



Software Tools for Standards Development and Compliance

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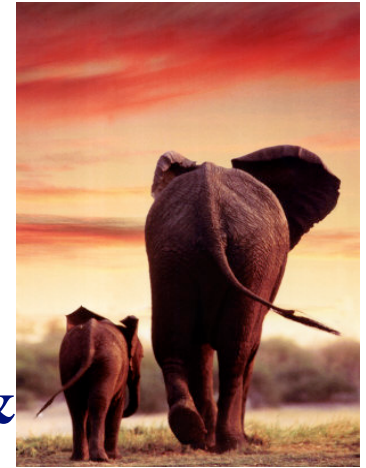
Presentation Outline



- ★ **Progression to Zero Net Energy Standards**
- ★ **Simulation Tools for Standards**
- ★ **Software Development Platform**
- ★ **Earlier Standards Compliance**
- ★ **Link between Performance Standards & Performance Rating**



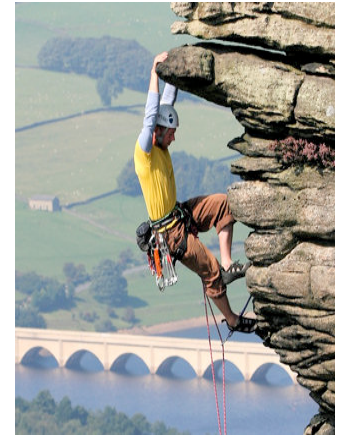
Efficiency Standards: Progress to Zero Net Energy



- ★ **New paradigm for Standards development & compliance**
- ★ **Quicker migration from R&D and IOU emerging technology programs to Standards**
- ★ **Redefining Standards' cost effectiveness criteria**
- ★ **Use of scenario analyses to understand impacts & gauge uncertainty**
 - ▶ e.g. fuel costs, technology costs, demographics, market acceptance, field performance, climate change
- ★ **Expansion of scope – for both Appliance & Building Efficiency Standards**



“Reach” Standard for Title 24



Voluntary Standard for more energy efficiency &
on-site renewable energy

- ★ **Similar approach as mandatory Standards**

- ▶ Public process w/ stakeholder workshops
- ▶ Energy performance budgets
- ▶ Written in code language

- ★ **Advanced Standard will become:**

- ▶ New Construction program targets
- ▶ Future versions of Green Building Standard
- ▶ Energy basis of regional green building codes

- ★ **Advanced Standard will provide:**

- ▶ List of measures for migration to mandatory Standards



Wish List: Simulation Tools for Standards



- * Separate the standards compliance rules from the building simulation**
- * Modify, test & compare Standards compliance rules**
- * Model & build rules for new technologies & systems**
- * Integrate building, solar thermal and solar electric simulations**
- * Develop rules for both mandatory and voluntary standards**
- * Scenario analyses**
- * Optimization studies**
- * Pathway to online compliance**



Standards Development Platform

High Level Scope



* Rules Editor

- ▶ Used to create electronic format of building energy standards and compliance requirements to be used with compliance software
 - CEC will develop Title 24 Building energy standards and ACM rules
 - Eventually ASHRAE and others may use the Rule Editor to develop their standards

* Rules Analyzer

- ▶ Used to test new building energy standards and make improvements to existing standards
 - CEC will test T24 standards and ACM compliance rules with the Rules Analyzer

* Compliance Engine

- ▶ EnergyPlus simulation engine, rules interpreter (preprocessor) and post-processor
 - Performs simulations requested by UI front-end e.g. Rules Analyzer

* Data Dictionary

- ▶ Keywords required for creating rules and building descriptions for developing and analyzing CA Title 24 standards and ACM requirements

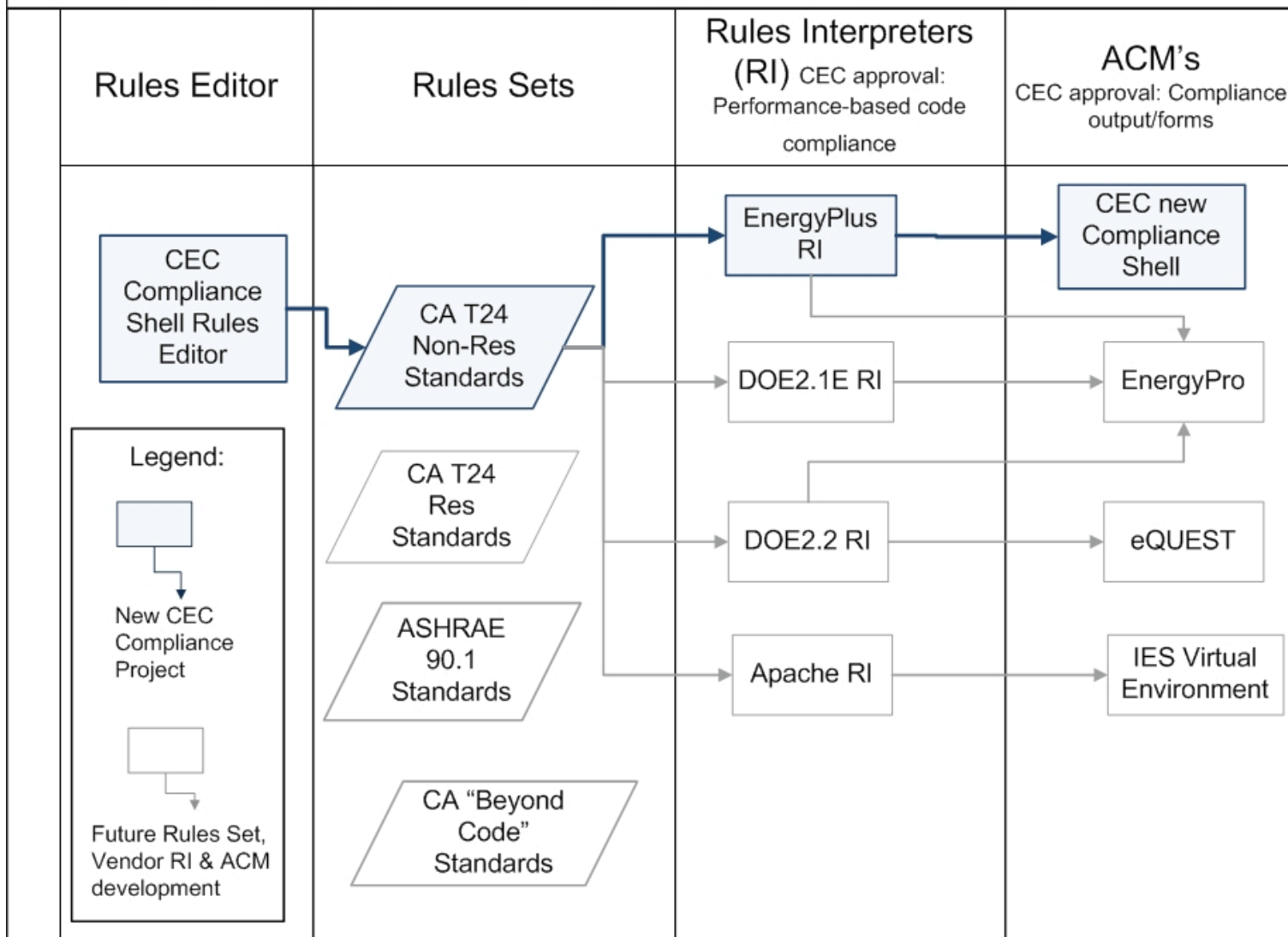
* Libraries



Draft Cross-Functional Process Map: Incorporating Rules into ACM's



New CEC Compliance Project Process: Incorporating Rules Into the ACM





Earlier Standards Compliance



- ★ **For ZNE, essential to minimize building loads**
- ★ **No longer acceptable to trade off between envelope & lighting/HVAC measures**
- ★ **Establish performance standard and compliance process for energy-related decisions that happen early in the design process**
 - ★ **e.g. orientation, mass, natural ventilation, daylighting**
- ★ **Simulations should be interoperable with early design tools**
- ★ **Early design simulations should send the same message as Standards development & compliance software**



Performance Standards & Performance Ratings



- ★ Build a continuum between design intent (standards) & realized design (performance rating)
 - ★ Model after European Union's *Energy Performance of Buildings Directive*
 - ★ Leverage / influence ASHRAE's emerging *Building Energy Label* project
- ★ Simulation tools will play a key role
 - ★ Consistent computations of expected energy performance
 - ★ Development of end use performance benchmarks

