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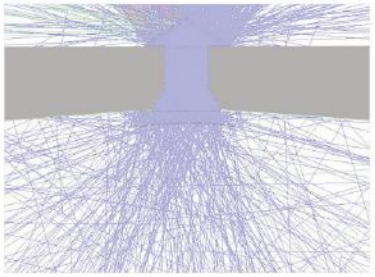
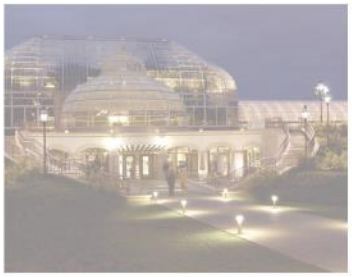
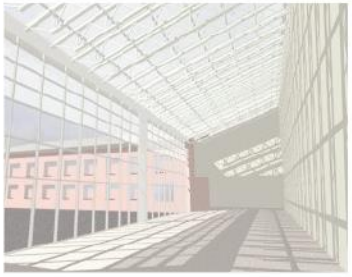
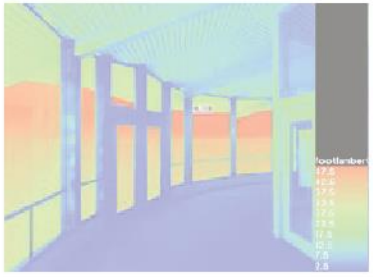
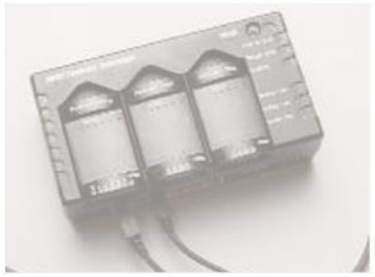




ARCHITECTURAL ENERGY CORPORATION



REM/*Rate* Advanced Training

RESNET 2014

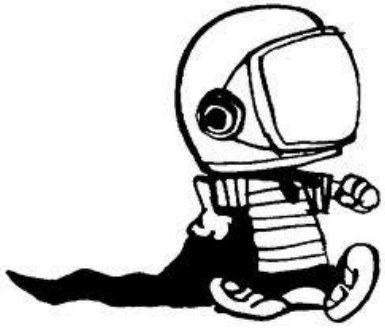
V. Robert Salcido, P.E., Director of REM Programs

Brian Christensen, HERS & LEED-H Green Rater, Senior Engineer

Architectural Energy Corporation

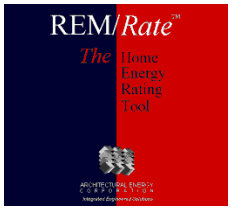
February 23, 2014

INTRODUCTION

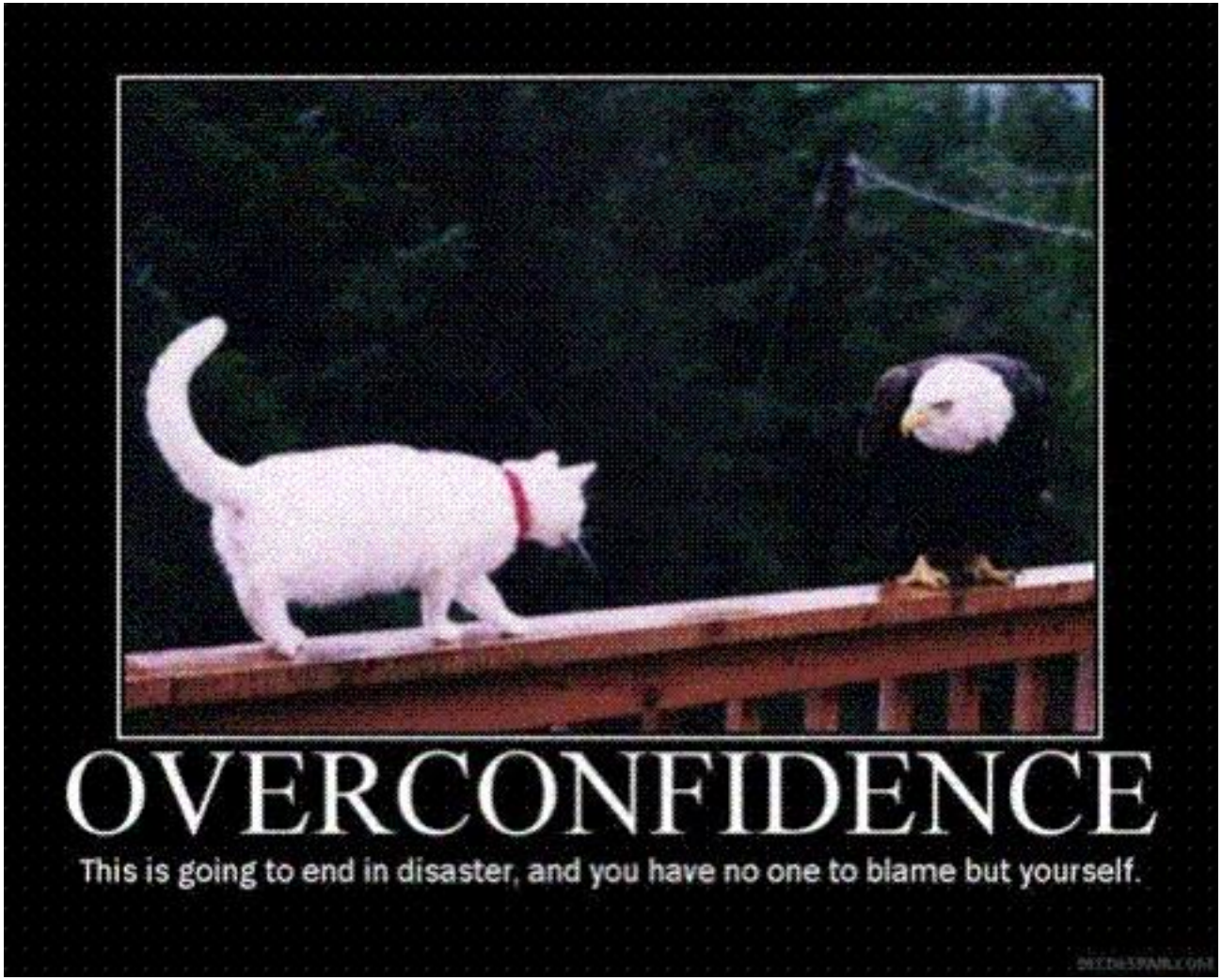


- V. Robert Salcido
  - Director of REM Programs
  - Background in Environmental and Civil Engineering
  - 20+ years experience in energy and building science

- Brian Christensen
  - Background in Physics and Mechanical Engineering
  - 20+ years experience in solar energy and building science (including 8 years of HERS Ratings)



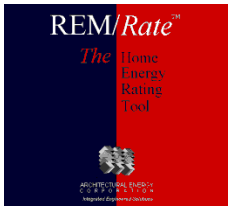
INTRODUCTION



REM/Rate™
The Home Energy Rating Tool

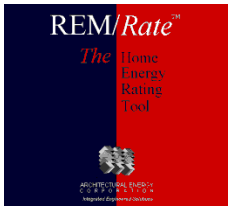
GOALS

1) Understand the new features in REM/*Rate*
2) What is going on behind the scenes at AEC
3) Understand what is coming with REM/*Rate CLOUD*
4) Training in REM/*Rate* advanced/unknown features
5) Understand what you want/need in software



OVERVIEW

- REM/Rate Installation
  - Installation
  - REM Files
- New Features
  - Adiabatic Floors and Ceilings
  - ENERGY STAR v3.0 Rev 7
  - eGRID 2012 emissions
  - LEED for Homes Report
  - RESNET Life Cycle Costing
  - Numerous unseen changes/fixes
- REM/Rate Cloud
  - Licensing
  - Operation
  - Features
  - Benefits
  - Cons
  - Current Desktop
- Printing/Data Output
  - Multi-Building Reporting
  - Report Grouping
  - Print Permissions
  - Logos
  - Data Export
- Libraries
  - File Opening
  - Temporary Libraries
  - Library Sets and Transfer
- Analysis
  - Existing Home Toolset
  - User Defined Reference Home
  - Batching
- Technical
  - Cond vs Uncond Foundations
  - Sealed Attics
  - Thermal Boundaries
  - Utility Rates
  - Integrated Systems
  - GSHP
- Tricks
  - Equation Solver
  - Tabs
  - Docking Panes
  - Reset Window Layout
  - Default Building
  - Window Rotation
  - Registration
- Options
  - Binding Adjustments
  - Home Energy Ratings
  - IECC
  - EPA / ENERGY STAR
- Discussion
- Q & A



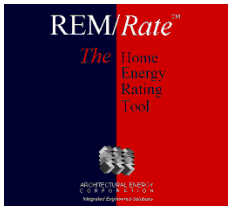
TECHNICAL SUPPORT

REM/Rate™
The Home Energy Rating Tool

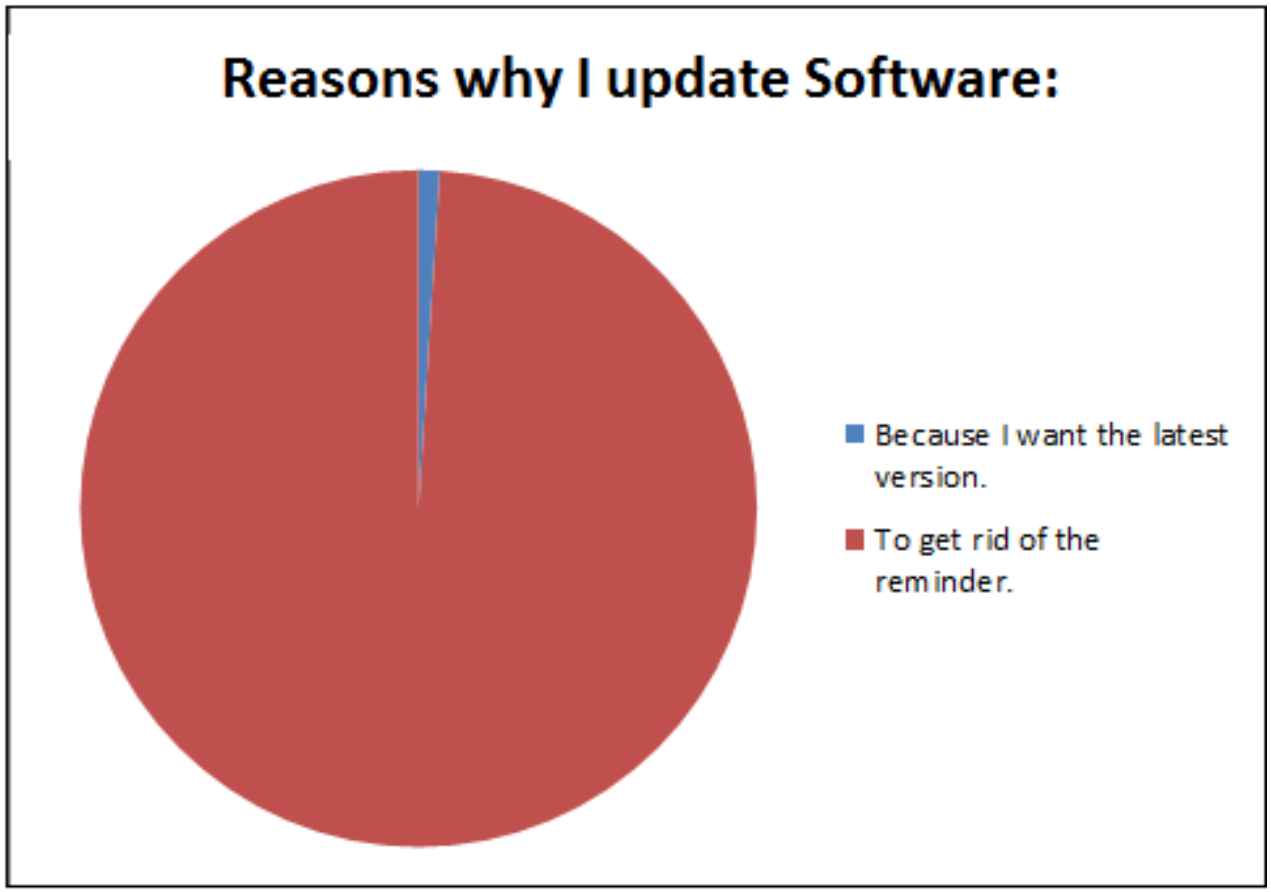
Two Installations

- Updater – updates REM/*Rate* executable file but does not overwrite libraries or building files.
- Full Install - if installed in an existing REM/*Rate* folder, then it will overwrite everything. Library transfer is possible from old versions to new, but not reverse.

Having multiple REM/Rate versions on your computer is possible.



SOFTWARE UPDATES



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NEW FEATURES

- Adiabatic floors and ceilings
  - Adiabatic Floor is set as a location
  - Adiabatic Ceiling is set as a type in library
- ENERGY STAR v3.0 Rev 7
  - Removed window/door exclusion from 2009 IECC UA Calculation
  - Added a slab floor insulation exemption checkbox
  - EPA Indoor airPLUS checklist no longer counted toward checklist requirements
  - Option for Total Duct Leakage for Rough-In added
  - ENERGY STAR v3.1 coming out later this year (working with EPA now!)
- eGRID 2012 emissions
- LEED for Homes Report
- RESNET Life Cycle Costing
- Numerous unseen changes/fixes

NEW FEATURES

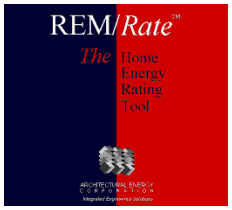
Enhancements in REM/*Rate*™ v14.4.1 include:

General:
Corrected IECC Labels to show dominant ceiling type rather than listing each type. The IECC Certificate shows a listing of each type.
Updated the Canadian version to remove printing restrictions for uploading to the RESNET Registry.
Bugs in v14.4 that were fixed in v14.4.1 include:
General:
Fixed the bug in the duct settings for the 2004 and 2006 IECC Design Building. This affected the Tax Credit calculations that are now fixed and getting the same results as past Tax Credit scores in REM/Rate v14.3.
Fixed a bug in the ENERGY STAR and DOE-Challenge Home UA Calculations. Now the reports show similar UA values to the 2009 and 2012 IECC UA Reports.
Fixed a bug with the REM/Rate PNW Version with the Building Option Package (BOPs) Reference Homes due to incomplete heating and water heating settings.
Fixed XML import bug where surfNum, wallNum, heatingEquipNumber, coolingEquipNumber fields were incorrectly set to the first item of the list.

Enhancements in REM/*Rate*™ v14.4 include:
General:
Added the RESNET energy savings life cycle cost methodology.
Added the ability to model adiabatic ceilings for individual apartments under conditioned space. This allows the apartment shell area to be calculated correctly.
Per EPA/ENERGY STAR request, added Slab Insulation exemption checkbox to the Mandatory Requirements screen.

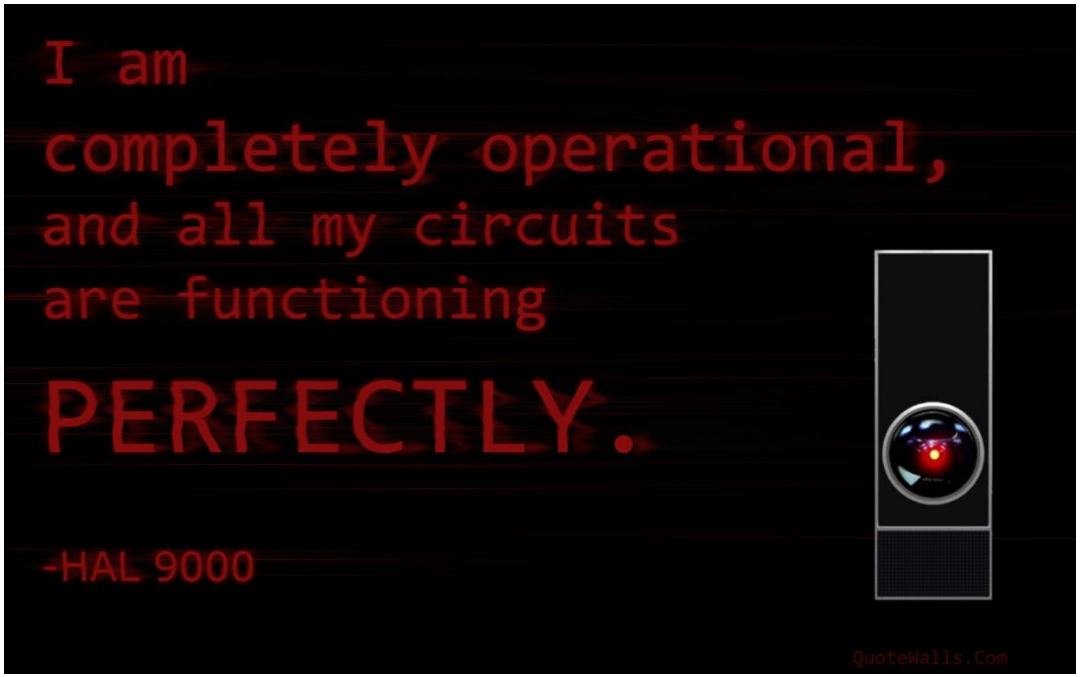
Reports:
Added a LEED for Homes code and report.
Added ecoSelect HERS Index label for Southern Energy Management.
Added the Illinois 2012 Performance Report to the group that can show an unofficial report using mechanical equipment which meets the Federal Minimum efficiencies.
Added the Texas Performance - North Central (NCTCOG) code report, which requires an access code provided by the North Central Texas Council of Governments.

Bugs in v14.3 that were fixed in v14.4 include:
General:
Corrected the U-value and SHGC check for NC codes. The NC code reports have been removed from REM's Old Reporting tool, and are only available in the New Reporting tool.
Corrected subtle bug in SHGC evaluation in UA Compliance reports; the 2009 & 2012 IECC set a maximum value for the area weighted average SHGC, while the other codes use the worst individual SHGC in the building instead of an average.
Corrected bug in internal gains for Multifamily whole-building models. Prior to the fix, increases in mechanical ventilation power caused a decrease in the annual consumption.
Corrected bug which checked insulation grade for adiabatic surfaces, which created problems for Multifamily ENERGY STAR ratings. Insulation grade is now ignored for adiabatic surfaces.
Corrected foundation insulation bug for ENERGY STAR, where exterior foundation insulation was adequate to allow grade 2 cavity insulation.
Adiabatic surfaces are no longer being listed as the dominant assembly type in reports with assembly summaries. Now, only assemblies which are part of the thermal envelope are included in the “dominant assembly” summaries.



REM WEB TOOL

- Licensing
- Operation
- Features
- Benefits
- Cons
- Current Desktop

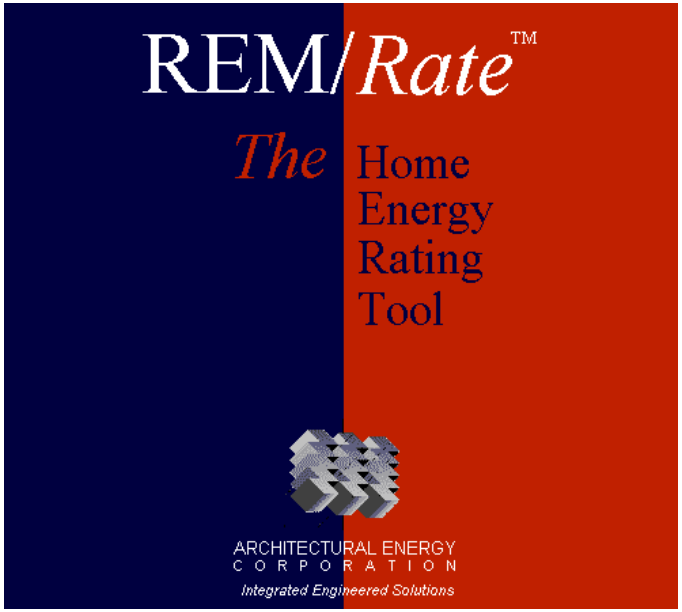


REM WEB TOOL – MODULAR LICENSING

Three Core Modules

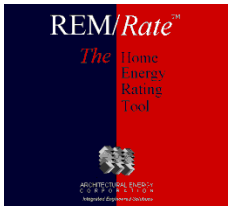
1. REM Core (Energy Analysis)
2. REM Compliance (Code Compliance)
3. REM HERS (HERS Ratings)

- REM/*Rate*
- REM/*Rate* Light
- REM/*Rate* Research and Oversight
- REM/*Rate* Educational
- REM/*Design*
- REM/*Design* Light

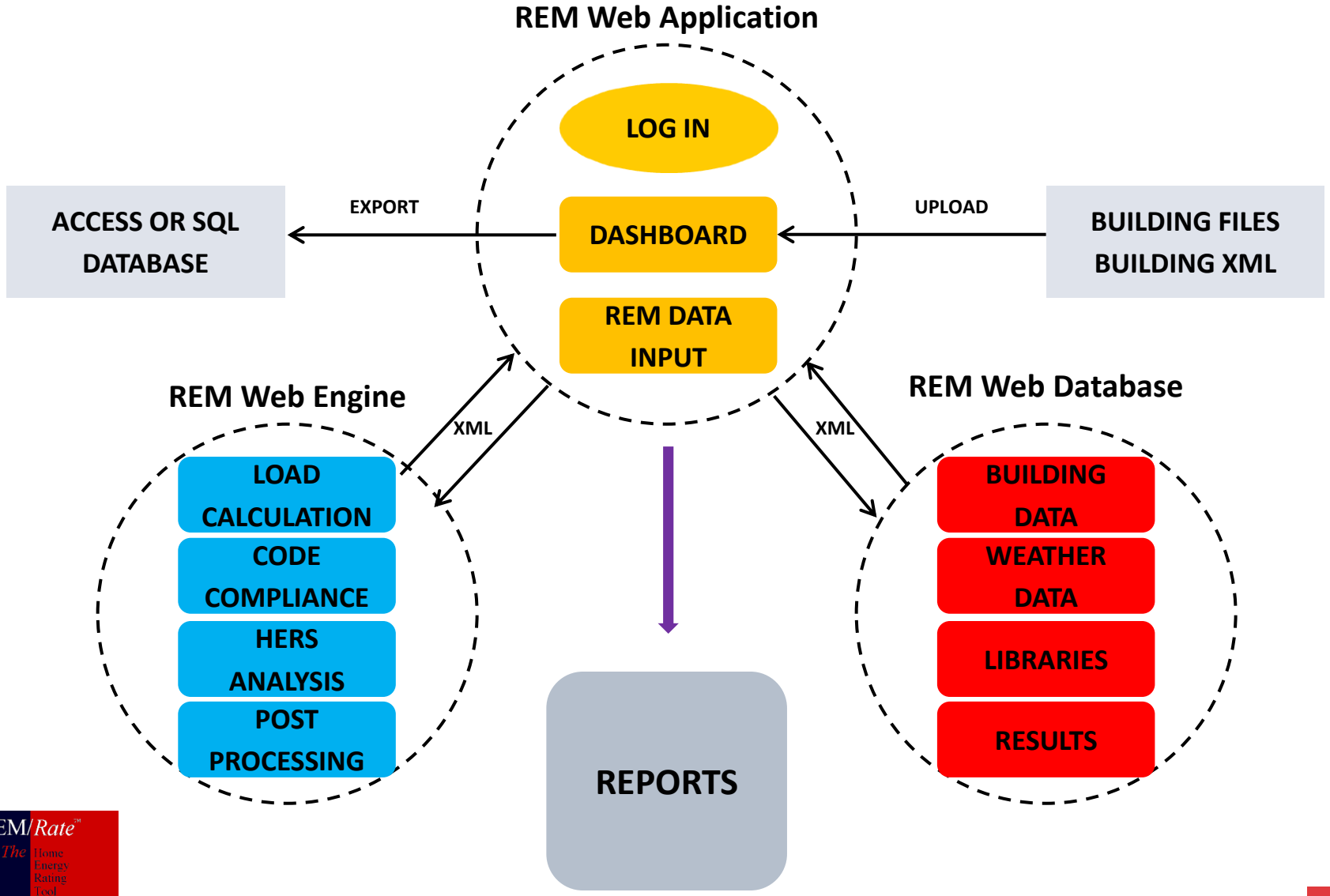


Each license can be modified based on functionality desired

Export
User Defined Reference Home
Batch File Modification
Improvement Analysis
Utility Bill Disaggregation
Batch Operation



REM WEB TOOL - OPERATION



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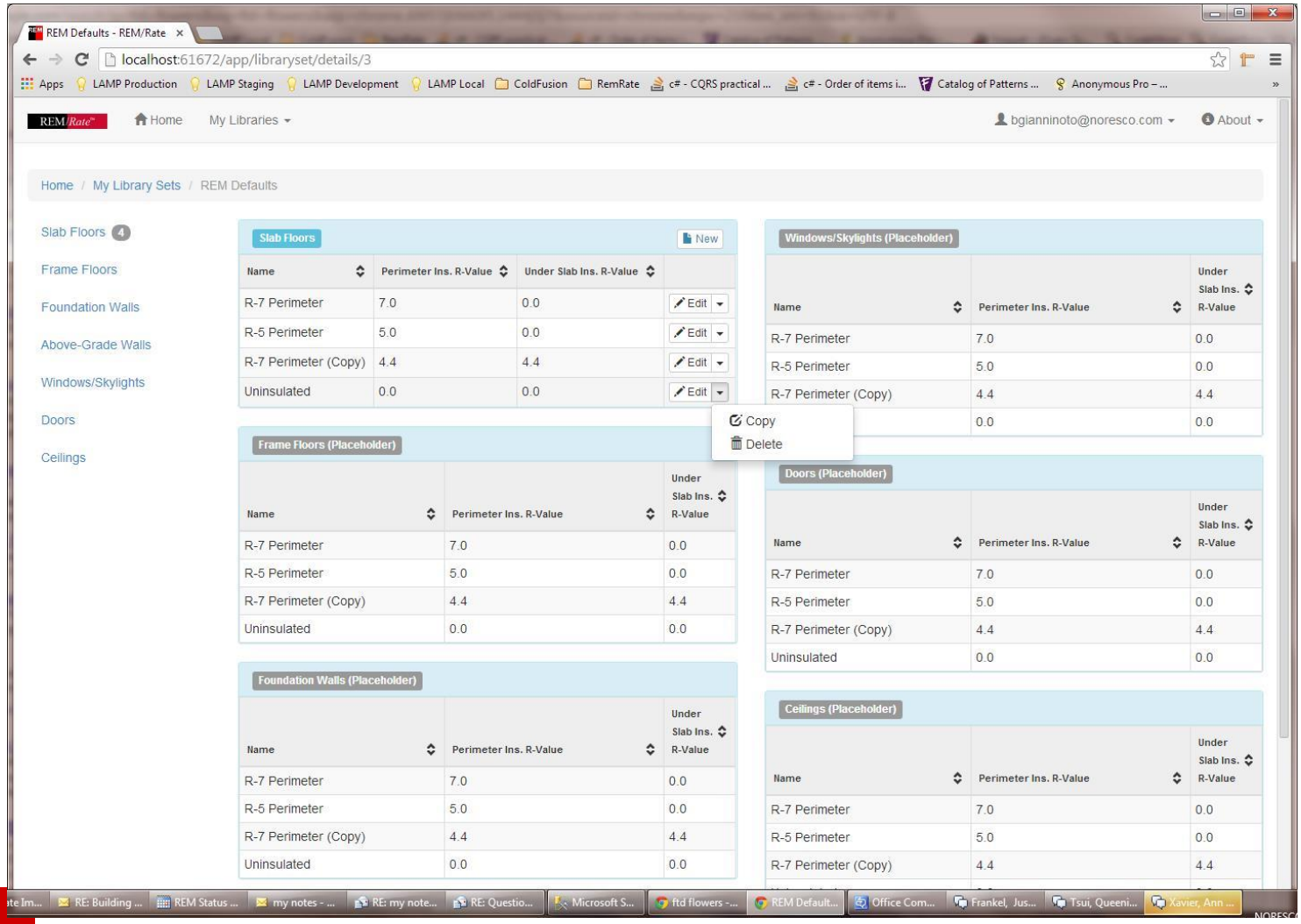
REM WEB TOOL - OPERATION



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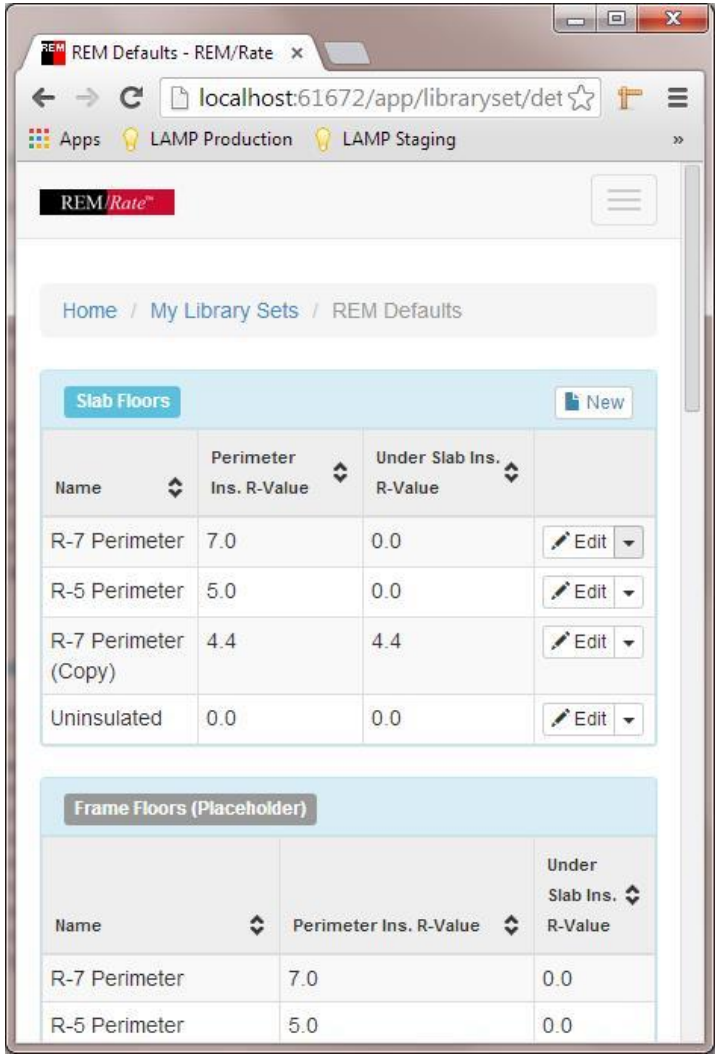
REM WEB TOOL - OPERATION



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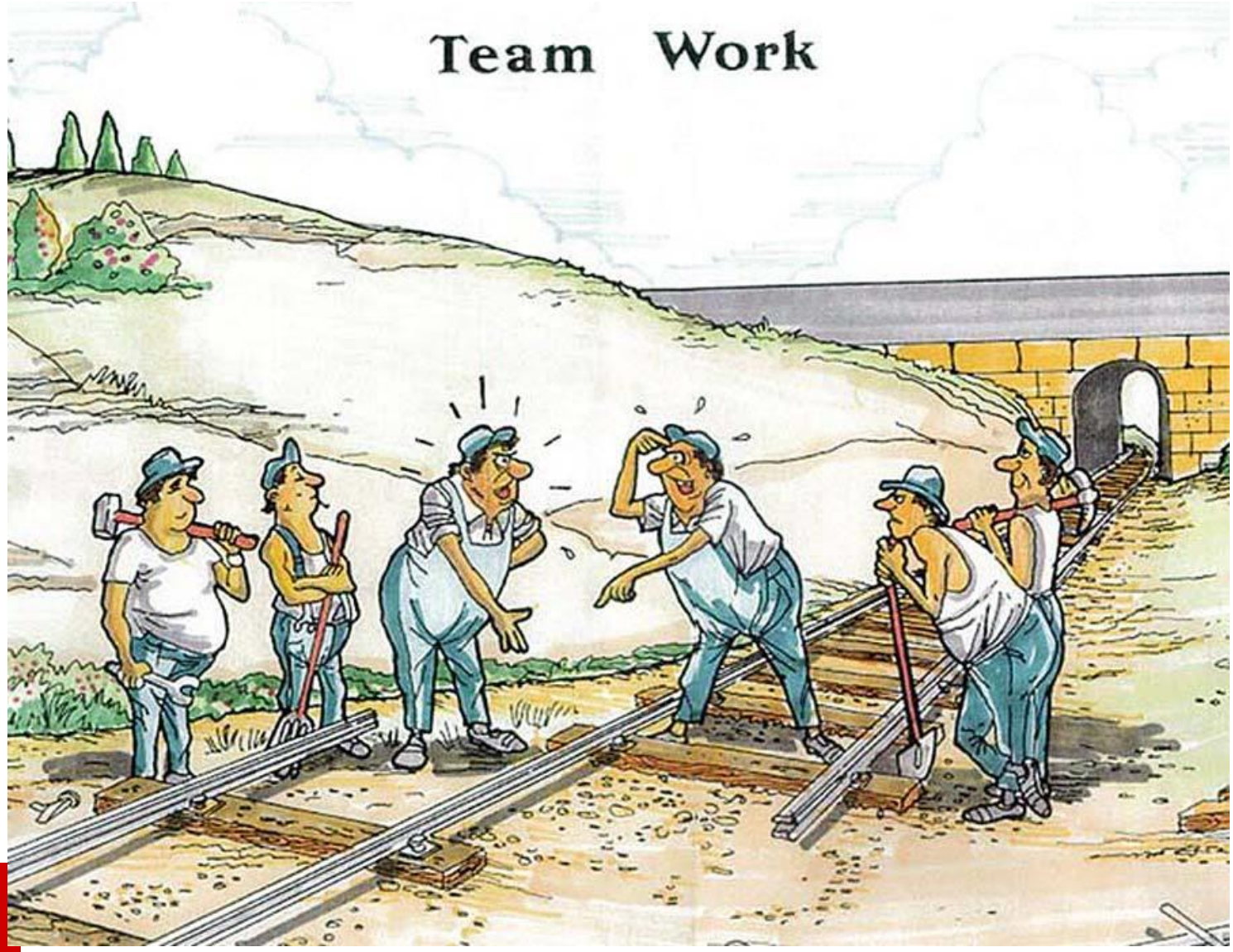
REM WEB TOOL – BENEFITS/FEATURES

- Ability to run REM/Rate on any browser
- No installations
- Quicker updates
  - Streamlined Input
  - Tracking changes to building model
  - Know building status
  - Ability to share and monitor building files
    - Online dashboard for better QA
    - Online license renewals and payments
    - Onboard counter for ratings and fees

REM WEB TOOL - CONS

- Only allow limited versions
- Will not operate without internet access
- May take some time to re-familiarize to new format

TEAMWORK



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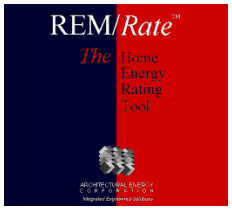
REM/RATE – TODAY

What can you do with today's REM?

(a survey of features that you might not know about,
or have forgotten were there)



PRINTING/DATA OUTPUT

- Multi-Building Reporting – demo
- Report Grouping – demo
- Print Permissions – demo
- Logos
- Data Export

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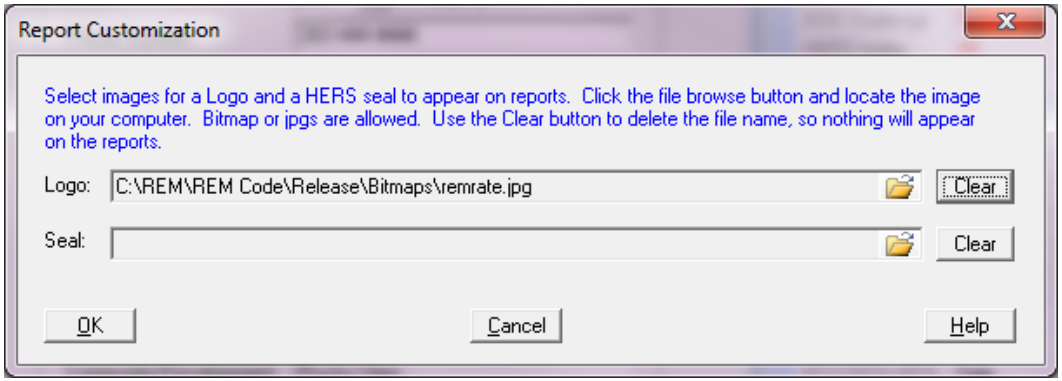
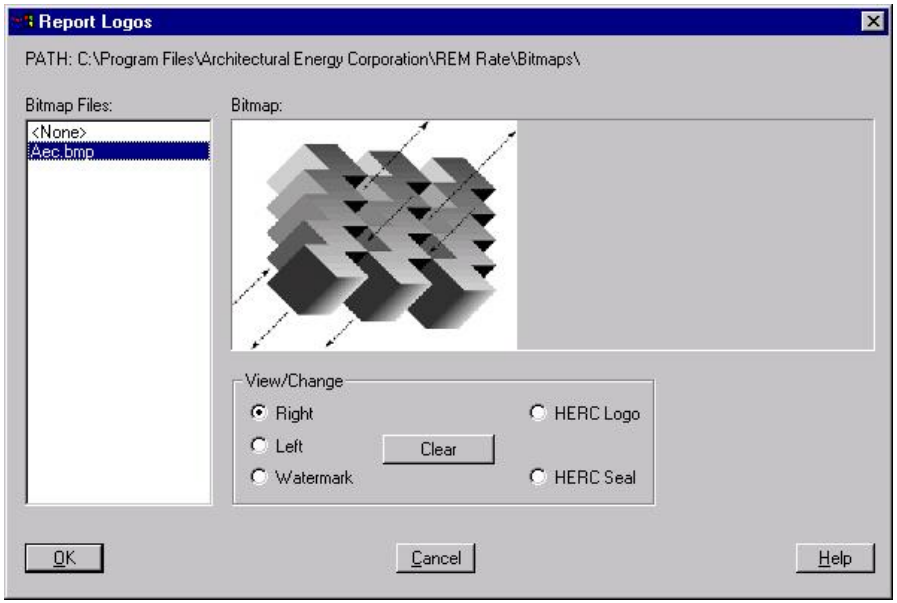
PRINTING/DATA OUTPUT– LOGOS ON REPORTS



New Logos →

Old Logos

- Reports->Old Logos…
  - Select the radio button representing the position you want to add a logo.
  - If there is already a logo selected for that position, its filename will be highlighted and the image will be visible.
  - Logo bitmaps must be placed in the path shown at top.



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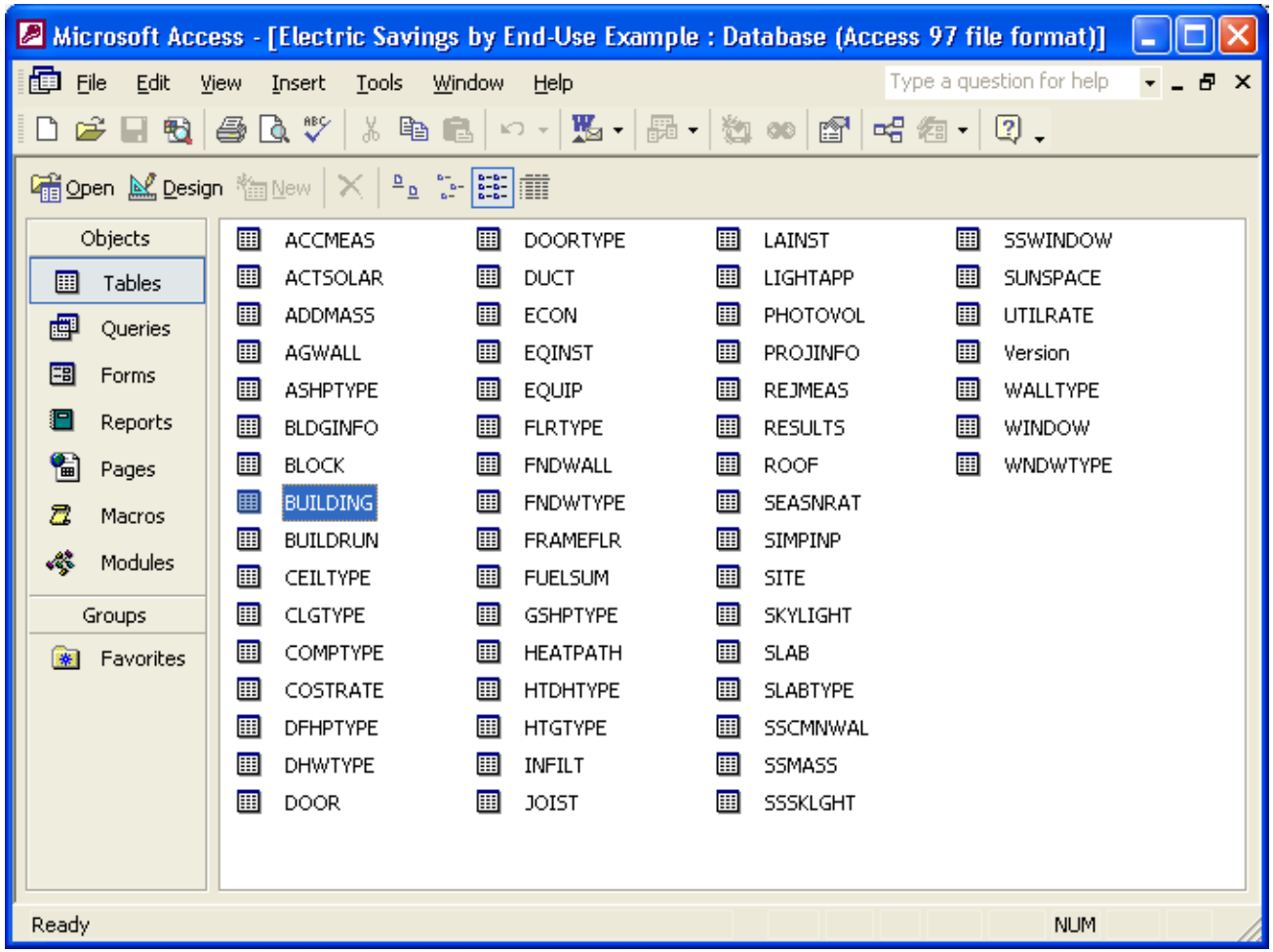
Export to Database

- Access or SQL relational database
- All input, nearly all output
- Use for archiving, data mining (w/ queries)
- Reference homes can be exported
- Extensive documentation on Help menu

PRINTING/DATA OUTPUT – DATA EXPORTING

All the table types in the REM export:

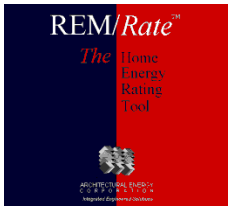
You'll want someone with experience to write your queries!



PRINTING/DATA OUTPUT – DATA EXPORTING

CSV

- "Comma separated values"
- Imports into Microsoft Excel
- Single building results
  - Same file name as building file, *.csv extension
  - Toggle on/off in Options menu
- Batch
  - Named Batch.csv
  - Always generated



TEAMWORK

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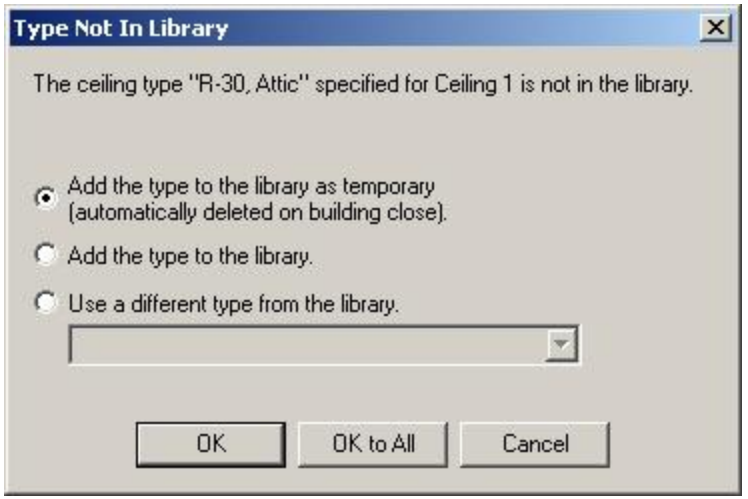
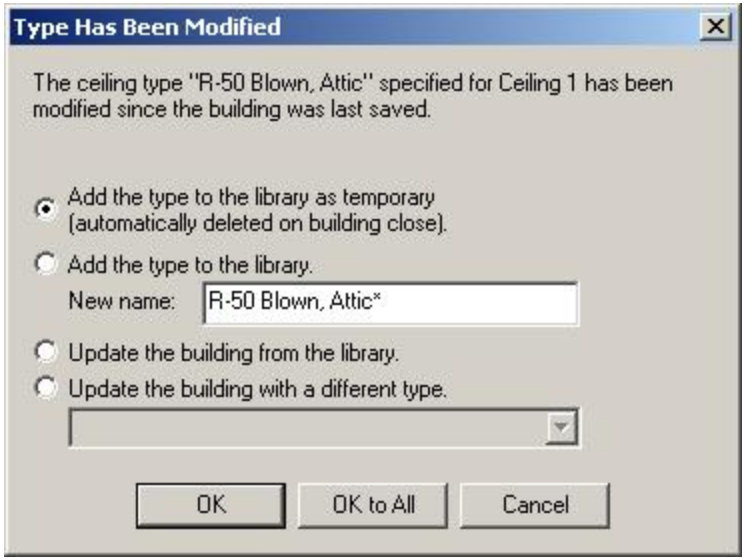
LIBRARIES

- File Opening messages
- Temporary Libraries
- Library Sets and Transfer

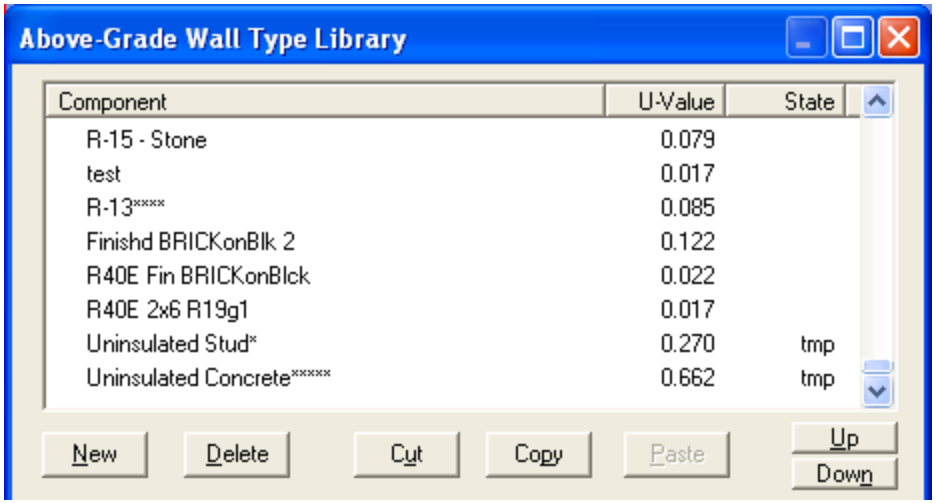
LIBRARIES – FILE OPENING

- Messages when opening building files
  - **Temporary** library entries
    - Appends an * to name
    - Avoids changing building file and voiding print permissions
  - **Adding** to the library
  - **Updating** a building from the library
    - Using a manually selected entry
    - Or, the library version of a modified entry





LIBRARIES – FILE OPENING



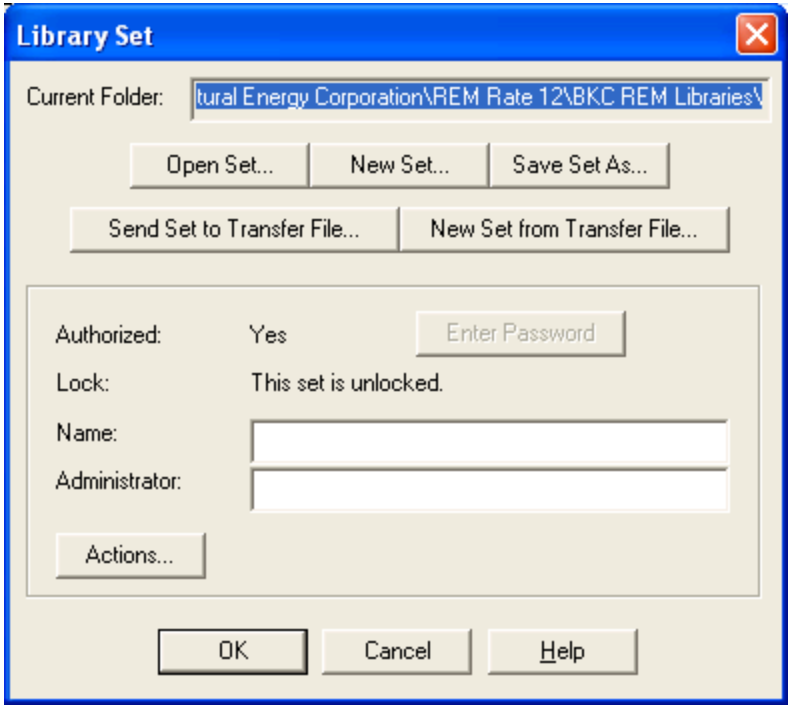
- Use of Temporary Library entries makes life easier (denoted with an “*” and “tmp”)
- QAD’s: Temp. library feature provides a way to spot new entries that need review
- Try not to save buildings with temporary libraries as this will save the asterisk and continue to add them

LIBRARIES – MOVING

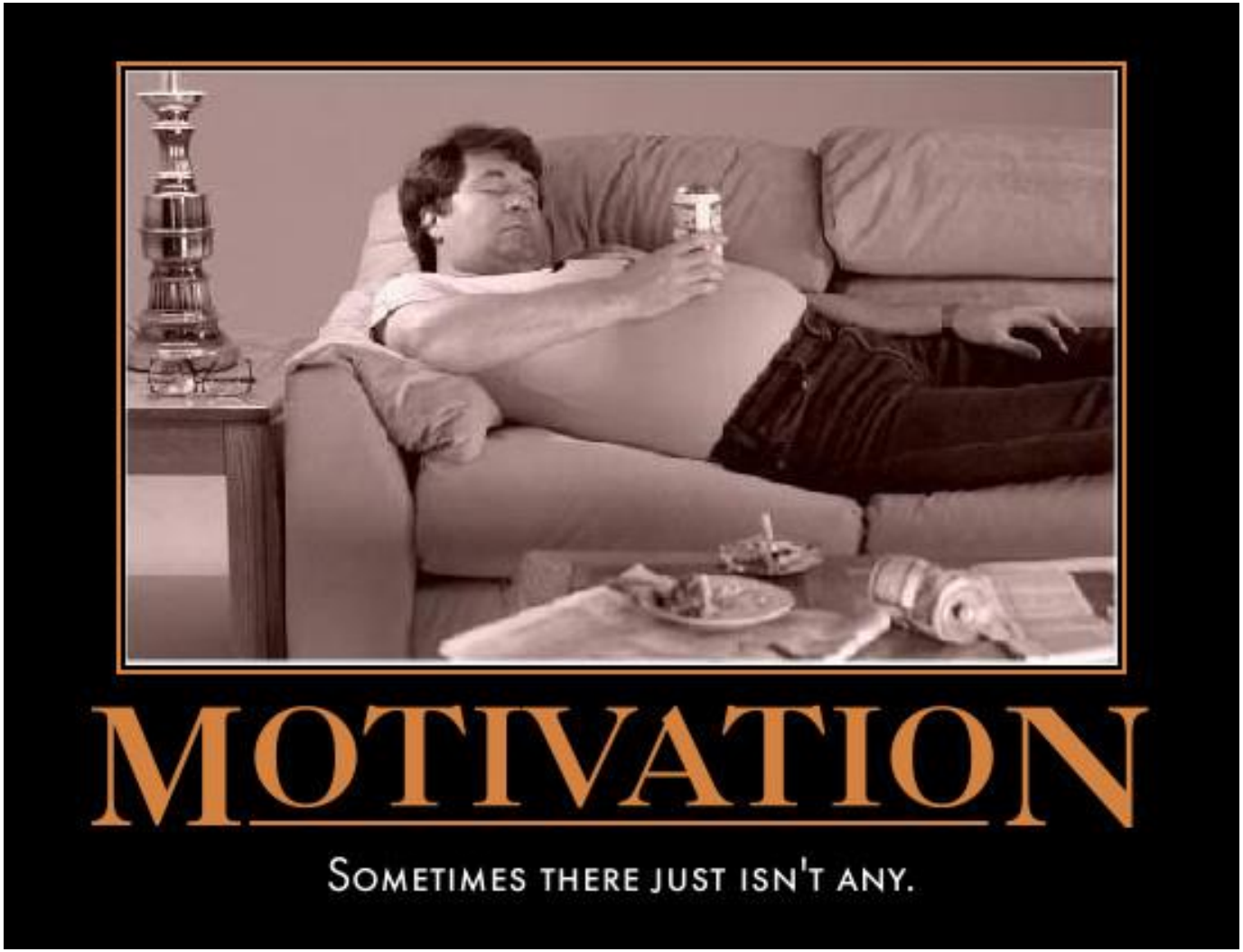
- Copying libraries, or Backing up
  - Full Library Sets
    - Easiest way: copy the entire folder containing the Library Set.
      - Default name & location: **C:\...\REM Rate 14\Libraries**
    - If doing backup, archive it in a safe place
  - Library Subsets
    - Use Transfer Files (Libraries Menu)
      - Select which entries to transfer/share

LIBRARIES – LIBRARY SETS

- Library Set (Libraries Menu)
  - You can have specialized library sets, such as:
    - Libraries required by a weatherization program
    - New construction libraries
  - Change sets when needed



MOTIVATION



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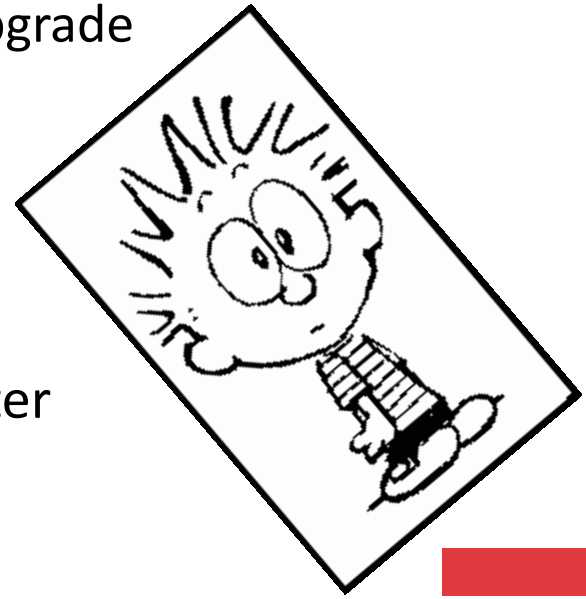
ANALYSIS

- Existing Home Toolset
  - Utility Bill Disaggregation
  - Improvement Analysis
- User Defined Reference Home
- Batching

ANALYSIS – EXISTING HOMES

- Existing Home Toolset Demonstration
  - Utility Bill Analysis
    - Including efforts to calibrate model of my own home
  - Component Consumption Graphic
    - To see what parts of house most need upgrade
  - Improvement Analysis
    - Economic optimization of improvements
  - Multi-building comparisons of before & after



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ANALYSIS – USER DEFINED REFERENCE HOME

- **User-Defined Reference Home**
  - Create custom reference homes
  - Local codes, utility program baseline
  - Uses text file w/ scripting language
  - Example provided w/ software: m92bstn.udr
  - Start w/ copy of example, retain *.udr extension
  - Extensive documentation in help system

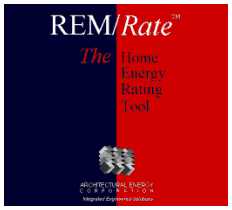
ANALYSIS – BATCHING

Batching

- Building file modifications (File menu)
- Results (Reports menu)
- Batch report, includes ENERGY STAR, tax credit status
- Can generate UDRH and other reports
- Export database
- ENERGY STAR labels, mailing labels

TECHNICAL

- Conditioned vs Unconditioned Foundations
- Sealed Attics
- Thermal Boundaries
- Utility Rates
- Integrated Systems
- Ground Source Heat Pumps



TECHNICAL – COND VS UNCOND FOUNDATIONS

- Conditioned vs. Unconditioned Basements
  - Conditioned - setpoint is maintained
  - Unconditioned - temperature calculated based on connections to conditioned/ambient, gain from ducts, equipment; generally floats 5 - 10 degrees lower than setpoint.

- Conditioned Crawls

Sealed Attics

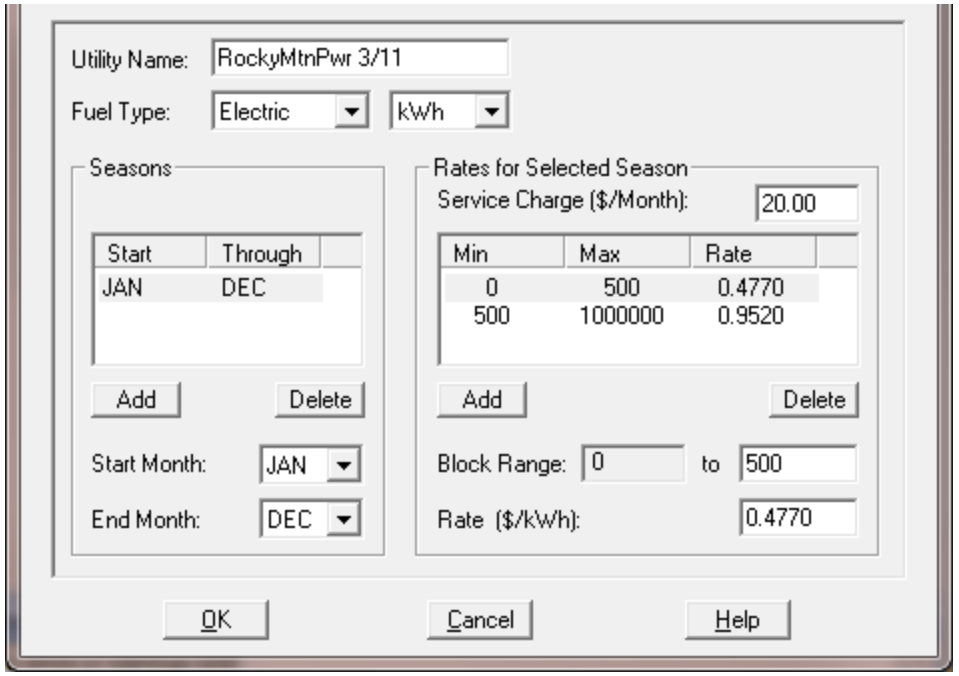
- DON'T model as Vaulted Ceiling or include the volume in Conditioned Space.
- DO use the new Ceiling Type (Sealed Attic) in the Ceiling Input screen.
- DO pay attention to the total exposure area of the attic, not just the roof area. (Attic Exterior input)
  - Sealed attic gable end walls can be modeled in the Above Grade Walls screen.

TECHNICAL – THERMAL BOUNDARY

- Thermal Boundary
  - For unconditioned basements and crawlspaces, REM will use insulation levels to determine where the thermal boundary is – frame floor or the foundation wall.
  - REM does allow the user to choose the thermal boundary location.

TECHNICAL – UTILITY RATES

- Utility rates
  - Seasonal
  - Block rates



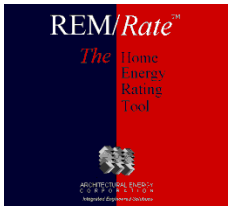
REM/Rate™ The Home Energy Rating Tool

ARCHITECTURAL ENERGY CORPORATION

Improving building performance since 1982

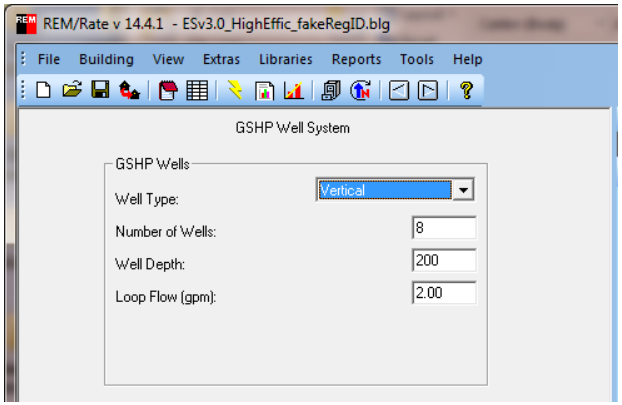
TECHNICAL – INTEGRATED SYSTEMS

- Integrated space/water heating systems
  - Boiler w/ side arm tank
    - Two systems: space heating, water heating
    - Use boiler AFUE for tank recovery efficiency
    - Set tank EF = 0.75 * AFUE
  - DHW tank serving space heating coils
    - Two systems: space heating, water heating
    - Use tank recovery efficiency for space AFUE
    - Commercial water heater



TECHNICAL – GROUND SOURCE HEAT PUMPS

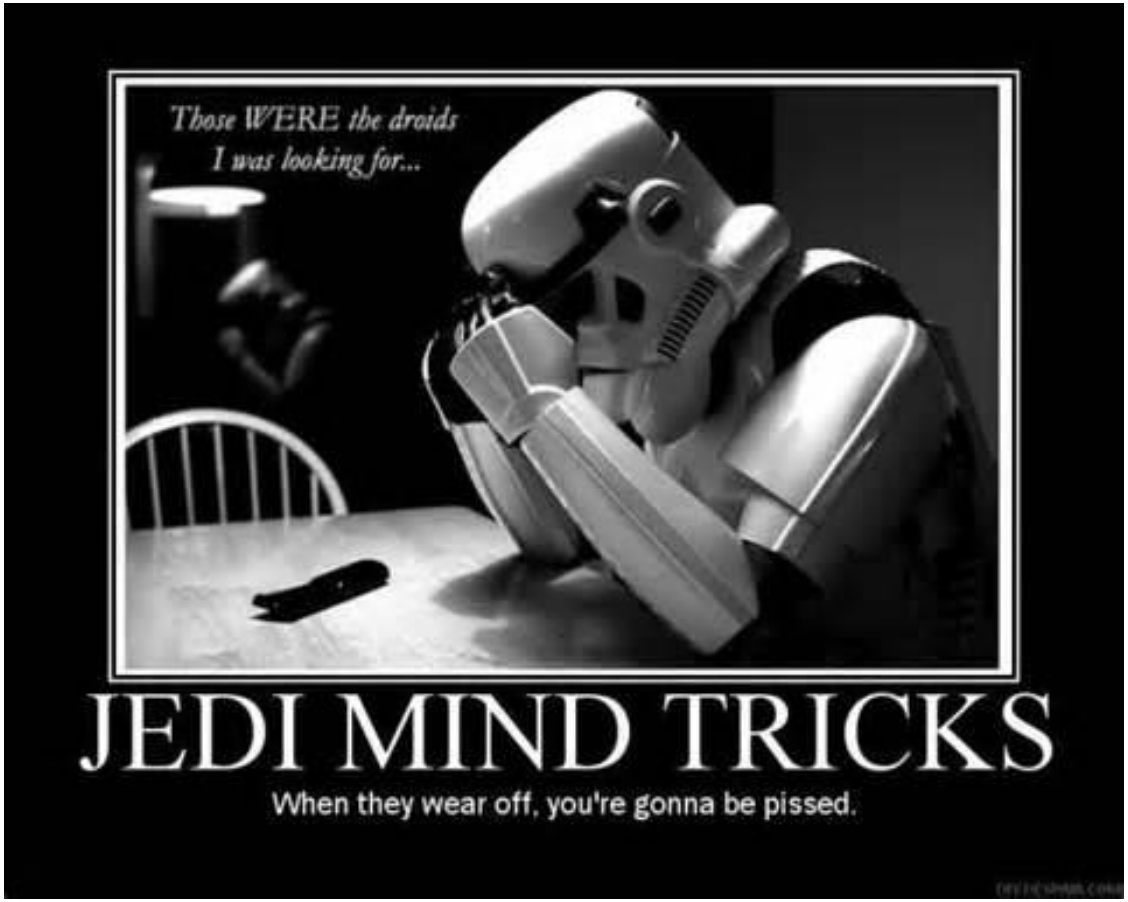
- GSHPs – include the ground loop efficiency



  - To use REM Well screen for ground loop model, use entry from GSHP library
  - To use vendor-calculated seasonal efficiencies, use entries from heating-only & cooling-only libraries
    - Check the Help for these libraries re: GSHP modeling
  - REM model has fixed assumptions regarding soil characteristics

TRICKS

- Equation Solver
- Tabs
- Docking Panes
- Reset Window Layout
- Default Building
- Window Rotation
- Registration



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- **Keyboard shortcuts**
  - Equation solver in fields
    - All numeric inputs
  - Using Tab key to speed entry
  - Using <alt> key to access menus

TRICKS

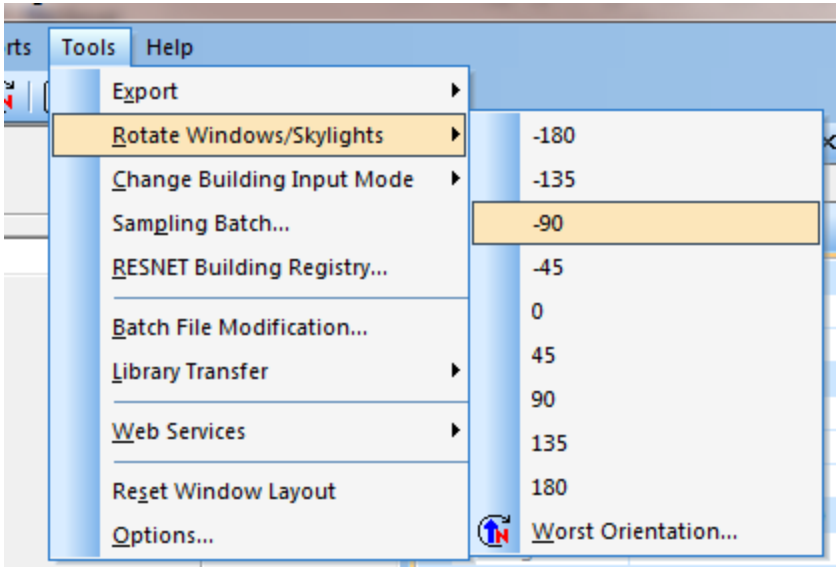
- **Docking Panes**
  - Windows for Quick Analysis and Errors/Warnings use docking

- **Reset Window Layout**
  - If Notes or Spreadsheet is moved off the screen, or can't find Errors/Warnings or Analysis panes
  - Brings back the default layout of REM/Rate
  - Under the Tools Menu

TRICKS

- **Default building**
  - On File menu
  - Lets you save/use partially filled out building
    - Your company name, etc.

Rotate windows/skylights



- Rotate manually
- Determine worst-case orientation
  - HERS score, energy costs, design loads

Web Services

- Registration
  - ID/PW must be exact, use copy/paste
  - Need to re-register annually or semi-annually to advance expiration date
  - Your Provider's expiration date can limit yours until she/he renews

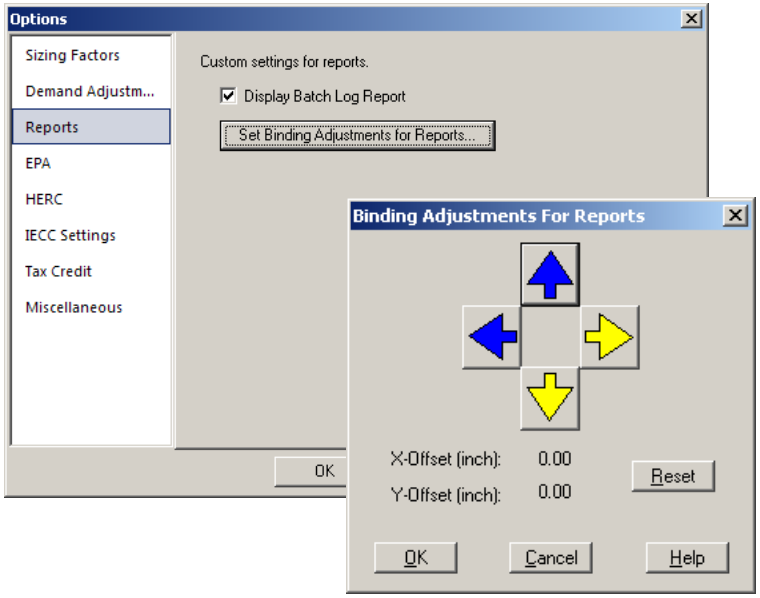
- Downloading print permissions
  - Also done during registration

OPTIONS DIALOG

- Binding Adjustments
- Home Energy Ratings
- IECC
- EPA / ENERGY STAR

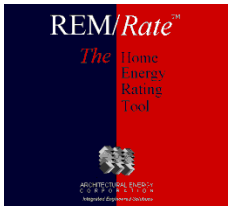
OPTIONS DIALOG - REPORTS

- **Binding adjustments**
  - Only applies to the Old Reports tool
  - Slides text over on printed reports to allow for binding

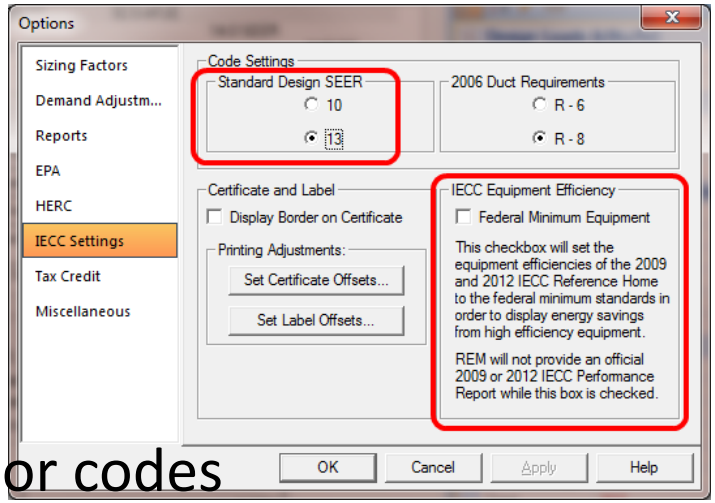


OPTIONS DIALOG - HERC

- **Home energy rating certificate**
  - HERS provider address
    - Appears in lower right corner
  - Criteria program check
    - Check if home meets energy codes imbedded in software
  - Disable regional criteria screen
    - Add program/regional criteria, check manually
  - Add signature line to report
    - For rater/provider to sign



OPTIONS DIALOG - IECC

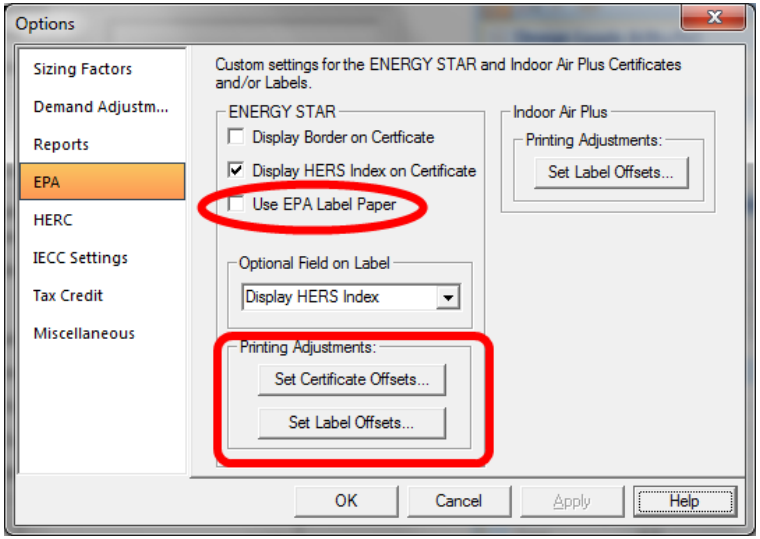


IECC Toggles

- Standard Design SEER
  - Applies only to 2003 and prior codes
  - Set to SEER 10 or 13, shows on reports

- IECC Equipment Efficiency
  - Uses Federal minimum equipment efficiency for 2009 & 2012 IECC reference homes
  - 2009 & 2012 IECC Performance Reports are unofficial when this checkbox is marked

OPTIONS DIALOG - EPA

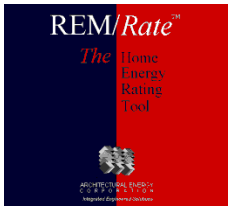


ENERGY STAR certificate

- Include border on certificate
- Add rating score to certificate/label
- Checkbox to use EPA Label Paper with New Reports
- Adjust printing offset for label (New or Old Reports)
  - All other printing adjustments apply only to Old Reports !

DISCUSSION – REM/*RATE* CLOUD

- **Next Steps:**
  - REM/*Rate* Cloud – Summer of 2014
  - New engine possibilities
  - RESNET ANSI Standard 301
  - New features we have been drooling over
    - New GSHP Ground Loop Analytical Solution
    - Add mini-split heat pump routine/library
    - Remove Integrated HTG/DWH library
    - RESNET Chapter 8
    - What do you want/need?



Q & A

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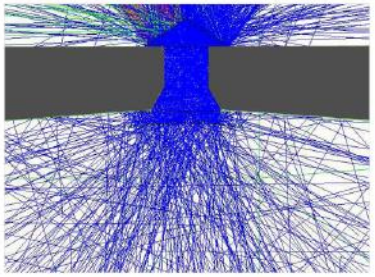
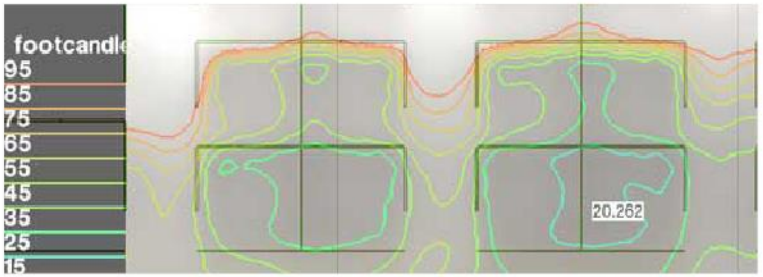
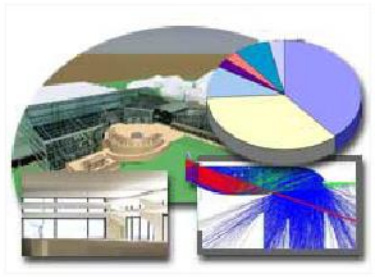
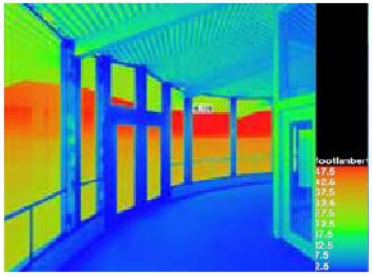
The Home Energy Rating Tool

PLASTIC

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