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| **Updated:** | 2024-03-26 |
| **Prep. By:** | DNV Energy Insights |
| **On behalf of:** | CPUC |

DEER Building Prototypes in EnergyPlus: Frequently Asked Questions (FAQs)

##### Question: Should I auto-size or hard-size HVAC capacity?

Answer: When EnergyPlus auto-sized HVAC systems in the residential models they ended up smaller than Manual J sizing and much smaller than systems we see in installed homes. When we normalized the energy savings based on the capacity of the modeled systems and then applied it to the average capacity of installed systems the savings per cap-ton is overstated.

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| **Energy Plus Auto-size results -- In the 2010-12 QI evaluation Manual J calcs averaged 650 sq ft per ton in CZs 8-14. The SFm and most MFm cooling capacities sized by E+ serve more than double the floor area** | | | | | | | | | |
| Climate Zone | **AC SFm SF/ton cool capacity (one story)** | **AC MFm tons SF/ton cool capacity** | **AC Dmo SF/ton cool capacity** | **Gas Furnace SFm Btu/hr-SF (one story)** | **Gas Furnace MFm Btu/hr-SF** | **Gas Furnace DMo Btu/hr-SF** | **Heat Pump SFm Btu/hr-SF compressor heating capacity (one story)** | **Heat Pump MFm Btu/hr-SF compressor heating capacity** | **Heat Pump Dmo Btu/hr-SF compressor heating capacity** |
| 1 | 4080 | 4079 | 2259 | 7.6 | 7.4 | 13.8 | 2720 | 2724 | 1506 |
| 2 | 1542 | 1913 | 1093 | 15.7 | 12.7 | 22.4 | 1192 | 1422 | 833 |
| 3 | 1540 | 1930 | 1077 | 18.0 | 13.6 | 25.7 | 1441 | 1291 | 718 |
| 4 | 1481 | 1819 | 1112 | 16.4 | 12.8 | 22.3 | 1128 | 1361 | 829 |
| 5 | 1441 | 1960 | 1059 | 19.1 | 13.3 | 26.0 | 961 | 1306 | 706 |
| 6 | 1780 | 1969 | 1190 | 16.2 | 13.1 | 24.3 | 1186 | 1321 | 794 |
| 7 | 1456 | 1916 | 1010 | 20.3 | 12.2 | 29.5 | 993 | 1405 | 682 |
| 8 | 1380 | 1558 | 1007 | 20.3 | 15.1 | 27.6 | 991 | 1161 | 729 |
| 9 | 1026 | 1400 | 783 | 25.2 | 15.7 | 32.2 | 694 | 1046 | 544 |
| 10 | 2617 | 1390 | 951 | 7.6 | 14.9 | 21.9 | 2248 | 1143 | 777 |
| 11 | 2022 | 1184 | 703 | 10.8 | 20.3 | 32.0 | 1607 | 902 | 543 |
| 12 | 2524 | 1707 | 842 | 8.5 | 12.1 | 26.6 | 2067 | 1474 | 660 |
| 13 | 1831 | 979 | 746 | 11.4 | 23.0 | 29.9 | 1516 | 754 | 581 |
| 14 | 1937 | 1217 | 787 | 9.1 | 16.3 | 22.7 | 1654 | 1046 | 660 |
| 15 | 1453 | 929 | 594 | 13.7 | 22.8 | 34.4 | 1233 | 755 | 492 |
| 16 | 2987 | 1288 | 785 | 8.6 | 18.8 | 33.5 | 2071 | 876 | 534 |

To solve this problem for Residential building types we recommend a short term solution of using a 1.8 sizing factor and a longer term solution to study the sizing factor that should be used.

(Recommendation provided prior to 7/11/2025) For Commercial systems, given the time constraints to getting measure packages completed, and because real world installations are more likely to be engineered and therefore are less likely to be grossly oversized, we recommended to use the EnergyPlus functionality to perform a sizing run first using a sizing factor of 2.3 for cooling and 2.5 for heating.[[1]](#footnote-1) Then perform the Existing, Standard and Measure case runs.

(7/11/2025) For commercial models used for PY2026, we recommend using the EnergyPlus sizing functionality to perform a sizing run, applying a sizing factor of 1.15 for cooling and 1.25 for heating.

Another option, if your measure is sensitive to capacity, such as those expected to improve part load efficiency, you may hard-size the Existing, Standard and Measure case runs at some reasonable capacity larger than the auto-size result. Please provide documentation of your reasoning for the hard-size value chosen.

The following is an example cases file for performing an auto-size run and then using that capacity for additional runs.

Example:

| skip | case\_name | sizing\_case | :main\_hvac\_type | :main\_fan\_speed | :main\_dx\_comp\_speed | :main\_oa\_econ\_type |
| --- | --- | --- | --- | --- | --- | --- |
|  | default\_SZCV |  | SZ-CAV | CONSTANT | CONSTANT | |
|  | Eg1\_Econo | default\_SZCV | SZ-CAV | CONSTANT | CONSTANT | FIXED-DRY-BULB |

##### Question: How should I use the new heat pump water heater models posted to GitHub?

Answer: We will be using the SFm model (meaning the shell of the SFm - no HVAC or building type variations) to model all residential water heater measures going forward. The only measure packages that should use these new models are:

**SWWH014 – Heat Pump Water Heater, Residential**

**SWWH025 – Heat Pump Water Heater, Residential, Fuel Substitution**

The DEER team will parametrize the following characteristics so we can model multiple measures:

* Draw profiles. We will have SFm, MFm and DMo profiles. Currently only SFm draw profile exists.
* Tank volume
* Input/output capacity
* UEF: We will implement a conversion from UEF to COP in Modelkit
* System type: Gas or Elec only, HPWH, Tankless.
* Compressor and/or storage location

##### Question: Are there tools available to help me perform quality control review of EnergyPlus results?

Answer: DEER team produced comparison of baseline model consumption between MC3 and E+ across climate zones and building types. <https://cedars.sound-data.com/deer-resources/tools/energy-plus/resource/26/history>

Measure developers will work on quality control spreadsheet to look at measure savings changes between previous MC3 modeled measures and new E+ modeled measures.

Historic DEER team QC template located here: <https://cedars.sound-data.com/deer-resources/deer-database/deer-change-log/resource/68/history>

##### Question: How will the GitHub prototypes be versioned?

We will create a new version each time a pull request is merged. The version will follow this format: D(DEER Year)v(Current Year.Month.Day.xx) where xx increments from 00 to whatever number is needed to accommodate all the pull requests merged that day. (Example D26v2024.04.30.00) In the VersionSource please provide the version used for the branch and the version after the merge. Example entry in the VersionSource field, “Branch fork from D26v2024.03.29.00; Branch merge D26v.2024.05.05.02”. If the branch merge number is not available when the MP is submitted, please enter TBD. The DEER team will provide a comment with the branch merge number to be updated.

##### Question: I changed a parameter value in the cases folder, but when I run the simulation, the changes don't seem to be reflected in the composed IDF model. How does that happen?

Answer: To change a model parameter value in Modelkit, ensure first that the parameter is defined in the templates or root file. There are multiple ways to modify a parameter value in the IDF:

1. Change the default value in the template imported into the root file.
2. Modify the parameter value in the root file to override the default in the template.
3. Edit the value in the cohorts.csv.
4. Adjust the value in the cases folder.

It's important to note that these approaches have different priorities: Approach 4 will override values set by 3, approach 3 overrides values set by approach 2, and approach 2 overrides values set by approach 1.

Additionally, parameters that may be used by multiple systems or components typically have a prefix added to them when imported into the root file. To modify the parameter using approaches 3 and 4, the entire name with the prefix must be used.

##### Question: After cloning the repository and attempting simulations following the README instructions, the IDFs are composed successfully, but none run, resulting in missing \*.sql and \*.err files. The command line doesn't provide useful error messages. What might be causing this?

Answer: This issue is often caused by the path length to the composed IDF, as Windows has a [MAX\_PATH](https://learn.microsoft.com/en-us/windows/win32/fileio/maximum-file-path-limitation?tabs=registry) limit of 260 characters. We suggest storing the repository close to the C drive, for example: C:\Users\Your\_Name\DEER-Prototypes-EnergyPlus.

##### Question: What version of California Title-24 should be used as the baseline for PY2026 measure packages?

Answer: California Title-24 standards will be updated in fall of 2024 with an effective date 1/1/2026. Since the standards will not be finalized (Fall 2024) until after measure packages are due (June 2024), the standard baseline for PY2026 measures will have to rely on the draft 2025 T-24 standards to be trued up after the 2005 T-24 standards are finalized.

Draft 2025 T-24 standard are here <https://efiling.energy.ca.gov/GetDocument.aspx?tn=252915&DocumentContentId=88051>

##### Question: Can we be very clear about which files should be saved and where?

Answer: Save the following files on GitHub:

* Inputs: Prototype root, all template files, cohort, climate, cases files; Make minimal changes to root file; use templates and parameterization instead.
* Outputs: Do not save any output files in GitHub.

Save the following files on eTRM:

* Inputs: Same files as in GitHub. Just zip the entire GitHub folder excluding the weather files. This will include all prototype root, template, cohort, climate, and case files; Make minimal changes to root file; use templates and parameterization instead.
* Outputs: Summary, gas, and electric files

##### Question: Where should hourly results be stored?

Answer: Do not save hourly results. The DEER database currently set up in which to store them can only be written to by the DEER team. Since everything will be set up to run in GitHub we can re-run the simulations later if we want to save hourly results.

##### Question: What updates can I expect for the post processing scripts?

Answer: The post processing scripts will be updated in two areas:

1. We have reduced the number of vintages to two: New and Existing. All the vintages currently rolled up into Old, Existing and Recent eras will be condensed into one Existing building model. The differences between the current vintages are all contained within the code file. Instead of modeling each vintage with the code file envelope parameters and weighting the results in post processing, we will weight the envelope parameters and run just one existing building model.
2. The post processing scripts will output results in a format that can be directly uploaded to eTRM.

##### Question: How does one modify an HVAC system parameter?

Answer: Should you wish to modify a specific parameter or HVAC system, you'll need to locate the parameter that activates the desired system and add them to the CSV files in the cases folder. The platform already contains templates for common HVAC systems that you can select from. Modifying the default system requires some familiarity with how Modelkit works. By identifying and tracking specific parameters (such as hvac\_type, cool\_coil\_type, heat\_coil\_type, etc.), you can determine the steps needed to update system defaults.

##### Question: How does one modify an HVAC performance curve?

Answer: ***Note that development of new performance curves will require clear documentation reviewed by the DEER team.*** In [this template](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgithub.com%2Fsound-data%2FDEER-Prototypes-EnergyPlus%2Fblob%2Fmain%2Ftemplates%2Fenergyplus%2Ftemplates%2Fsystem%2Funitary.pxt&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Ce50b4db88419468057e108dc2c037a63%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638433640652732306%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=s%2Bu86up92Ehk0P9l3qB1SlMdtWCB7xAgk8VAW2YWb8Q%3D&reserved=0) you will find all the modeled heat pump systems, except VRF, including performance curves and their sources. However, the available curves don't specifically model VCHP for residential applications. To incorporate VCHP systems, you need to add specific objects ([cooling](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbigladdersoftware.com%2Fepx%2Fdocs%2F22-1%2Finput-output-reference%2Fgroup-heating-and-cooling-coils.html%23coilcoolingdxvariablespeed&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Ce50b4db88419468057e108dc2c037a63%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638433640652742557%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=oOVbqFVGt6NzvX4NSIz00XtwpDMeMnvpZGVfPbdcMVo%3D&reserved=0), [heating](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbigladdersoftware.com%2Fepx%2Fdocs%2F22-1%2Finput-output-reference%2Fgroup-heating-and-cooling-coils.html%23coilheatingdxvariablespeed&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Ce50b4db88419468057e108dc2c037a63%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638433640652750364%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=n7aPUf3F5tsMWd273jowLpGfKKaN%2B9ZYSIXdgH0R%2BaE%3D&reserved=0)) to the template along with the corresponding curves. Here’s an example of a [coil](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgithub.com%2Fsound-data%2FDEER-Prototypes-EnergyPlus%2Fblob%2F13c041af2b2ba14efaa86dc351ac35fddc8b4798%2Ftemplates%2Fenergyplus%2Ftemplates%2Fsystem%2Funitary.pxt%23L311&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Ce50b4db88419468057e108dc2c037a63%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638433640652756881%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=k8zchd%2BW%2Bqs0PanLJClUFGiBo%2BjMV%2B%2B6sbKmzsgawCY%3D&reserved=0) and one of its [curve](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgithub.com%2Fsound-data%2FDEER-Prototypes-EnergyPlus%2Fblob%2F13c041af2b2ba14efaa86dc351ac35fddc8b4798%2Ftemplates%2Fenergyplus%2Ftemplates%2Fsystem%2Funitary.pxt%23L1982C3-L1982C38&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Ce50b4db88419468057e108dc2c037a63%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638433640652763335%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=m4k9Jx0exAf%2FELNI2OtU0XqycR1qvO1t98xbvLHkuxI%3D&reserved=0)s. You can either create a new parameter (or more) or utilize an existing one (e.g., *dx\_comp\_speed*) to activate the VCHP choice as needed. Additionally, I'd like to share a [resource](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgithub.com%2Fbigladder%2Fresdx%2Fblob%2Fmain%2Fexamples%2Fneep-examples.py&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Ce50b4db88419468057e108dc2c037a63%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638433640652769580%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=UgeVGr%2BajFh74PD1ZAxt0e12BzD00RXzGZAEO1KdfuE%3D&reserved=0) developed by Big Ladder that converts NEEP’s cold climate HP data to EnergyPlus performance curves or tables, which might be of interest to you.

Once you've added and parameterized the objects, users can define the system using parameters like *cool\_coil\_type*, *heat\_coil\_type*, *dx\_type*, *dx\_comp\_speed*, or any other relevant parameter in the cases folder. This defined system will then be added to a prototype model of their choice. Keep in mind that making modifications to the templates and root files requires a certain familiarity with both EnergyPlus and Modelkit. New parameters introduced in a template should be passed to the root file where the template is referenced using the command ‘*insert’*. We suggest examining existing templates and root files to understand how they are connected. Once the development process is complete, you can submit a pull request on GitHub to merge your changes into the main repository. We welcome any relevant feature additions or bug fixes.

##### Question: Should I parametrize added features such as a new system, performance curves, etc.?

Answer: Yes, contributors are expected to parameterize added features when necessary. For instance, if you add a new system, you are expected to parameterize its inputs and create a system name that users can use to swap systems.

##### Question: What are the DEER prototype descriptions of Fin, Lib, Rel, and SUn?

Answer: Financial (Fin), Library (Lib) and Religious (Rel) are new building types, only documented in [CalBEM documentation](https://calbem-benchmarking.com/docs/building-energy-models/non-residential/hvac/). They will be formally added to DEER in the next DEER Resolution. They are available building type types (<https://www.caetrm.com/cpuc/table/buildingtype/>) with DEER Building Flag set to False because they do not have building weights are are not included as part of the Com weighted building type. This will change when we update the commercial building weights.

Storage – Unconditioned (SUn) is an unconditioned warehouse facility already existing in DEER. Detailed descriptions of the DEER building types are in Appendix C of the DEER Prototype System User Guide on [CEDARS](https://cedars.sound-data.com/deer-resources/tools/energy-plus/).

##### Question: How do I convert SEER and HSPF to COP for the DEER prototype?

Answer: Please use the following “no-fan” equations to convert from SEER or HSPF to COP for one or two speed packaged rooftop units (cited on page 211 in ASHRAE 90.1 2022). These equations may also be used for split systems. These formulas are also referenced in Open Studio’s Prototype.utilities.rb support files ([link](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgithub.com%2FNREL%2Fopenstudio-standards%2Fblob%2F91e20752eccbd630bada530438df6cafcb4c297c%2Flib%2Fopenstudio-standards%2Fprototypes%2Fcommon%2Fobjects%2FPrototype.utilities.rb%23L282&data=05%7C02%7CmbxDeerSupport%40dnv.com%7Cefce1bbe3d2241844c9a08dc324aae41%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638440543553230688%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=OfLpXPZsRDeMVb6yymUz%2FBLHX6s21JiTGdP%2Fm%2F7Zl5c%3D&reserved=0)). . As described in this Big Ladder article ([link](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fbigladdersoftware.com%2Fepx%2Fdocs%2F9-3%2Finput-output-reference%2Fgroup-coil-cooling-dx.html%23field-gross-rated-cooling-cop&data=05%7C02%7CmbxDeerSupport%40dnv.com%7Cefce1bbe3d2241844c9a08dc324aae41%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638440543553219894%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=h0DtPM6xK7NGGWnhU91rEWFtI9hHPz5%2BOj1gID913pA%3D&reserved=0)) the COP should only represent the compressor/condenser fan, not the supply fan power.

Cooling COP = −0.0076 × SEER² + 0.3796 × SEER (applies to cooling efficiency only)

Heating COP = -0.0296 x HSPF² + 0.7134 x HSPF (applies to heating efficiency only)

Use the following ratios developed by FSEC to convert from SEER2 to SEER and HSPF2 to HSPF. (Source: <https://support.energygauge.com/support/solutions/articles/12000091241-modeling-of-seer2-hspf2-and-how-it-compares-to-seer-hspf>)

| Equipment Type | SEER2/SEER | HSPF2/HSPF |
| --- | --- | --- |
| Split System | 0.95 | 0.85 |
| Single Package | 0.96 | 0.84 |
| Small Duct Hight Velocity | 1.00 | 0.85 |
| Space Constrained | 0.99 | 0.85 |

##### Question: How do I convert EER to COP for the DEER prototype?

Answer: From previous question, similar formulas are provided on page 211 in ASHRAE 90.1 2022 ([link](https://ashrae.iwrapper.com/ASHRAE_PREVIEW_ONLY_STANDARDS/STD_90.1_2022_IP), page 213 in the linked document), with additional input of AHRI-rated cooling capacity Q in Btu/h.

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System type # descriptions are described on Table G3.1.1-4 in the same document (page 325)

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##### Question: How do I convert UEF to COP for the DEER prototype?

Answer: Please use the following equation to convert from UEF to COP for water heaters.



This formula was derived using the following assumptions from AHRI and EnergySTAR information:

Conversion of UEF to EF using the following equation from: [https://energy.gov/sites/prod/files/2016/12/f34/WH\_Conversion\_Final%20Rule.pdf](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fenergy.gov%2Fsites%2Fprod%2Ffiles%2F2016%2F12%2Ff34%2FWH_Conversion_Final%2520Rule.pdf&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Cb8ae536462bb48ed70d008dc34af774b%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638443175428652152%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=g3gC1J5tk19ILcHXPoFjUSiPZvUnp4i3aPTUhx0oJis%3D&reserved=0)

UEF = 0.1513 + 0.8407 \* EF + 0.0043 \* DV, where

DV (daily hot water Volume in gallons, DOE UEF tests) = 10 (VS, very small draw), 38 (LW, low draw), 55 (MD. Medium draw), or 84 (HI, high draw)

EF to COP formula is derived from a 2016 field performance study [https://www.nrel.gov/docs/fy16osti/64904.pdf](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.nrel.gov%2Fdocs%2Ffy16osti%2F64904.pdf&data=05%7C02%7CJennifer.McWilliams%40dnv.com%7Cb8ae536462bb48ed70d008dc34af774b%7Cadf10e2bb6e941d6be2fc12bb566019c%7C0%7C0%7C638443175428658691%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=CQB19BEu4pV5IyRAiWES8DSMYnczRqbKcpLflPxGPwY%3D&reserved=0)

COP = EF \* (2.6 - 0.0133 \* Ttank), where

Ttank = tank temperature set point

##### Question: I have noticed errors when running some of the prototypes in default. For example, the OfS, 2023, CZ01 gives the errors below. The simulation does run successfully. However I want to check whether there’s anything wrong with my configuration of ModelKit that’s causing these errors, or are they are expected?

Answer: You can ignore Modelkit error messages such as ‘Error: unknown key 'xxx' for parameter in import for ‘xxxx'; it will be ignored in the template’ or ‘Error: Undefined parameter specified (xxx); parameter ignored’. Some parameters are defined but not used, and this is what causes them to appear. We will, at some point, remove the unused ones.

##### Question: Do I need to define the COP of the DX cooling coil by myself for the baseline models or DEER templates will create it automatically? For example, if the building vintage is 2007 which version of Title 24 needs to be used for the baseline DX cooling coil efficiency?

Answer: In the residential models we updated the *existing* baseline heating and cooling efficiency to be consistent with T-24 code that would have been in place in 2009. Our logic is that based on the EUL of HVAC equipment (15 years) the average system in 2024 would be 15 years old. These *existing* baselines need to be updated for each DEER cycle, so for PY2026 measure packages the baseline would use the efficiency that would have been required by T-24 or federal code in 2011. Those *existing* baselines will only be used when appropriate such as for a first baseline of an AR measure. *Standard* baseline equipment should be aligned to the year the measure package will be used, so measures developed for use in PY2026 should use *standard* baseline equipment consistent with state and federal code that will be in effect in 2026. All the rules about when to use existing baseline versus standard baseline are set by CPUC policy documents and described in the Statewide Rulebook v5.0.

##### Question: What are the available HVAC weights (for cWtd) for commercial measures?

Answer: Commercial building prototypes are not permutated with different HVAC types like the Residential models.

HVAC weights are only applicable to these measureIDs:

Com-ILtg-HB-dWatt

Com-ILtg-HW-dWatt

Com-ILtg-HW-dWatt-kL

Com-ILtg-SI-dWatt

NE-HVAC-airAC-SpltPkg-240to759kBtuh-10p8eer

NE-HVAC-airAC-SpltPkg-240to759kBtuh-11p5eer

NE-HVAC-airAC-SpltPkg-240to759kBtuh-12p5eer

##### Question: Why is the EnergyPlus sizing factor so large in residential models?

When EnergyPlus auto-sized HVAC systems in the residential models they ended up right-sized and hence much smaller than systems we see in installed homes. When we normalized the energy savings based on the capacity of the modeled systems and then applied it to the average capacity of installed systems the savings per cap-ton is overstated. Because of this, we used a very large oversizing factor. ASHRAE 90.1 Appendix G3.1.2.2 states that the installed equipment should be oversized by a factor of 1.25 for heating and 1.15 for cooling above modelled capacity. In the residential models we used an oversize factor of 1.8 and still had system capacities smaller than those observed in program data for real homes.

To side-step the capacity issue, we changed the normalizing unit from cap-tons to floor area. However this creates a problem for upstream programs where the installed floor area served by the equipment is unknown so we developed a rule of thumb to convert from floor area to cap-tons for SEER-rated equipment. [This file](https://cedars.sound-data.com/deer-resources/deer-database/deer-change-log/file/2980/download) documents the rule of thumb used in California to size residential heating and cooling systems (545 sq ft per ton cooling and 588 sq ft per 20,000 Btuh heating), and shows that it is consistent with the capacities used in the DOE2 residential prototype models.

Going forward we will retain the cap-ton normalizing unit and adjust the capacity in the post processing scripts. See “Question: Should I auto-size or hard-size HVAC capacity in DEER models?

1. These numbers are based on the 190% overall average E+ under-sizing from Roger’s analysis, the solution at this time is to round 1.9 to 2 and apply a sizing factor of 2.3 (1.15\*2) for cooling and 2.5 (1.25\*2) for heating. This is an interim solution for PY2026 measures until we have a better solution for the PY2028 update. Futee is performing some research for the next cycle comparing sizing to CALBem, MC3, CBEC models from T-24 code cycle. [↑](#footnote-ref-1)