CALIFORNIA
ENERGY
COMMISSION

COMPLIANCE OPTIONS APPROVAL MANUAL FOR THE BUILDING ENERGY EFFICIENCY STANDARDS

MANUAL

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1 Overview

1.1 Introduction

This publication documents the California Energy Commission (Energy Commission) procedures for approval of compliance options with the (*California Code of Regulations* Title 24, Parts 1 and 6.) *Energy Efficiency Standards for Residential and Nonresidential Buildings*. This manual establishes the method for Energy Commission approval and serves as a guide enabling proponents of compliance options to assess the information and technical data necessary for approval.

Compliance options are addressed in Title 24, Part 1, Sections 10-109 of the *California Code of Regulations*, and include:

- Alternative Calculation Methods (ACMs), Sections 10-109 (b) 1 through 3 – usually computer programs, which are used to show compliance with the Building Energy Efficiency Standards.

- Alternative Component Packages (ACPs), Sections 10-109 (d) – prescriptive measures that achieve compliance with the Building Energy Efficiency Standards when applied to the design of a building.

- Exceptional Methods, Sections 10-109 (b) 4 – special modeling capabilities or calculation methods necessary to recognize building features that cannot be adequately modeled by the Energy Commission computer reference program.

Compliance options may be approved under the Energy Efficiency Standards for low-rise residential buildings and nonresidential buildings including hotel and high-rise residential buildings.

The Energy Commission may charge a fee to recover the cost of review and approval of all compliance options (Section 10-109(b) 3.0).

1.2 Alternative Calculation Methods (ACMs)

Alternative calculation methods (ACMs) are calculation procedures, usually computer programs that are approved by the Energy Commission for use with the performance approach to compliance. ACMs are approved separately for Energy Efficiency Standards for low-rise residential buildings, and nonresidential buildings including hotel and high-rise residential buildings. In general, ACMs are used to estimate the annual energy use of proposed building designs (custom budgets) for comparison against energy budgets for standard buildings.

In addition to this procedure manual, ACM vendors also need to obtain a separate ACM approval manual for the set of standards applicable to their alternative calculation method. These approval manuals include special tests and other requirements for ACMs. Please request one or more of the following:

- *Alternative Calculation Method Approval Manual for the 2001 Energy Efficiency Standards for Residential Buildins P400-01-012 (April 2001)*
- *Alternative Calculation Method Approval Manual for the 2001 Energy Efficiency Standards for Nonresidential Buildings P400-01-011 (April 2001)*
- *Residential Alternative Calculation (ACM) Approval Manual for the 2005 Building Energy Efficiency Standards for Residential and Nonresidential Buildings P400-03-003F (October 2004)*

1.3 Alternative Component Packages

Alternative component packages (ACPs) are sets of prescriptive requirements that will achieve a level of calculated energy use less than or equal to the standard design energy budgets when applied directly to the design of buildings. ACPs apply to both residential and nonresidential standards.

The Energy Commission may approve new ACPs when they are shown to result in estimated energy usage (custom budgets) equal to or less than the standard design energy budgets. In the past, new ACPs have been proposed to include consideration of building features not recognized by existing ACPs. Often, but not necessarily, ACP approval is coupled with the approval of exceptional methods, as discussed below.

For the Energy Commission to approve new ACPs, the Energy Commission must determine that the proposed ACP will "meet the energy budgets and is likely to apply to a significant percentage of new buildings or to a significant segment of the building construction and design community" [Section 10-109 (d) of Title 24].

1.4 Exceptional Methods

Exceptional methods are special modeling capabilities for estimating the energy performance of building features that "cannot be adequately modeled using the public domain computer programs" [Sections 10-109 (b) 4. of Title 24]. Exceptional methods must be approved by the Energy Commission before the associated building features may be used to show compliance with the Building Energy Efficiency Standards. Exceptional methods generally consist of three components: an algorithm, eligibility criteria and an approval test. These components are introduced below and discussed in greater detail in Section 3.4.

- *Algorithm*. A calculation method that clearly demonstrates the energy saving benefit of associated building features.
- *Eligibility Criteria*. Conditions that building features must meet before they can be modeled with the algorithm and used for compliance. Specific installation requirements may also be part of the eligibility criteria.
- *Approval Test*. A procedure to test whether ACMs have correctly implemented the exceptional method's algorithm or have developed an acceptable alternative algorithm.

It is important to make a distinction between modeling capabilities and building features, although approval of exceptional methods addresses both. It is possible for a modeling capability to apply to many building features. For instance, multi-zone modeling capabilities in residential ACMs might enable consideration of attached sunspaces, Trombe walls and controlled ventilated crawl spaces.

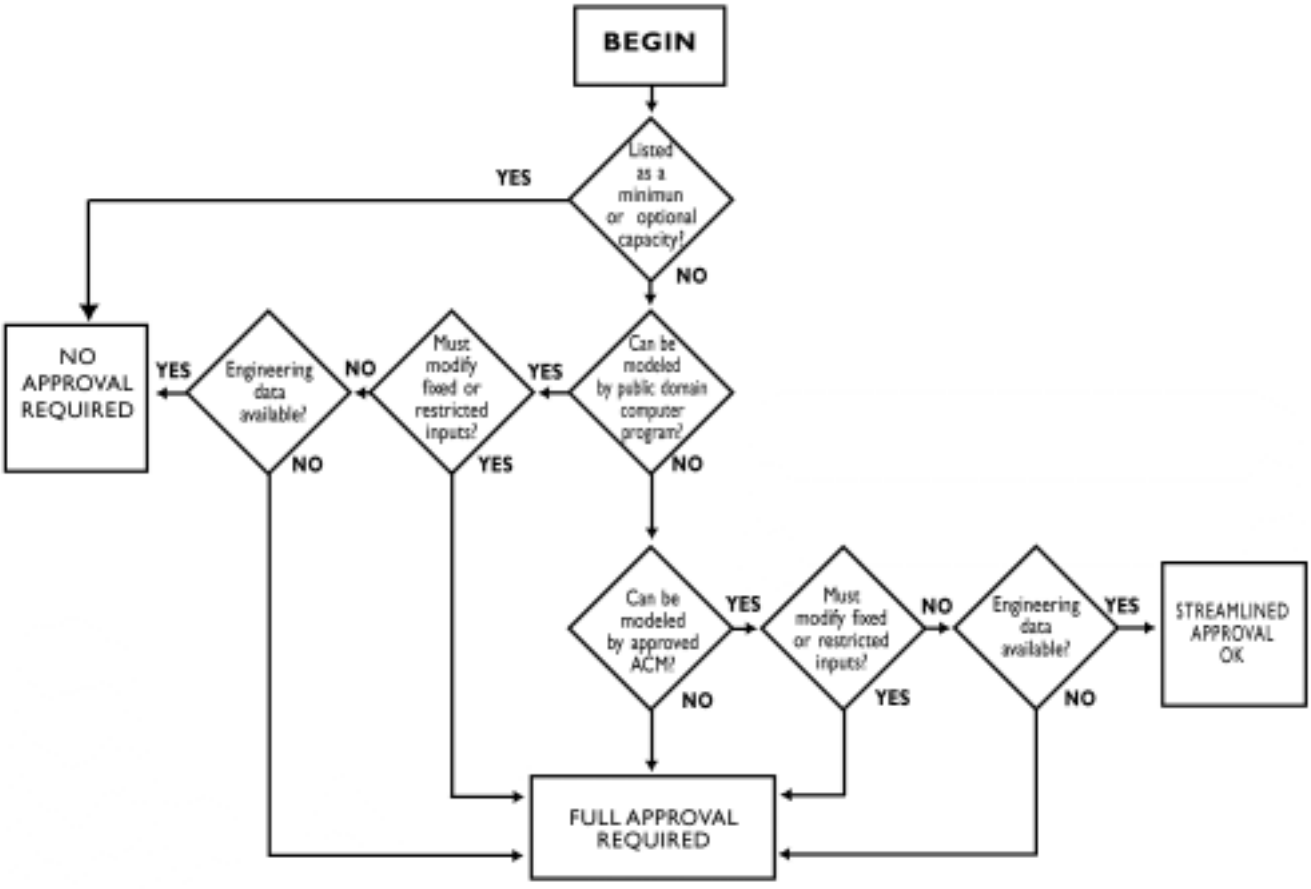
Usually, modeling capabilities approved as an exceptional method apply to only one building feature or a group of building features, and they become recognized by a specific name, for example, the *Controlled Ventilation Crawl Space* exceptional method. The eligibility criteria component can limit a modeling capability to certain building features. The Energy Commission's policy, however, toward approving exceptional methods is for them to be “generic.” That is, the exceptional method is not limited to one specific type of product or manufacturer.

Exceptional methods may be proposed for both residential and nonresidential Building Energy Efficiency Standards.

Not all modeling capabilities must be approved as exceptional methods. Some modeling capabilities that are not part of the Energy Commission reference ACM computer program may be approved for a vendor ACM. A streamlined process for approving these capabilities is described in the ACM approval manuals.

Five criteria determine when a modeling capability must be approved as an exceptional method. These criteria are discussed further and illustrated in the following figure.

Figure 1



Criterion 1 – Modeling Capability Listed in ACM Approval Manual

If a modeling capability or the algorithm component is included as a minimum or optional capability in the appropriate ACM approval manual, then it is not necessary that it be approved as an exceptional method. ACMs, however, must be approved for the optional capability.

Criterion 2 – Modeling Capability in Public Domain Computer Program
If a modeling capability is not listed as a minimum or optional capability in an ACM approval manual, but is a feature of the appropriate public domain computer program, then it is not necessary that it be approved as an exceptional method, provided criteria 4 and 5 are satisfied, as described below.

Criterion 3 – Can be Modeled by an Alternative Calculation Method (ACM)
If a modeling capability is not listed as a minimum or optional capability in an ACM approval manual and is not a feature of the appropriate public domain computer program, but is a feature of an approved ACM, then the streamlined process is available, provided criteria 4 and 5 are satisfied, as described.

Criterion 4 – Fixed and Restricted Input
Full approval is always required when a modeling capability requires a modification of the fixed or restricted inputs. The fixed and restricted inputs for the nonresidential Building Energy Efficiency Standards are contained in the *Alternative Calculation Method Approval Manual for Nonresidential Buildings*. The fixed and restricted inputs for the residential standards are contained in the *Alternative Calculation Method Approval Manual for Residential Buildings*.

Criterion 5 – Engineering Data
Full approval is always required when engineering data acceptable to the Energy Commission are not available. Acceptable engineering data are generally those that have been through the formal American National Standards Institute (ANSI) consensus process and are published in a recognized engineering handbook or reference manual. Acceptable engineering data may not include information presented in technical research papers presented at technical society meetings, published in proceedings or published in technical journals, unless the information in the technical paper has been through a formal consensus process. The Energy Commission will have final discretion in determining the reference and validity of technical and engineering data.

Sometimes, acceptable algorithms and engineering data may be available, but the standard fixed and restricted inputs do not allow consideration of the building feature. The effect of external shading devices on window U-factor is an example. The ASHRAE Handbook of Fundamentals has U-factor adjustments for exterior shading devices but the fixed and restricted inputs exclude consideration of these effects.

1.5 Energy Commission Approvals Not Addressed in this Manual

This manual does not address the procedures for approval of exceptional designs (as opposed to exceptional methods), locally adopted energy standards, exemptions or rule making proceedings. The following paragraphs briefly describe these other approvals.

1.5.1 Exceptional Designs

Exceptional designs are similar to exceptional methods, except they apply on a one-time basis for a specific building permit application. Exceptional methods, by contrast, may generally be used by all building permit applicants. Because the algorithms and procedures associated with exceptional designs apply to only one permit application, a different approval process is followed rather than the one described in detail in this manual for exceptional methods.

The application requirements and approval procedures for exceptional designs are covered in Title 24, Part 1, Section 10-104 of the *California Code of Regulations*.

1.5.2 Locally Adopted Standards

Local governments may adopt and enforce alternative energy efficiency standards, provided the Energy Commission has verified that those alternative energy efficiency standards require that buildings be designed to use no more energy than would result if the Energy Commission standards were adopted.

Energy Commission approval of locally adopted standards is covered in Title 24, Part 1, Section 10-106 of the *California Code of Regulations*.

1.5.3 Exemptions

The Energy Commission may approve an exemption from the standards when substantial funds have been expended on planning, design or engineering prior to the adoption date of the standards.

Energy Commission approval of exemptions is covered in Title 24, Part 1, Section 10-108 of the *California Code of Regulations*.

1.5.4 Rulemaking Proceedings

Changes made to the regulations contained in Title 24, Part 1 Section 10-101 through 10-110, of the *California Code of Regulations*; and Title 24, Part 6, Sections 100 through 152, of the *California Code of Regulations* must go through a formal Energy Commission rule making proceeding. Rule makings may be initiated by the Energy Commission or by the public. The public may initiate a rule making by formally petitioning the Energy Commission in accordance with the guidelines contained in Title 20, Sections 1220 through 1222 of the *California Code of Regulations*. The Energy Commission Public Adviser's Office should be contacted for information regarding rulemaking petitions at (916) 654-4489 or (800) 822-6228 toll free in California.

2 Approval Process

The approval process for compliance options is illustrated in the following figures (2 and 3) and explained in the text. Figure 2 shows the steps, the maximum approval time, and when a public workshop is necessary. Figure 3 shows the steps, the maximum approval time and when a public workshop is not necessary. The need for a public workshop will depend on the complexity of the approval and whether or not there is significant public interest.

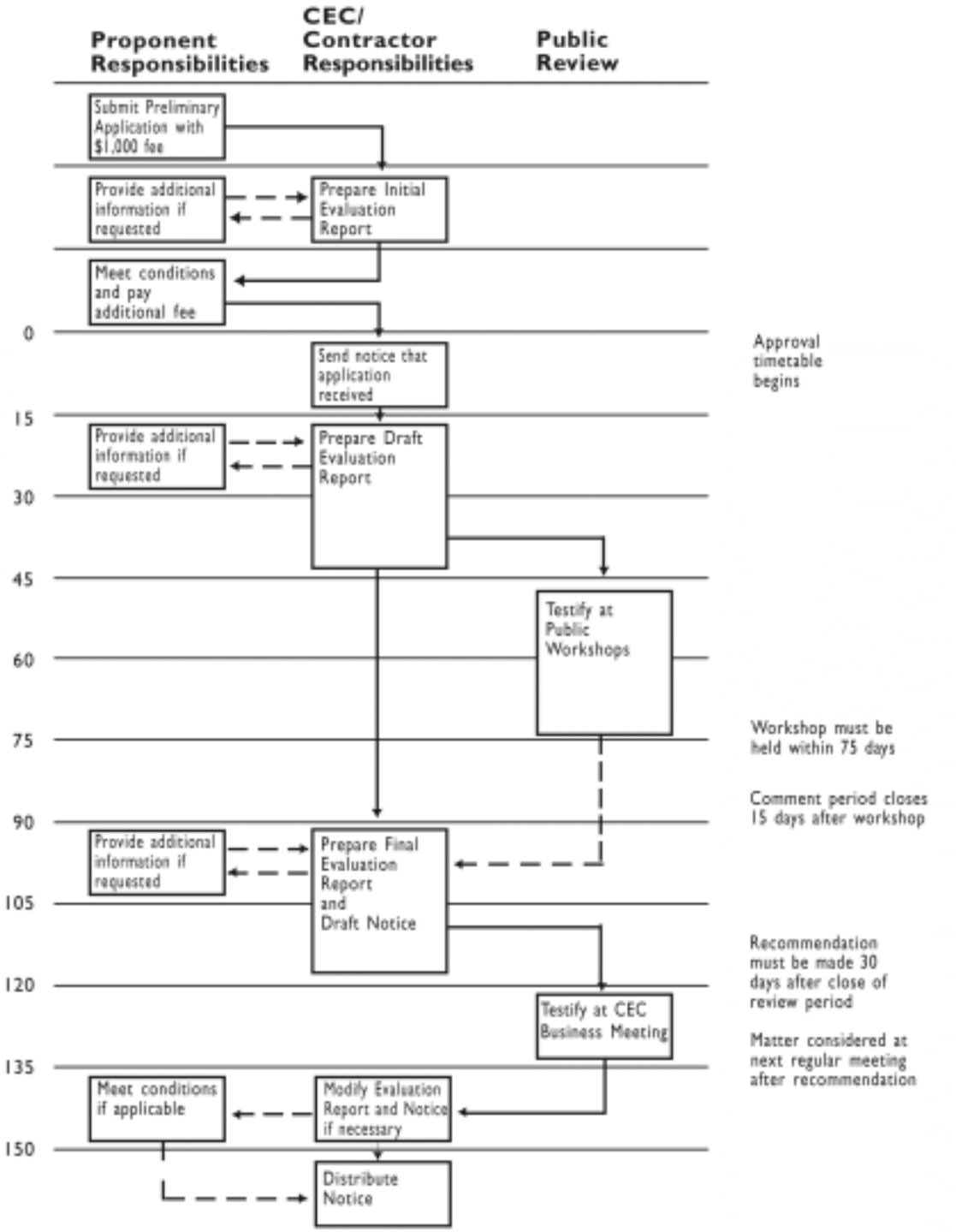
In both figures, the activities in the first column are the responsibility of the applicant. Those in the second column are the responsibility of the Energy Commission. The activities in the third column are opportunities for public input.

Dashed lines indicate that the path through the approval process is not always required. For instance, the path through the public workshop is dashed.

The numbers on the far left side of the figures indicate the maximum number of days allowed for the Energy Commission to reach a point in the approval process. The steps illustrated in the figures follow the requirements of Title 24, Part 1, Section 10-110 of the *California Code of Regulations*. The Energy Commission may request additional information from the proponent during development of staff reports. When such a request is made, the approval clock is stopped until the information is provided. As a result, the maximum timetable can extend beyond the limits shown in the figures.

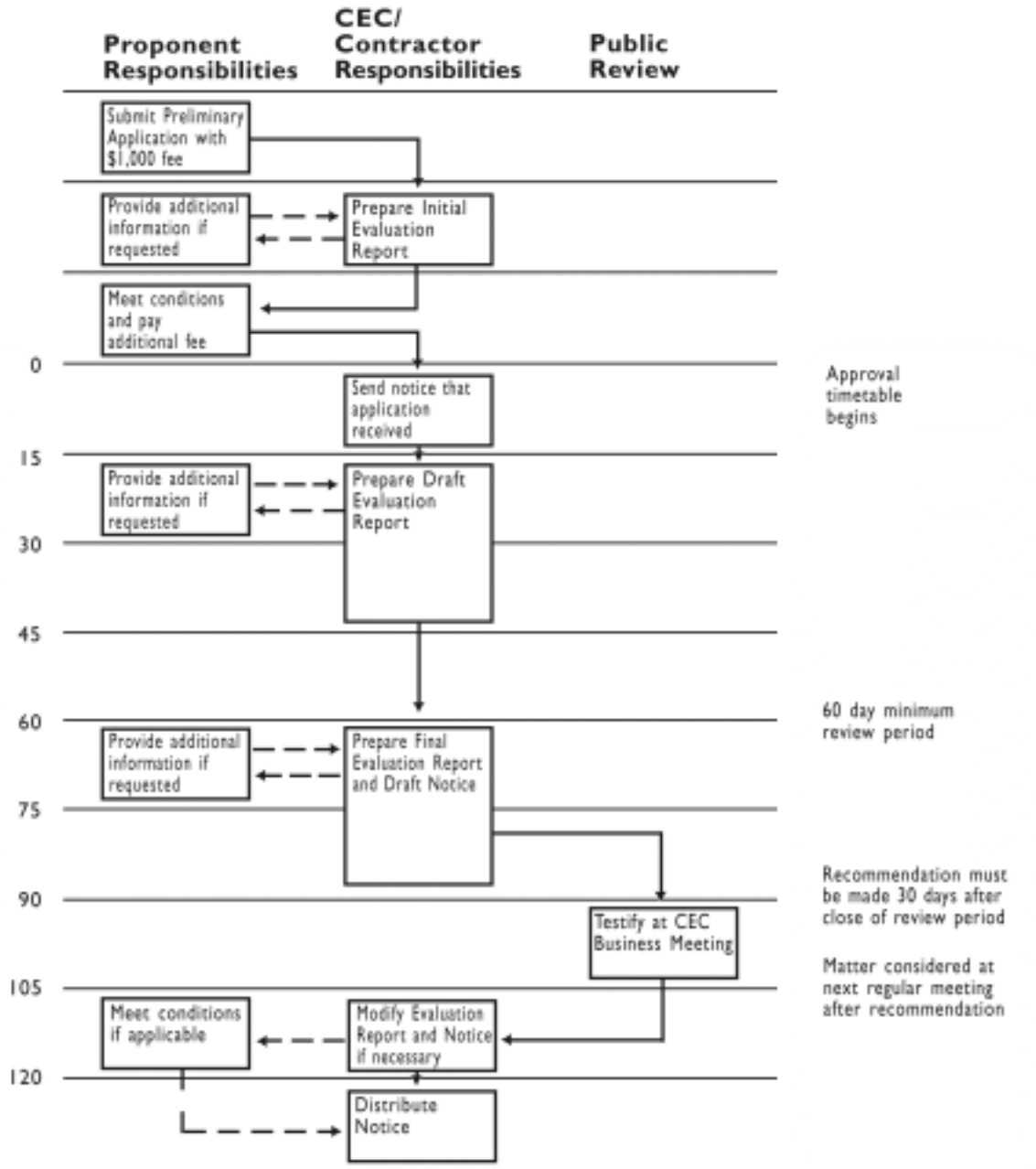
This figure shows the maximum time in calendar days and the approval steps required in the event that a public workshop is necessary.

Figure 2 - COMPLIANCE OPTIONS APPROVAL PROCESS



This figure shows the maximum time and the approval steps required in the event that a public workshop is not necessary.

Figure 3 - COMPLIANCE OPTIONS APPROVAL PROCESS



2.1 Preliminary Application

The approval process for any type of compliance option begins with a Preliminary Application. The information that must be contained in the application is presented in Section 3 of this manual. The applicant must submit a check for $1,000 payable to the California Energy Commission to cover the cost of initial review and preparation of an Initial Evaluation Report. Other fees may be charged to cover the cost of completing the review and analysis of the applicants supporting documentation. A separate fee is required for each application, but a single application may include more than one compliance option. The only time fees may be waived for the review and approval of compliance options is for ACMs meeting the "streamlined" approval process requirements as described in the appropriate ACM manual.

2.2 Initial Evaluation Report

If the Preliminary Application is complete, the Energy Commission prepares an Initial Evaluation Report. If the Preliminary Application is not complete, the Energy Commission may request additional information from the applicant. Development of the Initial Evaluation Report will stop until the additional information is provided by the applicant. The Initial Evaluation Report will be completed within approximately three weeks following acceptance of the Preliminary Application.

The Initial Evaluation Report will contain a preliminary recommendation on whether or not the compliance option should be considered for approval.

If the Initial Evaluation Report recommends against consideration, the decision will be based on whether or not the Energy Commission has administrative authority, rather than on the technical merit of the compliance option. For example, an exceptional method for a building feature not regulated by the standards might be rejected at the Initial Evaluation Report stage of the process. The Initial Evaluation Report will state the reasons why the Energy Commission does not have authority to approve the compliance option and offer alternatives in the event that the applicant chooses to resubmit the application.

If the Initial Evaluation Report recommends Energy Commission consideration, the report will identify:

- The principal issues raised by the application.
- Any additional data that needs to be provided to support the request of the proponent.
- Any additional work that would be required by the Energy Commission.
- A cost estimate for completing the review of the application culminating in a Draft and Final Evaluation Report

2.3 Applicant Decision to Continue

After completion of the Initial Evaluation Report, a copy will be sent to the applicant. The applicant can then decide whether to continue or to withdraw.

Should the applicant decide not to continue, the $1,000 initial fee to cover the cost of preparing the Initial Evaluation Report would be forfeited. Should the

applicant decide to continue with the application after more than 120 days from completion of the Initial Evaluation Report, an additional $1,000 fee would be required in order to develop a new initial Evaluation Report. Should the applicant decide to proceed within the 120-day time frame, a check must be submitted to the Energy Commission for the estimated amount indicated in the Initial Evaluation Report. This estimated fee is intended to cover the cost of completing the review.

Upon the applicant's decision to continue and receipt of the required fee, the timetables indicated in Title 24, Section 10-110 of the *California Code of Regulations* begin. The timetables do not begin upon submission of the Preliminary Application.

2.4 Public Notice

Once the proponent decides to continue with the application, the Energy Commission will send out a Notice advising the public and interested parties that review of the compliance option is beginning and the application is available for review. Interested parties can request a copy of the application by writing to the Energy Commission. Portions of an applicant's documentation that he/she has claimed as confidential will be withheld from public inspection subject to such a determination pursuant to *California Code of Regulations*, Title 20, Section 2501, et seq,. A copy of the application will also be placed in the Energy Commission library for review purposes. A public review period of at least 60 days begins. The minimum public review period is specified in Title 24, Section 10-110 (a) of the California Code of Regulations.

2.5 Draft Evaluation Report

The Energy Commission will then proceed to prepare a Draft Evaluation Report. Anytime within 75 calendar days from when the notice is distributed, the Energy Commission or its contractors may request additional information. A request for information may come during the development of the Evaluation Report or following public input. When a request for additional information is made, the approval time clock stops and the approval timetable is extended until the information has been satisfactorily provided.

The contents of the Draft Evaluation Report will depend on the type of compliance option(s) covered by the application. In all cases, however, the Draft Evaluation Report will summarize all research conducted as part of the evaluation. The Energy Commission findings may differ from those proposed in the Preliminary Application.

Specific information for each type of compliance option follows:

2.5.1 Alternative Calculation Methods

The Draft Evaluation Report will verify that the proposed ACM meets the requirements of the ACM Approval Manual, that the correct fixed and restricted inputs are used, that fixed and restricted inputs for proposed optional capabilities are clearly defined, that an acceptable compliance supplement is available and

that the proposed ACM is capable of generating standard input and output reports in a consistent format.

2.5.2 Alternative Component Packages

The Draft Evaluation Report will verify that the proposed ACP is accurately analyzed, that the correct building prototype is used to establish equivalency, that the correct fixed and restricted inputs are used and that proper eligibility criterion are included to limit the use of the ACP to appropriate situations. If the application requires approval of an exceptional method in order to recognize special building features, the exceptional method will be reviewed as part of the application but will be considered as a separate approval.

2.5.3 Exceptional Methods

The Draft Evaluation Report will include Energy Commission staff recommendation, including an algorithm, eligibility criteria and optional capability tests. The Energy Commission staff recommendation could be the same as that proposed by the applicant.

Another key issue for Exceptional Methods is the reliability of the building equipment, material or system in achieving energy savings. This analysis of reliability should be reflected in the proposed algorithm and eligibility criteria. For instance, if exceptional methods were approved for building equipment, materials or systems that require special occupant behavior in order to achieve energy savings, the proposed algorithm may reflect realistic assumptions about such occupant behavior.

The Draft Evaluation Report will also address:

- Whether or not the fixed and restricted inputs are accurate or need to be varied.
- Compatibility of the Exceptional Method with approved ACMs.
- The sensitivity of energy use predictions to variations in the key variables or inputs.
- The extent of use expected for the building features recognized by the exceptional method.
- Identification of applicable eligibility criteria.
- Identification of any clarifying information that must be provided by the proponent.
- Need for public workshops, as further discussed.

2.6 Public Workshop(s)

The Draft Evaluation Report might be reviewed at one or more public workshops. A decision on whether or not a workshop(s) is necessary will be made during the development of the Draft Evaluation Report. The decision will also be based on any comments or requests for a workshop received from interested parties or from the public during the 60-day minimum review period.

Section 10-110 of Title 24 provides that the workshop be held within 75 calendar days of the time the proponent decides to proceed and to pursue compliance option approval. Interested parties will have 15 calendar days following the workshop to make additional comments.

2.7 Final Evaluation Report and Draft Notice

Following public review, the Energy Commission will prepare a Final Evaluation Report and draft notice for action by the Commissioners. The Final Evaluation Report will summarize comments and suggestions received during the public review process and will contain Energy Commission staff recommendations. It will also include additional analysis performed as a result of comments received in the public review process.

A draft notice is prepared as part of the Final Evaluation Report package. The draft notice will be written as a bulletin to enforcement officials and interested parties. The draft notice will advise that the compliance option has been approved and state any restrictions for using the compliance option. The draft notice will not contain all the research work in the proponent's application or in the Final Evaluation Report; rather the draft notice will make reference to those documents when appropriate.

The Final Evaluation Report might identify conditions that the proponent must meet. An example of such conditions or requirements might be to provide technical information or catalogs to all enforcement officials in the state. Also, proponents of ACMs are required to make available copies of their compliance supplement to all building departments in California.

A recommendation for Energy Commission approval of any compliance option in the Final Evaluation Report will depend heavily upon the effects and influences upon enforcement of the compliance option. Proposed compliance options that confuse, obfuscate, or deter local building department enforcement will not receive a recommendation for approval.

During the preparation of the Final Evaluation Report, the Energy Commission can request additional information from the proponent. Such a request will stop the approval time clock and extend the timetable until the information has been satisfactorily provided.

2.8 Final Approval and Notice

A recommendation for approval or rejection of the compliance option will be included in the Final Evaluation Report. The matter will then be placed on the calendar of the next available regular Energy Commission Business Meeting. Energy Commission Business Meetings are generally held every other Wednesday.

If the compliance option is approved at the Business Meeting, the Final Evaluation Report and draft notice will be modified, if necessary, in response to direction from the Commission.

After verification that the proponent has complied with any conditions identified in the Approved Final Evaluation Report, the final notice will be distributed to all building officials and interested parties. Implementation and use of the compliance option to show compliance with the Building Energy Efficiency Standards will follow the procedures established by the Energy Commission.

3 Application Requirements

The first step in the application process is for the proponent of a compliance option to file a Preliminary Application with the Energy Commission. The contents of the application will depend on the type of compliance option proposed; an ACM, ACP, or Exceptional Method.

Four copies of the completed application must be submitted to the Energy Commission. One copy should be sent to the attention of the Energy Commission Executive Director, two should be addressed to staff, and the final copy is addressed to the Energy Commission Accounting Office. The application fee shall be attached to the accounting office copy. Please use the following addresses:

One Copy To: Executive Director
California Energy Commission
1516 Ninth Street, Mail Stop 39
Sacramento, CA 95814
RE: Energy Commission Approval of Compliance Options

One Copy To: Deputy Director for Energy Efficiency & Demand Analysis
California Energy Commission
1516 Ninth Street, Mail Stop 28
Sacramento, CA 95814
RE: Energy Commission Approval of Compliance Options

One Copy To: Manager of Buildings and Appliances Office
California Energy Commission
1516 Ninth Street, Mail Stop 25
Sacramento, CA 95814
RE: Energy Commission Approval of Compliance Options

One Copy To: Chief of Accounting
Accounting Office
California Energy Commission
1516 Ninth Street, Mail Stop 2
Sacramento, CA 95814
RE: Energy Commission Approval of Compliance Options

The Preliminary Application must be accompanied by a check payable to the California Energy Commission in the amount of $1,000 and included with the copy to the Accounting Office. This fee is charged to cover the costs of preparing the Initial Evaluation Report.

The preliminary application will be reviewed by the Energy Commission for completeness and to verify that the proposed compliance options are appropriate for approval under Title 24, Part 1 Section 10-109 and 10-110 of the *California Code of Regulations*. The Energy Commission will then prepare an Initial Evaluation Report, as described in the previous section.

The following subsections summarize the information to be included in the application. Preliminary Application Standard form is contained in Appendix A.

3.1 General Information

General information about the application should be provided in a cover letter. At a minimum the cover letter should indicate (1) the compliance option(s) covered by the application (its type and the set of standards that it applies to) and (2) reference to the appropriate sections of the *California Code of Regulations*.

Applications may cover more than one type. For instance, approval of an alternative component package may be directly related to approval of an exceptional method that provides a modeling capability for a building feature not previously recognized by the standards.

3.1.1 Reference to *California Code of Regulations*

The cover letter should also make reference to the appropriate section of the *California Code of Regulations* that applies to the particular application. The following references may be used for the types of applications covered by this document:

10-109 (b) 1-3 Alternative Calculation Methods
10-109 (b) 4 Exceptional Methods
10-109 (d) Alternative Component Packages

Title 24, Section 10-110 of the *California Code of Regulations* may also be referenced. This section contains the approval timetable for all three types of compliance options.

3.2 Alternative Calculation Methods

The required contents of an application for alternative calculation methods (ACMs) are presented in considerable detail in the appropriate ACM approval manuals, referenced in Section 1.2 above. These manuals must be used in conjunction with this document when applications are made for approval of ACMs. In order for an ACM to be approved, it must be demonstrated that:

- The ACM predicts energy use in a manner substantially equivalent to that predicted by the reference ACM computer program or as specified in the ACM approval manual.
- The ACM vendor has developed a compliance supplement to the program users' manual that explains how to use the program for compliance purposes.
- The ACM program produces standard output reports to enable enforcement officials to analyze program results in a manner consistent with the requirements of the appropriate ACM manual.
- The ACM meets the other approval requirements, as specified in the applicable ACM Approval Manual.

The following subsections summarize the ACM approval requirements. These summaries, however, do not replace the more detailed requirements found in the individual ACM Approval Manuals.

3.2.1 Predicted Energy Use

To show that the ACM program predicts energy use in a manner substantially equivalent to the reference computer program or as specified in the ACM approval manual, the ACM applicant must perform a number of computer runs which are described in the applicable ACM approval manual. These computer runs include variations of insulation levels, glazing areas, mechanical system design and other aspects of building design. The computer runs are based on different prototype buildings.

Different analysis methods do not produce identical results, even if they are substantially similar. The effects of these variations between the results of the candidate ACM and the reference test results are reduced by the use of custom energy budgets that are automatically calculated by each ACM based on a specific alternative component package using the methodology described in the appropriate ACM Approval Manual, some specified algorithms, and the fixed and restricted inputs described in the ACM Approval Manuals. ACMs are compared to the reference program using compliance margins, where compliance margins the difference between the custom budget and the proposed design or test calculated by the ACM or the reference method. This makes the absolute value of the energy budget calculated by an ACM less important than the difference in calculated energy budgets for the proposed design and a standard design calculated in accordance with a specific set of rules and a constrained set of inputs.

3.2.2 Capabilities List

A detailed, standardized list of required and minimum analysis capabilities must be provided to document the ACMs applicability to possible energy conservation measures.

3.2.3 Compliance Supplement

Before an ACM may be approved for use with the California energy standards, the vendor must develop a supplement to the users' manual that explains how the program is to be used for compliance with the 2001 Building Energy Efficiency Standards. The compliance supplement must be clear and concise, address all the fixed and restricted inputs, specify which reports must be generated for review by enforcement officials and present other information necessary for compliance with the Building Energy Efficiency Standards. A detailed outline of the compliance supplement is found in the appropriate ACM Approval Manual.

3.2.4 Standard Reports

ACMs must automatically generate output in a standard format as described in the appropriate ACM manual.

3.3 Alternative Component Packages

This section explains the procedures for showing that the energy use of the proposed design with an Alternative Component Package is equivalent to or less

than the standard design energy budgets. However, there is no separate ACP Approval Manual.

The requirement for approval of ACPs is that they result in calculated energy budgets that are less than or equal to the energy budget calculated by using the appropriate packages as shown below when applied to the appropriate standard prototype building (e.g. the 1761 square foot prototype for single family dwellings):

- *Nonresidential buildings (except high-rise residential buildings and guest rooms of hotel/motel buildings)* – Prescriptive envelope criteria shown in Table No. 1-H and described in Section 142 of the Building Energy Efficiency Standards;
- *High-rise residential buildings and guest rooms of hotel/motel buildings* – Prescriptive envelope criteria shown in Table No. 1-I and described in Section 142 of the Building Energy Efficiency Standards; or
- *Low-rise residential buildings* – Alternative Component Packages D as shown in Table Tables No. 1-Zl through 1-Z16 and described in Section 151 of the Building Energy Efficiency Standards.

3.3.1 Application of the ACP

A proposed ACP must be shown to result in equivalent or greater energy savings (less than or equal energy use than the custom budget generated for the proposed ACP) for each and every climate zones and for each and every occupancy type for which the ACP is proposed. When the proposed ACP is applied to the standard building prototype, it is necessary to show that it produces calculated energy budgets less than or equal to the standard design energy budgets. Averaging between climate zones or occupancy types cannot be used in showing equivalency of an ACP. In special situations, the Energy Commission may approve ACPs for a subset of the total climate zones or for a subset of the occupancy types.

3.3.2 Required Analysis Method

When possible, the appropriate public domain computer program must be used to show that an ACP meets the standard design energy budgets. For the nonresidential standards, DOE-2.1 is the public domain computer program while CALRES2 is the public domain computer program for residential standards.

An approved ACM may be used instead of the public domain program to show equivalency when analysis of the proposed ACP requires modeling capabilities that are not available with the public domain program. However, the special modeling capability must be approved for use with the ACM. Approval of the special modeling capability can occur when the ACM is approved, provided the special modeling capability is listed among the optional capabilities. If the special modeling capability has not been approved for any ACM, then the application for approval of the ACP must be accompanied with an application for approval of an exceptional method. The exceptional methods procedure described in this document leads to such approval.

3.3.3 Basis of Comparison

The standard design energy budgets are based on the following Alternative Component Packages:

- Prescriptive envelope criteria for nonresidential buildings (except high-rise residential buildings and guest rooms of hotel/motel buildings) shown in Table No.1-H and described in Section 142 of the Building Energy Efficiency Standards; or
- Prescriptive envelope criteria for high-rise residential buildings and guest rooms of hotel/motel buildings shown in Table 1-I and described in Section 142 of the Building Energy Efficiency Standards; or
- Alternative Component Packages D for the low-rise residential buildings shown in Tables No. 1-Z1 through 1-Z16 and described in Section 151 of the Building Energy Efficiency Standards.

The package requirements are then applied to a specific building prototype. These prototype buildings, meeting the appropriate package requirements, are presented in the ACM Approval Manual.

Each ACM Approval Manual contains a detailed description of the building prototype used for comparison and the ACP requirements. A copy of the reference ACM computer input file used to set the Energy Commission standard design energy budgets or to determine energy equivalency is available from the Energy Commission.

The specific building prototype appropriate for each set of standards must be used when establishing equivalency, unless the proponent can show that the building prototype is not appropriate for the conditions for which the ACP is to apply. If an alternative building prototype is used to show equivalency, the burden of proof will rest with the applicant to show why the prototype is not appropriate. Furthermore, specific eligibility criteria must be proposed to indicate when the proposed ACP may be used.

An alternative building prototype might be justified when one or more measures required by the proposed ACP are not appropriate for the building prototype. In this instance, the proponent must propose eligibility criteria detailing the circumstances or the type of housing for which the ACP can be used.

3.3.4 Standard Modeling Assumptions

When modeling the prototype or the alternative prototype with the features of the proposed ACP, the modeling must be the same as those used to calculate the budgets.

When it is necessary to modify these modeling assumptions, the application for approval of the ACP must be accompanied with an application for an exceptional method. Section 1.4 of this document identifies variance from the fixed and restricted inputs as a criterion that triggers the need for an exceptional method.

The fixed and restricted inputs are presented in the Alternative Calculation Methods Approval Manual for nonresidential buildings and the Alternative Calculation Methods Approval Manual for residential buildings. These are also included in the computer input files available from the Energy Commission. When

an approved ACM instead of the reference ACM computer program is used, to show equivalency, the standard modeling assumptions for that particular approved ACM must be used. These are documented in the appropriate ACM compliance supplement.

3.3.5 Documentation Requirements

Proponents should include information and documentation with the application in sufficient detail for the Energy Commission to accurately assess the equivalency of the proposed ACP.

3.4 Exceptional Methods

The criteria used to determine when approval of an exceptional method is required are discussed in Section 1.4 of this document. The procedures for streamlined approval of a modeling capability (not an exceptional method) are discussed in the appropriate ACM approval manual.

3.4.1 Application to ACMs

Exceptional methods may be used in conjunction with one or more ACMs. The application for approval of exceptional methods should indicate with which of the approved ACMs the exceptional method may be used. For instance, zonal control is an approved exceptional method with the low-rise residential standards and it may be used with ACMs that have a general multi-zone modeling capability. Other approved exceptional methods, such as combined space and water heating, may only be used with residential ACM computer programs.

The exceptional method application should list all the currently approved ACMs, and indicate with a yes/no response if the exceptional method would be applicable. In order to be approved to use the exceptional method, however, the ACM must pass the optional capabilities test.

While an exceptional method may be used with any approved ACM, the primary or first implementation must be developed with the public domain computer program, when possible. Approved ACMs may be used instead of the public domain computer program only when the ACM has essential modeling capabilities that are not included in the public domain program.

3.4.2 General Information

The application must contain a general description of the equipment, material or system that is to be addressed by the exceptional method. The general description should include construction information detailing how the equipment, material or system is to be installed in buildings, including design guidelines, sizing criteria, and other relevant information.

Apart from the general information there are no rigid guidelines for the information that must be submitted with applications for approval of exceptional

methods. This is because of the extreme variety of possible exceptional methods that are eligible for approval. In order for an exceptional method to be approved, three items must be developed: an algorithm (or calculation method), eligibility criteria and an optional capability test(s).

It is desirable, although not required, that algorithms, eligibility criteria and optional capability tests be fully developed in the preliminary application. The more information that is included, the less costly the evaluation and the less time will be required for review. If they are not fully developed in the preliminary application, the cost for final review and approval can be significantly greater. Furthermore, greater approval time will be required.

The following subsections explain the three required components in more detail. All three must be developed before the exceptional method can be approved.

3.4.3 Algorithms

An algorithm is a calculation procedure or equation used to calculate the energy benefit associated with building equipment, materials or systems. Algorithms can be categorized in many ways, but one way that they are commonly categorized by the Energy Commission is in terms of the time step of analysis: hourly or annual. Often both annual and hourly algorithms are developed in order for a building feature to be recognized by all approaches to compliance. If only an hourly algorithm is developed, the building feature can only be used with hourly ACMs. Development of an annual algorithm will enable the measure to be used with most ACMs.

Algorithms may take many forms. Some algorithms for instance consist of a precise set of modeling procedures and may offer alternatives to the standard fixed and restricted inputs. Some algorithms consist of worksheets, for example the approved algorithm for combined hydronic space/water heating. In this case, information taken from the worksheet becomes an input to approved ACMs. Other algorithms consist of quick look-up tables.

3.4.4 Eligibility Criteria

Eligibility criteria are minimum requirements for the building equipment, material or systems that must be met before they can be recognized by the standards. Eligibility criteria are usually necessary for one of two reasons:

Use of a building feature may have a detrimental impact unless certain conditions are met. For instance, the approved exceptional method for controlled ventilation crawl space requires that a vapor barrier be placed on the floor of the crawl space to prevent moisture migration into the house.

The approved algorithm may not cover all cases and the eligibility criteria will limit its use to cases that can be accurately modeled.

Usually more detailed eligibility criteria are necessary when simplified annual algorithms are proposed. Comprehensive algorithms may require very few eligibility criteria. For instance, it may only be required that manufacturers provide performance data based on an established test procedure.

3.4.5 ACM Approval Test

The third component of an exceptional method is the ACM approval test. The test is used to verify that ACMs correctly implement the exceptional method or develop an alternative algorithm that results in substantially equivalent results.

When an exceptional method is approved by the Energy Commission, it will generally become an amendment to one of the ACM approval manuals. In essence, a new optional capability is available and ACMs must be approved to use the new optional capability. In order for an ACM to secure such approval, it must pass the approval test. However, some exceptional methods may be permitted without the approved ACMs having to pass new tests. For instance, the residential ACMs already allow the user to enter an energy credit for space heating, space cooling or water heating. An exceptional method that is recognized through such a credit could be used with no changes to existing ACMs.

Algorithms and eligibility criteria related to approved Exceptional Methods are placed in the public domain and may be used directly by ACM vendors. ACM vendors may also develop alternative algorithms, but these must pass the ACM approval test in order to be approved, as described in the ACM approval manual.

The ACM approval test consists of a series of computer runs that are used as the basis of judging whether ACMs have correctly implemented the algorithm or that an alternative algorithm is substantially equivalent. The ACM vendor performs the computer runs; these are statistically compared to the results from the public domain exceptional method; and approval is granted if the ACM results are within an acceptable margin.

If a vendor believes that the public domain algorithms and the optional capabilities tests are invalid or inappropriate, the ACM Approval Manual provides a process for challenging the public domain algorithm, eligibility criteria and/or ACM approval test. The process for filing the challenge is explained in the ACM approval manuals, referenced in Section 1.2.

APPENDIX A

COMPLIANCE OPTIONS PRELIMINARY APPLICATION FORM

Compliance Options Preliminary Application for the Building Energy Efficiency Standards

Applicant's Name	Company
Address	City, State, Zip
Telephone	

Fee Enclosed: $1000.00 payable to the California Energy Commission

Applicable Standards (Check One or More)

__ Residential

__ Nonresidential

This Application is for {Check One or More)

__ Alternative Calculation Method, See Section I

__ Exceptional Method, see Section II

__ Alternative Component Packages, See Section III

Complete the following section(s) which applies to your application

Section I: Alternative Calculation Methods [Refer Title 24, 10-109 (b) 1]

In order to apply for approval of an Alternative Calculation Method (ACM) tests specified in the appropriate Alternative Calculation Method Approval Manual must be completed. Obtain a copy of the Manual from the Energy Commission.

- Attach test run results as specified in the Alternative Calculation Method Approval Manual
- Attach list of required and minimum analysis capability to document possible energy conservation measures.
- Attach instructions (user manual) explaining how to use the ACM for showing compliance with the Building Energy Efficiency Standards which must address:
  - Fixed and restricted inputs
  - Generates standard reports

- Enclose a copy of the ACM in magnetic media (PC compatible format). .
- Attach signed statement certifying ACM (see ACM Approval Manual).

Section II: Exceptional Methods [Refer Title 24, 10-109 (b) 4]

- Attach empirical data showing energy conservation effect of the proposed method.
- Attach installation/manufacturing criteria applicable to proposed exceptional method.
- Attach brief description of operation or any special characteristics.

Useful life expectancy (check one):

	1 year - 5 years		6 years -10 years
—	11 years – 20 years	—	21 years to 30+ years
—		—	

Estimated installed cost per building:

Section III: Alternative Component Packages [Refer Title 24, 10-109 (d)]

Attach documentation demonstrating that the proposed package meets (i.e. results in energy budgets less than or equal to) the applicable budgets.

Mail Four Copies of Completed Application to:
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

1. Executive Director
2. Deputy Director, Energy Efficiency & Demand Analysis Division
3. Manager, Buildings and Appliances Standards Office
4. Manager, Accounting Office

See Compliance Options Manual Section 3 for specific address/mail stops.