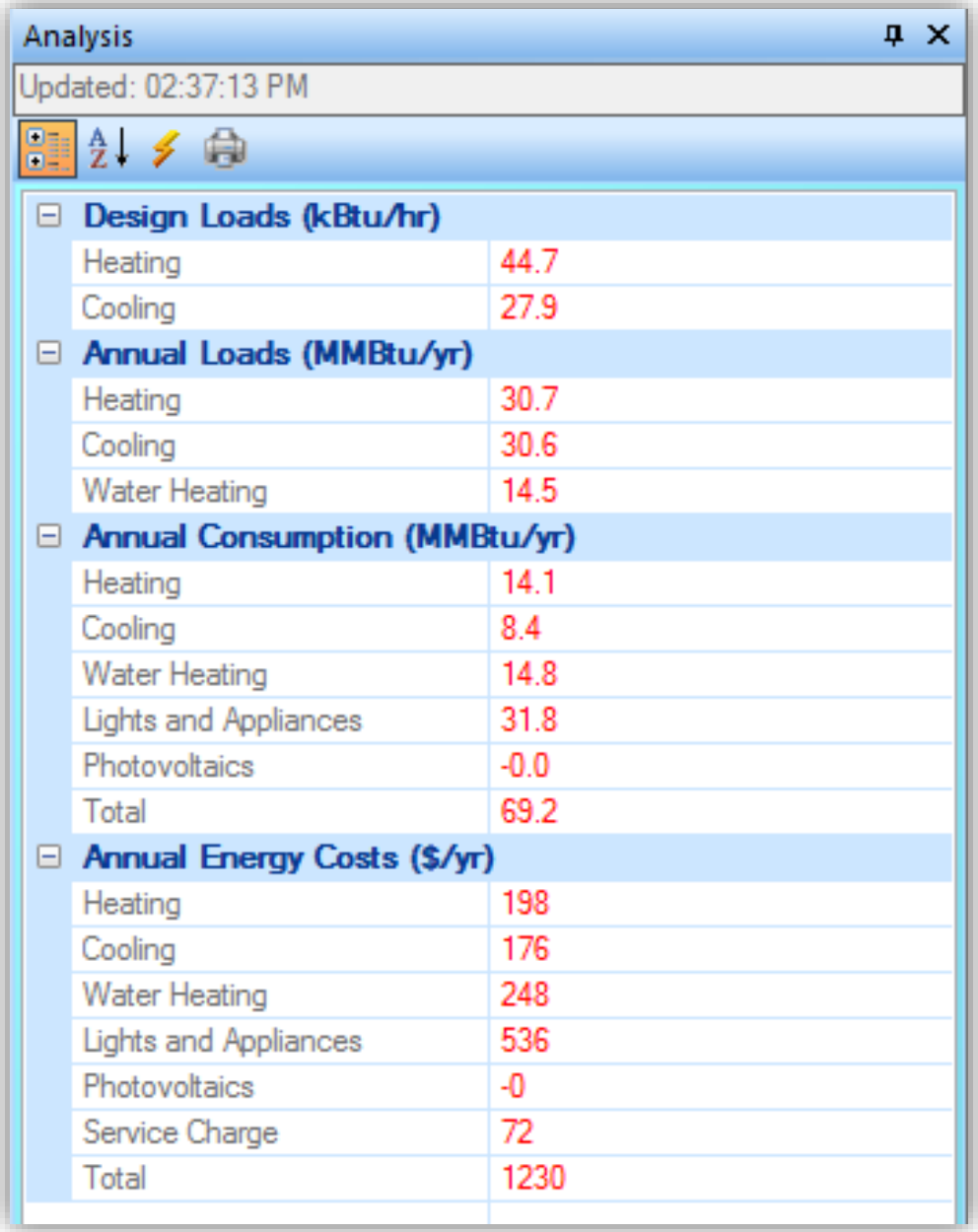
Electricity	Feel the power****

REM/RATE REPORT OPTIONS

"Design Home" Reports

- To run a comparison report, the Building Selection will need to be changed
- Only reports on the left hand side *without* a (1) next to the name, will work for this feature





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Performance Report

Property
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Weather:Augusta, GA
Test File 1_HERS 74.blg

Organization
Southface
123-456-7891
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Builder
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HERS
Confirmed
01/12/2016
Rater ID:

Annual Load(MMBtu/yr)	HERS	Test File 1_HERS 74.blg	Savings	%Saved
Heating	41.0	32.6	8.4	20.5%
Cooling	39.1	30.6	8.5	21.9%
Water Heating	16.3	14.5	1.8	11.3%

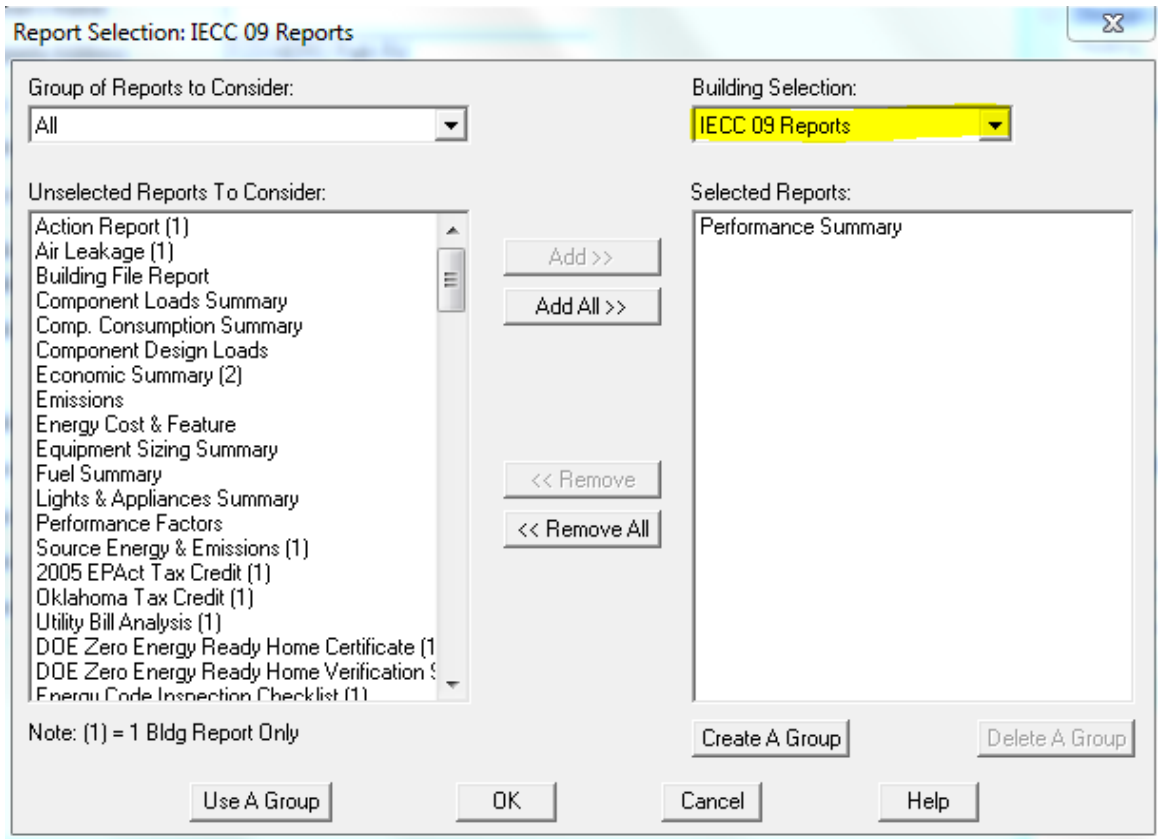
Annual Consumption(MMBtu/yr)				
Heating	23.0	14.9	8.2	35.5%
Cooling	14.3	8.4	5.8	41.0%
Water Heating	16.7	14.8	1.9	11.3%
Lights & Appliances	32.9	31.8	1.1	3.2%
Photovoltaics	-0.0	-0.0		
Total	**86.9**	**69.9**	**17.0**	**19.5%**

Annual Energy Cost ($/yr)				
Heating	319	208	110	34.6%
Cooling	307	175	132	43.0%
Water Heating	282	248	34	12.0%
Lights & Appliances	560	536	24	4.3%
Photovoltaics	-0	-0		
Service Charges	72	72		
Total	**1539**	**1239**	**300**	**19.5%**

Design Loads (kBtu/hr)				
Space Heating	42.2	45.9	-3.7	-8.7%
Space Cooling	33.9	31.4	2.5	7.3%

Utility Rates

Electricity	Feel the power****



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Weather:Augusta, GA
Test File 1_HERS 74.blg

Organization
Southface
123-456-7891
Wiley Coyote

Builder
Contruction Time LLC

HERS
Confirmed
01/12/2016
Rater ID:

Annual Load(MMBtu/yr)	2009 IECC	Test File 1_HERS 74.blg	Savings	%Saved
Heating	49.2	44.5	4.7	9.6%
Cooling	48.6	40.6	8.0	16.5%
Water Heating	14.5	14.5		

Annual Consumption(MMBtu/yr)				
Heating	20.7	19.3	1.4	6.6%
Cooling	13.3	11.2	2.2	16.3%
Water Heating	14.8	14.8		
Lights & Appliances	31.8	31.8		
Photovoltaics	-0.0	-0.0		
Total	**80.6**	**77.1**	**3.5**	**4.4%**

Annual Energy Cost ($/yr)				
Heating	287	269	18	6.4%
Cooling	285	236	49	17.1%
Water Heating	250	249	1	0.4%
Lights & Appliances	540	538	2	0.4%
Photovoltaics	-0	-0		
Service Charges	72	72		
Total	**1435**	**1364**	**71**	**4.9%**

Design Loads (kBtu/hr)				
Space Heating	53.8	45.9	7.9	14.8%
Space Cooling	40.0	31.1	8.9	22.2%

Utility Rates

Electricity	Feel the power***

Data Extraction Process

PROCESS OVERVIEW

1) Gather Resources
2) Create Database
3) Setup Export
4) Export to Database
5) Manipulate Database
6) Analyze data

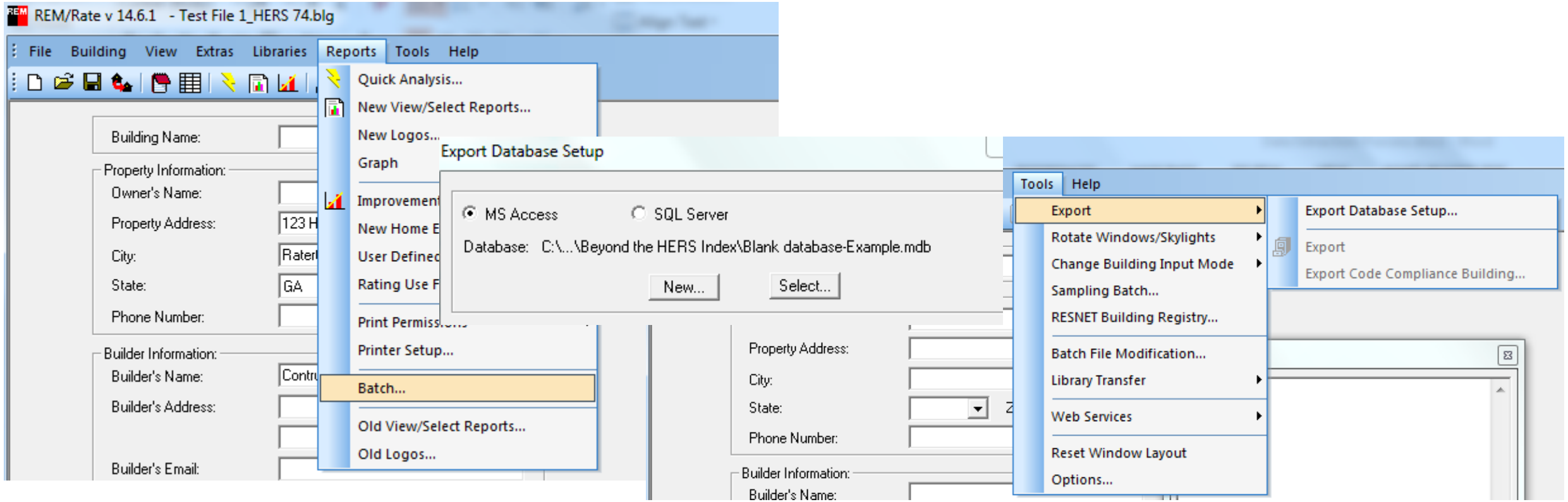
GATHERING RESOURCES TO EXPORT DATA

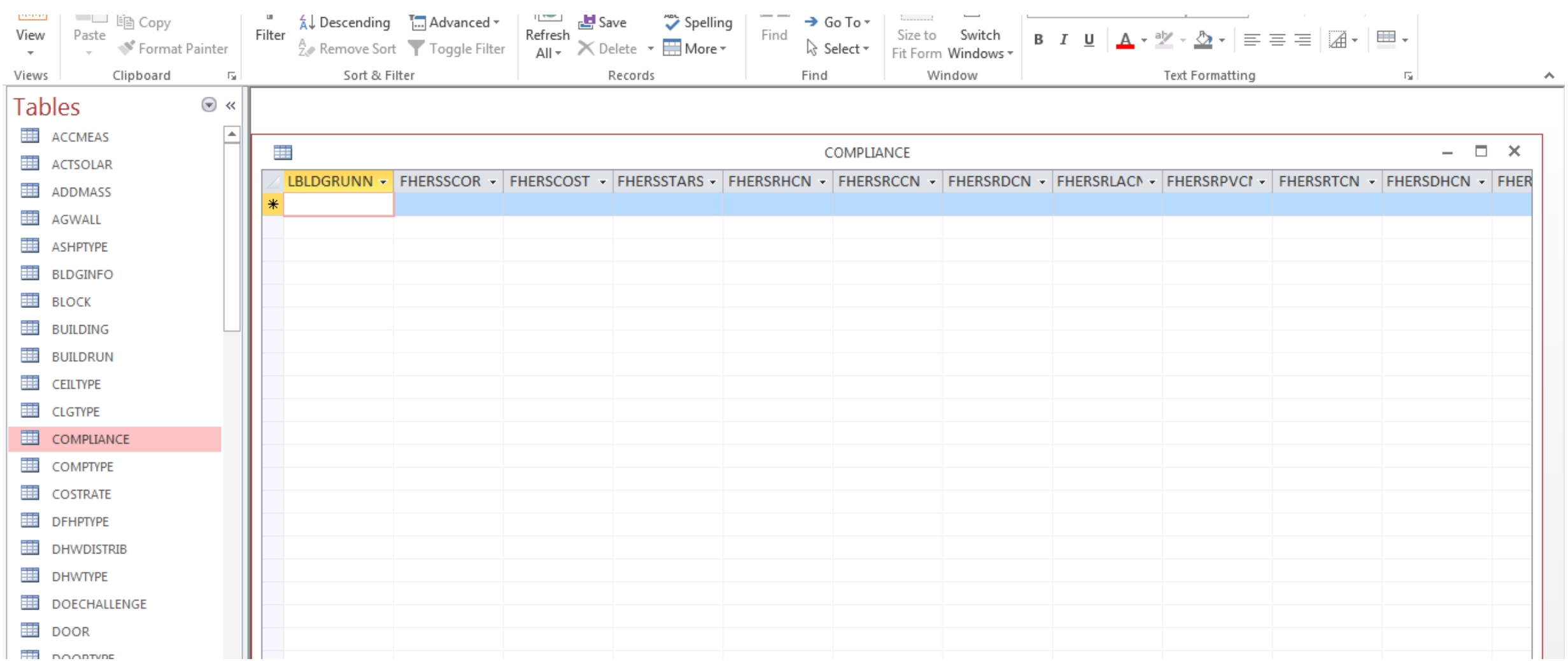
- Data Extraction Process document (handout)
- REM Report aka "Export Bible"
- Patience and an investigative spirit
- Microsoft Access
- REM Software Google Group

http://groups.google.com/group/remsupport?pli=1

DATABASE SETUP

Access this feature through Tools or Reports





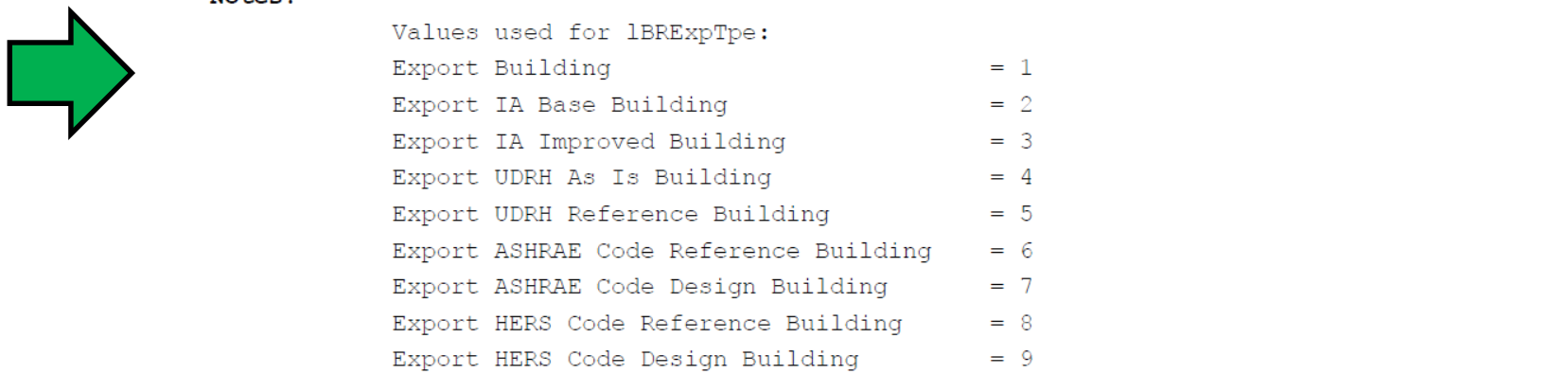
EXPLORE NEW DATABASE

Can you pronounce these words?

EXPLORE NEW DATABASE

Use the REM/Rate Report to decode language:

Help→Export Format Report→Print All



Export Format Report - BuildRun

Date: February 09, 2016 Page 1

Table: **BuildRun**

Notes:

Values used for lBRExpTpe:

Export Building	= 1
Export IA Base Building	= 2
Export IA Improved Building	= 3
Export UDRH As Is Building	= 4
Export UDRH Reference Building	= 5
Export ASHRAE Code Reference Building	= 6
Export ASHRAE Code Design Building	= 7
Export HERS Code Reference Building	= 8
Export HERS Code Design Building	= 9

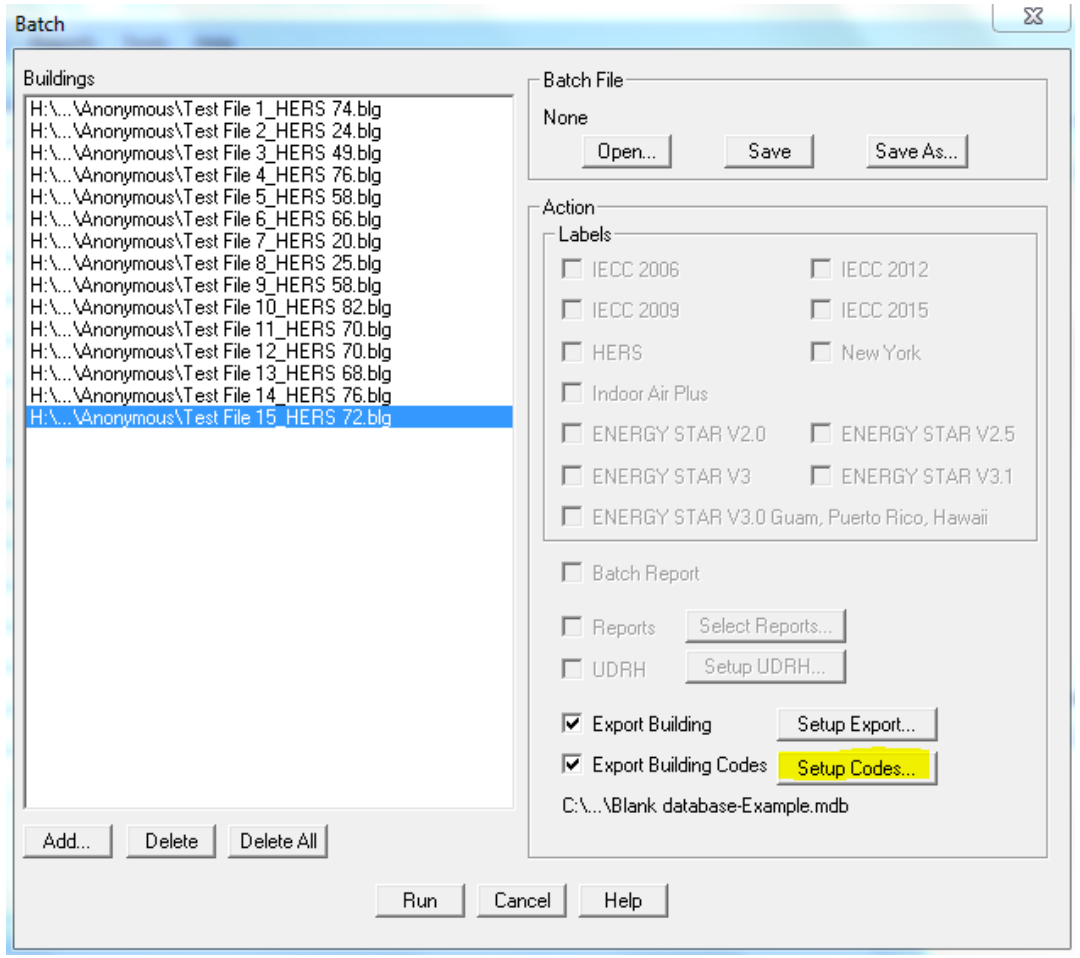
EXPLORE NEW DATABASE

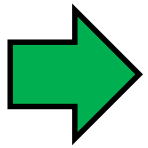
Snapshots of REM/Rate Report

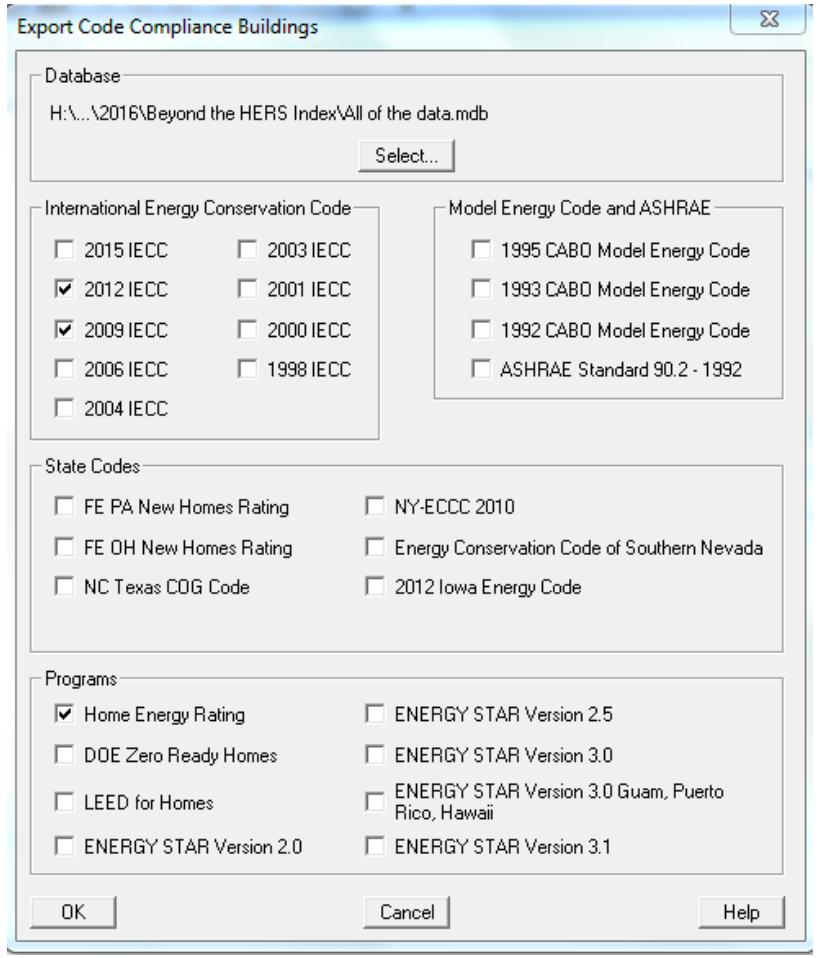
223	f09IEDSVCT	float(20,4)	2009 IECC Design Service Cost
224	f09IEDTCT	float(20,4)	2009 IECC Design Total Cost
225	b09IECC	int(20)	2009 Meets IECC Cost Compliance 1 = TRUE
226	f09IECCRUA	float(20,4)	2009 IECC Reference Overall UA
227	f09IECCDUA	float(20,4)	2009 IECC As Designed Overall UA
228	b09IECCDuP	int(20)	2009 IECC Ducts pass 0 = False and 1 = TRUE
229	b09IECCuAP	int(20)	2009 IECC Overall UA Compliance 0 = False, 1 = TRUE
230	fHERS_PV	float(20,4)	HERS PV Adjusted (Not in REM/Design)
231	fES_HERS	float(20,4)	ES HERS Rating Score (Not in REM/Design)
232	fES_HERSSA	float(20,4)	ES HERS SAF Adjusted (Not in REM/Design)
233	bEStarv25	int(20)	ENERGY STAR v 2.5 (0=Fail, 1=Pass) (Not in REM/Design)

```
These values are used for variable nSIFndType:
   Slab                    = 0
   Open Crawl Space        = 1
   Enclosed Crawl Space    = 2
   Cond. Crawl Space       = 3
   Uncond. Full Basement   = 4
   Cond. Full Basement     = 5
   Uncond. Walkout Basement = 6
   Cond. Walkout Basement  = 7
   Mixed                   = 8
Values for nSIInfMTyp:
   User estimate    = 1
   Tracer gas test  = 3
   Blower door test = 4
Values for nSIInfUnit:
   CFM @ 50 Pascals        = 1
   CFM @ 25 Pascals        = 2
   ACH @ 50 Pascals        = 3
   Natural ACH             = 4
   Eff. Leakage Area(sq.in) = 5
   ELA/100 sf shell        = 6
Values for lSILvAbGar:
   First    = 1
   Second   = 2
```

EXPORT SETUP







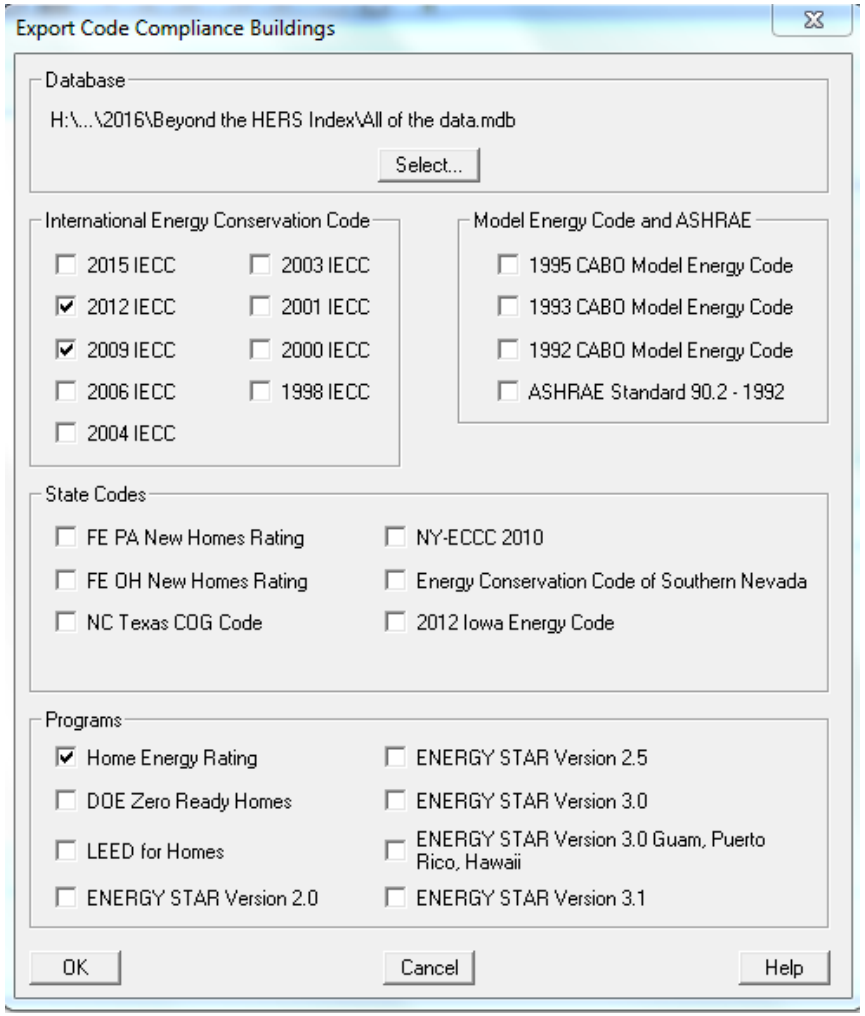
QUIZ QUESTION

For one REM/Rate file, how many total export buildings will REM/Rate export, based on the options selected? Identify each export type for each option selected.

Answer:

7 total

1) AS-IS 2) 2012 Design 3) 2012 Reference 4) 2009 Design 5) 2009 Reference 6) HERS Design 7) HERS Reference

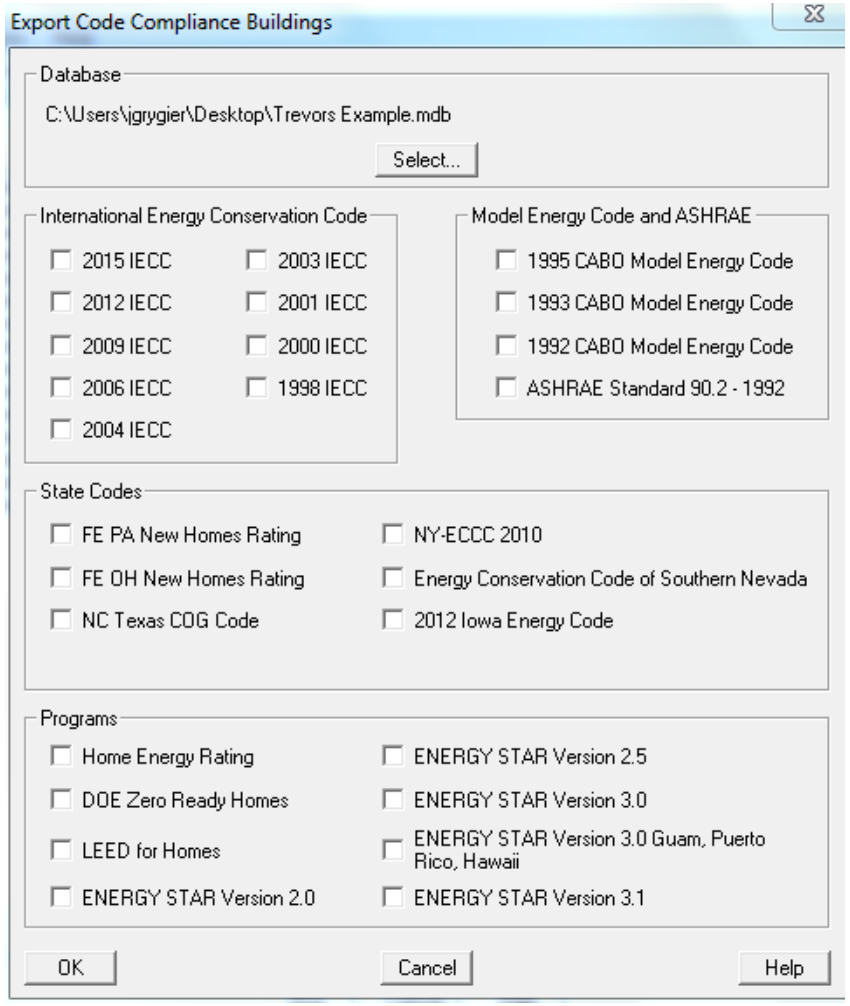


QUIZ QUESTION

If you only wanted to export the AS-IS buildings, what would you select here?

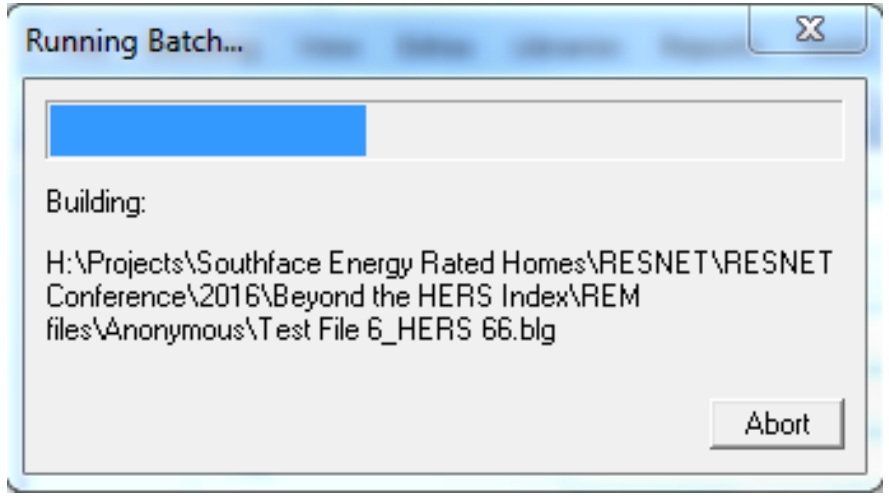
Answer:

Nothing ☺



EXPORT TO DATABASE

- Example with 15 confirmed, anonymous REM/Rate Files
- Multiple methods to sort through data
    - Writing SQL code
    - Query Wizard



Queries

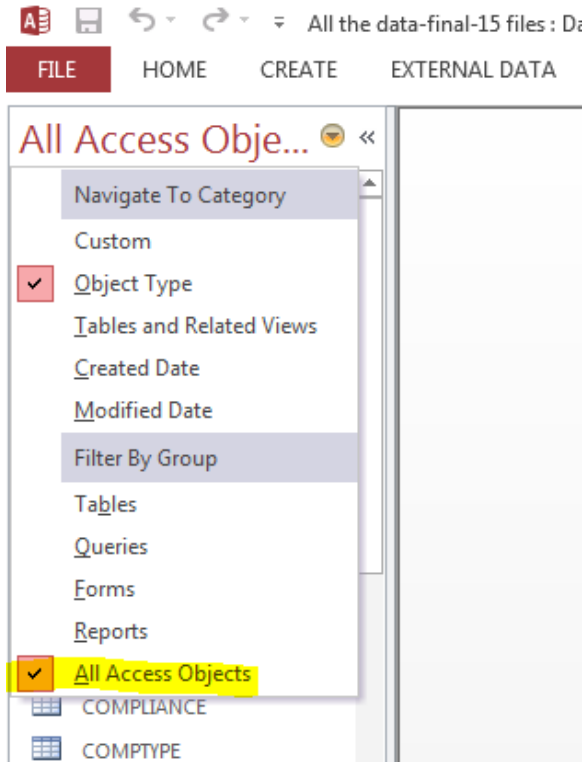
Queries are the real workhorses in a database, and can perform many different functions. Their most common function is to retrieve specific data from the tables. The data you want to see is usually spread across several tables, and queries allow you to view it in a single datasheet. Also, since you usually don't want to see all the records at once, queries let you add criteria to "filter" the data down to just the records you want. Queries often serve as the record source for forms and reports.

EXPORT TO DATABASE

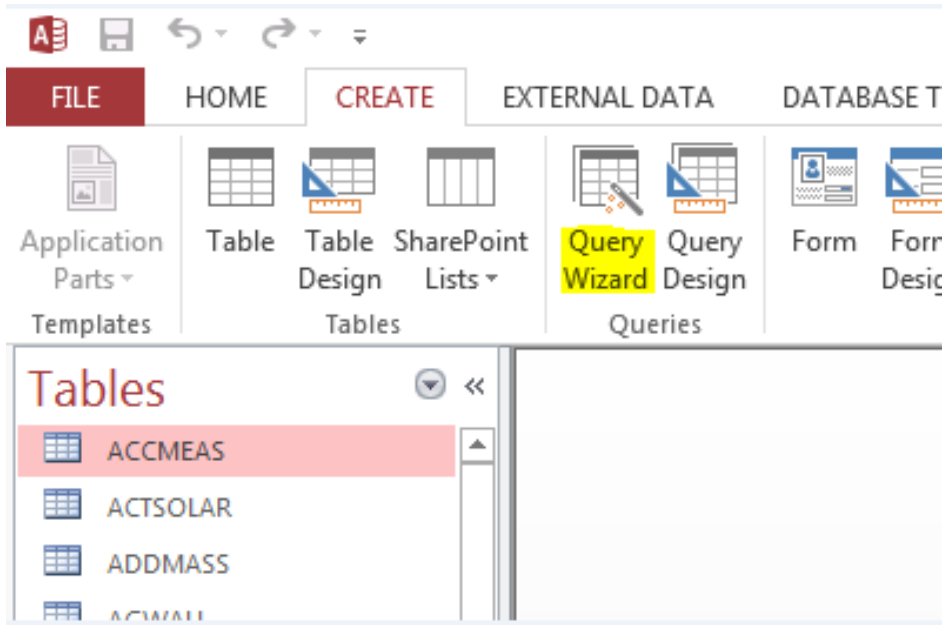
What is a Query? Defined by Microsoft Office Support

MANIPULATE DATABASE

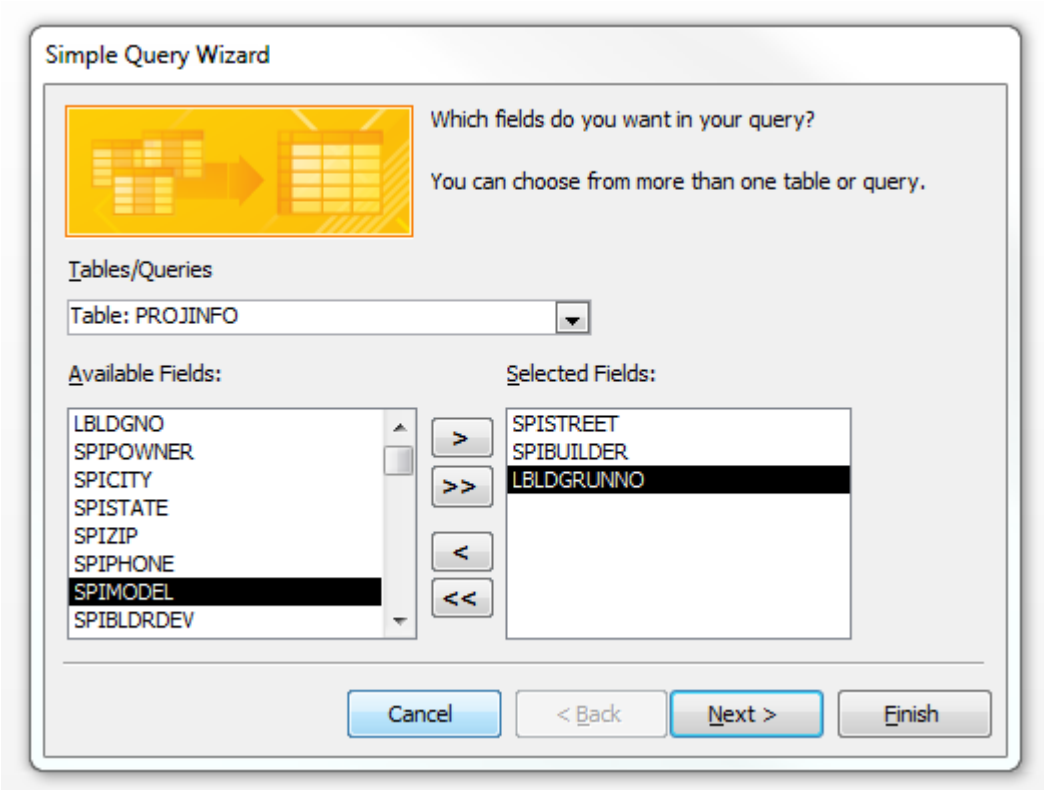
Choose "All Access Objects" to be visible



SELECT what you want to see by using SQL coding and/or built-in Query Wizards



MANIPULATE DATABASE

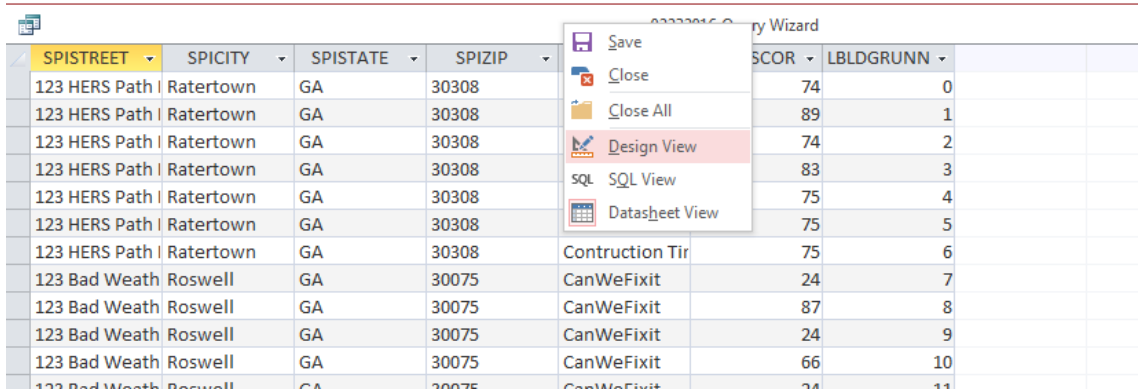


- The dropdown allows you to select the Table(s) you want to pull from
- "Available Field" lists the column headers from the Table(s)

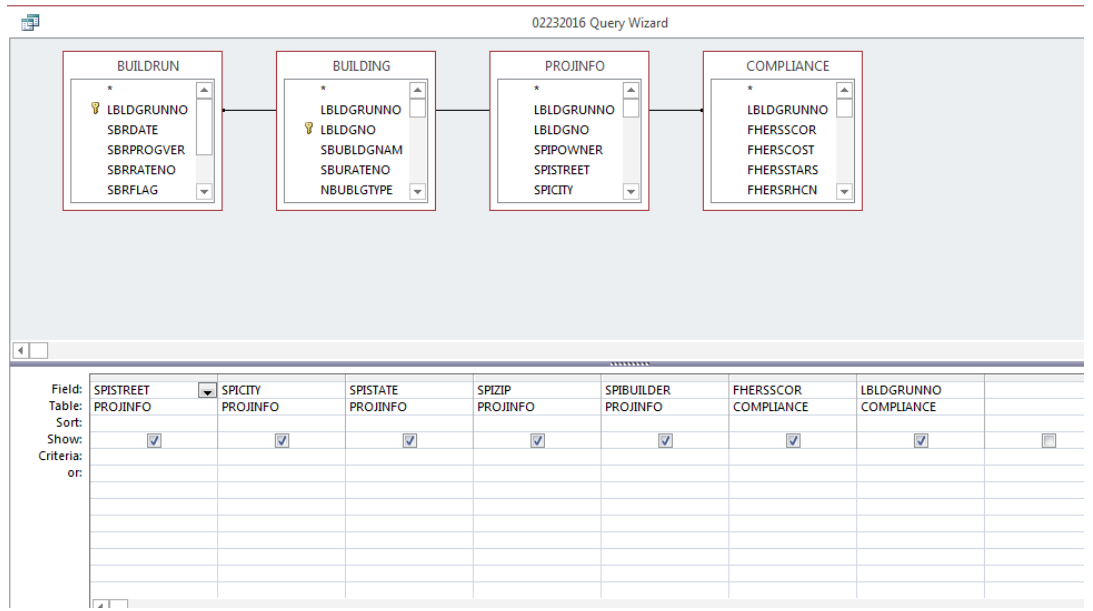
MANIPULATE DATABASE

In "Design View," you can edit your existing Query

- You also have the option to select "SQL" view here. You can use one or both methods to create/edit your Query
- Start simple, you can always add more fields later, using the drag and drop method in design view



SPISTREET	SPICITY	SPISTATE	SPIZIP		SCOR	LBLDGRUNN
123 HERS Path	Ratertown	GA	30308		74	0
123 HERS Path	Ratertown	GA	30308		89	1
123 HERS Path	Ratertown	GA	30308		74	2
123 HERS Path	Ratertown	GA	30308		83	3
123 HERS Path	Ratertown	GA	30308		75	4
123 HERS Path	Ratertown	GA	30308		75	5
123 HERS Path	Ratertown	GA	30308	Contruction Tir	75	6
123 Bad Weath	Roswell	GA	30075	CanWeFixit	24	7
123 Bad Weath	Roswell	GA	30075	CanWeFixit	87	8
123 Bad Weath	Roswell	GA	30075	CanWeFixit	24	9
123 Bad Weath	Roswell	GA	30075	CanWeFixit	66	10



MANIPULATE DATABASE

Let's change the column headers

- Highlighted=manually added
- Tip: this works best when column headers do not have spaces

Field:	City: SPICITY	State: SPISTATE	Zip: SPIZIP	Builder: SPIBUILDER	HERS_Index: FHERSSCOR	ESTARv3: IIf([bESTARV.	Volume: FBIVOLUME	CFA: FBIACOND
Table:	PROJINFO	PROJINFO	PROJINFO	PROJINFO	COMPLIANCE		BLDGINFO	BLDGINFO
Sort:								
Show:	☑	☑	☑	☑	☑	☑	☑	☑
Criteria:								
or:								

IIf Function

Returns one of two parts, depending on the evaluation of an expression.

You can use IIf anywhere you can use expressions. You use IIf to determine if another expression is true or false. If the expression is true, IIf returns one value; if it is false, IIf returns another. You specify the values IIf returns.

Example:

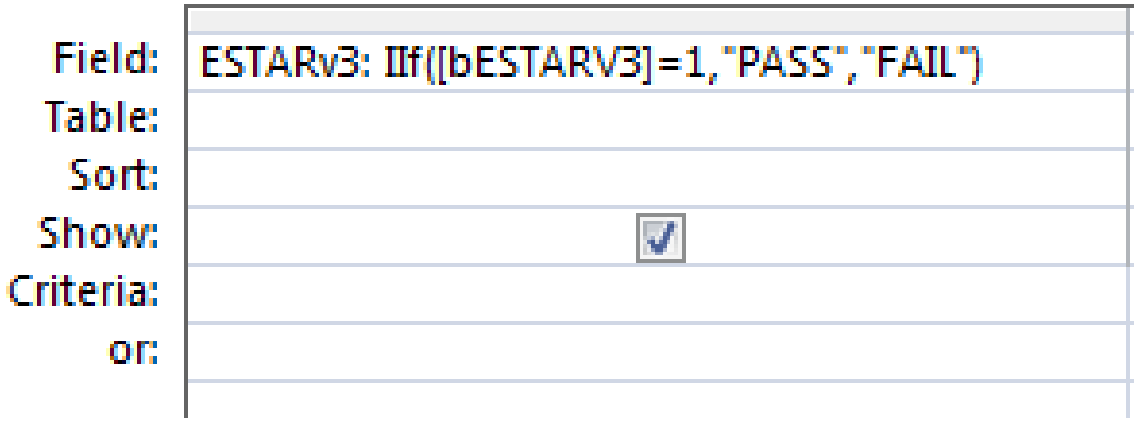
ESTARv3: IIf([bESTARV3]=1,"PASS","FAIL")

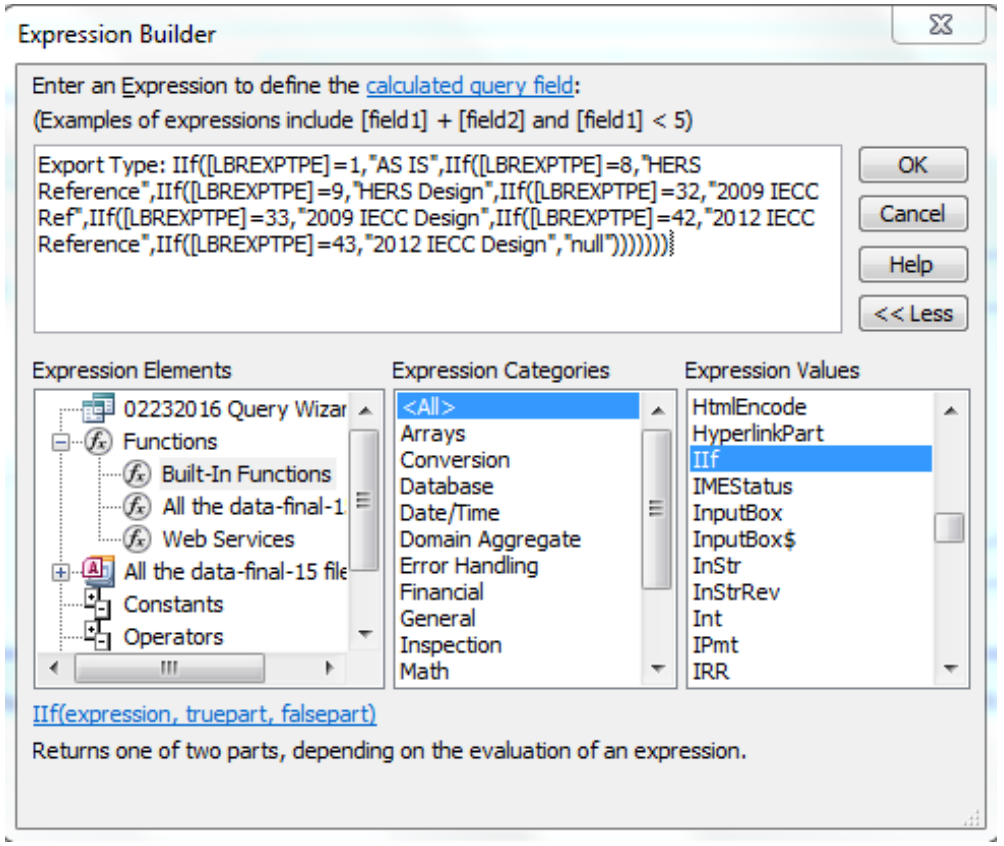
EXPORT TO DATABASE

What IF you want to write an IIF statement? Defined by Microsoft Office Support

MANIPULATE DATABASE

You can either type this expression in the "Field" Row in Design View, or use the "Expression builder" to help you





TIPS AND TRICKS

- Baby steps-make sure you understand each field
- Use Microsoft Access embedded tools to help you
  - Totals, Make Table, Criteria

- Export a fresh database with each new REM/Rate version
  - Copy and paste existing queries to save work
- Reference Process Document for more, then create your own!

PRACTICE

1: HERS index vs building envelope

-shell size, CFA, and/or volume

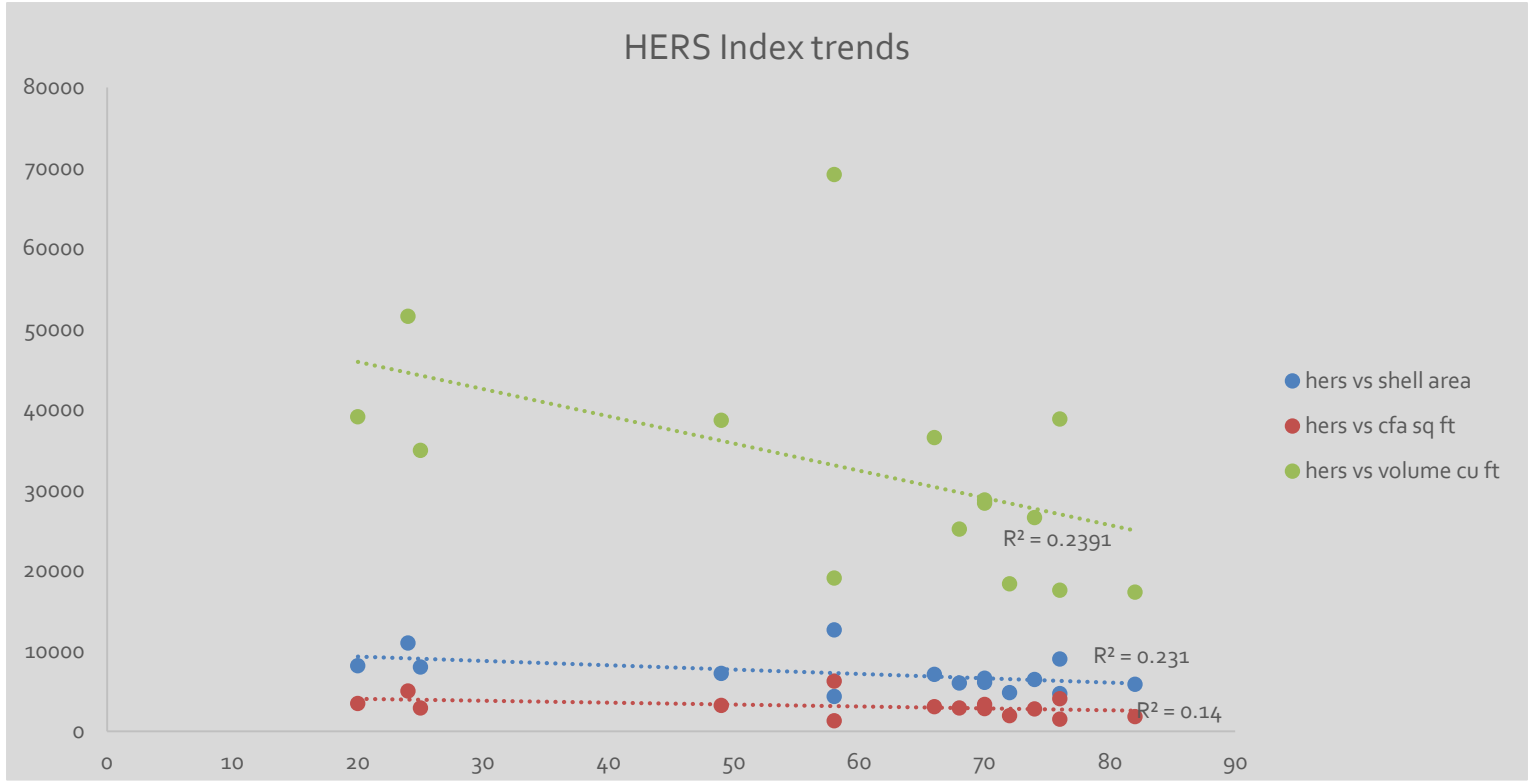
2: Average savings against IECC Reference home

-energy, emissions, or cost ($)

3: How many of current homes pass 2009 or 2012 IECC Code?

4: How many of current homes pass required ERI Index?

PRACTICE


HERS Index trends
80000
70000
60000
50000
40000
30000
20000
10000
0
0
10
20
30
40
50
60
70
80
90
hers vs shell area
hers vs cfa sq ft
hers vs volume cu ft
R² = 0.2391
R² = 0.231
R² = 0.14

Question & Answer