CUAC Training

Introduction

Nehemiah Stone
Benningfield Group, Inc.
Principal

Agenda – Full Session

9:00 - 10:30   Basic Intro

10:30 – 11:00   EnergyPro & MICROPAS analysis **specifics** for CUAC runs

11:00 - 11:15   Q&A and Break

11:15 - 12:45   CUAC
- Input details
- Documentation and Verification – what's expected by TCAC

12:45 - 1:15   Q&A

1:15 - 1:30   Next version (what's not already been covered) & Wrap-up

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Morning Agenda

9:00 - 10:30   Basic Intro

- UAs for LIHTCs

- CUAC basic functionality

- Preparing inputs, especially EP and MP (basic)

10:30 – 11:00   EnergyPro & MICROPAS analysis **specifics** for CUAC runs

- Two approaches
    - Weighted Averaging Worksheet
    - Adiabatic walls

- Understanding the outputs

- Inputs: Plans, specifications, HERS reports, etc.

11:00 - 11:15   Q&A and Break

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Introduction

- Benningfield Group
- Nehemiah
- Adrian

Format for Training

- The first section (~1.5 hours) is introductory; e.g., *redundant* to energy consultants already familiar with CUAC
- Developers are not energy consultants
- Energy consultants are not developers
- Consultants may be experienced with CUAC, ***or not***

Background

- Utility allowance purpose
  - Not originally for determining LIHTC rents
    - PHAs develop and use them for public housing and Section 8 vouchers
    - Based on their older housing stock
  - When applied to LIHTC projects, PHAs' utility allowance schedules over-estimate tenants' energy use
  - Shrinking rents

Rent Calculation

- Per IRS, tenants ought to pay ~30% of monthly income for "gross rent"

- Gross Rent = Rent + Estimated Utilities

- Utility allowance = "what a reasonably conservative household would use"

Problems with PHAs' UA

- In California, the mean age of the housing stock for which a PHA's UA schedule is developed is 28 years

- The stock is not 15% better than Title 24

- …actually, it's not usually **even close** to **meeting** Title 24

- TCAC projects will be **at least** 15% **better** than current code

Evolution of UAs

- Riverside County: In 1999, the 1st CA PHA to adopt an energy efficiency-based utility allowance schedule (EEBUA)

- ~Two dozen other PHAs followed suit over past ten years

- 2006: CEC's Affordable Housing Advisory Group listed "Project Specific UA" as the #1 step needed to encourage more use of PV by affordable housing developers

Evolution of UAs (cont)

- 2007: CEC/KEMA contract to develop project specific UA tool

- July 2008: IRS changes regulations and allows developers to use a "consumption based model" for estimating UAs for LIHTC projects

- November 2008:   CEC adopts California Utility Allowance Calculator (CUAC)

- January 2009: CTCAC adopts regulations specifying requirements for use of CUAC

Example

- The Smiths make $24k/year, or $2000/mo
- 30% = $600/month for Gross Rent
- Say PHA's UA schedule indicates UA ought to be $150/month
- That leaves $450/month for rent
- If the building is efficient, then UA ought to be, say $75/month, leaving $525/month for rent
- Better debt service for the incremental cost of the EE upgrades

CUAC's Role

- The CUAC provides a more accurate estimate of tenants' eventual utilities

- Based on engineering models

- It is project-specific

The 1st Round 2011 TCAC

- Will save 24 Million kBtu/year (19.6 Million kBtu/year for 9% projects and 4.4 Million kBtu/year for 4% projects)
- That is equivalent to
    - Over 191,000 gallons of gasoline
    - Annual total of all energy used by 21 people in U.S.
    - Annual heating energy for 122 average U.S. homes
    - Power from a 400 MW power plant for 2 ½ days (roughly all of Sacramento's electricity needs for 2 ½ days)

Using the CUAC

- Per TCAC's regulations:
  - User must be a certified energy plans examiner (CEPE) through CABEC
  - Must also be:
    - CA licensed electrical or mechanical engineer, or
    - HERS Rater certified through a HERS Provider recognized by the CEC
  - Not financially related to the developer

Process - Summary

- Gather project details

- Perform ACM analysis

- Perform CEC PV analysis if needed

- Enter data into CUAC

- Print out "Original" version for submission with application; sign it

- Include back-up documentation

Process

Developer provides CEPE with:

- Plans

- Specifications

- The original whole building ACM model

- And at *Placed In Service*:

  – HERS Rater reports

  – Bills of lading

  – Details on any changes

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CUAC Output Versions Sidebar

There are three times a CUAC analysis will be done, and they have different requirements:

- **Application** phase – "approximately right"
- **Placed In Service** phase – very right, and fully supported by documentation
- **Annual update** – re-run to catch utility tariff changes

Process

- Consultant:
  - Corrects any anomalies in the model, and splits it into separate models for each apartment type (e.g., 1 Bdrm, 2 Bdrm)
  - Uses ACM output as inputs to CUAC [NOTE: this is **not** the CF-1R]
  - Adds other CUAC inputs
    - Project data
    - Appliances
    - Lighting
    - CEC PV

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ACM Process Sidebar

Greater detail on this later

- Typical ACM run for T24 compliance or utility program requirements is whole building

- UAs must be calculated separately by apartment type (e.g., # of bedrooms)

- Whole building ACM run must be split

  – Weighted Averaging

  – Isolation of apartments of one type

Process (cont.)

Consultant

- Prints a "Draft" to review with developer

- Amends as needed

- Prints the "Original" to be submitted with the LIHTC application

- Works with TCAC staff and QC contractor on clarifications during their review(s)

Process (cont.)

- Work is reviewed by TCAC staff and QC contractor

- Project is constructed and measures verified
    NOTE: you **will** need a HERS Rater; don't wait

- For "Placed in Service" submittal:

  - If changes are made during construction, consultant updates CUAC analysis and prints a new "Original"

  - If no changes, consultant _can_ print an "Annual Update"

- Work is reviewed by TCAC and QC contractor

Developers need to Provide Consultant with:

- Plans and specs

- If not the original ACM consultant, a working ACM model

- HERS Rater reports

- Lighting and appliance details and proofs (e.g., bills of lading)

- Details on which utilities the tenants will pay

- Rate details: CARE?, VNM?, etc.

- Additional back-up docs as needed (e.g., description of site service for CARE sign-ups)

CUAC Output

- Schedule of UAs by apartment type in a format similar to the HUD form
- Signature lines for consultant and developer
- List of CUAC inputs
- Summary sheets for gas and electricity

Consultant is Responsible:

- To determine utility companies and utility sub-territories based on address

- To verify agreement between plans, specs, HERS Rater reports, ACM model, etc.

- To ensure ACM inputs and CUAC inputs are adequately supported with documentation

- To help address any questions raised during QC review

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Developer is Responsible for:

- Providing all the data the consultant needs for the ACM and CUAC inputs

- Providing documentation on specifications (including HERS Rater's reports)

- Employing a HERS Rater to verify proper installation of energy efficiency measures

- Helping to address any questions raised during QC review

Signatures

- Developer has to sign the CUAC form before submittal

- Consultant has to sign the CUAC form, and list:
  - her/his CEPC # ***and***
    - HERS Rater certification number *or*
    - CA Engineer's License #

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Definitions

- ACM – alternative compliance method; the computer programs approved by the CEC for building energy performance modeling

- CABEC – California Association of Building Energy Consultants

- CARE – California Alternate Rates for Energy; lower rates for low-income households

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Definitions

- HERS – home energy rating system; in CA, all HERS Providers (CHEERS, CalCERTS, CBPCA) must be approved by CEC

- HERS Rater – professional certified by a HERS Provider to perform HERS verifications

- LIHTC – Federal tax credits designed to foster construction of affordable housing (in California, there are state credits too)

Definitions

- NSHP – New Solar Home Partnership

- PHA – public housing agency; entity responsible for administering Section 8 vouchers and public housing

- Placed In Service – point in life of a LIHTC project when construction is done and tenants are moving in

- PV – photovoltaic system (panels and inverter)

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Definitions

- Section 8 Vouchers – housing choice vouchers; allow low-income households to rent decent housing with HUD, via local PHA, covering part of cost

- VNM – virtual net metering; billing mechanism that allows the economic benefits of a single solar photovoltaic system to be shared with multiple tenants.

Hopefully, it is 10:30

- End of first section
- What follows is more geared to experienced or somewhat experienced users

CUAC Training

Energy Modeling Process

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Principal

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Data Collection

- Getting familiar with the type of project, and the client's needs.

- What information is available and what do we need?

- Data collection worksheet

- HERS reports/bills of lading

Data Collection

- Data Collection Spreadsheet
C:\Users\Nehemia\Desktop\Data Collection sheet.xlsx

- This format allows the consultant to communicate to the developer what data (a) is still missing, but (b) is needed for the CUAC analysis

- Note that there are data that the Developer HAS to provide, data that the Consultant can get herself after obtaining a few details, and some that could go either way

ACM Preparation

- EnergyPro (any height) or MICROPAS (under 4 stories)

- Requesting energy model from client.

- Determine if it is usable

  - Basic model used for HVAC design vs.

    detailed model used for T-24

  - Number of apartment units

  - Number of HVAC & DHW systems

  - Labeling/orientation

  - Area (sq.ft.) of walls, windows, doors, zones, etc

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ACM Preparation

- ***Constructing*** an energy model (because it will often fall to you to **create** the model)
  - Identify the project and its layout
    - Apartment types
    - Parking garages/community rooms
    - Identifying wall layout
      - Conditioned space boundary
      - Other
    - HVAC system

ACM Preparation

- Constructing an energy model

  - Construction measures (default v. verified)
  - HERS reports
  - Appliance bills of lading
  - Windows/Doors
  - Water Heating system
  - Quick QA

Disaggregating the Whole Building Model

There are two ways to do this:

- Weighted averaging

- Adiabatic surfaces

  – Note: "adiabatic" means a condition in which heat does not enter or leave the system of concern. IOW, infinitely insulating.

Weighted Averaging

You need to use this method if there are too many buildings.

- Determine the number and description for each unique apartment situation
  - Vertical and horizontal position in the building(s)
  - Number of bedrooms
  - Other?

Example

- A 2-bdrm corner apt on the ground floor facing northeast has a different energy usage from:
  - Any 1-bdrm or 3-bdrm apt
  - Any apt on the top or middle floors
  - Any corner apt facing any other direction
  - Any apt not on a corner

Weighted Averaging Approach

- Build a model for each unique apartment description

- Enter all results in WA Worksheet

- [C:\Users\Nehemia\Desktop\WA Worksheet.xls](C:\Users\Nehemia\Desktop\WA Worksheet.xls)

Adiabatic Surfaces Approach

Works best if there are only 1-3 buildings, or if all buildings are alike

With a building that has, for example, 1-bdrm, 2-bdrm, and 3-bdrm apartments:

- Make a copy of the whole building model, and remove all spaces that are not 1-bdrm apartments

Adiabatic Surfaces Approach

- Wherever removing 2-bdrm, 3-bdrm, or common area spaces adjacent to a 1-bdrm apt, insert an adiabatic wall, floor, or ceiling, respectively.

Adiabatic Surfaces Approach

- Run the model and divide the results by the number of 1-bdrm apts to get the "per unit" energy usage

- Repeat the process for the 2-bdrm and 3-bdrm apartments

New Topic Coming Up

Any questions before next topic?

Output Energy Values

Regardless of whether you use the WA approach or the Adiabatic approach, you still have different forms in which you can use the output.

- TDV
- Econ 1
- CSV (comma separated values)

EnergyPro Results

- CF-1R, TDV Energy (kBtu/ft^2-yr)

PERFORMANCE CERTIFICATE: Residential				(Part 3 of 5)		CF-1R
Project Name *Residential Training Model*		Building Type	☑ Single Family ☐ Addition Alone ☐ Multi Family ☐ Existing+ Addition/Alteration			Date 11/1/2010

ANNUAL ENERGY USE SUMMARY

TDV (kBtu/ft^2-yr)	Standard	Proposed	Margin
Space Heating	15.20	15.94	-0.74
Space Cooling	15.19	20.84	-5.65
Fans	4.95	7.42	-2.48
Domestic Hot Water	20.88	11.65	9.23
Pumps	0.00	0.00	0.00
Totals	56.22	55.86	0.36
Percent Better Than Standard:		0.6 %	

BUILDING COMPLIES - NO HERS VERIFICATION REQUIRED

		Ext. Walls/Roof	Wall Area	Fenestration Area
Building Front Orientation:	(S) 180 deg			
Number of Dwelling Units:	1.00	(S)	397	30
Fuel Available at Site:	Natural Gas	(W)	401	56
Raised Floor Area:	0	(N)	370	40
Slab on Grade Area:	1,640	(E)	428	34
Average Ceiling Height:	9.0	Roof	1,640	0
Fenestration Average U-Factor:	0.34		TOTAL:	159
Average SHGC:	0.38		Fenestration/CFA Ratio:	9.7 %

- Not sufficient! Do *not* use these data!

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EnergyPro Results

- ECON-1 (kWh, Therms)

ENERGY USE AND COST SUMMARY										ECON-1
Project Name									Date	1/18/2011
Rate:							Fuel Type: Electricity			
	STANDARD			PROPOSED			MARGIN			
	Energy Use (kWh)	Peak Demand (kW)	Cost ($)	Energy Use (kWh)	Peak Demand (kW)	Cost ($)	Energy Use (kWh)	Peak Demand (kW)	Cost ($)	
Jan	9,961	218		14,303	212		-4,342	5		
Feb	8,208	201		12,717	221		-4,509	-20		
Mar	7,010	152		10,162	138		-3,152	13		
Apr	3,051	72		5,930	138		-2,879	-65		
May	1,727	102		4,347	173		-2,619	-72		
Jun	3,561	112		8,063	175		-4,502	-63		
Jul	8,371	108		17,286	171		-8,915	-63		
Aug	7,509	125		15,644	183		-8,135	-58		
Sep	7,485	136		15,644	212		-8,158	-76		
Oct	3,780	106		8,872	162		-5,092	-56		
Nov	4,689	165		8,053	177		-3,364	-12		
Dec	9,773	211		13,989	231		-4,215	-21		
Year	75,126	218		135,008	231		-59,882	-14		

- One acceptable way to get CUAC input values

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ECON 1

- Aggregated kWh and therms values across all end uses

- Separating, for example, gas water heating from gas DHW energy
  - Note: this does not **always** matter.

- If there are anomalous results, it may be difficult to find, or even see them

ACM Results - CSVs

- "CSV"s
- 8,760 hourly values
- For each end use:
  - Heating
  - Cooling
  - Fans
  - Pumps
  - Water heating
- Ignore:
  - Lighting
  - Process
  - Plug loads

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ACM Results - CSVs

Advantages of using CSVs

- More accurate separation of end-use energy in months with an overlap

- Easier trouble-shooting when end results just don't look right

Disadvantage of using CSVs

- More complex

- Requires creation of additional spreadsheet

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EnergyPro Results - CSV Summary

- "CSV"'s into an Excel Worksheet

	Elec Heat w/Fan Energy Btu	Elec Cool w/Fan Energy Btu	Elec Heat kWh	Elec Cool kWh	Elec Heat/Unit kWh	Elec Cool/Unit kWh
Jan	119,517.00	980,946.00	35.03	287.47	4.38	35.93
Feb	10,626.00	1,491,802.00	3.11	437.18	0.39	54.65
Mar	13,147.00	1,634,006.00	3.85	478.86	0.48	59.86
Apr	1,032.00	3,200,610.00	0.30	937.96	0.04	117.25
May	-	4,511,265.00	-	1,322.06	-	165.26
June	-	5,994,112.00	-	1,756.62	-	219.58
July	-	8,575,822.00	-	2,513.21	-	314.15
Aug	-	7,721,808.00	-	2,262.93	-	282.87
Sep	-	7,115,606.00	-	2,085.28	-	260.66
Oct	-	4,318,424.00	-	1,265.55	-	158.19
Nov	27,703.00	1,139,221.00	8.12	333.86	1.01	41.73
Dec	222,761.00	491,493.00	65.28	144.04	8.16	18.00
	394,786	47,175,115				

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Summary

- Two ACM programs
  - EnergyPro
  - MICROPAS
- Two approaches to separating different apartment types
  - Weighted averaging
  - Adiabatic surfaces

- Two acceptable ways to get energy use values:
  - ECON 1 aggregated by fuel and month
  - CSVs disaggregated by end use and hour of the year

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Hopefully, It's 11:00

- Time for a few Questions (and perhaps fewer answers)
- …and then break until 11:15

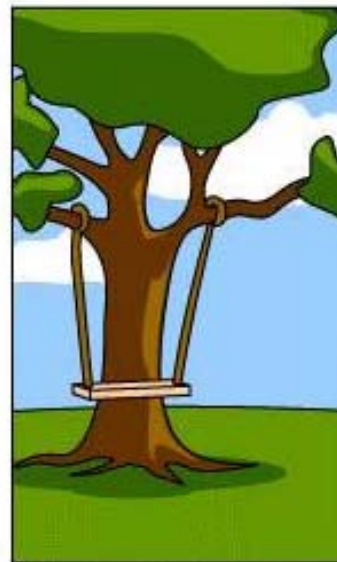# CUAC Training

CUAC Analysis Process

Nehemiah Stone
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Principal

Introduction

- I designed the CUAC so I know what it is supposed to do

- Several people who use it fairly regularly can speak as well as I on what it actually does

- Adrian is leading a project to rewrite it so that it does what we want it to do

How the customer explained it
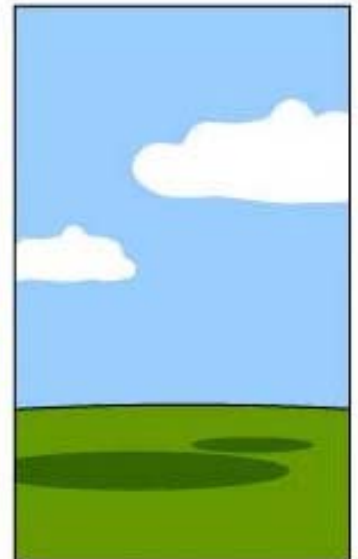
How the Project Leader understood it

How the Analyst designed it

How the Programmer wrote it

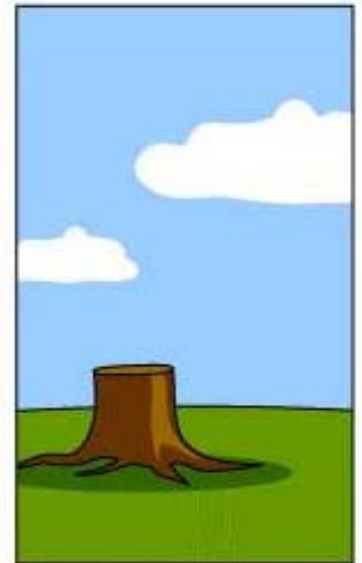How the Business Consultant described it

How the project was documented

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What operations installed

How the customer was billed

How it was supported

What the customer really needed

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Afternoon Agenda (starting late morning)

11:15 - 12:45   CUAC
- Input details
  - From EPro & MP
  - Plans & specs
  - Other
  - Use and assumptions
- Documentation and Verification – what's expected by TCAC
  - Application Phase
  - Placed In Service Phase

12:45 - 1:15   Q&A

1:15 - 1:30   Next CUAC version & Wrap-up

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Downloading the CUAC

Download the calculator directly to your hard (C:) drive. Latest version of the CUAC is available here: www.gosolarcalifornia.org/affordable_housing/cuac.html

- There are two parts to download: the program itself, and the look-up tables (together in a ZIP file).

- Download both of these to the <u>same</u> folder on your hard drive. Otherwise, you will not be able to open the program.

- When the CEC updates the look-up tables (utility tariffs), you download the ZIP file and extract just the new look-up tables.

Other Things You Need to Know

- Upon opening, you must enable the macros.

"**Security Warning**: Certain content in the database has been disabled."

Click on "**Options**," and then click on "Enable this content"

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You Cannot Use the CUAC if:

- You cannot separate owner's costs and tenants' costs from the ACM results. Examples:

  - Two or four pipe fan coil systems; owner supplies hot and/or cold water in a loop, but tenant pays for fan coil energy

  - Individual water-source heat pumps supplied with chilled or heated water from a central plant

- You are not CABEC certified as a CEPE

- You are neither a CA licensed engineer nor a HERS Rater through a CEC approved HERS Provider (i.e., CHEERS, CalCERTS, CBPCA)

Other Things You Need to Know

- DO **NOT** click on "Save" or "Save As!" in the "File" menu! Doing so will **destroy** your copy of the CUAC.

- Use the "QC and Save" button on the top of the program pages to save your work. Do this before going to the next tab.

UTILITY Allowance Calculation

Tool Version: 12/22/2010
Lookup Table Version: 12:00:00 AM

QC and Save

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Temporary End of live PPT presentation

- The rest of the slides are notes for accessing the training later.

- At this point, we will switch to the CUAC itself.

Getting Started

- Click "Start New"

- Name your new project

- Click "Copy to this Project"

- In the "Copy From" box, browse to find a similar project from which to "build" yours

- The "Copy To" box should already have the name of your new project; if it doesn't, you forgot to name your project.

- Go thru pages sequentially, or some calcs will be wrong.

Project Info Tab

- Details on this page do not affect calculations

- Ensure accurate data so that the QC agent can verify that the CUAC analysis matches the rest of the project application documents

- Include APN

- Hit "QC and Save" before going to next screen

Affordable Housing and Other Data

• Check off "Affordable Housing." This is a bit of a "duh" moment. If your project is not affordable housing, why would you be using the CUAC?

• "Instructions" gives you rough guidance; "Cancel" means "return" from the instructions page.

Utility Info Tab

- Not all utilities -- watch for problems with mismatch (no safeguard to keep you from choosing the wrong one)

- Only utilities that will be paid by tenant

- Do not select CARE unless all tenants will qualify and owner will provide on-site service to help tenants sign up for CARE rate

- Meaning of "territory"
  - Standard
  - Electric (for *all-electric* homes)

- Water Rates – two types (no way to vary rate by bedroom type)

Apartment Details Tab

- Adding apartment types
- High-efficacy lighting. This means **_All_** high efficacy
- Edit room types – caution!
- Yellow – can't edit
- Green – you *can (doesn't mean "you should")*
  - Edit number of baths, dining, living, laundry
  - Edit water usage ONLY if you have bullet-proof research data to justify your change

ACM Cooling Tab

- Does it match the ACM run (note: "ACM" = computer program)

- One line for each apt type (by # of bedrooms)

- Note that input values are kWh, not kBtu

- When cooling system energy costs are shared by tenants and owner (e.g., individual water source heat pumps with central chiller), you cannot use the CUAC

ACM Heating Tab

- Input values from worksheets based on the ACM runs

- Use kWh for electric heating and kBtu for gas heating

- When heating system energy costs are shared by tenants and owner (e.g., 2 pipe fan coil systems with common boiler), you cannot use the CUAC

ACM DHW Tab

- Input values from worksheets based on the ACM runs

- Use kWh for electric DHW and kBtu for gas DHW

- If tenants do not pay for water heating, you do not need to do this sheet

Lighting Sheet

- Report only – note that all cells are Yellow

- Verification you should provide if checked "High Efficacy"

  - HERS Rater – not normally her job

  - Photos (recommend photos of **every** lamp in at least 3 apartments of every type)

- This doesn't make a lot of difference usually (generally less than $2/month per apt)

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Appliances Tab

- Are all supplied appliances shown?

- Note: if plans show in-unit washer and dryer **hook-ups**, and developer is not supplying them:

  1. You must check "Has Washer," and "Has Dryer"

  2. You cannot check "Washer is ENERGY STAR"

  3. And there is an electrical outlet for the dryer, you must select "Electric" as the dryer fuel

- If developer **is** providing in-unit washers and dryers, use her/his details

Appliances Tab

- Are all appliances that show on the plans shown here? [in-unit appliances only]

- Are they ENERGY STAR?

- At Placed in Service phase, do not check "ENERGY STAR" if there is no verification (okay at application)

  - Bill of lading works best – with project address

  - HERS Rater verification (not part of HERS protocols)

- Note that "Has Refrig" should *always* be checked (possible exception for SROs)

CEC -- PV

- If PV is for common areas only, ignore it
- If PV is partly for tenant energy, indicate percentage that is for **common area**
- You do not need a separate line for each system
  - Despite the note at upper left, you only need 2 lines
  1. Gang together all systems that only serve tenant load
  2. Gang together all systems that serve tenant + common area load, and enter the percent of total that serves common load

Electric End-Use Summary Tab

- It is just a summary [How do you know this? All yellow.]

- Are values reasonable?

- If gas heating, cooking, or water heating, make sure values on this sheet are zero

- Remember to double check which appliances show up versus what's on plans

  - Check here, and

  - Check when looking at "Appliance" sheet

  - Belt and suspenders

Gas End-Use Summary Tab

- Are all gas and end-uses showing up?
    - Including Dryer, if plans show hook-up, even if owner is not supplying dryer [Trick question – if owner is not supplying dryer, it should show up on the "Electric End Use Summary" tab, not the "Gas End Use Summary"]
- Are there any showing up that shouldn't be there?

Back to PPT

- This is the point we return to *this* presentation

Print Buttons

- If everything looks good, click "Print Draft"

  - Anyone can do this
  - TCAC will not accept a sheet that says "Draft"

- Print Final (for LIHTC *Application* **or** *Placed In Service* (PIS))

  - Changes cannot be made after this is generated
  - If construction details change between the application phase and PIS (likely), run a **new** CUAC analysis, print the "Final" for that run, sign and submit it

- Print Annual – Print an "Annual Update":

  - For the PIS submittal if there were no changes during construction (rare)
  - For TCAC annual Compliance Verification (if no architectural or appliance changes were made after printing "Final")

Documentation to Submit

- Is different depending upon the phase of the project
  - Application
  - Placed In Service
  - Annual Update

Documentation at Application

- Plans that show correct number of units, layout of building, likely details

- Spec. book as needed to support assumptions in ACM model and CUAC

- CARE rate eligibility analysis, and owner's plan for helping tenants sign up

Documentation at Application

- CEC PV preliminary analysis (for tenant-serving PV)

- Contact information for developer's project manager and for the energy consultant

- Proof that consultant meets TCAC's requirements for certifications

Documentation at PIS

- Plans that show correct number of units, layout of building, window/door schedules, HVAC and DHW details, etc.

- Spec. book as needed to support detailed assumptions in ACM model and CUAC

- ACM reports (CF-1R, ECON-1, etc.)
    - Note that you will have to submit complete BLD files if your CUAC submittal is among those QC'd

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Documentation at PIS

- Documentation from serving utilities with rates and terms for water, sewer, and trash, if tenants pay

- Utility NSHP agreement if PV for tenants

- CEC PV analysis if PV for tenants

- Contact information for developer's project manager and for the energy consultant

- Proof that consultant meets TCAC's requirements for certifications

Documentation at PIS

- HERS Rater reports

  – Standard reports as noted in ACM

  – Certification of Energy Star appliances and lighting (one alternative)

- Bills of lading for appliances (other appliance alternative)

- Photos of substantial portion of lighting if "High Efficacy" checked (other lighting alternative to HERS Rater)

- CARE eligibility analysis and description of developer's program (site service) to help tenants sign up for CARE

Documentation, Annual Update

- If no energy-impacting changes to project:
  - "Annual Update" version of CUAC output
  - Proof that consultant meets TCAC's regulations for CUAC use
  - Letter from developer stating that construction details and appliances have not changed

- If changes were made that impact tenants' energy use:
  - Re-run CUAC with new design details
  - Provide support for new measures (e.g., new appliances, new PV system, new HVAC equipment)
  - Copy of CUAC output from previous design
  - Proof that consultant meets TCAC's regulations for CUAC use

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QC Effort Will Check for:

- Correct assumptions about appliances based on plans

- Correct use of WA worksheet or Adiabatic Surfaces approach

- Appropriate use of ACM output values

- Utility location and tariff choices

- Any changes to room configurations

QC Effort Will Check for:

- Accuracy of cooling, heating and DHW inputs to CUAC

- Consultant's qualifications

- Reports from appropriately qualified HERS Raters (e.g., PV verification from PV-qualified HERS Raters only)

- Current version of CUAC and lookup tables

Summary

- A good CUAC analysis starts with a quality ACM model
- Use defaults (T24 mins.)when you cannot document higher efficiency equipment
- Make conservative assumptions
- Check your work

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Questions?

LIHTC Questions
   Ammer Singh
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Ammer.Singh@treasurer.ca.gov

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More Questions?

CUAC Technical Questions
  Adrian Ownby, EC Specialist I

California Energy Commission

AOwnby@energy.state.ca.us

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Really? More Questions?

CUAC History & Some Tech Questions

Nehemiah Stone
  Principal

Benningfield Group Inc.
  nehemiah@benningfieldgroup.com

Useful Information

- "CUAC Submission Requirements" from TCAC web site

- 6/17/2011 report "Low Income Housing Tax Credits Projects and Energy Conservation; Utility Calculator Analysis: Policy Options" from the *WA State Housing Finance Commission* www.wshfc.org

- May 2011 report "Utility Allowance Options for Investments in Energy Efficiency: Resource Guide" from *Enterprise Green Communities*