

The Role of Energy Codes in Getting to Zero Net Energy Buildings

ACEEE National Symposium on Market Transformation

Pat Eilert
April 22, 2015





2014 in California - Impact of 1°C

Lake Oroville



Amador County



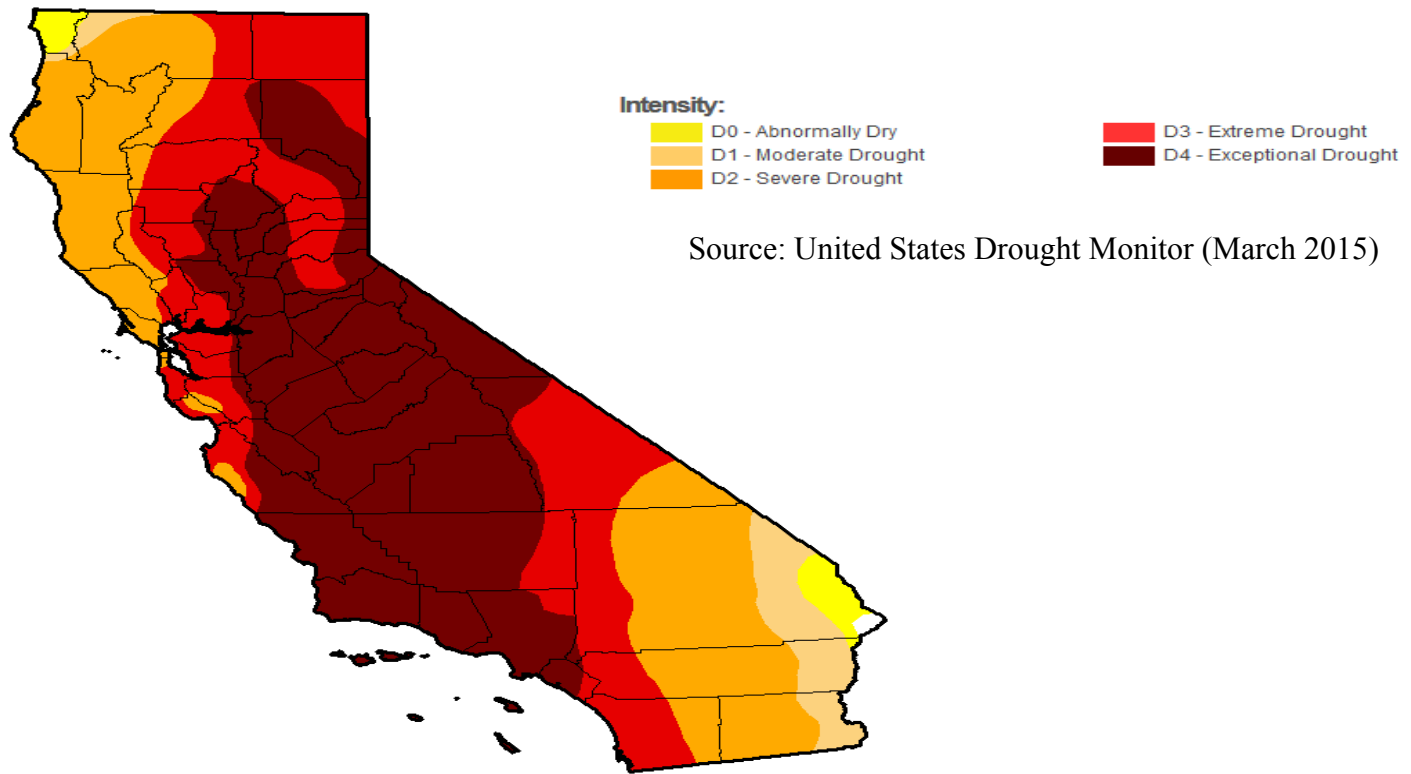
King Fire



Source: WIRED

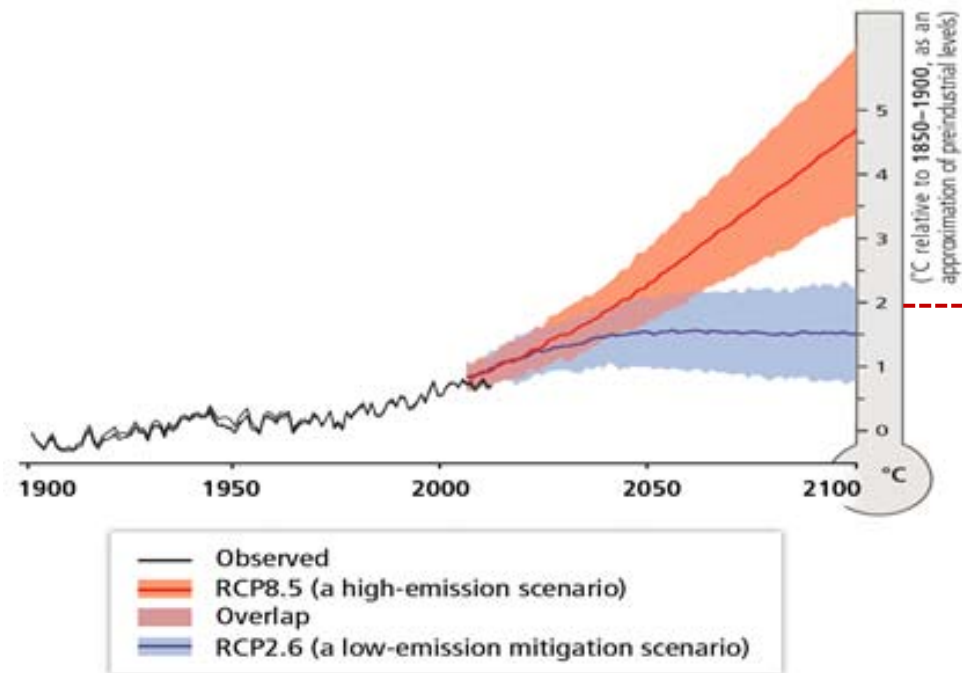


California Drought





Two Different Futures...



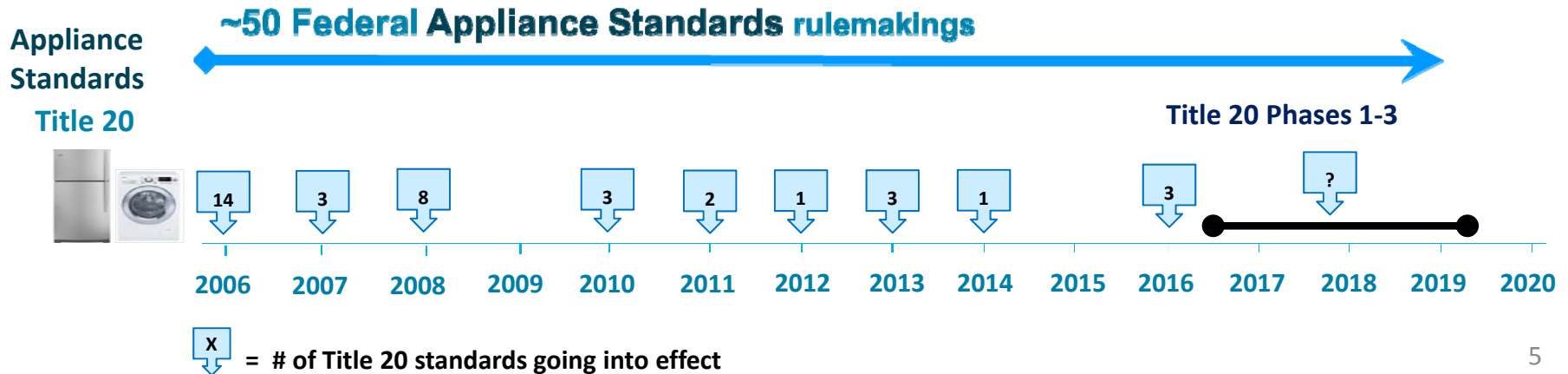
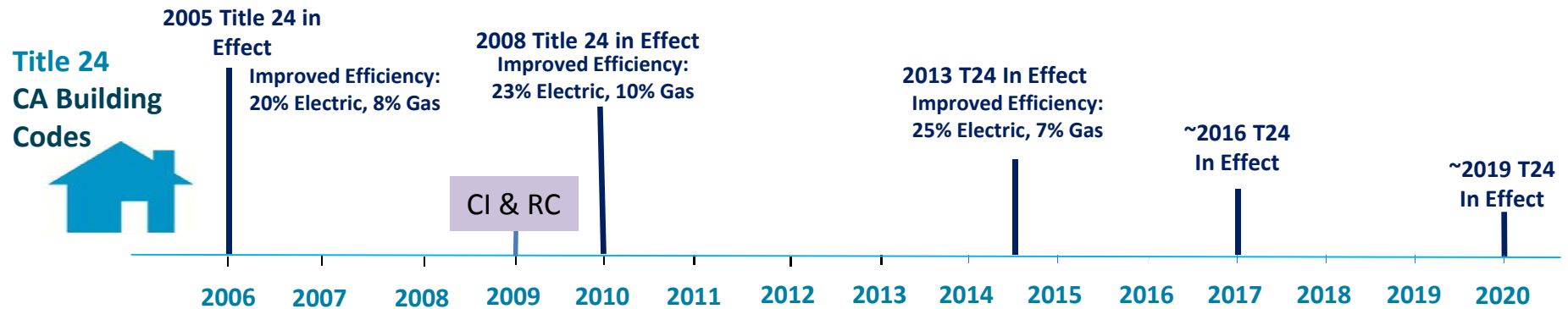
The warmest it's been over the past 2 million years is 2°C above preindustrial times.

RCP = Representative Concentration Pathways (e.g., scenarios)

Source: IPCC 2014. "Working Group III Contribution to the IPCC Fifth Assessment Report"

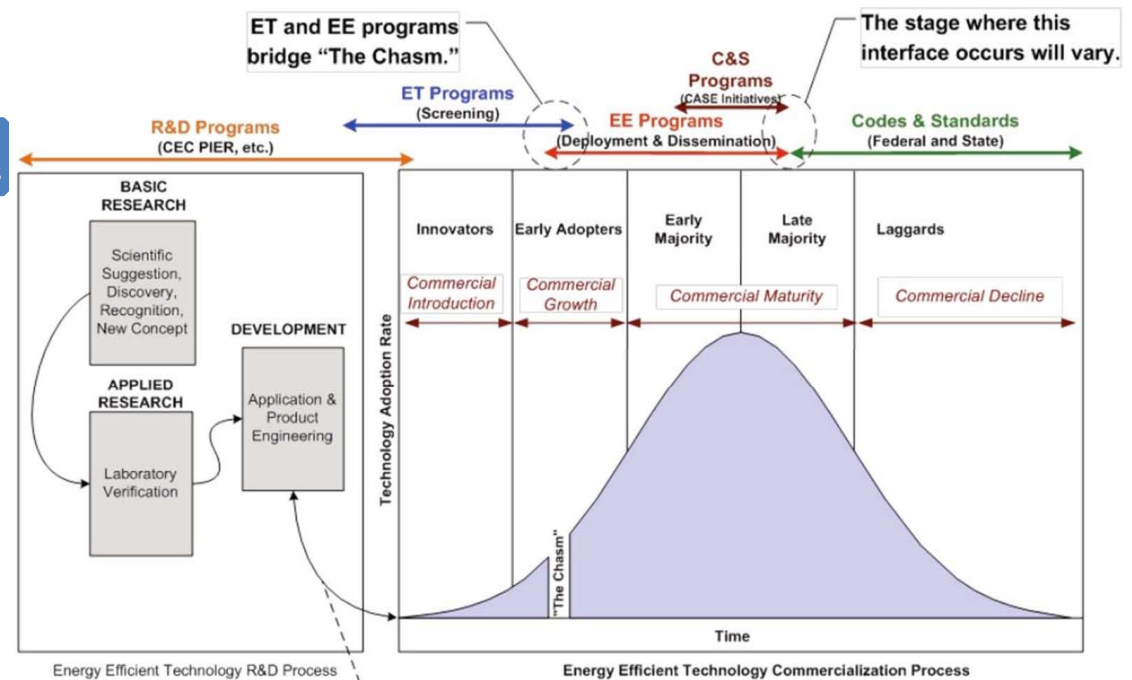


California and Federal Codes and Standards





This view of programs needs to be updated...

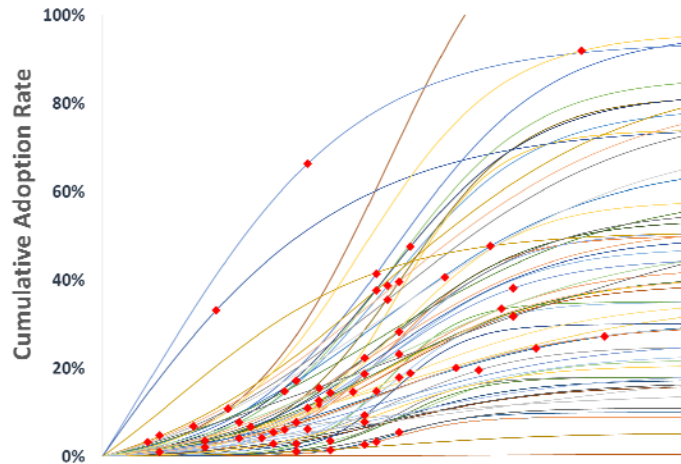


New technologies and applications may cycle between Product Engineering and Commercial Introduction several times until the correct mix of features, performance, price, availability, etc. are reached. Degree of failures and risk are high.

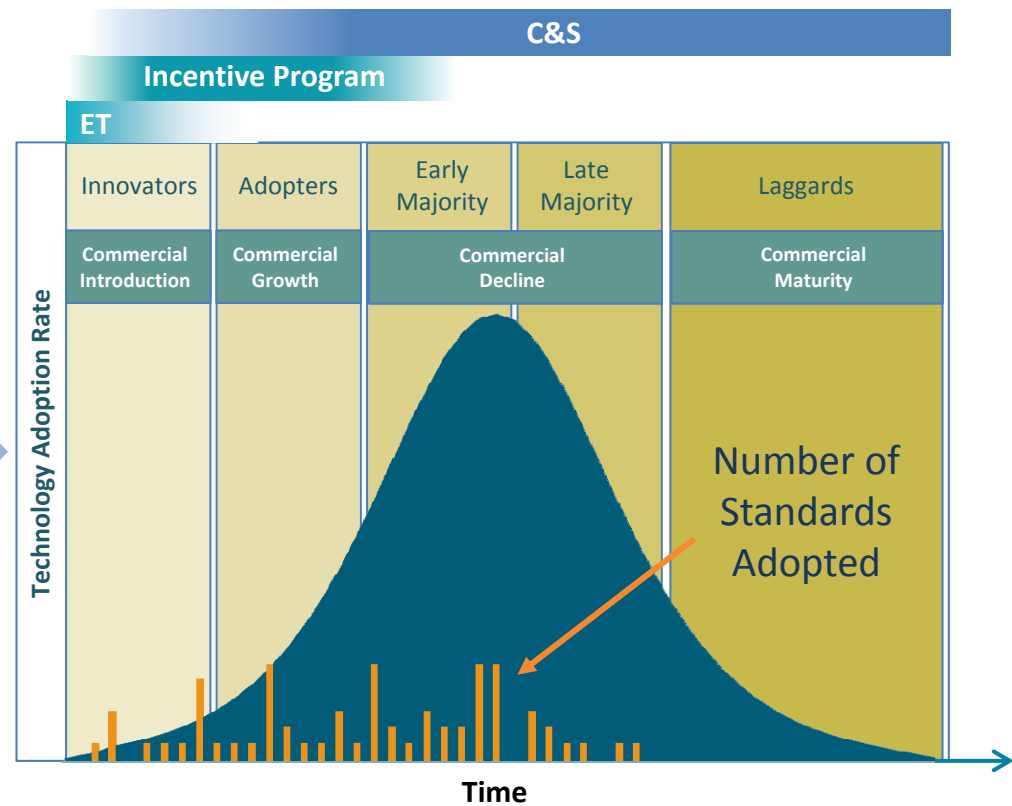
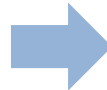


Here's what's actually happening...

Naturally Occurring Market Adoption (NOMAD) Curves



Red Mark: adoption point



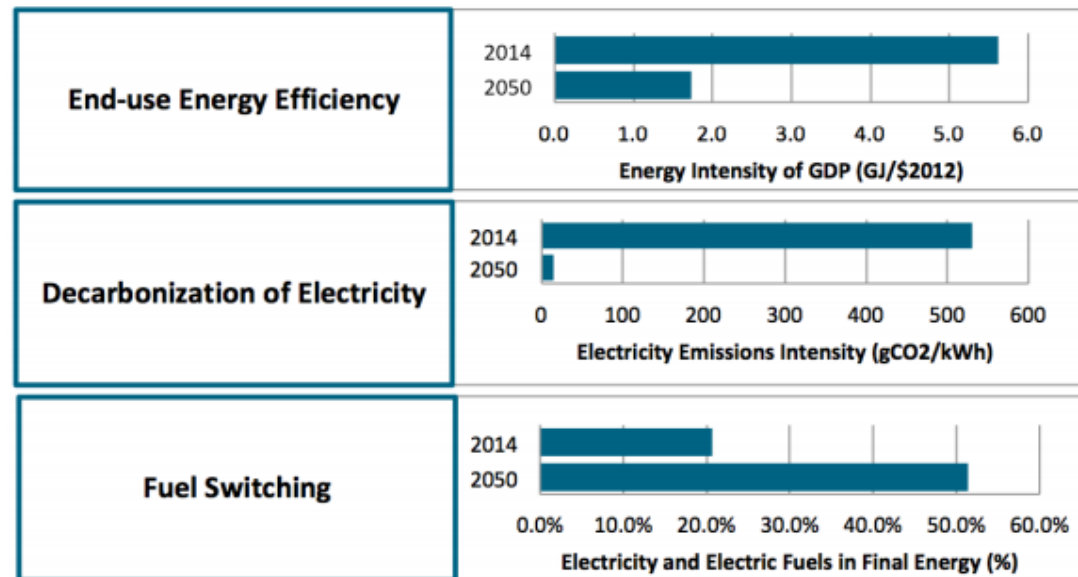


Deep Decarbonization



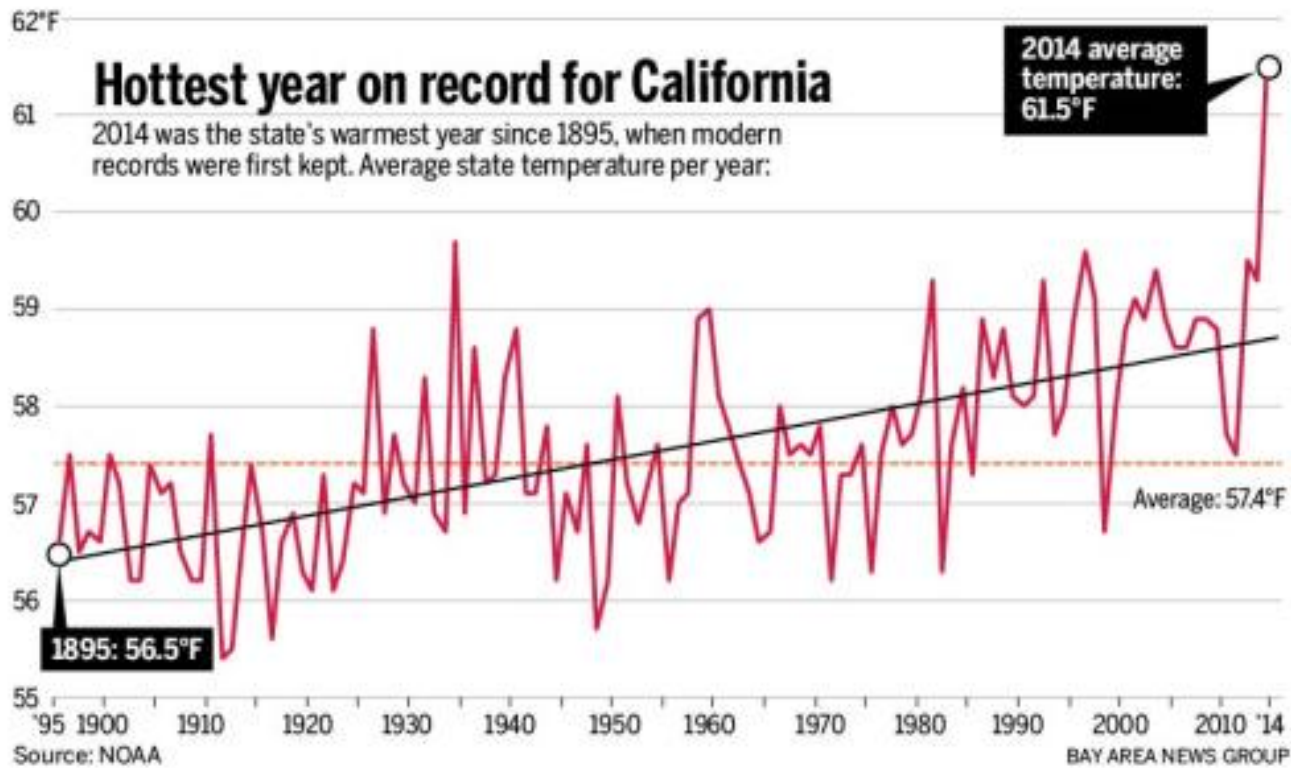
Three main strategies required to get to 80% below 1990 levels by 2050:

Figure 11. Indicative Metrics for the Three Main Decarbonization Strategies, Mixed Case Compared to 2014





2014: California's warmest year on record



Source: San Jose Mercury News



California's ZNE Goals

Building Type	Sector	2020	2025	2030
New Construction	Residential	100%		
	State buildings		100%	
	Commercial			100%
Existing	Residential			50%
	Commercial			
	State buildings		50%	

Supporting Agencies:





Some ZNE Challenges and Strategies

Challenge

Technical Feasibility

Cost Effectiveness

Non-compliance concerns

Industry Pushback on standards

Strategy

Fully integrated MT efforts

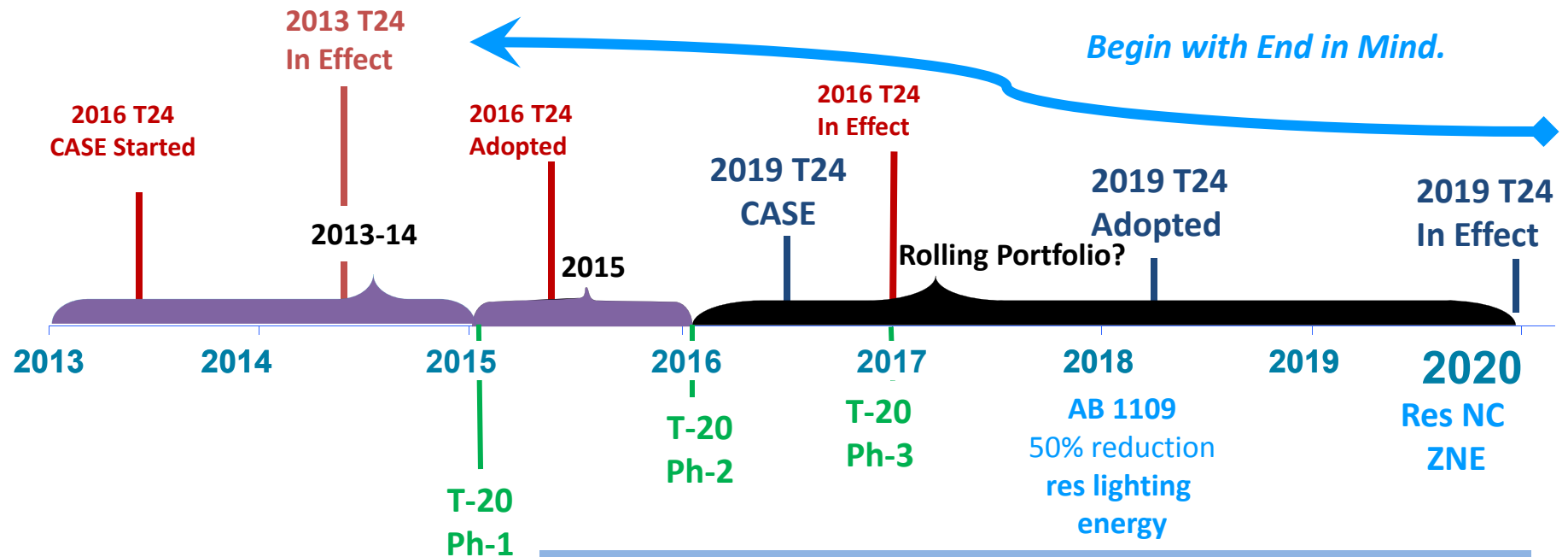
Whole Building, systems, other

Compliance education, outreach,
tools, resources, etc.

Improved support for standards
setting



Integrating Portfolios through Tactical Planning



1. Policy goals drive code objectives.
2. Code objectives drive voluntary program design.
3. Programs evolve to provide data.



Statewide Codes & Standards Program



Building Codes Advocacy
(State and National)



Appliance Standards Advocacy (State and Federal)*



Compliance Improvement
(Buildings and Appliances)



Reach Codes



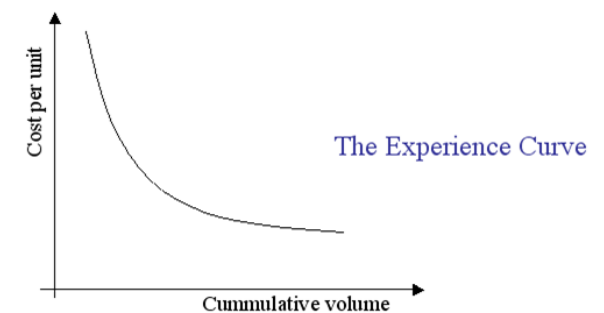
Planning and Coordination

**Appliances are considered anything other than the building envelope.*



Need for more sophisticated and more accurate cost-effectiveness analysis

- Buildings
 - Move to whole building approach instead of individual measures
- Appliances
 - Move to systems approach for certain products (e.g. motors/pumps; fans/blowers)
 - Incorporate product learning curves into analysis
 - Better accounting for carbon impacts





Anderson Forecast Conclusions of Cost-Price Study

1. “We cannot find evidence that structure cost increase will cause higher home prices in either coastal or inland California.”
2. “We cannot find statistically significant evidence that California’s ... Title 24 is associated with home construction costs in 8 Metros in California, in which 2 Metros are in inland California.”





Compliance

Standards	2006-08 Evaluation		2010-12 Evaluation	
	Range	Average	Range	Average
Appliance Standards: 2005 Title 20	31 – 100%	85%	Not Updated	
Appliance Standards: 2006 – 09 Title 20			40 - 98%	86%
Appliance Standards: Federal			37 – 100%	83%
Building Code: RNC (whole Building)	120% (Electric) 235% (Gas)		Not Updated	
Building Code: NRNC	8 – 100%	67%	397% (kWh) 329% (kW) 141% (Therm)	
Building Code: NR Alteration			580% (Indoor lighting) 83% (Re-roof)	

The Compliance Adjustment Factors (CAF) in the above table indicate the percentage of achieved savings as compared to those prescribed by the corresponding standards.



Our approach to improve compliance



- Analyze the compliance supply chain market actors' unique roles and needs
- Determine:
 1. How current performance compares to desired performance
 2. Reasons for the gap
 3. Appropriate solutions to improve code compliance
- Apply appropriate **performance-based solutions** that meet stakeholders' specific needs and preferences



Appliance Standards Compliance Improvement

Goal: Develop and implement an education and outreach campaign to improve compliance with **Federal and State Appliance Standards.**

- Webinars, handouts, FAQs
- Targeted training by retailer, manufacturer, distributor, and/or trade group
- Web tools to help with compliance (in development)
- Coordination with other states and utilities (in development)





Improving support for standards setting

- Field Research and more



Big Data



Enhanced data analytics



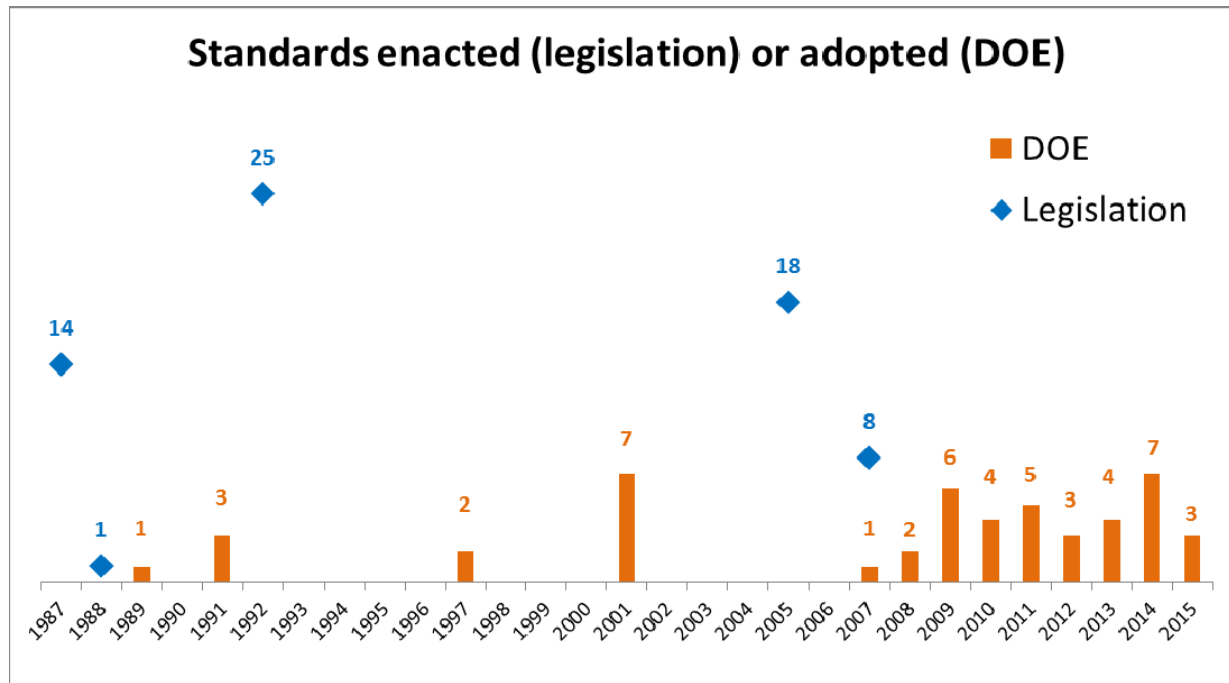
Product testing



Product teardowns



Federal standards enacted thru legislation or adopted via DOE





Allow states to innovate on appliance standards

Current situation

- Roughly **eighty percent** of U.S. building energy consumption is associated with end-uses covered by federal appliance standards that preempt states from adopting more efficacious standards.



Desired outcomes*

- Multi-state standards
- Relaxed waiver for California
- Expanded sunset provisions