DOCKETED	
Docket Number:	21-BSTD-01
Project Title:	2022 Energy Code Update Rulemaking
TN #:	240698
Document Title:	Final Express Terms for the Proposed Revisions to the 2022 Energy Code ACM Approval Manual
Description:	N/A
Filer:	Javier Perez
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/23/2021 10:42:41 AM
Docketed Date:	11/23/2021

Alternative Calculation Method Approval Manual (~~2019~~2020)
Cover Page

Building Standards
Efficiency Division

CALIFORNIA
ENERGY COMMISSION

~~Robert B. Weisenmiller, Ph.D.~~
Chair

Commissioners
~~Karen Douglas, J.D.~~
~~Andrew McAllister~~
~~David Hochschild~~
~~Janea A. Scott~~

~~Dee Anne Ross~~
~~Peter Strait~~
Project Managers

~~Christopher Meyer~~
Manager
Building Standards Office

~~David Ashuckian, P.E~~.
Deputy Director
Efficiency Division

Drew Bohan
Executive Director

ABSTRACT

This manual explains the requirements for approval of Alternative Calculation Methods (ACMs), which include compliance software. Compliance software is used to demonstrate compliance with the performance approach to the ~~2019~~ 2022 Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Standards). The residential requirements of this document apply to buildings covered by the low-rise residential provisions of the Standards. All building types other than low-rise residential that are within the scope of the Standards are covered by the nonresidential requirements of this document.

The approval procedure for ACM compliance software is one of self-testing and self-certification by the software vendor. The vendor conducts the specified tests, evaluates the results and certifies in writing that the compliance software passes the tests. The California Energy Commission performs spot checks and can require additional tests to verify that the proposed compliance software is suitable for compliance purposes. The vendor is required to develop a user manual explaining how to use the program to show compliance with the Standards. The user manual must include a tutorial, user guidance for each program input, and an index. The manual is checked by the Energy Commission for accuracy and ease of use.

Open source compliance software developed by the Energy Commission, called the Compliance Manager in this document, is made available at no cost to potential compliance software vendors, and is created and approved by the Energy Commission following the specifications of this Manual. The ACM tests submitted by the vendor either confirm and document that the Compliance Manager is successfully integrated into the vendor software, or demonstrate that the vendor software accurately achieves the same results as the Energy Commission's software.

Section 1 presents the general requirements for compliance software, and for applications for approval of third-party modeling software.

Section 2 provides the specifications and requirements that apply to the Compliance Manager in establishing the standard design energy use of residential and nonresidential buildings. The Residential and Nonresidential ACM Reference Manuals required by Section 2.4 are documents that are developed and maintained by the Energy Commission to document in greater detail the specific building performance modeling calculations implemented in the Compliance Manager software and used to model building performance. These reference manuals are approved by the Energy Commission and updated as necessary to resolve issues identified during implementation.

Section 3 describes the required content of the user manuals provided by software vendors for their compliance products. The certification tests that compliance software must pass in order to receive approval are documented in detail in Appendix A for low-rise residential buildings and Appendix B for nonresidential buildings.

TABLE OF CONTENTS

.

1 Approval of Compliance Software

1.1 Application Checklist

The following is a list of the items that must be included in an application package for compliance software approval by the Energy Commission.

1.1.1 Compliance Software Vendor Certification Statement

The compliance software vendor shall include a signed, dated statement certifying under penalty of perjury under the laws of the State of California that the vendor's compliance software integrates the current version of the Compliance Manager or, for nonresidential modeling, implements an alternative energy simulation engine consistent with Section 1.1.5, and successfully passes the tests specified in Appendix A or B that are applicable to the software seeking approval.

1.1.2 Computer Runs and Summary Sheets

The compliance software vendor shall provide copies of the input files for the computer runs related to the tests required by Section 1.1.1, which includes, but is not limited to, all input and output files, the file necessary for transferring information to a HERS provider as generated by the software (if required), and a summary sheet of the compliance results from all required computer runs. These files shall be provided to the Energy Commission in an electronic format. These files shall demonstrate that the criteria in Section 10-109 are met, as required by Sections 10-109(b)2B and 10-109(c)2.

Full approval of new software and approval following major Compliance Manager updates requires completion of all tests applicable to a program's capabilities. Minor compliance manager updates require completion of only the tests relevant to the update. The Energy Commission shall, when it publishes a minor update, specify the tests determined to be relevant to the update.

1.1.3 User Manual and Changelog

An electronic copy of the user manual specified in Section 2 shall be included with the approval application. This document shall contain a description of the functional and analytical capabilities of the software, as required by Section 10-109(b)2A.

Applications for approval of an updated version of currently approved software shall also include a complete list of changes to the software.

1.1.4 Compliance Software

An executable version of the compliance software for which approval is sought shall be provided for the Energy Commission's use. The software must include the ability to generate the file necessary to register the compliance documentation with a HERS provider, if required.

1.1.5 Alternative Nonresidential Energy Simulation Engines

Software vendors may propose to use alternative energy simulation engines for nonresidential modeling, provided the energy simulation engine passes ASHRAE 140 (2014) and produces results that are accurate to the simulation results of the Compliance Manager within a negligible margin of error, meaning that it has no effect on the determination of building compliance or noncompliance or on final metrics such as percent compliance margin.

In this case, ~~the compliance rules contained in the Compliance Manager~~ vendor software shall ~~be directly integrated in the vendor software by incorporating the Energy Commission developed ruleset, rules processor, and report generator~~ adhere to Energy Commission published schema and rulesets, and submit compliant data to the Energy Commission developed report generator. The vendor shall not establish differing compliance rules from those that have been approved by the Energy Commission for use in the Compliance Manager. The Energy Commission shall verify that the simulation is accurate compared to the Compliance Manager and that the implemented compliance rules are identical.

1.1.6 Application Fee

An application fee is required to cover the costs of evaluating an application when the software has not previously been approved by the Energy Commission, or for the first approval following an update to the Title 24, Part 6 Building Energy Efficiency Standards (Standards). In these cases, the applicant shall provide a deposit of $1,000.00 (one thousand dollars) to cover the Energy Commission's evaluation costs, as required by Section 10-109(b)2C.

Within 75 days of receipt of an application, the Commission will provide the applicant with an estimate of the total maximum cost to review and analyze the application. After the Energy Commission completes its review, if the costs exceed the initial deposit, the Energy Commission shall assess an additional fee to cover the total costs up to the estimated amount provided to the applicant. If the cost of reviewing the application is less than the initial deposit, the Energy Commission shall refund the difference to the applicant.

Following submittal of the application package, the Energy Commission may request additional information pursuant to Title 24, Part 1, Section 10-110. Failure to provide such information in a timely manner may be considered cause for rejection or disapproval of the application. Resubmittal of a rejected or disapproved application is considered a new application, and may include a new application fee.

1.2 Approval of Received Applications

1.2.1 Approval Process

For approval of an application, the following procedures apply:

- The compliance software vendor submits an application to the Energy Commission containing all of the materials required by Section 1.1. For software that has not previously been approved, or approval following a change to the Standards, the applicant will also provide the deposit required by Section 1.1.5.

- The Energy Commission shall respond to the application within 45 days, letting the applicant know whether their application is complete and able to be approved. The Energy Commission shall approve the software, request additional information, or require that the compliance software vendor make specific changes to either the user manual or the compliance software.

- Applications shall be approved either by the Energy Commission at a business meeting or by the Executive Director, as appropriate for the application.

The Energy Commission will provide a written approval upon completion of evaluation and approval of the compliance software application. Once approved, the vendor may issue new copies of the compliance software with the user manual and notify compliance software users and building officials.

1.2.2 When Approval Is Not Required

Changes to the compliance manager that only affect functionality (see Section 1.4) do not require vendors of compliance software to follow the process set forth in Section 1.2.1. Changes to compliance software that do not affect compliance with the Standards do not require approval. However, the compliance software vendor must notify and provide the Energy Commission with an updated copy of the program, a list of changes, and an updated copy of the user manual in order for versions of the software that include such changes to remain eligible for demonstrating compliance with the Standards.

Any questions regarding applicable approval procedures should be directed to the Energy Commission.

1.3 Compliance Manager Version Updates

The Energy Commission periodically makes changes to the Compliance Manager to correct functional and analytical errors, incorporate software modules to address compliance options approved by the Energy Commission, add building systems, assemblies, and construction materials, or to make changes necessary to accurately estimate the energy use of buildings covered by Title 24, Part 6 and demonstrate compliance with the Standards.

Changes to the Compliance Manager may be a major change, a minor change, or a functionality correction, as described below.

Approved compliance software is expected to incorporate the most current version of the compliance manager. Depending on the nature of the update to the compliance manager, compliance software vendors will have different deadlines for incorporating the most current version of the compliance manager into their software, and different allowances for the use of approved software incorporating the previous version of the compliance manager.

1.3.1 Major Changes to the Compliance Manager

A major change to the Compliance Manager is any change that is determined by the Energy Commission to be a significant change in software input or output, meaning a change that would affect either a significant number of users of the software or a significant fraction of modeled buildings.

Major changes will be shown, in part, by incrementing the version number of the compliance manager software. When a new version of the Compliance Manager is released that includes a major change, the Energy Commission shall determine a schedule of 90 days or longer, based on the extent of the change, for vendors of approved compliance software to incorporate the change in the updated Compliance Manager, either by directly incorporating the new version of the Compliance Manager or, for software using an alternate nonresidential energy simulation engine, by updating their software to produce results that are accurate to the new version of the Compliance Manager.

When the Energy Commission approves updated vendor compliance software that incorporates the change in the updated Compliance Manager, approval of previous versions of the vendor's compliance software expires 90 days after approval of the new version. Versions with expired approval may not be used to show standards compliance for new permit applications.

1.3.2 Minor Changes to the Compliance Manager

A minor change to the Compliance Manager is any change that is not determined to be a major change.

Minor changes will be shown, in part, by appending a letter or sub-number to the compliance software version number. When a new version of the compliance manager is released that includes a minor change and does not include a major change, the Energy Commission shall determine a schedule of 45 days or longer, based on the extent of the change, for vendors of approved compliance software to incorporate the change in the updated Compliance Manager. The Energy Commission may also determine that the change is sufficiently minor that vendors are not required to incorporate the change on any particular schedule.

When the Energy Commission approves updated vendor compliance software that incorporates the change in the updated Compliance Manager, the Energy Commission may specify, as a condition of the approval of the updated version, that approval of previous

versions expires 60 days after the approval of the new version. Versions with expired approval may not be used to show standards compliance for new permit applications.

1.4 Changes that Do Not Require Approval

The following changes do not require approval by the Energy Commission, However, the compliance software vendor must notify and provide the Energy Commission with an updated copy of the program, a list of changes, and an updated copy of the user manual in order for versions of the software that include such changes to remain eligible for demonstrating compliance with the Standards.

1.4.1 Functionality Corrections to the Compliance Manager

A change to the Compliance Manager that solely affects functionality, including but not limited to editing the content of error messages, modifying the appearance of screens, correcting an error that causes an incorrect or unexpected result (i.e., a bug fix), or accommodating a new operating system, shall be indicated by the Energy Commission appending a version letter or sub-number to the version number.

When a new version of the Compliance Manager is released that includes solely functionality corrections and results in no change in compliance results, compliance vendors may update their compliance software to incorporate the updated Compliance Manager at their discretion. Vendors that do so may request an extension of their approval to cover this updated version. This type of change must be indicated by appending a version letter or sub-number to the version number of the compliance software in order for the Energy Commission to reference the updated version in the written approval.

When approval is extended to a newer version in this manner, approval of the previous version or versions will not expire.

1.4.2 Changes Made by Compliance Software Vendors

Vendors may, when they update their compliance software in a manner that results in no change in compliance results but address other aspects of their software's performance, request that approval of their software be extended to apply to this newer version.

Vendors requesting extension of approval shall provide a signed, dated statement certifying under penalty of perjury under the laws of the State of California that the changes have no effect on the determination of compliance with the Standards. This type of change must be indicated by appending a version letter or sub-number to the version number of the compliance software in order for the Energy Commission to reference the updated version in the written approval.

When approval is extended to a newer version in this manner, approval of the previous version or versions will not expire.

1.5 Expired Approval and Decertification

Decertification is a formal process to withdraw approval of compliance software and is distinct from expiring approval of a particular obsoleted version of approved compliance software.

1.5.1 Expiring Approval

Approval of a prior version of software expires, and is replaced by approval of a newer version, as part of the typical cycle of updating compliance software to account for bug fixes and changes to the compliance manager. When new versions of compliance software containing major changes as specified in Section 1.3.1 are approved by the Energy Commission, the approval of previous versions for use with new permit applications shall expire after 90 days, except upon request for a longer period by the software vendor.

A vendor asking for a longer period before expiration shall provide a letter stating the exceptional circumstances that require a longer period in order to prevent harm to the users of the software or the public at large. The Executive Director shall review the letter and determine whether to allow a longer period for the software in question.

During the first 30 days following approval of a new version of compliance software, the Energy Commission shall update the approved compliance programs website, and the Executive Director shall send a notice to building officials and interested parties announcing the expiring approval of the prior version and the current approval of the newer version.

1.5.2 Decertification

Decertification is a formal process for withdrawing approval of compliance software, distinct from expiring approval of an obsolete version of otherwise approved software. Decertification may occur as a result of the following:

- All compliance software products are automatically decertified when the Standards undergo substantial changes such that the software would fail to confirm compliance with the Standards.

- Any compliance software product can be decertified without a proceeding by a letter from the compliance software vendor requesting that a particular version (or versions) of their product be decertified. The decertification request shall briefly describe the nature of the program errors that justify the need for decertification, or the reason why decertification is appropriate for the vendor’s circumstance.

- Any "initiating party" may commence a procedure to decertify a compliance software product according to the steps outlined below. This process provides a means whereby serious program errors, flawed numeric results, improper forms, or incorrect program documentation not discovered in the certification process can be verified, and use of the particular compliance software version discontinued.

1.5.3 Initiating a Decertification Proceeding

The following is the process for challenging compliance software or initiating a decertification procedure:

1. Any party may initiate a review of compliance software approval by sending a written communication to the Energy Commission's Executive Director, with copies to the Building Standards Office. Alternatively, the Energy Commission may be the initiating party for this review. The initiating party shall:

   (a) State the name of the compliance software and the program version number(s) that contain the alleged errors;

   (b) Identify concisely the nature of the alleged errors in the compliance software that require review;

   (c) Explain why the alleged errors are serious enough in their effect on analyzing buildings for compliance to justify decertification; and

   (d) Include appropriate data or other information relevant to evaluate the alleged errors.

2. The Executive Director shall notify and make a copy of the initial written communication available to the compliance software vendor and any known interested parties within 30 days of receipt. Interested parties shall have 45 days from the date of the notification provided by the Executive Director to submit comments to the Energy Commission relating to the request.

3. Within 75 days of receipt of the written communication, the Executive Director may request any additional information needed to evaluate the alleged compliance software errors from the party who initiated the decertification review process. The party initiating the process must respond within 30 days of the request for additional information.

4. Within 75 days of receipt of the initial written communication, the Executive Director may convene a workshop to gather additional information from the initiating party, the compliance software vendor and interested parties. All parties will have 15 days after a workshop to submit additional information regarding the alleged program errors.

5. Within 90 days after the Executive Director receives the application or within 30 days after receipt of complete additional information requested of the initiating party, whichever is later, the Executive Director shall either:

   (a) Determine that the compliance software need not be decertified; or

   (b) Submit to the Commission a written recommendation that the compliance software be decertified.

6. If the Energy Commission approves the compliance software decertification, it shall take effect 60 days later. Within the first 30 days of the 60-day period, the Executive Director

shall send out a Notice to Building Officials and Interested Parties announcing the decertification.

All initiating parties have the burden of proof to establish that the review of alleged compliance software errors should be performed. The decertification process may be terminated at any time by mutual written consent of the initiating party and the Executive Director.

The compliance software vendor may use the period outlined here to update the compliance software, obtain approval by the Commission, and release a revised version that corrects the errors initially brought to the attention of the Commission.

1.6 Compliance Software Tests

Compliance software vendors applying for approval of their software shall perform a series of computer runs. Each of these runs shall be a systematic variation of the applicant base case model as described in the tests in Appendix A or B. The results from the vendor's software shall be compared to the reference results to verify that the vendor's software meets the requirements for approval as compliance software.

1.6.1 Alternate Compliance Software Tests

The compliance software vendor may propose alternate tests from those specified in Appendix A and Appendix B when the vendor believes that one or more of the standard tests are not appropriate for their compliance software. Alternate tests will be evaluated by the Commission on a case-by-case basis and will be applied to that vendor's software if they are considered reasonable.

1.7 Approval of New Exceptional Methods

The Commission may approve new exceptional methods. Exceptional methods may include special modeling capabilities or calculation methods necessary to recognize building features that cannot be adequately modeled with existing compliance software. See California Code of Regulations, part 1, chapter 10, sections 10-109 and 10-110. When an exceptional method is approved, a new optional capabilities test may be approved as part of the process. To be approved for the new optional capability, vendors must amend their compliance software and update their user manual.

Determinations made by vendor software shall not include Exceptional methods that are not yet approved by the Energy Commission.

2 Compliance Manager Capabilities

The Compliance Manager is the simulation and compliance rule implementation software developed by the Energy Commission. The Compliance Manager software simulates the energy use of a proposed residential or nonresidential building and compares it to a standard design energy budget to determine if the building complies with the Standards.

Residential and nonresidential compliance software that is used to demonstrate compliance with the Standards must incorporate this simulation and compliance rule implementation software.

2.1 Standard Design

The standard design building is a building simulated to establish the baseline energy budget for space heating, space cooling, indoor air quality ventilation, and water heating for a proposed building.

For newly constructed buildings, the standard design building shall be modeled as existing in the same location and having the same characteristics, including but not limited to floor area, volume, and configuration, as the proposed building, except that wall and fenestration areas shall be distributed equally between the four main compass points, North, East, South and West. For additions and alterations, the standard design shall be modeled as existing in the same location and having the same characteristics, and shall have the same wall and fenestration areas and orientations as the existing building.

Where the Energy Commission specifies that the standard design building includes a covered product subject to 42 USC 6295, or an appliance regulated by the Appliance Efficiency Regulations, the standard design building shall be modeled to meet but not exceed the efficiency level required by 42 USC 6295 for that covered product or applicable standards required by the Appliance Efficiency Regulations for that regulated appliance, respectively.

The standard design building shall be modeled to include the mandatory requirements of the ~~2019~~ 2022 Standards, and to meet but not exceed the prescriptive requirements that would apply to the proposed building.

The process of generating the standard design shall be performed automatically by the compliance manager software. The compliance manager shall perform this modeling based on the inputs that describe the proposed building, substituting the assumptions for wall and fenestration area distribution, required efficiency for the covered product subject to 42 USC 6295 that the Energy Commission specifies in the standard design, and the applicable standards for the appliance regulated by the Appliance Efficiency Regulation that the Energy Commission specifies in the standard design, and mandatory and prescriptive options applicable to the proposed building, thereby creating a standard design building against which the energy use of the proposed building can be evaluated.

The specific calculations used by the Compliance Manager to model the performance of the standard design building shall be documented in the Reference Manual described in Section 2.4.

2.2 Time Dependent Valuation

The compliance manager shall convert all electricity, gas or propane used within the modeled buildings to time dependent valuation energy (TDV energy). TDV energy is defined in Joint Appendix 1 and further specified in Joint Appendix 3.
The compliance manager shall calculate the modeled energy budgets of the standard design building and the energy consumption of the proposed building in terms of TDV energy, thereby ensuring that all modeled building features are specified on a one-for-one equivalent energy use or equivalent energy cost basis. Compliance credit for covered products subject to 42 USC 6295 having efficiencies exceeding the efficiency levels required by 42 USC 6295 shall be calculated in terms of TDV energy, thereby ensuring that the compliance credit is on a one-for-one equivalent energy or equivalent cost basis.

2.3 Climate Zone

Compliance requirements, weather, design temperatures, and the Time Dependent Valuation of energy are partly a function of climate. The Commission has established typical weather data, prescriptive packages and energy budgets for 16 geographic areas of California, called climate zones, as specified in the 2022~~19~~ Standards and Joint Appendix 2.

The compliance manager software shall incorporate modeling of climate zone dependent information based on the climate zone or zip code specified for the proposed building.

Where the compliance manager incorporates climate elements into the modeling calculations for the standard and proposed buildings, the compliance manager shall calculate the effects of weather, temperature, and other climate elements based on the climate zone specified for the proposed building, and shall apply the same adjustments to both buildings.

The standard design shall be modeled as incorporating prescriptive options appropriate to the climate zone specified for the proposed building.

For covered products subject to 42 USC 6295, and for appliances regulated by the Appliance Efficiency Regulations, the estimated energy use of those covered products or appliances used to calculate the total energy use of the standard design and proposed buildings shall be determined using the test procedure prescribed by 42 USC 6293 or the Appliance Efficiency Regulations, respectively. This estimated energy use shall be adjusted to reflect the conditions where Part 6 is being applied, as a part of calculating the total TDV energy of each building, consistent with the Alternative Calculation Approval Manual and as documented in the Alternative Calculation Approval Method Reference Manual.

2.4 Reference Manual

The Energy Commission shall publish a Reference Manual for the Compliance Manager software that specifies the standard design and documents the calculations and methods used by the Compliance Manager software to model building performance, calculate TDV energy, and determine compliance with the ~~2019~~ 2022 Standards.

3 User Manual

Each approved compliance software vendor shall publish a user manual, which shall contain sufficient information for users to understand how to correctly prepare complete and operable files, and how to generate standard compliance documentation. The user manual shall describe the specific procedures for using the compliance software to comply with the Standards. This includes instructions for preparing the building input and using the correct fixed and restricted inputs. A copy of the user manual must be submitted with the vendor's application for approval of their software.

User manuals must be written in a clear and concise manner and with an organization and format that allows users to quickly locate the topic and understand the instructions. Vendors of approved compliance software are also required to make copies of their user manual available to all building departments in California.

The following sections describe the information that must be included in user manuals.

3.1 Software Capabilities

The user manual shall include a section that discusses the program capabilities. Reference may be made to other sections of the user manual for more complete descriptions, if appropriate.

3.2 Preparing Basic Input

The user manual shall cover the basic use of the compliance software for compliance. This section shall include a complete summary of all inputs and commands necessary for compliance.

3.3 Checklist for Compliance Submittal

The user manual shall contain a checklist of all items that must be included in a compliance submittal to a building official using the compliance software.

3.4 Sample Compliance Documentation

The user manual shall include a complete set of compliance documentation for a sample building. The building need not be overly complex, nor include every software capability. The example shall include all documentation and standard reports that would normally be submitted to a building official. This example shall be usable as a model for compliance software users and building officials of a proper compliance submittal.

3.5 Compliance Statement

The following statement shall appear within the first three (3) pages of the user's manual:

> [Compliance software name] may be used to show compliance with California's ~~2019~~ 2022 Building Energy Efficiency Standards.

3.6 Related Publications

The user manual shall refer users to the following related Energy Commission publications and where to obtain them:

- ~~*2019*~~ *2022 Building Energy Efficiency Standards* (publication number unknown at time of printing)
- ~~*2019*~~ *2022 Residential Compliance Manual* (publication number unknown at time of printing)
- ~~*2019*~~ *2022 Nonresidential Compliance Manual* (publication number unknown at time of printing)

(This page intentionally left blank.)