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CALIFORNIA ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

Arup US, Inc.

CONSULTANT REPORT

Improving Energy Code Compliance: Recommendations on Tools, Processes, and Performance Indicators

Final Report

Prepared for: California Energy Commission

Prepared by: Arup US, Inc.

ARUP

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ABSTRACT

This report presents a set of practical, phased recommendations to improve compliance with California's Energy Code, based on analysis of current tools, stakeholder feedback, and compliance tracking practices. It synthesizes findings from three previous efforts commissioned by the California Energy Commission (CEC): the *Permit and Compliance Tools Inventory and Characterization Report* (Attachment I, "Tools Inventory"), the *Surveys with Contractors and Installers, HERS Raters, and Acceptance Test Technicians and Employers* (Attachment II, "Stakeholder Survey"), and the *Key Performance Indicators to Track Energy Code Compliance Rates* (Attachment III, "KPI Report").

The report identifies critical barriers — administrative burdens, including inconsistent enforcement, fragmented data systems, and underutilized digital tools — and translates them into actionable strategies. Recommendations are grouped into near-term improvements, midterm enhancements, and one long-term transformational initiative: the creation of a centralized statewide compliance data platform. These actions are designed to improve usability, increase standardization, streamline documentation workflows, and support performance-based enforcement.

By aligning policy insights with implementation pathways, this report provides the CEC and its partners with a roadmap to enhance the Energy Code compliance rates, reduce administrative burden, and enable more robust tracking of energy performance outcomes across California's diverse jurisdictions.

Keywords: Title 24, Energy Code Compliance, California Energy Commission, building energy standards, energy policy, compliance tools, enforcement, HERS raters, acceptance test technicians, AHJ, unpermitted work, prescriptive packages, Energy Code tracking, centralized data platform, stakeholder engagement, building decarbonization, code enforcement modernization

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EXECUTIVE SUMMARY

California's Energy Code plays a critical role in advancing the state's energy efficiency and decarbonization goals. The Energy Code serves to reduce wasteful, uneconomical, and unnecessary uses of energy for the state. They include requirements in the Energy Code (Title 24, Part 6) and voluntary energy efficiency provisions in CALGreen (Title 24, Part 11), and they are updated every three years. The California Energy Commission (CEC) plays a pivotal role in developing and administrating programs that support building decarbonization efforts. Building decarbonization refers to activities and programs that reduce greenhouse gas emissions from buildings and is a key strategy for meeting California's long-term climate goals. However, compliance with the Energy Code remains inconsistent, and efforts to enforce and track implementation face persistent barriers, including administrative burdens, lack of guidance tools, inconsistencies with enforcement, and tracking limitations.

This report, prepared for the California Energy Commission (CEC), combines findings from three earlier efforts, including:

- **The Permit and Compliance Tools Inventory and Characterization Report** (Attachment I, referred to as the *Tools Inventory*);
- **The Surveys With Contractors and Installers, HERS Raters, and Acceptance Test Technicians** (Attachment II, the *Stakeholder Survey*); and
- **The Key Performance Indicators to Track Energy Code Compliance Rates** (Attachment III, the *KPI Report*) — to identify improvement of digital tools, compliance workflows, and enforcement metrics.

The analysis highlights four core challenges to improving Energy Code compliance:

(1) uncertain but significant rates of unpermitted and noncompliant work;

(2) burdensome and fragmented documentation processes;

(3) inconsistent enforcement practices across jurisdictions; and

(4) the absence of centralized, structured compliance data.

In response, this report proposes a **phased set of recommendations** to help the CEC improve compliance support, reduce administrative burden, and modernize compliance tracking.

Key Challenges Identified

Across the three source studies, a consistent set of barriers emerged:

- **Administrative burden and process difficulties**: Contractors, Home Energy Rating System (HERS) raters, and Acceptance Test Technicians (ATTs) reported difficulty navigating the Energy Code documentation, citing unclear guidance, hard-to-locate resources, and inconsistent terminology across platforms. HERS raters are trained, tested, and certified by a HERS Providers to verify the work of licensed contractors, including heating, ventilation, and air-conditioning (HVAC), insulation, and plumbing trades. ATTs are installation technicians that are certified by an ATTCP to perform nonresidential acceptance testing for lighting controls or mechanical systems.

- **Lack of coordination and guidance tools:** Many stakeholders, including contractors, HERS raters, ATTs, etc. felt unsupported in the field, often facing real-time compliance questions with no timely support mechanism. Existing tools lack integration and usability, particularly during inspection and verification, to assist contractors, HERS Raters, ATTs, etc. with ensuring construction and installations comply with the Energy Code.
- **Jurisdictional inconsistencies in enforcement:** Local authorities having jurisdiction (AHJs) vary in enforcement practices, resourcing, and interpretation of the Energy Code. Smaller jurisdictions often lack the staff or training to perform consistent enforcement, creating confusion and risk for industry professionals.
- **Data fragmentation and tracking limitations:** Compliance documentation is typically housed in local systems (to each authority having jurisdiction or, for example, in HERS Provider databases), paper files, or PDFs, limiting the CEC's ability to track compliance rates, measure performance, or target improvements. Home Energy Rating System (HERS) providers are approved by the California Energy Commission (CEC) to train and certify raters, and administer a data registry to record and maintain Energy Code compliance documentation. Previous studies often relied on proxy data and sampling methods to infer compliance rates.

Recommended Approach

The report outlines nine recommendations, organized by time frame and implementation complexity:

Near-Term Recommendations (Lower-Effort, Actionable Now)

- **Enhance organization and clarity of compliance guidance**
  Improve the usability of existing resources by creating a centralized, structured web-based guidance hub organized by project type, user role, and compliance trigger.
- **Ensure clear, concise summary documents are available for code updates and key concepts**
  Provide short, clear summaries highlighting changes at each code cycle to reduce confusion and improve code update adoption.
- **Complete digitization of compliance forms**
  Digitize common compliance forms and embed them in online workflows to streamline documentation and reduce errors.

Midterm Recommendations (Moderate Effort, Moderate Coordination)

- **Create a user support forum**
  Establish a moderated, user-driven forum to allow peer-to-peer troubleshooting and informal compliance support.
- **Deploy an AI-powered chatbot**
  Train a chatbot on the Energy Code documentation and FAQs to provide real-time, informal guidance and reduce hotline dependency.
- **Streamline compliance through additional prescriptive packages**
  Expand prescriptive compliance paths for common commercial project types to reduce burden on smaller projects and simplify enforcement.
- **Initiate code simplification and alignment efforts**
  Conduct a targeted review to simplify language, align definitions, and improve overall clarity within the Energy Code and across related codes.
- **Explore resource sharing among AHJs**
  Promote best-practice sharing, co-staffing models where both internal and external professionals and resources are leveraged, and access to shared tools among jurisdictions to improve consistency and efficiency in enforcement.

Long-Term Recommendation (Transformational, High Impact)

- **Develop a centralized compliance data platform**
  Build a statewide digital platform for Energy Code compliance tracking, submission, and validation. This platform would unify currently fragmented workflows, enable real-time monitoring, and provide the CEC with robust compliance metrics.

Intended Impacts and Use

These recommendations aim to:

- Reduce compliance costs and administrative burden on contractors, designers, and enforcement personnel.
- Improve consistency across jurisdictions and user types.
- Enable the CEC to better track compliance outcomes, enforcement gaps, and savings potential.
- Lay the foundation for future automation, standardization, and policy development tied to real-world implementation data.
- Improve the efficiency of buildings in California

Each recommendation includes a description of roles, implementation steps, stakeholder benefits, and phasing guidance. While the report provides suggested strategies based on Arup's research and expertise, final implementation should align with the CEC's internal priorities, timelines, and available resources.

Conclusions

Improving compliance with the Energy Code is not simply a technical issue. It is a structural challenge involving policy, process, and people. These recommendations are designed to be realistic, actionable, and scalable. They build from what is already working, address known pain points, and chart a course toward a more effective and measurable compliance framework. With strategic investment and incremental progress, California can continue to lead in energy efficiency not just by setting standards, but by ensuring they are met.

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CHAPTER 1: Introduction

This report synthesizes findings from three prior efforts - the *Permit and Compliance Tools Inventory and Characterization Report* (ATTACHMENT I, hereafter referred to as the Tools Inventory), the *Surveys with Contractors and Installers, HERS Raters, and Acceptance Test Technicians and Employers* (ATTACHMENT II, hereafter referred to as the Stakeholder Survey), and the *Key Performance Indicators to Track Energy Code Compliance Rates* (ATTACHMENT III, hereafter referred to as the KPI Report) - to inform practical recommendations and implementation strategies for improving compliance with California's Energy Code. These earlier efforts examined the compliance landscape through a review of available tools, direct input from industry professionals, and proposed metrics to evaluate enforcement and track compliance outcomes. Collectively, they provide a comprehensive foundation for understanding and addressing the challenges of Energy Code implementation.

Findings indicate that compliance with the Energy Code is inconsistent due to administrative burdens, decentralized enforcement practices, and limited visibility into non-compliant work. Unpermitted installations remain a major issue, particularly in the residential sector, where for example, HVAC and DHW alterations frequently occur without permits and attention to Energy Code requirements. Additionally, enforcement is the responsibility of a large number of local building departments, each with different levels of resources, expertise, and commitment to the Energy Code enforcement. These inconsistencies contribute to a fragmented compliance landscape, making it difficult for regulators and industry professionals to navigate the process efficiently.

Building on these findings, this report focuses on actionable steps that can enhance compliance and enforcement. It proposes a phased approach, beginning with targeted, lower-cost measures that provide immediate benefits while laying the groundwork for broader long-term solutions. A key theme in this report is the need for standardization, efficiency, and data-driven enforcement. The recommendations include both independent improvements - such as better compliance tools, training programs, and integration of existing resources - and foundational steps toward a centralized compliance data platform.

While a centralized compliance data platform is explored as a long-term transformative solution, its development would require substantial effort, coordination, and investment. Therefore, this report outlines interim steps that incrementally address current gaps while building momentum toward a more integrated compliance system. The proposed recommendations are structured to help the California Energy Commission (CEC) prioritize efforts based on feasibility, impact, and cost-effectiveness.

The intended audience for this report is the CEC, but the recommendations also provide insights into state and local agencies, policymakers, enforcement personnel, industry professionals, and compliance tool developers. By translating research insights into strategic recommendations, this report aims to improve compliance rates, reduce administrative inefficiencies, and ensure that California's Energy Code delivers its intended energy savings and emissions reductions. The following chapters will present key compliance challenges, outline proposed solutions, and provide a roadmap for phased implementation.

Stakeholder Groups Considered in This Report

The following stakeholder groups are referenced throughout the report, reflecting the full ecosystem involved in California Energy Code compliance. These groups either carry out compliance activities, directly enforce the Code, or are indirectly impacted by improvements in compliance infrastructure.

- **Contractors**: Licensed general and specialty contractors - including HVAC, lighting, and envelope specialists - responsible for installing code-compliant systems and submitting required documentation.
- **HERS Raters and Acceptance Test Technicians (ATT)**: Individuals certified to perform Field Verification and Diagnostic Verification (FV&DT) testing or acceptance testing, required in many compliance scenarios.
- **HERS Providers/Acceptance Test Technician Certification Providers (ATTCP)**: Organizations responsible for certifying, training, and overseeing HERS raters and ATTs (e.g. California Home Energy Efficiency Rating Services, California State Pipe Trades Council, California Advanced Lighting Controls Training Program, National Lighting Contractors Association of America, etc.). These groups also play a role in resource development, enforcement standards, and data infrastructure.
- **Building Designers**: Architects, engineers, energy consultants, and Energy Code documentation authors who prepare compliance documentation and design energy-efficient building systems.
- **Builders and Developers**: Entities overseeing construction or development projects. These include both residential and commercial builders responsible for ensuring subcontractors comply with code requirements.
- **Authorities Having Jurisdiction (AHJs)**: Local building departments responsible for reviewing permit applications, enforcing Energy Code requirements, and issuing final approvals.
- **CEC Staff**: California Energy Commission personnel who develop Energy Code policy, oversee implementation, maintain documentation and tools, and provide technical assistance.
- **Homeowners and Building Owners**: End-users who commission work and are affected by compliance decisions, documentation requirements, or noncompliance consequences.
- **Product Manufacturers**: Companies that produce HVAC equipment, windows, lighting, and other building components. Their product specifications and documentation influence what qualifies for compliance.
- **Energy Code Trainers and Training Organizations**: Educators, industry associations, and regional networks that develop and deliver training on the Energy Code to professionals. Includes entities that specialize in the Energy Code training and technical resources, such as Energy Code Ace, California Regional Energy Networks (3C-REN, BayREN, SoCalREN, MCE), and regional workforce programs. Other organizations like the California Building Officials (CALBO) also provide the Energy Code training mainly through coordination with Energy Code Ace or the CEC.

CHAPTER 2:
Synthesis of Findings From Preceding Subtasks

Summaries of Findings From Previous Research

Before presenting the recommendations developed under this task, it is important to summarize key findings from the three preceding reports:

- Subtask 4.1: Tools Inventory and Assessment
- Subtask 4.2: Stakeholder Survey of Contractors, HERS Raters, and ATTs
- Subtask 4.3: Compliance Indicators and KPI Framework

The summaries below reflect the conclusions and recommendations identified in each report, particularly focusing on the gaps or opportunities in the relevant scopes of work.

Summary of Subtask 4.1: Tools Inventory and Assessment

The Subtask 4.1 report provided a characterization of 30 software tools used across different phases of the Energy Code compliance process. Aimed at identifying solutions that enhance workflows, improve energy efficiency, and support decarbonization goals, the report assesses tools used across the full compliance cycle - from design and permitting, to inspection and field verification. It examines both established and emerging platforms, highlighting their strengths as well as key market gaps, including limited alignment with California-specific standards, little integration across compliance phases, and user accessibility challenges. For detailed conclusions, see Attachment I.

Key findings for this report included the following:

- **Diverse set of tools, concentrated in early phases of compliance**: While describing a broad spectrum of tools, the report found a strong concentration of tools supporting building design and permit application phases, but few tools supporting later phases such as field verification and acceptance testing.
- **Improving energy modeling and documentation features:** The report identified several ways to improve energy modeling and documentation software. These include providing residential tools like REScheck to simplify documentation; adding features such as HVAC load analysis into existing tools to streamline workflows and enhance accuracy; and incorporating 3D modeling to improve usability and precision.
- **Strong Permit Application and Plan Review Tools:** The assessment found some of the strongest and most useful tools serving the permit application and plan review phases. These tools help streamline workflows and improve the overall user experience for applicants and staff by integrating, centralizing, and linking code compliance steps together.
- **Instant permitting and automation**: Tools like SolarAPP+ and Symbium offer automated permit approval processes that improve efficiency for specific project types, though they are not yet integrated with Energy Code workflows.
- **Gaps in inspection and field verification tools**: The report identified a lack of dedicated tools for Energy Code field verification and acceptance testing, suggesting an opportunity for new tool development or better integration with existing platforms.

- **Inspection Improvements**: Inspection tools show potential for improvement. Key recommendations include customizable checklists for energy-focused reviews, auto-generated reports to streamline documentation, and remote inspection capabilities to better utilize specialized staff. Additionally, integrating inspections with permit management systems can consolidate workflows and capitalize on overlapping functionality.

From these findings, the report recommended the following:

- **Expand Tool Development for Underserved Phases:** There is a need to expand tool development for underserved phases, such as acceptance testing and field verification. Prioritizing tools that integrate fieldwork with office-based compliance workflows can help close current market gaps and support end-to-end Energy Code compliance.
- **Integrate with Existing Tools:** CEC should leverage widely used platforms like Autodesk BIM 360 and inspection tools such as Home Inspector Pro to integrate compliance-related features. This approach can streamline workflows, reduce duplication, and enhance support for acceptance testing and field verification across residential and nonresidential projects.
- **Track Developments:** As new technologies emerge, the CEC should monitor software advancements to identify tools that may improve Energy Code compliance. Staying informed will ensure the state continues to adopt effective, up-to-date digital solutions.

Summary of Subtask 4.2: Stakeholder Survey of Contractors, HERS Raters, and Acceptance Test Technicians (ATTs)

This report presents findings from a survey designed to enhance the CEC's understanding of Energy Code compliance practices among contractors, HERS raters, and ATTs. As part of a broader code compliance study, the survey explored current field practices, common barriers to compliance, and opportunities for improvement. Data were collected through online surveys distributed through licensing and certification organizations, as well as direct outreach. For detailed conclusions, see Attachment II.

Although the response rate was lower than ideal, several consistent themes emerged:

- **Costs and competition discourage permitting**: Most contractors indicated that they do not have issues applying for permits and generally attempt to meet Energy Code compliance standards. However, contractors, HERS raters, and ATTs reported that permitting fees and verification costs can discourage proper permitting, particularly for small-scale projects.
- **Navigating the compliance process is burdensome**: Many respondents described Energy Code paperwork and permitting processes as confusing, time-consuming, and difficult to complete accurately, especially for alteration and retrofit projects. Stakeholders noted that current compliance resources are hard to navigate and not well-tailored to project-specific requirements.
- **Inconsistent enforcement across jurisdictions**: Survey responses described frustration with varying interpretations of the Energy Code by different building department personnel, and limited consequences for non-compliance.

- **Limited coordination across project teams**: Lack of early engagement between contractors, HERS raters, ATTs, and AHJs was identified as a barrier to smooth compliance, resulting in project implementation errors and last-minute compliance failures.
- **Challenges keeping up with Energy Code updates**: Respondents reported difficulty adapting to frequent code updates while also expressing concerns that the Energy Code does not always keep pace with new technologies.

Summary of Subtask 4.3: Compliance Indicators and Key Performance Indicators (KPIs) Framework

The Subtask 4.3 report examined data and literature on unpermitted and non-compliant work in California, proposing Key Performance Indicators (KPIs) for better tracking. Through literature and data review, the report highlights gaps in enforcement, fragmented data systems, and unrealized energy savings, particularly in areas like HVAC, lighting, and building envelopes. By synthesizing existing research and recommending actionable metrics, the report offers ways for the CEC to track unpermitted and non-compliant work using proxy datasets. For detailed conclusions, see Attachment III.

Key findings included the following:

- **High rates of unpermitted and non-compliant work**: Previous studies reviewed indicated permit rates as low as single digits to 29% for residential HVAC replacements, with frequent discrepancies between documentation and field conditions.
- **Data gaps and tracking limitation:** The report confirmed that fragmented and inconsistent compliance data due to a lack of centralized databases. Permit records are often non-standardized across jurisdictions, hindering statewide analysis. Most current studies investigating compliance rates rely on data sampling methods that are labor-intensive and costly.
- **Unrealized Energy Savings:** Non-compliant and unpermitted work limits California's ability to meet its energy efficiency goals by reducing achievable energy savings. Studies show that stronger compliance can unlock major energy and cost savings.

From these findings, the report recommended:

- **Tracking KPIs:** The report proposed new KPIs to track unpermitted work using proxy datasets (e.g., sales data, useful life of equipment estimates, and real estate estimates).
- **Conducting code compliance studies:** The report recommended surveying projects within various jurisdictions to assess non-compliant work and understand any trends in non-compliant work between jurisdictions. This involves comparing permit applications and inspection reports with actual site data for a sample of permitted buildings. Repeating this process every 3–5 years would help track compliance trends over time and support informed code updates.
- **Prioritizing energy-saving measures**: Given resource constraints, the report recommended focusing compliance efforts on HVAC, lighting, and envelope measures where potential energy savings are greatest.

- **Engaging External Data Sources**: Collaborating with external data providers could help the CEC explore new ways to estimate unpermitted work.

Distilling Key Themes

With attention to the CEC's goal of improving t Energy Code compliance rates in the state, the project team distilled the key themes from the three previous reports. These themes were intended to serve as the basis for the recommendations and actions outlined in Chapter 3 and detailed in Chapter 4 of this report. They include the following:

- **Fragmented and Inconsistent Tools and Data:** Both tools and permitting data are fragmented across jurisdictions, making it difficult to navigate resources or track project compliance consistently.
- **Inconsistent Enforcement:** Practices of Energy Code enforcement differ across jurisdictions, leading to inconsistency and confusion among stakeholders involved in the process.
- **Lack of User-Friendly Support and Documentation:** Users - especially contractors and HERS raters - expressed widespread frustration with hard-to-navigate documentation, unclear workflows, and the lack of centralized or real-time support for compliance tasks.
- **Complexity of the Energy Code:** The structure and requirements of the Energy Code are perceived as overly complex, especially for small or simple projects. There is a clear demand for simplification and more intuitive solutions.
- **Automation Opportunities:** Certain tools like SolarAPP+ and Symbium demonstrate the benefit of automation in the permitting process.
- **Data Limitations and the Need for Better Tracking:** The absence of centralized, standardized compliance data and reliance on fragmented or sampled datasets limits the state's ability to monitor compliance effectively. Developing KPIs and performing recurring jurisdiction audits could offer a clearer picture of statewide compliance trends. However, these methods only approximate rates of Energy Code compliance.

Translating Findings into Actions

The preceding summaries and key themes highlight many potential pain-points and opportunities - far more than any single initiative could tackle at once. To convert this body of evidence into a practical roadmap, the project team worked with CEC staff to triage the issues and identify potential interventions.

During a virtual whiteboarding session, the project team and CEC staff followed a series of steps to establish recommendations that systematically address the challenges as well as leverage the opportunities uncovered in the previous work.

Synthesis of Stakeholder and CEC Brainstorming

To strengthen and validate the recommendations, the project team convened collaborative brainstorming sessions with CEC staff. These discussions aimed to test the feasibility and priority of different improvement strategies drawn from the earlier research findings.

The sessions highlighted strong consensus around the interest for a centralized statewide compliance platform. CEC staff agreed that unifying fragmented jurisdictional data and workflows is essential for long-term improvement, although they noted this would require phased development, inter-agency coordination, and policy support over many years.

Participants also expressed interest in simplifying and standardizing the compliance process to make the Energy Code easier to navigate for contractors, HERS raters, ATTs, designers, and AHJs. Ideas such as expanding prescriptive compliance packages, producing illustrated guides (similar to ASHRAE 90.1 user guides), and exploring AI-based support tools (similar to UpCodes' Copilot) were met with enthusiasm, particularly for their potential to reduce confusion and support less-resourced jurisdictions.

The group emphasized that training and knowledge gaps continue to be a barrier. There was broad support for enhancing digital resources like Energy Code Ace, Virtual Compliance Assistant (VCA) functionality, and considering shared staffing models to help smaller AHJs build expertise. However, attendees also recognized that training and resources alone would not fully resolve enforcement inconsistencies.

Opportunities to deepen integration of the Energy Code requirements into existing e-permitting and plan review platforms were seen as promising. Although this approach is not currently in active development, stakeholders noted its potential to streamline compliance and reduce duplication.

Finally, participants discussed larger or longer-term ideas - such as a comprehensive overhaul of the Energy Code and full integration of proprietary registries - but agreed these would require significant policy development and could not be addressed within the immediate scope.

These brainstorming sessions helped shape the final set of recommendations, ensuring they reflect both research evidence and on-the-ground realities. While many potential strategies were identified, the team focused on actions that were feasible within the current scope. Larger-scale proposals - such as a full overhaul of the Energy Code, unification of proprietary HERS/ATT data tools, or broad training mandates - were acknowledged as valuable longer-term opportunities but deferred for future policy consideration.

Turning Brainstorming into Priorities

To guide implementation, the recommendations have been organized according to a framework that reflects CEC priorities, implementation effort, and long-term goals:

1. Align with CEC priorities and existing initiatives (e.g., modernization of digital resources, equity across AHJs).
2. Deliver measurable improvement with reasonable effort - meaning they can be piloted or scaled within typical budgeting and staffing cycles.
3. Build toward a long-term, data-driven compliance ecosystem, rather than creating standalone fixes that may become obsolete.

4. Leverage (rather than duplicate) proven solutions. Wherever possible, the recommendations lean on tools or processes already familiar to the market - then extend or integrate them for the Energy Code needs.

Using those criteria, we grouped viable responses into three implementation horizons:

Table 1: Organization of Recommendations by Implementation Horizon

Horizon	Focus	Why These Items Rose to the Top
Near-term (0–2 yrs)	Improvements to guidance, documentation, and existing digital forms.	Addresses the "hard-to-find / hard-to-use" challenges cited in every prior report; improvements can be implemented relatively quickly through website and resource updates.
Mid-term (2–5 yrs)	Collaboration tools, simplified prescriptive pathways, and code alignment efforts.	Responds to stakeholder feedback on inconsistent enforcement, burdensome documentation processes, and limited peer support networks; requires moderate technical and administrative development.
Long-term (5+ yrs)	A centralized compliance data platform that integrates all phases of compliance.	Addresses the underlying "fragmented data" issue (Compliance Indicators report) and enables KPI-level tracking; requires multi-agency coordination and phased implementation planning.

Not every challenge surfaced in the previous tasks is addressed in the initial recommendation list. Topics such as financial incentives, whistle-blower protections, or statewide training mandates may require separate policy discussions. The recommendations that are advanced here were selected because they meet the criteria above and create a foundation that future incentive or enforcement efforts can build upon.

CHAPTER 3: details each recommendation, shows the explicit cross-referencing to the underlying findings (see Table 2), and provides implementation steps grouped in the appropriate horizon.

CHAPTER 3:
Recommendations Overview

This chapter provides an overview of practical recommendations designed to significantly enhance compliance with California's Energy Code. These recommendations directly address key themes identified through stakeholder engagement and research, specifically:

- Fragmented and Inconsistent Tools and Data
- Inconsistent Enforcement
- Lack of User-Friendly Support and Documentation
- Complexity of the Energy Code
- Automation Opportunities

The recommendations are structured into three phases: near-term incremental improvements, mid-term enhancements, and long-term transformative solutions. This phased approach allows the CEC to prioritize actions strategically, building momentum from manageable, lower-effort improvements to more comprehensive solutions over time.

Table 2: Crosswalk Between Recommendations and Prior Findings

Recommendation	Tool Inventory	Stakeholder Survey	Compliance Indicators
Enhance Organization and Clarity of Compliance Guidance	Identified fragmented tool ecosystem; poor visibility into existing resources	Strong user frustration with inconsistent or difficult-to-navigate online documentation and uninformed inspectors	Potential indicators: time to locate resources, user engagement metrics
Ensure Concise Summary Documents are Available for Code Updates and Key Concepts	N/A	Repeated feedback about difficulty understanding what had changed between code cycles	Potential indicators: adoption rates of new code cycles, training attendance
Complete Digitization of Compliance Forms	Existing tools noted as limited but promising	Contractors reported confusion around current documentation workflows	Potential indicators: digital vs. manual form submission rates, processing times

Recommendation	Tool Inventory	Stakeholder Survey	Compliance Indicators
Create a User Support Forum	Some tools offer community forums that support troubleshooting and user collaboration, but all are tool specific and not wholistic to the compliance process	HERS raters and contractors indicated a lack of real-time, peer-based support for navigating complex compliance tasks	Potential indicators: forum usage rates, response times, user satisfaction
Deploy AI-Powered Chatbot	UpCodes Copilot highlights early-stage use of AI for code navigation; broader application potential remains unexplored	Some respondents indicated interest in tools that provide immediate answers, such as more reliable phone lines. Automation or AI is another path to achieve similar outcomes.	Potential indicators: chatbot usage rates, query resolution rates
Streamline Compliance through Additional Prescriptive Packages	Gaps in streamlined solutions for nonresidential compliance identified	Contractors and designers noted frustration with complex requirements for simple projects	Potential indicators: prescriptive package adoption rates, project approval times
Code Simplification and Alignment	Tools limited by Energy Code structure complexity	General stakeholders call for simplification	Potential indicators: code interpretation queries, training needs assessment
Explore Resource Sharing Among AHJs	Highlighted varying levels of AHJ tool sophistication and usage	Contractors, HERS Raters, and ATTs noted inconsistency in code enforcement	Potential indicators: enforcement consistency metrics, AHJ collaboration frequency

Recommendation	Tool Inventory	Stakeholder Survey	Compliance Indicators
Centralized Compliance Data Platform	Documented highly fragmented permit and compliance data across jurisdictions	Noted inability to track project history or permit status across jurisdictions	Need for consistent, real-time KPI tracking identified

Near-Term Incremental Improvements

Enhance Organization and Clarity of Compliance Guidance

- Continuing to refine the user experience of CEC's Energy Code website by conducting a usability (UX) review, identifying and addressing user difficulties in finding and accessing existing resources from the CEC, Energy Code Ace, compliance software developers, or others developed with CEC funding or otherwise approved by the CEC.
- Provide specific recommendations to Energy Code Ace on improving visibility and ease-of-use for their existing resources, ensuring stakeholders can quickly locate and utilize essential compliance information.

Ensure Concise Summary Documents are Available for Code Updates and Key Concepts

- Conduct a review of existing summary documents (e.g., for code version changes, documentation workflows, or key compliance concepts) to identify gaps in availability, clarity, or accessibility.
- Where summaries already exist, assess their usefulness for a range of stakeholders (e.g., contractors, AHJs, designers, HERS raters), and revise or reformat as needed to improve clarity and practical value.
- For topics where summaries are missing or insufficient, develop new concise (2–3 page) summaries that provide actionable guidance, while linking to longer resources for additional detail.
- Ensure all summaries are prominently hosted within the centralized compliance resource hub (see previous recommendation), and clearly organized by audience, topic, and code cycle.

Complete Digitization of Compliance Forms

- Evaluate current use of digital compliance forms across the Energy Code ecosystem, including tools like the Virtual Compliance Assistant (VCA) and other existing platforms, to assess adoption rates and identify gaps where manual processes still dominate.
- Explore opportunities to develop or enhance digital submission interfaces for common Energy Code compliance forms, building on successful models like VCA while recognizing the need for CEC-controlled solutions.
- In the short term, assess which frequently used compliance forms would benefit most from digitization, online validation, or form-based inputs, and identify workflows that could be streamlined through digital tools under CEC guidance.
- Collaborate with existing digital form providers, including the VCA team managed by the IOUs and Energy Code Ace, to share best practices and coordinate efforts where appropriate, while maintaining CEC's ability to independently develop digital compliance solutions.

Mid-Term Enhancements

Create a User Support Forum

- Establish an online, user-driven forum (Following the Stack Overflow model, for example, which will allow users to develop reputation) to facilitate peer-to-peer support

among stakeholders, enabling informal guidance and faster resolution of common compliance questions.

Deploy AI-Powered Chatbot

- Develop and deploy an AI chatbot trained specifically on the Energy Code content, to provide real-time informal compliance support, complementing the user forum and code hotline.

Streamline Compliance through Additional Prescriptive Packages

- Develop additional prescriptive compliance packages targeted at simplifying the compliance process for straightforward commercial projects, expanding existing residential approaches.

Code Simplification and Alignment

- Identify and remove outdated or unnecessary sections of the Energy Code based on detailed research and stakeholder input.
- Align the structure and organization of the Energy Code with other relevant codes and standards to simplify cross-referencing and compliance.

Explore Resource Sharing Among AHJs

- Initiate processes and guidelines to facilitate resource and best practice sharing among Authorities Having Jurisdiction (AHJs), improving consistency and reducing duplication of efforts, in line with the related recommendations above.

Long-Term Transformative Solution

Centralized Compliance Data Platform

- Establish a comprehensive, centralized digital platform for managing, tracking, and analyzing the Energy Code compliance statewide, improving oversight, consistency, and enforcement efficiency.

Implications for Compliance Tracking and Performance Metrics

Several of the recommendations in this report - while primarily focused on improving the Energy Code compliance - will also substantially enhance the State's ability to track, analyze, and report on compliance outcomes using meaningful KPIs. Previous efforts, including the data report and survey report, revealed that the CEC has limited ways to directly track these KPIs. The recommendations outlined here are intended to lay the groundwork for addressing that challenge.

A Centralized Compliance Data Platform would establish the technical infrastructure necessary to consistently collect project-level data across jurisdictions and compliance pathways. By standardizing how compliance documents are submitted, validated, and stored, the platform would enable direct measurement of:

- The percentage of permitted projects that complete each phase of the Energy Code compliance
- The prevalence of documentation issues or failed verifications across measures and project types

- Timeline and workload metrics (e.g., average time from submission to verification)
- Jurisdictional consistency in enforcement
- The use and effectiveness of prescriptive pathways or documentation tools

Other recommendations - including digitizing all compliance forms, streamlined documentation guidance, and user support tools - contribute by improving data structure, accuracy, and completeness. These changes reduce ambiguity in submitted documentation, allow for standardized digital workflows, and help ensure that data collected through the compliance process is suitable for aggregate analysis.

Together, these efforts represent a substantial step toward enabling the CEC and its partners to track the Energy Code compliance across California in a consistent, timely, and actionable way - supporting future performance monitoring, transparency, and policy evaluation.

Organization Of Recommendations

Each recommendation in this report follows a consistent structure to support clarity and usability. Recommendations are grouped by implementation horizon - near-term, mid-term, and long-term - and are presented with the following components:

- **Context and Rationale** – A brief summary of the problem or barrier identified through stakeholder input or prior research.
- **Recommended Approach** – A proposed strategy to address the challenge, based on Arup's experience with the Energy Code implementation and digital tool development.
- **Implementation Steps** – A sequenced list of suggested actions to guide planning and phasing.
- **Implementation Responsibility** – A table outlining the types of roles or entities likely needed to support implementation.
- **Stakeholder Impacts** – A summary of which groups are likely to benefit from the recommendation and how.

The roles and steps described in each recommendation are based on Arup's professional judgment and prior experience with implementation planning. These are provided to help the CEC assess feasibility and anticipate potential needs. However, if any recommendation is selected for implementation, the CEC will determine the appropriate project structure, delivery method, and assignment of responsibilities based on its internal processes, procurement requirements, and policy priorities.

Summary and Recommendation Interaction

The phased recommendations are mutually reinforcing and designed for scalable implementation. Near-term actions focus on usability and clarity improvements that address immediate challenges and lay the groundwork for broader reforms. These early improvements support wider adoption of digital forms and tools, setting the stage for mid-term enhancements such as peer forums and AI assistants, which will deepen collaboration and help stakeholders navigate increasing system complexity. Ultimately, these phases culminate in a long-term solution that integrates improvements into a cohesive, centralized compliance management system. The next chapter details each group of recommendations and describes implementation pathways.

It is important to note that the CEC has already implemented certain aspects of these recommendations successfully. Rather than proposing wholesale changes, this framework builds upon existing effective practices while enhancing their accessibility and integration. The recommendations focus on improving current systems and ensuring that all existing resources are easily discoverable by the public. The next chapters detail each group of recommendations and describes implementation pathways.

CHAPTER 4:
Near-Term Recommendations

This chapter outlines actionable, near-term strategies to improve the Energy Code compliance using existing tools, resources, and processes. These recommendations are designed to address critical barriers identified through stakeholder input and survey feedback, particularly those related to guidance clarity, accessibility, and the usability of current compliance documentation.

Each recommendation in this chapter can be initiated with relatively modest effort and cost and is intended to produce tangible improvements in the short term. In many cases, the work involves improving the presentation, organization, or reach of information that already exists. These strategies lay the groundwork for broader improvements by resolving immediate points of confusion and making the compliance process easier for practitioners to navigate.

Enhanced Organization and Clarity of Compliance Guidance

Across contractor, HERS rater, and ATT responses, one of the most consistent themes was the difficulty in clearly understanding the Energy Code requirements, especially when navigating online resources. Stakeholders noted that while the CEC and Energy Code Ace provide numerous existing resources - such as guides, checklists, and FAQs - these resources are difficult to locate or inconsistently referenced across platforms, leading to confusion, delays, and errors in compliance documentation.

Contractors specifically described frustration at uncertainty regarding which resources are relevant or how to locate project-specific guidance. Similarly, both HERS raters and ATTs expressed challenges with navigating online documentation, particularly for new or complex requirements.

Stakeholder feedback emphasized the need for better navigation, clearer organization, and easier access to existing resources. Many respondents described spending excessive time trying to locate the correct guide, checklist, or form - especially when working across multiple platforms like the CEC website and Energy Code Ace. This recommendation addresses that gap by improving how resources are structured, presented, and linked within the CEC's digital environment.

Recommended Approach

We recommend that the CEC enhance the usability of the existing Energy Code Support Center by refining and expanding its current structure to better serve diverse user needs. Building on the strong foundation of the current support center, these improvements should focus on addressing stakeholder feedback about navigation and resource discoverability while leveraging the CEC's existing investment in this platform.

Specifically, these enhancements to the existing Energy Code Support Center should:

- **Enhance the existing organization** of the Energy Code summaries, guides, FAQs, and tools, including both CEC-developed and external resources (e.g., Energy Code Ace), to improve discoverability and user experience
- Refine the navigation structure to provide clearer pathways organized by:
    - User role (e.g., contractors, designers, HERS raters, ATTs)
    - Project type (new construction, alterations, equipment replacement)
    - Relevant compliance triggers and project phases
- Strengthen the visibility of recommended resources for each step in the compliance process
- Improve the prominence and accessibility of summaries highlighting changes for each Energy Code update

Implementation Steps

1. **Website Content Audit**:
    - Continue to conduct thorough reviews and inventories of existing compliance guidance resources available, noting their locations on the CEC and partner websites.
2. **Stakeholder Engagement**:
    - Collect specific stakeholder feedback (particularly contractors, HERS raters, and ATTs) to identify the most frequently used and most urgently needed resources.
3. **Resource Curation and Categorization**:
    - Curate, organize, and categorize existing resources clearly, based on stakeholder feedback and analysis of usage patterns.
4. **Website Restructuring and Integration**:
    - Implement an updated, intuitive website structure, integrating the resource hub within the current web infrastructure.
5. **Continuous Feedback and Improvement**:
    - Establish ongoing feedback mechanisms (surveys, analytics, stakeholder input) to continuously improve resource usability.

Implementation Responsibility

Table 3: Roles and Responsibilities for Enhanced Organization and Clarity of Compliance Guidance

Role	Responsibility
Project Management Staff (Technical Specialists, Web Admin)	Conduct resource audit, curation, and oversight
Web Developer (Internal or Contracted)	Execute website redesign and integration
Stakeholders (Contractors, HERS Raters, ATTs)	Provide input and user testing for continuous improvements

Stakeholder Impacts of Recommended Improvements

The following table summarizes which stakeholder groups are expected to directly or indirectly benefit from each recommendation in this report. Understanding the range of beneficiaries can help guide implementation priorities and communication strategies. This same table will be repeated for each recommendation in this report.

Table 4: Stakeholder Impacts for Enhanced Organization and Clarity of Compliance Guidance

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Easier access to targeted code resources improves accuracy of submissions
HERS Raters and ATTs	Direct	Faster access to compliance documentation and test guidance
HERS Providers and ATTCPs	Indirect	Streamlined guidance supports consistent training and registry implementation
Building Designers	Direct	Central hub for documentation reduces time spent searching for updates and forms
Builders and Developers	Indirect	Design teams operate more efficiently, reducing project risks
AHJs	Direct	Improved clarity and consistency supports enforcement and plan review
CEC Staff	Direct	Fewer support requests and reduced ambiguity in stakeholder interpretation
Homeowners and Building Owners	Indirect	Professionals better understand and fulfill compliance obligations on their behalf
Product Manufacturers	Indirect	Fewer submission errors or misinterpretation of product eligibility
Energy Code Trainers and Organizations	Direct	Improved ability to locate up-to-date materials to use in workshops and training sessions

Ensure Concise Summary Documents are Available for Code Updates and Key Concepts

Stakeholder feedback consistently highlighted the difficulty of keeping up with frequent updates to the Energy Code. While detailed summaries exist, respondents (and the authors of this paper) reported difficulty locating them, noted they were often overly lengthy, or felt they lacked clarity in practical applications. These issues lead to confusion about new requirements, missed compliance steps, and subsequent project delays.

Clearly written, concise summaries outlining key changes with practical implications were repeatedly requested by contractors, HERS raters, and ATTs. This should include side by side comparisons of old and new code requirements to explicitly highlight the changes. These summaries would significantly reduce uncertainty around new requirements and improve compliance accuracy.

The review phase of the previous recommendation to summarize existing documentation should be taken into account during the development of these summary documents.

Recommended Approach

We recommend the CEC enhance and optimize existing summary documents for the Energy Code updates, building on current resources such as the Blueprint, "What's New" materials, and fact sheets. While these valuable resources exist, stakeholder feedback indicates opportunities to improve their accessibility, discoverability, and practical utility for practitioners. This recommendation focuses on refining the format, presentation, and distribution of these existing summary efforts to better serve user needs.

Enhanced summary documents should maintain their concise format (2–3 pages) while improving:

- Accessibility and discoverability - ensuring summaries are prominently featured and easily located by practitioners
- Practical focus - emphasizing critical updates relevant to common project scenarios (new construction, alterations, replacements)
- Clear presentation of changes in compliance documentation steps or expectations
- Prominent coverage of important compliance triggers and enforcement changes
- Integration of common pitfalls, frequently asked questions, and relevant compliance checklists or tools

Each enhanced summary should be clearly linked from the Energy Code homepage and prominently featured within the Energy Code Support Center, with improved pathways for different user types to locate the most relevant information for their needs.

This approach builds on the CEC's existing summary efforts while addressing stakeholder feedback about usability and accessibility.

Implementation Steps

1. **Initial Outline and Draft Development**:
    - Develop summary outlines highlighting critical changes for each code update cycle.

2. **Stakeholder Review and Feedback**:
    - Solicit and integrate feedback from representative stakeholder groups to ensure clarity, accuracy, and practical relevance.
3. **Finalization and Publication**:
    - Publish concise summaries concurrently with each new Energy Code release on CEC and partner websites.
4. **Integration with Resource Hub**:
    - Integrate summary links prominently within the centralized resource hub.

Implementation Responsibility

Table 5: Roles and Responsibilities for Concise Summary Documents

Role	Responsibility
Technical Specialists & Outreach Staff	Draft concise summaries and integrate feedback
Stakeholder Representatives	Provide practical feedback and validation
Web Administrators	Publish summaries and ensure prominent placement

Stakeholder Impacts of Recommended Improvements

The following table summarizes which stakeholder groups are expected to directly or indirectly benefit from this recommendation.

Table 6: Stakeholder Impacts for Concise Summary Documents

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Summaries help contractors understand new requirements quickly, reducing delays.
HERS Raters and ATTs	Direct	Easier access to identify what procedures or documentation steps may have changed.
HERS Providers and ATTCPs	Indirect	Clear summaries improve training accuracy and help ensure alignment with new rules.
Building Designers	Direct	Improved understanding of how to incorporate updated requirements into early design and documentation.
Builders and Developers	Indirect	Better-informed teams and fewer compliance errors.
AHJs	Indirect	Facilitation of consistent enforcement by clarifying new requirements in each code cycle.
CEC Staff	Direct	Fewer clarifying inquiries and greater consistency in submitted documentation.
Homeowners and Building Owners	Indirect	Better-informed professionals and fewer compliance setbacks.
Product Manufacturers	Indirect	Easier access to track documentation or eligibility changes tied to specific code updates.
Energy Code Trainers and Orgs	Direct	Summaries providing foundational content for new code cycle trainings.

Complete Digitization of Compliance Forms

Survey and informal conversations with CEC staff indicate that digital compliance forms are currently underutilized across the Energy Code ecosystem, with many processes still relying on static printed or PDF forms. While tools like the Virtual Compliance Assistant (VCA), managed by the IOUs and Energy Code Ace, have demonstrated the value of digital forms, gaps remain. Contractors, designers, and AHJs expressed a desire for more comprehensive, interactive digital compliance processes that could improve documentation accuracy, reduce errors, and shorten permit timelines.

Significant potential exists to streamline compliance and reduce paperwork by expanding the digitization of common compliance forms beyond existing tools. Stakeholders suggested that a more comprehensive approach to digitizing commonly used compliance forms could substantially enhance documentation quality and consistency across all compliance pathways.

Recommended Approach

We recommend the CEC initiate a phased approach to complete the digitization of Energy Code compliance forms, learning from successful models like VCA while developing CEC-controlled digital solutions for the most common compliance forms and documentation workflows.

This phased expansion should include:

- Initial assessment to identify forms and documentation steps best suited for digital submission across all compliance pathways
- Development of interactive, user-friendly digital forms with built-in validation logic and help features
- Integration of digital submissions with existing compliance resources and documentation systems
- Collaboration with existing digital form providers to share best practices while maintaining CEC's independent development capabilities
- Pilot testing of new digital form workflows in selected jurisdictions or for specific common project types

Implementation Steps

1. **Assessment and Prioritization:**
    - Conduct a comprehensive assessment to identify compliance forms most suited for interactive digital submissions, including evaluation of existing tools like VCA.
2. **Digital Interface Development:**
    - Develop user-friendly, validated digital compliance forms accessible via web or cloud-based platforms under CEC guidance.
3. **Pilot Testing and Iteration:**
    - Deploy initial digital forms in selected jurisdictions or with representative user groups; refine based on feedback.
4. **Expanded Statewide Deployment:**
    - Gradually expand digital form submissions statewide, ensuring alignment with the central resource hub and overall compliance process.
5. **Training and Support Materials:**

- Develop clear training materials, tutorials, and user support resources for the expanded digital form system.

Implementation Responsibility

Table 7: Roles and Responsibilities for Digitization of Compliance Forms

Role	Responsibility
Project Management	Lead assessment, prioritization, and development
IT and Web Development Team (Internal/Contracted)	Build digital submission interface and validation logic
Industry Stakeholders (Designers, Contractors, AHJs)	Provide input, participate in pilot testing and evaluation

Stakeholder Impacts of Recommended Improvements

The following table summarizes which stakeholder groups are expected to directly or indirectly benefit from this recommendation.

Table 8: Stakeholder Impacts for Digitization of Compliance Forms

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Interactive digital forms reduce paperwork, guide users, and minimize documentation errors.
HERS Raters and ATTs	Indirect	More accurate upstream documentation, reducing back-and-forth.
HERS Providers and ATTCPs	Indirect	Improved documentation processes support more consistent registry submissions.
Building Designers	Direct	Improved ability to generate, complete, and validate documentation early in design.
Builders and Developers	Indirect	More efficient permitting and fewer documentation-related project delays.
AHJs	Direct	More legible, complete, and standardized compliance submissions.
CEC Staff	Direct	Documentation consistency and support of future data integration.
Homeowners and Building Owners	Indirect	Fewer project holdups and reduced the risk of failed inspections.
Product Manufacturers	Indirect	Less risk of misinterpretation or omission of product compliance documentation.

Stakeholder Group	Benefit Type	Notes / Explanation
Energy Code Trainers and Orgs	Indirect	Digital forms provide more consistent teaching examples and fewer outdated formats.

CHAPTER 5:
Mid-Term Recommendations

This chapter presents medium-term strategies that build upon near-term improvements by introducing new tools, digital workflows, and support systems. These recommendations are more ambitious in scope and may require moderate levels of investment, coordination, or policy support to implement effectively.

The focus of these strategies is to streamline compliance processes, improve consistency across jurisdictions, and enhance real-time support for stakeholders. Recommendations in this chapter aim to fill key structural gaps - such as the lack of peer-to-peer support, limited use of digital forms, and uneven AHJ enforcement - and to establish systems that make compliance not only easier but more reliable and predictable. These efforts also begin to create the foundational infrastructure needed for longer-term transformation.

Create a User Support Forum

Survey responses from contractors, HERS raters, and ATTs highlighted a significant need for informal, peer-to-peer support channels to complement formal guidance currently provided by the California Energy Commission (CEC) and Energy Code Ace. Many respondents indicated that while official documents and resources are valuable, there is often a gap between the formal guidelines and the practical, project-specific questions that arise in day-to-day work. These practical questions are often better answered through direct, peer-driven interactions, especially when formal resources are difficult to navigate or interpret in a timely manner.

Contractors and designers frequently encounter compliance scenarios that, while seemingly straightforward, may not be clearly addressed in existing documentation. In these cases, waiting for an official response from the CEC or interpreting lengthy documentation is impractical. Similarly, HERS raters and ATTs noted in the survey report (Attachment II, specifically responses from questions C36, H34, and A35) that quick access to practical answers would greatly streamline their inspection and documentation tasks, reducing delays on job sites. An easily searchable, moderated, and reliable peer-to-peer resource would directly address this need, improving compliance efficiency across all roles involved – though of course would need to be labeled as unofficial.

Recommended Approach

We recommend that the CEC establish and support an online, user-driven support forum specifically focused on the Energy Code compliance, inspired by successful technical forums such as Stack Exchange or Quora. The key features of this forum should include:

1. **User-Driven Q&A Structure:** Users should be able to post questions and provide answers related to practical compliance issues, code interpretations, and documentation guidance. Questions and answers should be clearly categorized by topic (e.g., HVAC, lighting, envelope, documentation), making it easy to navigate and search for relevant information.
    - **Reputation and Expertise** Tracking: Adopting a reputation system (similar to the Stack Overflow model), users would gain points for providing accurate, helpful answers, increasing their credibility and visibility within the community.

Such a system incentivizes high-quality participation, discourages misleading or incorrect information, and provides informal but valuable peer validation of compliance advice.

- **Community Moderation and Accuracy:** Community-based moderation features should be implemented, allowing experienced users with established credibility to edit or flag content for accuracy, appropriateness, or to remove outdated information. CEC staff should have the ability to perform direct moderation actions, further ensuring the accuracy and appropriateness of content.
- **Integration with Other Recommendations and Resources:** The user support forum should be integrated into the enhanced CEC resource hub described in the earlier recommendation ("Enhanced Organization and Clarity of Compliance Guidance"), providing easy access to related documentation and resources. In the future, it should also be linked with AI-powered compliance tools (such as the AI chatbot recommended separately) to leverage community-driven answers as a knowledge base to train automated responses.
- **Searchability and Accessibility:** Robust search functionality is essential, allowing users to quickly find relevant questions and answers by keywords, code sections, or topics. Additionally, questions that receive frequent views or multiple similar queries should be highlighted as "frequently asked" or featured prominently.
- **Ongoing User Engagement and Updates:** Regular updates and engagement strategies should be implemented to maintain user activity, including periodic newsletters highlighting popular or critical topics, recognition of active contributors, and responsiveness to changes in the Energy Code or associated documentation.

Implementation Steps

To implement this recommendation effectively, the following key steps should be undertaken:

1. **Platform Selection and Development**:
   - Select an appropriate existing open-source or commercially available platform designed for user-driven Q&A forums.
   - Customize this platform to suit the specific context of the Energy Code compliance.
2. **Initial Seeding and Stakeholder Involvement**:
   - Engage a small, focused group of experienced practitioners (e.g., contractors, HERS raters, ATTs, building designers) to seed initial content by answering frequently asked questions and common challenges.
   - Use existing inquiries from the CEC's hotline, emails, or trainings as initial content to populate the forum.
3. **Moderation and Governance Framework**:
   - Establish clear governance guidelines detailing user conduct expectations, roles for moderators, and criteria for gaining and maintaining reputation points.

- Define moderation responsibilities and allocate staff resources for oversight, moderation, and content accuracy checks.

4. **Beta Testing and Stakeholder Feedback**:
    - Conduct a beta test of the forum with a selected user group, gathering feedback to refine the user experience, structure, and moderation approach before widespread rollout.
5. **Launch and Promotion**:
    - Conduct an outreach and promotional campaign via existing communication channels, such as CEC webinars, newsletters, and the Energy Code Ace platform, clearly articulating the forum's value and role within the compliance ecosystem.
    - Actively encourage participation from diverse stakeholders, emphasizing benefits such as rapid problem-solving, reduced delays, and better compliance outcomes.
6. **Integration with Broader Resource Ecosystem**:
    - Ensure the forum is seamlessly linked from the central Energy Code compliance resource hub and integrated with other planned digital tools and compliance platforms recommended elsewhere (such as the future online compliance platform and the AI chatbot).

Implementation Responsibility

To successfully implement this recommendation, the following roles and responsibilities are necessary:

Table 9: Roles and Responsibilities for Creating a User Support Forum

Role	Responsibility
Project Management Staff (Program Managers, Technical Specialists)	Lead governance, moderate oversight, and initial content seeding; ensure alignment with official CEC resources and accuracy of compliance guidance
Web Developers and Platform Specialists (Internal or Contracted)	Customize, deploy, maintain, and update the forum platform; ensure robust searchability, reliability, and user experience
Stakeholders (Contractors, HERS Raters, ATTs, Building Designers)	Regularly participate by asking and answering questions, provide ongoing content moderation, and give feedback for continuous forum improvements

Stakeholder Impacts of Recommended Improvements

The following table summarizes stakeholder groups expected to directly or indirectly benefit from the creation of the user support forum:

Table 10: Stakeholder Impacts for Creating a User Support Forum

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Rapid access to practical, peer-driven compliance guidance
HERS Raters and ATTs	Direct	Guidance for and response to common inspection and documentation questions
HERS Providers and ATTCPs	Indirect	Benefit from shared understanding and improved field communication
Building Designers	Direct	Clarification of nuanced documentation and code issues
Builders and Developers	Indirect	More reliable documentation from better-informed teams
AHJs	Indirect	Reduced inquiries and higher quality submissions
CEC Staff	Direct	Fewer repetitive support requests, better insight into field challenges
Homeowners and Building Owners	Indirect	Smoother compliance processes via better-informed professionals
Product Manufacturers	Indirect	Clarification of product compliance use cases and documentation
Energy Code Trainers and Orgs	Direct	Improved insights into training gaps and support needs

Deploy AI-Powered Chatbot

Survey feedback frequently highlighted frustration with the complexity of the Energy Code requirements and the challenges of obtaining timely clarification on compliance questions. Contractors, HERS raters, and ATTs all expressed a need for immediate, informal guidance - particularly for relatively straightforward questions that do not warrant formal requests or lengthy research. While formal compliance hotlines and documented FAQs exist, stakeholders reported delays and inefficiencies associated with relying exclusively on these resources.

To address this need, we recommend that the CEC develop and deploy an AI-powered chatbot specifically trained on the Energy Code and associated compliance documentation including resources provided by Energy Code Ace and others. This chatbot would provide stakeholders with real-time support, quickly addressing common questions and directing users toward relevant compliance resources. As with the user forum, this should be clearly labeled as informal, suggesting that users verify the results by reading relevant code sections that the chatbot provides. Note that the chatbot would need to be able to clearly distinguish between code versions.

Recommended Approach

Key features of the recommended AI-powered chatbot include:

- **Immediate and Accessible Guidance:** Offer users instant answers to common compliance-related questions, significantly reducing wait times compared to traditional support channels (e.g., email or hotline).
- **Integration with Existing and Recommended Resources:** Link seamlessly to the central Energy Code compliance resource hub, the proposed user support forum, compliance summaries, and other guidance documentation.
- **Continuous Learning and Updates:** Utilize ongoing interactions to train the chatbot, regularly improving its accuracy and effectiveness. This continuous learning will ensure responsiveness to new or frequently asked questions over time.
- **User-Friendly Interface:** Provide a simple, intuitive interface, accessible via the CEC's Energy Code webpage and potentially embedded within compliance forms or compliance software tools.
- **Escalation Pathways:** Clearly defined pathways to human support when the chatbot cannot sufficiently address a query, including links to live assistance or forums.

Implementation Steps

1. **Development and Training**:
    - Curate a comprehensive dataset of existing compliance guidance materials (FAQs, code documents, training materials).
    - Engage a specialist AI technology provider to develop, train, and test the chatbot's natural language processing and understanding capabilities.
2. **Integration and Initial Testing**:
    - Integrate the chatbot onto the existing Energy Code compliance resource hub webpage.
    - Conduct extensive internal testing with technical specialists to ensure accurate responses.
3. **Pilot Program and User Feedback**:
    - Implement a controlled pilot deployment involving selected contractors, HERS raters, ATTs, and designers.
    - Gather extensive stakeholder feedback to refine accuracy, usability, and interface design.
4. **Full Deployment and Ongoing Management**:
    - Officially launch the chatbot for all stakeholders.
    - Continuously monitor user interactions, regularly updating and training the chatbot based on user feedback and emerging questions.

Implementation Responsibility

Table 11: Roles and Responsibilities for Deploying AI Chatbot

Role	Responsibility
Technical Specialists	Lead content curation, provide compliance expertise, and oversee chatbot training accuracy
AI Technology Provider (Contracted)	Develop, deploy, and maintain chatbot infrastructure and natural language capabilities
Web Development Team	Integrate chatbot interface onto compliance resource hub
Stakeholders (Contractors, HERS Raters, ATTs)	Participate in pilot testing and provide continuous feedback for improvement

Stakeholder Impacts

Table 12: Stakeholder Impacts for Deploying AI Chatbot

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	24/7 assistance for quick compliance clarifications
HERS Raters and ATTs	Direct	Immediate support for procedural questions in the field
HERS Providers ATTCPs	Indirect	Alignment in training and reduction of misinformation
Building Designers	Direct	Faster clarification during design and documentation phases
Builders and Developers	Indirect	Reduced project risks from faster, more accurate answers
AHJs	Indirect	Reduced time spent addressing common questions
CEC Staff	Direct	Decreased hotline burden, real-time insights into user questions
Homeowners and Building Owners	Indirect	Indirect benefit from reduced confusion and project delays
Product Manufacturers	Indirect	Clarified requirements for product use
Energy Code Trainers and Orgs	Indirect	Source of frequently asked questions for training program refinement

Streamline Compliance through Additional Prescriptive Packages

Respondents consistently expressed frustration regarding compliance complexity - especially for common commercial projects. Contractors and designers specifically highlighted the difficulty navigating detailed performance-based compliance processes for straightforward, common commercial project scenarios. Survey responses emphasized that prescriptive compliance pathways could significantly reduce confusion, minimize errors, and streamline project approvals.

We recommend the CEC expand existing prescriptive compliance packages, already common in residential codes, to more comprehensively include straightforward commercial projects. Such prescriptive packages would offer clearly defined pathways and documentation, reduce uncertainty and simplify compliance.

The forms for these packages should be directly integrated into digital versions, rather than use PDF forms.

Recommended Approach

The expanded prescriptive compliance packages should include:

- **Clearly Defined Project Scenarios:** Identify and clearly define prescriptive packages for common commercial project types, such as small retail, office tenant improvements, and simple HVAC replacements. The scenarios are an opportunity to encourage electrification and solar installations.
- **Standardized Documentation:** Provide simplified, standardized forms clearly detailing the requirements for each package.
- **Integrated Guidance:** Clearly link prescriptive package resources to the centralized compliance guidance and resource hub.
- **Periodic Updates:** Review and update packages regularly to ensure alignment with technological advances, market trends, and code changes.

Implementation Steps

1. **Scenario Identification**:
    - Analyze stakeholder feedback and survey data (Attachment II) to determine highest-priority scenarios needing simplified compliance approaches.
2. **Prescriptive Package Development**:
    - Draft detailed documentation and standardized compliance pathways for selected scenarios.
3. **Stakeholder Validation**:
    - Engage contractors, HERS raters, designers, and AHJs to review draft packages and provide targeted feedback.
4. **Publication and Training**:
    - Publish approved packages prominently on compliance resource hub.
    - Provide targeted training sessions explaining new prescriptive packages to stakeholders.

Implementation Responsibility

Table 13: Roles and Responsibilities for Streamlined Compliance Through Prescriptive Packages

Role	Responsibility
Technical Specialists	Lead package development, maintain updates
Industry Stakeholders (Contractors, Designers)	Provide feedback and validation on prescriptive packages
Web Development and Communications Team	Publish prescriptive packages, ensure integration into compliance resource hub

Stakeholder Impacts

Table 14: Stakeholder Impacts for Streamlined Compliance Through Prescriptive Packages

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Simplified compliance options reduce cost and confusion
HERS Raters and ATTs	Indirect	More consistent documentation from prescriptive projects
HERS Providers and ATTCPs	Indirect	Improved documentation quality for registry compliance
Building Designers	Direct	Easier integration of prescriptive options into project documentation
Builders and Developers	Indirect	Lower project risk, clearer documentation workflows
AHJs	Direct	Easier plan review for clearly defined project types
CEC Staff	Direct	Reduced variance in documentation and streamlined enforcement
Homeowners and Building Owners	Indirect	Reduced project delays, increased affordability
Product Manufacturers	Indirect	Clearer paths to product acceptance in standard packages
Energy Code Trainers and Orgs	Direct	Use cases for simplified training scenarios

Code Simplification and Alignment

Survey respondents across all stakeholder groups - particularly contractors, HERS raters, and building designers - consistently identified complexity, redundancy, and inconsistency within the Energy Code as barriers to effective compliance. Stakeholders noted difficulties resulting from unclear wording, outdated references, and poor alignment with other applicable and adopted reference standards and codes such as the California Building Code, Green Building Code, Electrical Code, Fire Code, and Mechanical Code. These issues lead to frequent confusion, errors in documentation, and unnecessary delays.

To address these concerns, we recommend that the CEC initiate a systematic review of the Energy Code aimed at simplifying, clarifying, and aligning the structure and content with other relevant codes and standards. This is distinct from the current Codes and Standards Enhancement (CASE) process in which code requirements are updated. Instead, it should focus on the code as a whole to improve clarity, navigation, inter-code alignment, and readability.

Recommended Approach

This simplification and alignment process should include:

- **Comprehensive Code Review:** Conduct a detailed, systematic analysis of the Energy Code, section by section, to identify outdated provisions, redundant requirements, dependencies, and unnecessarily complex or circuitous language.
- **Stakeholder Input:** Engage a broad range of stakeholders - including contractors, HERS raters, ATTs, building designers, and AHJs - to provide targeted feedback identifying the most challenging sections and recommended improvements.
- **Alignment with Related Codes and Standards:** Align the Energy Code's structure, numbering, definitions, and cross-references closely with related building codes (e.g., CBC, CMC) to simplify compliance and reduce cross-referencing errors as much as possible.
- **Simplified Documentation and Resources:** Create simplified compliance flowcharts and checklists for the most common project scenarios, linking directly to aligned code sections for quick reference.

Implementation Steps

1. **Initial Code Audit**:
    - CEC technical specialists and contractors conduct an audit of the Energy Code, identifying sections for potential revision or removal.
2. **Stakeholder Workshops and Feedback Sessions**:
    - Organize multiple workshops or surveys to collect direct input from key stakeholder groups on sections requiring simplification or alignment.
3. **Draft Revised Structure and Language**:
    - Develop draft revisions, simplifying language, updating or removing outdated provisions, and aligning references to related codes.
4. **Public Comment and Revision Process**:
    - Release draft revisions for public comment. Collect and integrate feedback, then finalize revised code language.
5. **Integration with Other Compliance Resources**:

- Integrate simplified and aligned code sections within the centralized compliance resource hub, compliance forms, and prescriptive packages.

Implementation Responsibility

Table 15: Roles and Responsibilities for Code Simplification

Role	Responsibility
Project Management Staff and Technical Specialists	Conduct comprehensive review and lead code simplification efforts
Stakeholder Group Representatives	Provide detailed feedback and suggestions
Web and Communications Team	Publish revised code, ensure proper integration with resources

Stakeholder Impacts

Table 16: Stakeholder impacts for Code Simplification

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Simplified requirements reduce interpretation issues
HERS Raters and ATTs	Direct	Easier application of clear and concise procedures
HERS Providers and ATTCPs	Indirect	Consistency in registry and enforcement standards
Building Designers	Direct	Fewer code conflicts and easier documentation generation
Builders and Developers	Direct	More predictable timelines and smoother compliance
AHJs	Direct	Easier enforcement and faster plan review
CEC Staff	Direct	More maintainable code with reduced stakeholder confusion
Homeowners and Building Owners	Indirect	Increased consistency and fewer compliance mistakes
Product Manufacturers	Indirect	Less ambiguity about what product features satisfy which code provisions
Energy Code Trainers and Orgs	Direct	Easier process to teach consistent and up-to-date code content

Explore Resource Sharing Among AHJs

Feedback from stakeholders highlighted that inconsistency across Authorities Having Jurisdiction (AHJs) significantly contributes to compliance challenges. Contractors and designers reported substantial variability in how AHJs interpret and enforce the Energy Code

requirements, leading to unpredictable project timelines, increased cost, and frustration. AHJs themselves expressed challenges in keeping up with rapid code updates and best practices, citing limited resources and insufficient communication among jurisdictions.

To address these challenges, we recommend that the CEC establish internal protocols to facilitate consistent communication, collaboration, and resource-sharing among AHJs throughout California. This recommendation builds upon earlier suggestions, particularly regarding enhanced organization, clarity of compliance guidance, and code simplification, providing foundational support to ensure more consistent statewide code implementation.

Recommended Approach

The resource-sharing initiative should include:

- **Centralized AHJ Knowledge Repository:** Establish an online resource platform specifically tailored for AHJs, housing best practices, successful compliance processes, example documentation, and frequently asked enforcement questions. This could be a dedicated area in the new User Support Forum that only AHJ and CEC staff can access.
- **Regularly Scheduled AHJ Collaboration Meetings:** Organize regular virtual meetings or workshops, allowing AHJs across jurisdictions to discuss challenges, share experiences, and learn from each other's practices.
- **Standardized Enforcement Guides:** Develop standardized, easy-to-use guides clearly outlining enforcement expectations for common scenarios, linked closely with simplified Energy Code language and prescriptive packages. These could be formatted as a process diagram, frequently asked questions (FAQs), or similar based on the requests of the AHJs.
- **Statewide Communication Tools:** Deploy user-friendly digital communication tools (e.g., newsletters, dedicated email updates, alerts) that consistently inform AHJs about code updates, changes, best practices, and available resources.
- **Cross-Jurisdictional Staffing Support:** Establish mechanisms that allow staff from one AHJ - particularly those with specialized knowledge - to assist with projects in other jurisdictions. This could help address resource constraints, support smaller jurisdictions, and promote consistent enforcement practices across the state.

Implementation Steps

1. **Initial AHJ Needs Assessment**:
    - Conduct detailed surveys and interviews with AHJs statewide to assess needs, common challenges, and preferred resource-sharing methods.
2. **Development of Resource Repository**:
    - Curate and organize a comprehensive collection of enforcement tools, best practices, templates, and FAQs specifically tailored for AHJ use.

3. **Launch AHJ Collaboration Forums**:
    - Begin regularly scheduled collaborative meetings or workshops among AHJs to exchange knowledge, share resources, and promote consistency.
4. **Ongoing Communication and Support**:
    - Maintain continuous communication through regular email updates, newsletters, and alerts to AHJs, ensuring awareness and engagement with new resources.
5. **Pilot Cross-Jurisdictional Staffing Arrangements**:
    - Work with a small number of AHJs to pilot a shared staffing model. This could include a remote review of documentation, temporary staff lending, or shared regional specialists. Develop template agreements and workflows to support broader adoption over time.
6. **Evaluation and Continuous Improvement**:
    - Regularly survey AHJs to assess effectiveness of resources and collaboration forums. Adjust content and approach based on feedback.

Implementation Responsibility

Table 17: Roles and Responsibilities for AHJ Resource Sharing

Role	Responsibility
Project Management Staff and AHJ Coordination Specialists	Facilitate development, coordination, and support efforts
AHJ Representatives	Actively engage in forums and resource development
Web Developers	Build and maintain AHJ-focused resource repository
Communications Specialists	Manage and deliver ongoing statewide communications

Stakeholder Impacts

Table 18: Stakeholder Impacts for AHJ Resource Sharing

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	Reduced jurisdictional variability in enforcement
HERS Raters and ATTs	Direct	More predictable enforcement practices across jurisdictions
HERS Providers and ATTCPs	Indirect	Consistency across trainings and registries
Building Designers	Direct	Streamlined workflows across multiple jurisdictions

Stakeholder Group	Benefit Type	Notes / Explanation
Builders and Developers	Direct	More consistent and transparent permitting expectations
AHJs	Direct	Reduced burden and improved enforcement quality
CEC Staff	Direct	Improved collaboration and reduced support redundancies
Homeowners and Building Owners	Indirect	More predictable timelines and reduced compliance risk
Product Manufacturers	Indirect	Improved consistency in product interpretation across jurisdictions
Energy Code Trainers and Orgs	Indirect	Refined training strategies via AHJ insights and feedback

CHAPTER 6:
Long-Term Recommendation

This chapter introduces a single, long-term recommendation: the development of a centralized compliance data platform to unify and modernize how the Energy Code compliance is tracked and enforced in California. This is the most ambitious recommendation in the report and the logical culmination of the structural improvements proposed in earlier chapters.

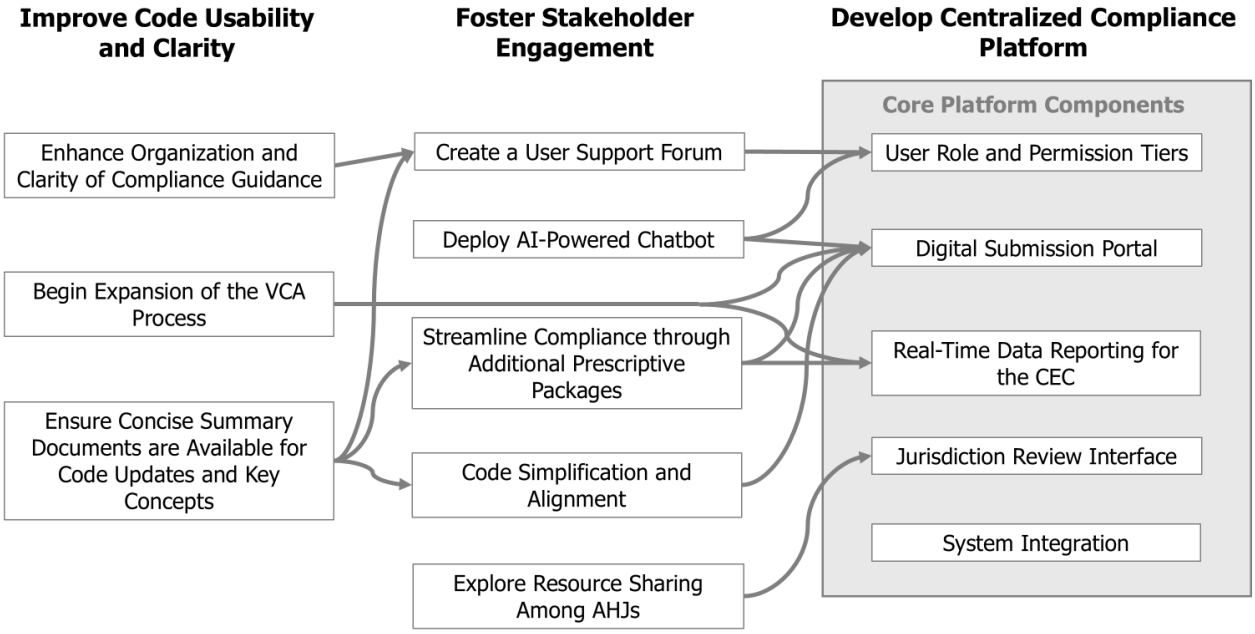
The platform would enable a standardized, statewide workflow for submitting, reviewing, and verifying the Energy Code documentation. It would serve multiple functions: simplifying the compliance process for applicants, supporting local enforcement, enabling analytics and performance tracking for the CEC, and closing loopholes that currently allow noncompliance to go undetected. Because of its scope, this recommendation includes a staged implementation roadmap, with early pilot efforts informed by lessons from existing permitting systems and registries. If successful, the platform would transform the Energy Code compliance from a fragmented, paper-heavy process into an integrated digital system.

Centralized Compliance Data Platform

Currently, the process of Energy Code compliance across California's diverse jurisdictions is highly fragmented, resulting in redundant efforts, inconsistent data collection, and limited transparency. Contractors, AHJs, HERS Raters, ATTs and even CEC staff face significant challenges in managing compliance-related documentation and validation.

Inspired by successful digital compliance and permitting systems such as LEED Online for sustainable building certification and the user-friendly, guided compliance approach of software platforms like TurboTax, we recommend developing a comprehensive, statewide Centralized Compliance Data Platform. This ambitious initiative will integrate submission, validation, and tracking of all the Energy Code compliance documentation through a unified digital portal, accessible to all authorized stakeholders. Figure 1 below shows how all of the previous recommendations could integrate with each other and ultimately support this data platform.

Figure 1: Recommendation Flow Chart Culminating into Centralized Compliance Data Platform



The envisioned platform would unify the fragmented compliance workflows into a seamless digital ecosystem:

- **Applicants** (designers, contractors, owners) would submit the Energy Code compliance documentation digitally through user-friendly, guided interfaces.
- **AHJs** would manage all plan reviews, approvals, and compliance checks digitally, greatly reducing paperwork and administrative burden.
- **HERS Raters and ATTs** would upload inspection and test results directly to the system, with data flowing seamlessly to their respective Provider organizations for oversight and quality assurance.
- **HERS Providers and ATTCPs** would maintain their certification and oversight responsibilities while integrating their existing databases with the platform, enabling real-time tracking of their certified professionals' work and compliance with registry requirements. They would also support the training for the HERS Raters and ATTs in the new system.
- **CEC staff** would have instantaneous, statewide access to compliance data, greatly improving oversight, enabling targeted support, and enhancing analytics.

Key benefits include:

- **Transparency:** Real-time visibility of compliance status for AHJs and the CEC.
- **Efficiency:** Elimination of redundant manual entry, reduced errors, and streamlined review processes.
- **Improved Analytics:** Access to comprehensive data enabling better targeting of compliance efforts and policy refinement.

- **Higher Compliance Rates:** Enhanced accountability and reduced opportunities for non-compliant work.

AHJs would use the platform to digitally receive, review, and track all the Energy Code-related documentation, approvals, and inspections:

- Initial submissions would automatically trigger reviews based on pre-defined criteria.
- Inspectors could use mobile integration to enter real-time results from the field.
- The system would flag incomplete submissions, discrepancies, or potential compliance issues.
- AHJs could easily support each other by providing specialized reviews from other jurisdictions, or by balancing resourcing statewide

AHJs will benefit from reduced administrative workloads, clearer communication, and standardized data handling.

The CEC would significantly benefit from the platform's centralized data, which would enable:

- Real-time monitoring of compliance trends and issues.
- Advanced analytics to identify patterns, compliance gaps, and enforcement priorities.
- Data-driven policy development based on accurate, comprehensive compliance statistics.

Recommended Approach

We recommend that the CEC develop a centralized digital platform to manage the Energy Code compliance submissions, validations, and performance tracking across all jurisdictions in California. The platform should streamline interactions between designers, contractors, HERS raters, ATTs, AHJs, and the CEC itself, reducing paperwork, improving data quality, and enabling more consistent enforcement. Core components of the platform should include:

- **Digital Submission Portal**: A standardized web-based interface for submitting the Energy Code documentation, including forms, modeling files, inspection reports, and test results.
- **Jurisdictional Review Interface:** Tools to support AHJ plan checks, documentation validation, and inspection scheduling within a consistent workflow.
- **Real-Time Data Access for the CEC:** Structured data reporting and dashboards that allow the CEC to track project compliance status, identify gaps, and monitor key metrics.
- **System Integration:** Compatibility with existing permit systems (e.g., Accela, eTRAKiT) and third-party registries such as HERS data registries and ATTCP databases.
- **User Roles and Permissions:** Tiered access for different user types (e.g., applicants, enforcement officials, CEC analysts) with clear responsibilities and data protections.

The platform should be developed in phases, beginning with a core data aggregation and tracking hub, then expanding to support end-to-end compliance workflows. Stakeholder engagement, pilot testing, and flexible integration options will be critical to widespread adoption.

Implementation Steps

1. Feasibility Study and Requirements Gathering

- Conduct interviews and surveys with AHJs, HERS providers, contractors, and design professionals.
- Document workflow needs, integration requirements, and existing permitting infrastructure.
- Evaluate off-the-shelf platforms vs. custom development.

2. Pilot Development – Core Data Hub
   - Build a functional prototype that aggregates structured compliance documentation from a select group of jurisdictions.
   - Include basic data visualization for monitoring documentation completeness, verification status, and project trends.
   - Test interoperability with selected permitting and registry systems.
3. Expanded Workflow and User Interface Development
   - Develop a full-featured digital submission and review interface with built-in logic for completeness checks, alerts, and role-based access.
   - Pilot with a small number of representative jurisdictions and project types.
4. Training and Stakeholder Support
   - Provide step-by-step training for AHJ reviewers, contractors, and other users.
   - Establish a helpdesk and technical support system to facilitate early adoption.
5. Statewide Rollout and Incentivized Adoption
   - Expand access to all jurisdictions using a phased rollout, supported by outreach, training, and optional early-adopter incentives.
   - Incorporate lessons learned from pilots to refine features, interface design, and integration tools.
6. Ongoing Optimization and Data Use
   - Use platform data to refine the Energy Code policy, identify compliance gaps, and target outreach.
   - Incorporate advanced analytics, including project trends, time-to-compliance, and regional variation.
   - Explore automated compliance flagging, benchmarking, and connections with utility or emissions data sources.

Roles and Responsibilities

Table 19: Roles and Responsibilities for Centralized Data Platform

Role	Responsibility
Project Management Leadership and Technical Staff	Project oversight, stakeholder coordination, policy alignment
Software Development Team	Technical platform design, build, and iterative refinement

Role	Responsibility
AHJs (Jurisdictions)	Early adopter engagement, pilot testing, training, feedback
HERS Raters and ATTs	Participation in training, platform usage, feedback loops
Industry Stakeholders (Applicants)	User interface testing, active platform utilization, feedback
Data Analysts	Develop analytics, providing ongoing insight and reporting

Risk Mitigation and Management

- Ensure robust data privacy, security, and governance frameworks from inception.
- Maintain strong, transparent communication with stakeholders to manage expectations and ensure continuous support.
- Offer flexible integration options (full adoption, partial integration via APIs) to accommodate diverse jurisdictional capacities.
- Regularly demonstrate and publicize tangible benefits (e.g., reduced review times, compliance improvements) to justify investment and encourage adoption.

Stakeholder Impacts

Table 20: Stakeholder Impacts on Centralized Data Platform

Stakeholder Group	Benefit Type	Notes / Explanation
Contractors	Direct	One-stop digital submission that reduces paperwork and clarifies expectations
HERS Raters and ATTs	Direct	Streamlined workflows and reduced miscommunication through direct upload of test results
HERS Providers and ATTCPs	Indirect	Better integration with registries improves consistency, data quality, and enforcement
Building Designers	Direct	Simplified documentation and support of early compliance through the integrated digital workflow
Builders and Developers	Direct	Greater transparency into project status, clearer timelines, and fewer approval delays
AHJs	Direct	Standardized documentation, easier enforcement, and access to shared staff resources
CEC Staff	Direct	Real-time data access that enables performance monitoring, enforcement, and policy insights

Homeowners and Building Owners	Indirect	Improved project tracking, better assurance of compliant outcomes
Product Manufacturers	Indirect	Clearer linkage between product documentation and code approvals across jurisdictions
Energy Code Trainers and Orgs	Indirect	More consistent data, which enables better targeting of training efforts and updates

Conclusion

Developing a Centralized Compliance Data Platform represents a transformative opportunity for California to significantly enhance the Energy Code compliance rates, streamline regulatory processes, and facilitate robust, data-driven energy policy decisions. While ambitious, a phased, carefully managed approach ensures feasibility, stakeholder buy-in, and long-term success, ultimately positioning California as a leader in modern, efficient, and effective Energy Code implementation.

Though the primary intention here is to support the CEC in the Energy Code compliance, it could be beneficial to include other state code bodies in the planning discussions, in case the costs and benefits of the platform could be spread out in a mutually advantageous way.

CHAPTER 7: Conclusions

This report outlines a practical, phased approach to improving the Energy Code compliance in California, based on survey feedback, stakeholder interviews, and implementation experience across the building industry. While the challenges are complex - ranging from inconsistent enforcement and inaccessible guidance to burdensome documentation and outdated tools - the proposed recommendations offer a path toward a more transparent, coordinated, and user-friendly compliance ecosystem.

The recommendations presented are grouped by implementation horizon: near-term strategies that can be initiated with modest effort and cost; mid-term strategies that build capacity and streamline processes; and one long-term, transformational initiative - a centralized compliance data platform - that ties the system together. Each is intended to address a specific set of barriers, but they are also designed to reinforce one another. The success of later stages depends, in part, on early progress.

Several cross-cutting themes emerge across the recommendations:

- **Accessibility and Clarity First**: Compliance is more likely when professionals can easily find and understand what is required of them. The near-term recommendations focus on better organizing and presenting existing resources, rather than creating new ones, recognizing that confusion is often a product of poor interface, not missing content.
- **Leverage Existing Tools and Platforms**: Rather than reinventing the wheel, many of the strategies call for building on platforms and practices that already work - like expanding Energy Code Ace summaries, using digitized forms in more contexts, or offering prescriptive paths modeled after successful residential packages.
- **Coordination Across Stakeholders Is Key**: Consistency across AHJs, improved communication between designers, builders, and raters, and a shared understanding of expectations are vital for any compliance improvement. Recommendations for shared resources, user forums, and structured support reflect this.
- **Data Infrastructure Will Enable the Next Generation of Compliance**: The long-term recommendation to build a centralized compliance platform provides not just a more efficient workflow, but a foundation for ongoing monitoring, enforcement, and future code development. It is ambitious, but achievable if built in stages and aligned with the more incremental improvements already underway.
- **Continuous Feedback and Usability Must Guide Implementation**: Whether it is a chatbot, a digital form, or a new code summary, every solution must be built and tested with the users in mind. Practitioners in the field - contractors, AHJs, HERS raters, and others - are best positioned to identify friction points and provide insight into what will work in practice. Their feedback is essential not only to develop effective tools but to ensure those tools are used.

In addition to improving compliance experiences for practitioners, these recommendations also lay the groundwork for more consistent and meaningful tracking of Energy Code outcomes. In particular, the centralized compliance data platform would give the CEC, AHJs, and researchers a vastly improved ability to measure actual compliance rates and identify common gaps or high-impact improvements over time. Other recommendations - such as digitized forms, expanded use of structured documentation, and improved stakeholder coordination - would further enhance the quality and completeness of compliance data. Together, these improvements will enable the state to move beyond anecdotal or incomplete indicators and begin tracking real-world implementation of the Energy Code in a way that supports performance-based policymaking and transparent public reporting.

Finally, while the Energy Code is a technical document, compliance is a human process. It depends on the judgment, motivation, and capacity of thousands of individuals across the state. Any successful compliance strategy must recognize this reality and work to make the process simpler, clearer, and more predictable for everyone involved. Doing so is not just a matter of paperwork - it's a critical step toward ensuring California's buildings perform as intended, saving energy, reducing emissions, and contributing to the state's climate goals.

GLOSSARY

ACCEPTANCE TEST TECHNICIAN (ATT) - A certified professional responsible for testing and verifying the performance of installed mechanical systems in accordance with the Energy Code requirements.

AHJ (AUTHORITY HAVING JURISDICTION) - The agency or individual responsible for enforcing code compliance in a given jurisdiction, such as a city or county building department.

CALIFORNIA ENERGY COMMISSION (CEC) - The primary energy policy and planning agency for California, responsible for adopting and updating Title 24, Part 6 (Energy Code).

COMPLIANCE WORKFLOW - The sequence of tasks and documentation required to demonstrate and enforce the Energy Code compliance for a building project, typically spanning design, permitting, construction, and inspection.

ENERGY CODE ENFORCEMENT - The process by which AHJs verify and enforce that construction projects meet the applicable Energy Code requirements through plan checks, inspections, and penalties for violations.

FIELD VERIFICATION - On-site inspection of building systems or components to confirm that they have been installed according to design documents and comply with the Energy Code.

HOME ENERGY RATING SYSTEM (HERS) - A system of third-party verification for residential energy efficiency measures. HERS raters inspect and test homes for compliance with energy efficiency requirements.

KEY PERFORMANCE INDICATOR (KPI) - A quantifiable measure used to evaluate success in meeting objectives, in this context used to track the Energy Code compliance rates and enforcement effectiveness.

KPI REPORT - Shortened name for Key Performance Indicators to Track Energy Code Compliance Rates (Attachment III), which proposes metrics to quantify unpermitted and non-compliant work.

NON-COMPLIANT WORK - Work completed under a permit that does not fully meet the Energy Code standards, often due to deviations between plans and field conditions.

PERMIT MANAGEMENT SYSTEM - A digital platform used by AHJs to manage the permit lifecycle, including application intake, plan review, fee processing, inspection scheduling, and status tracking.

PRESCRIPTIVE PATH - A method of the Energy Code compliance that follows a fixed set of design criteria rather than performance-based modeling or trade-offs.

PROXY DATASET - A data source used to estimate compliance metrics when direct measurements (e.g., verified field data) are unavailable or impractical to obtain.

STAKEHOLDER ENGAGEMENT - The process of consulting with individuals or groups - such as contractors, technicians, or regulators - whose work is affected by the Energy Code, to gather input for decision-making or policy development.

STAKEHOLDER SURVEY - Shortened name for Surveys with Contractors and Installers, HERS Raters, and Acceptance Test Technicians and Employers (Attachment II), which gathered feedback on compliance practices and challenges.

TITLE 24 - Shorthand for California Code of Regulations, Title 24, Part 6, which sets minimum energy efficiency standards for residential and nonresidential buildings in California. Also referred to as "ENERGY CODE".

TOOLS INVENTORY - Shortened name for Permit and Compliance Tools Inventory and Characterization Report (Attachment I), which reviews software tools used to support the Energy Code compliance.

UNPERMITTED WORK - Construction or system installation completed without obtaining the required permit from the AHJ, which may result in non-compliance with applicable building codes.

VIRTUAL COMPLIANCE ASSISTANT (VCA) - A web-based tool intended to guide users through completion of the Energy Code compliance forms.

ATTACHMENT I:
Permit and Compliance Tools Inventory and Characterization Report

ATTACHMENT II:
Surveys with Contractors and Installers, HERS Raters, and Acceptance Test Technicians and Employers

ATTACHMENT III:
Key Performance Indicators to Track Energy Code Compliance Rates