

Demand Analysis Working Group (DAWG)

Additional Achievable Energy Efficiency (AAEE) Preliminary Definitions for 2019 CED Forecast



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California Energy Commission

SB 350 vs. AAEE

Element	SB 350 Projections	AAEE Projections
Purpose	Identify whether the potential of programmatic targets achieve the doubling goal	Create EE projections incremental to baseline demand forecast to serve resource planning and procurement needs

SB 350 vs. AAEE

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Purpose	Identify whether the potential of programmatic targets achieve the doubling goal	Create EE projections incremental to baseline demand forecast to serve resource planning and procurement needs
Accounting framework	Fixed 2015 base year	Rolling base year relative each IEPR cycle
Treatment of Uncertainty	Used a single reference case in 2017 but for 2019 a limited scenario capability exists.	Elaborate scenario design to condense uncertainty of specific elements into scenarios ranging from conservative to optimistic

SB 350 vs. AAEE

Element	SB 350 Projections	AAEE Projections
Purpose	Identify whether the potential of programmatic targets achieve the doubling goal	Create EE projections incremental to baseline demand forecast to serve resource planning and procurement needs
Accounting framework	Fixed 2015 base year	Rolling base year relative each IEPR cycle
Treatment of Uncertainty	Used a single reference case in 2017 but for 2019 a limited scenario capability exists.	Elaborate scenario design to condense uncertainty of specific elements into scenarios ranging from conservative to optimistic
Use by Other Agencies	Some agencies use SB 350 as a proxy for a very high efficiency scenario.	Explicit agreements to use specific AAEE scenarios in various resource planning and transmission planning studies
Implications of Targets Falling Short of Goals	CEC searches for additional efforts that might close the gap	NA

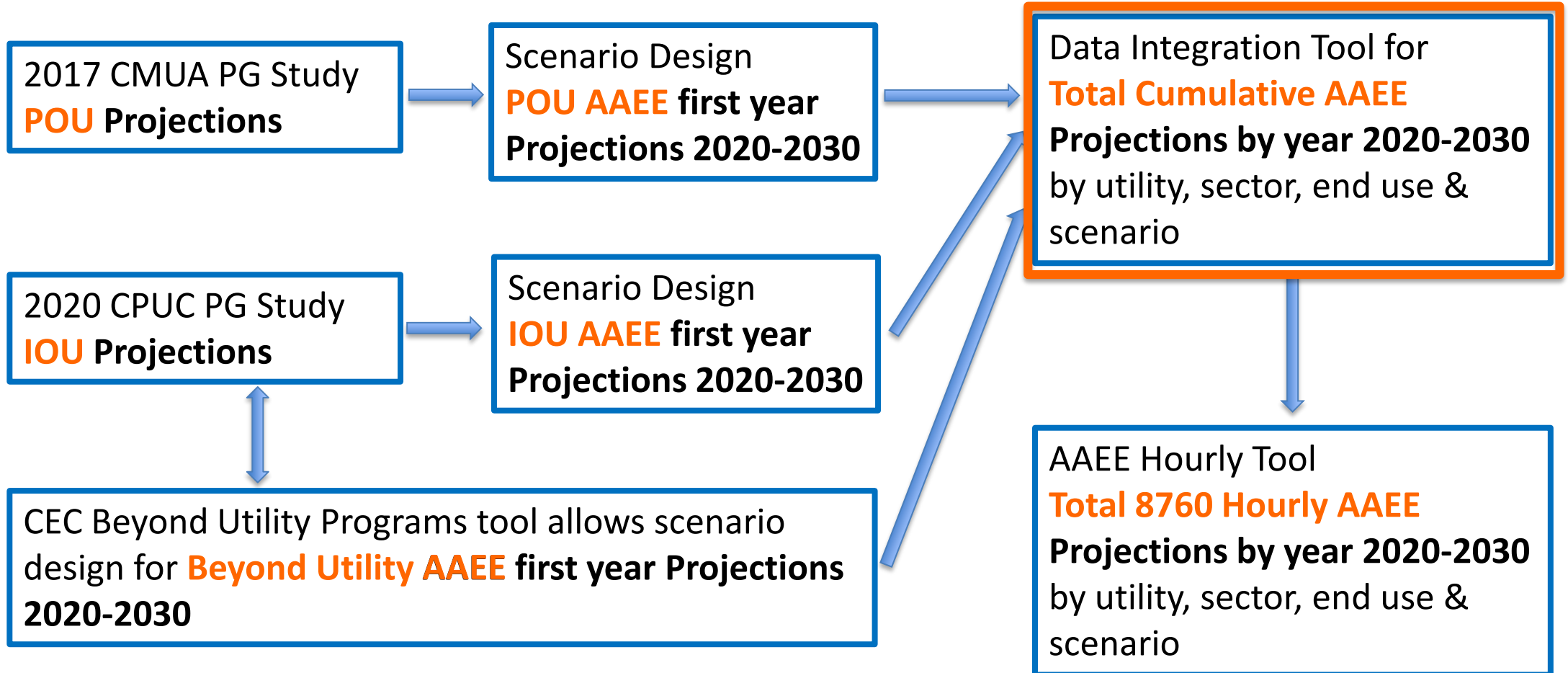


Additional Achievable Energy Efficiency (AAEE) Improvements from 2017 to 2019 IEPR Cycle

- Improved analysis of decay and re-participation
 - Using cumulative results from IOU PG Study
 - Using POU model cumulative results from work on potential savings
 - expansion of the number of POU AAEE element scenarios from the one case that is submitted in the CMUA report
- Update and expand the Beyond Utility Program workbooks originally developed in 2017 for SB 350
 - Workbooks are embedded in a tool that assigns end use level decay based on EUL
 - total of 20 workbooks including:
 - Fuel Substitution (% of new construction only)
 - Conservation Voltage Reduction
 - Agricultural and Industrial Sectors
- Improved attribution to sector/end-use
- development of an hourly tool utilizing updated load shapes to generate 8760 hourly projections from annual AAEE savings for the ten year forecast period
- Improving natural gas demand analysis
 - building decarbonization is an emerging policy emphasis



Additional Achievable Energy Efficiency (AAEE) 2019 Process Flow Overview



Preliminary 2019 AAEF Definitions

Source	Level	High Low (Scenario 1)	Mid Low (Scenario 2)	Mid Mid (Scenario 3)	Mid High (Scenario 4)	Low High (Scenario 5)	Mid High Plus (Scenario 6)	
2017 IEPR	Building Stock	2017 IEPR High-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Low-Case	2017 IEPR Mid-Case	
	Retail Prices							
Navigant & CEC Processing of 2020 PG Study	AIMS ETs	Reference		Reference	Average of Reference & Aggressive		Aggressive	
	Incentive Levels	capped at 25% of incremental cost	capped at 50% of incremental cost	capped at 50% of incremental cost	capped at 50% of incremental cost		capped at 75% of incremental cost	
	C-E Measure Screening Threshold using 2019 Avoided Costs) (TRC	1		1	0.5			0.65
	Marketing & Outreach	Default calibrated value		Default calibrated value	Increased marketing outreach			
	Financing Programs	No modeled impacts		No modeled impacts	IOU financing programs broadly available to Residential customers			
	Low Income	PG Study Result Unchanged		PG Study Result Unchanged	PG Study Result Unchanged			
	BROs Program Assumptions	Reference		Reference	Average of Reference & Aggressive		Aggressive	
Navigant & CEC Processing of 2020 PG Study AND CEC Processing of WA#2 Results for BU Programs WB	Title 24	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Compliance Enhancements		
		Code Cycles (Vintages)	2022 Nonresidential New Construction and A&A; 2022 Residential A&A BUWB			same scope through 2025 Standards BUWB	same scope through 2028 Standards BUWB	
	Title 20	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Compliance Enhancements		
		Code Cycles (Vintages)	Selected Standards through 2022		Selected Standards through 2022	Selected Standards through 2022	Selected Standards through 2022	PG Study & BUWB
	Federal Standards	Compliance Reduction or Enhancement	no additional included		Reference Case Compliance	Compliance Enhancements		
		Code Cycles (Vintages)			through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study	through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study & BUWB	through 2023 + 2026 Water Source Heat Pump (including 2020 GSL Std expanded scope) PG Study & BUWB	all through 2026 Water Source Heat Pump + selected standards through 2030 PG Study & BUWB
CEC Processing of WA#2 Results for BU Programs WB	Prop 39	mid: established programs with historical performance data and expected future funding allocations				high low mid: assumptions based on pilot or proposed programs mid: limited assumptions based on pilot or proposed programs		
	DGS Energy Retrofit	low						
	ECAA Financing							
	GGRF: Water Energy Grant	mid: limited historical data on a pilot or other subset of programs and reasoned assumption on future funding allocations						
	GGRF: Low Income Weatherization							
	Local Government Ordinances	not included						
	PACE Financing							
	Benchmarking and Public Disclosure	not included						
	Fuel Substitution							
	Behavioral, Retrocommissioning, Operational Savings	not included						
	Local Government Challenge							
	Energy Asset Rating	not included						
	Smart Meter Data Analytics							
	Air Quality Management District	not included						
Agricultural								
Industrial	not included							
Conservation Voltage Reduction								
CEC Processing of WA#1 Results based on 2017 CMUA PG Study	Expand Measure List	Reference		Reference		Add new measures		
	Incentive Level	Reference x 100%		Reference		Reference		
	Promotional Expenditures	Reference x 100%		Reference		Reference x 120%		
	Behavioral Programs	Reference x 100%		Reference		Reference x 120%		
	Early Retirement Programs	Reference x 100%		Reference		Reference x 120%		
	IOU or POU Net to Gross	Reference		Reference		Reference		
Re-participation Rates	Reference		Reference		Reference			

IOU Potential Program Savings

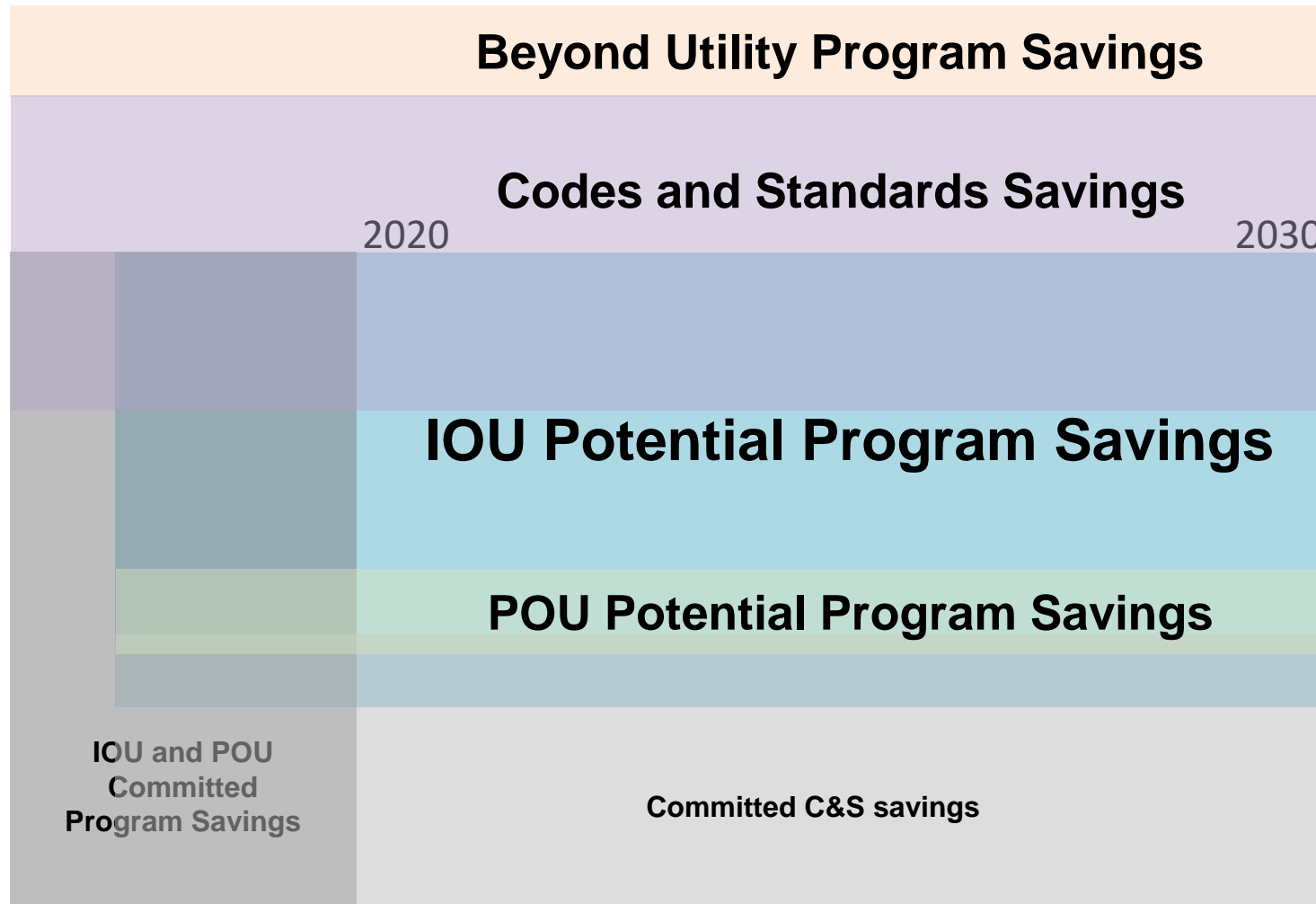
Codes and Standards Savings

Beyond Utility Program Savings

POU Potential Program Savings

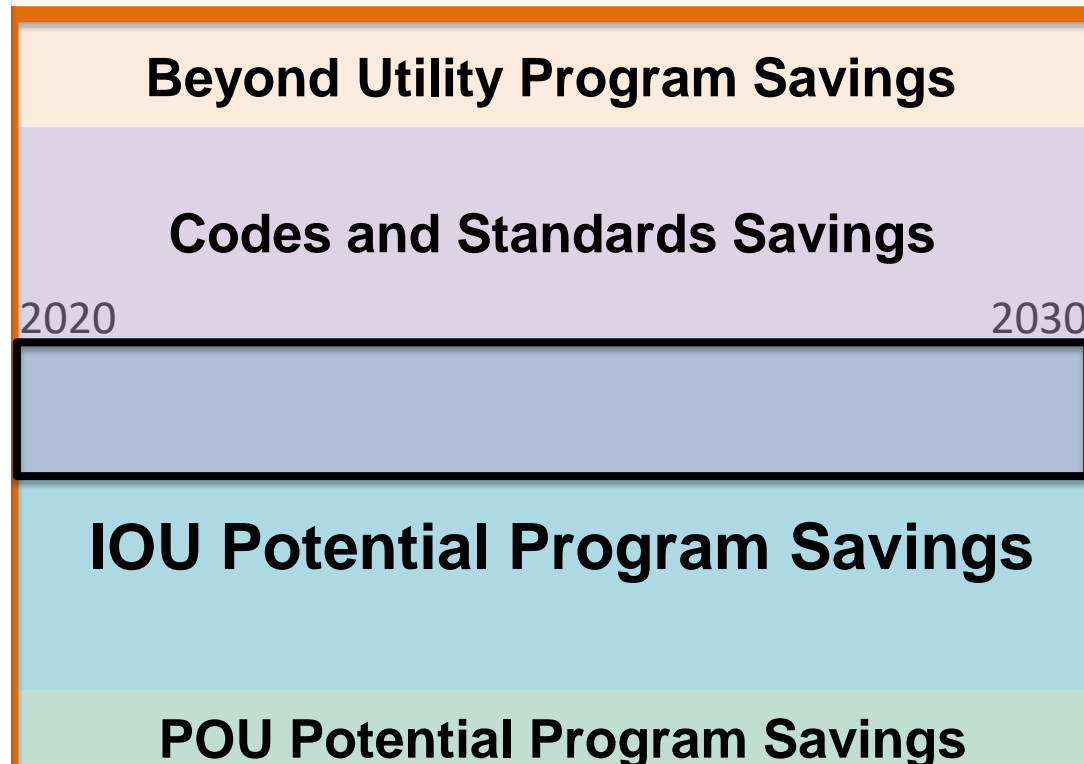


Additional Achievable Energy Efficiency (AAEE) 2019 Scenario Design





Additional Achievable Energy Efficiency (AAEE) 2019 Scenario Design



- eliminate duplication with baseline forecast

- eliminate any other duplication between savings streams



IOU AAEE Scenario Design

Lever	High Low (Scenario 1)	Mid Low (Scenario 2)	Mid Mid (Scenario 3)	Mid High (Scenario 4)	Low High (Scenario 5)	Mid High Plus (Scenario 6)
Building Stock			2017 IEPR Mid-Case			
Retail Prices			Reference			
AIMS ETs			capped at 50% of incremental cost			
Incentive Levels			1			
C-E Measure Screening Threshold (TRC using 2019 Avoided Costs)			Default calibrated value			
Marketing & Outreach			No modeled impacts			
Financing Programs			PG Study Result Unchanged			
Low Income			Reference			
BROs Program Assumptions						

- Design IOU Program AAEE Scenarios around the scenario chosen by the CPUC as the Goal from the IOU PG Study Scenarios



IOU AAE Scenario Design

Lever	High Low (Scenario 1)	Mid Low (Scenario 2)	Mid Mid (Scenario 3)	Mid High (Scenario 4)	Low High (Scenario 5)	Mid High Plus (Scenario 6)
Building Stock			2017 IEPR Mid-Case			
Retail Prices			Reference			
AIMS ETs			capped at 50% of incremental cost			
Incentive Levels			1			
C-E Measure Screening Threshold (TRC using 2019 Avoided Costs)			Default calibrated value			
Marketing & Outreach			No modeled impacts			
Financing Programs			PG Study Result Unchanged			
Low Income			Reference			
BROs Program Assumptions						

- Began with sensitivity analysis
 - of various levers within the Rebate and Financing Programs
 - then separately two savings options for AIMS ETs
 - and BROs Programs



IOU AAEE Scenario Design

Lever	High - Low (Scenario 1)	Mid - Low (Scenario 2)	Mid - Mid (Scenario 3)	Mid - High (Scenario 4)	Low - High (Scenario 5)	Mid - High Plus (Scenario 6)
Building Stock	2017 IEPR High-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Low-Case	2017 IEPR Mid-Case
Retail Prices						
AIMS ETs	Reference		Reference	Average of Reference & Aggressive		Aggressive
Incentive Levels	capped at 25% of incremental cost	capped at 50% of incremental cost	capped at 50% of incremental cost	capped at 50% of incremental cost		capped at 75% of incremental cost
C-E Measure Screening Threshold (TRC using 2019 Avoided Costs)	1.25		1	0.85		0.65
Marketing & Outreach	Default calibrated value		Default calibrated value	Increased marketing strength		
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Low Income	PG Study Result Unchanged		PG Study Result Unchanged	PG Study Result Unchanged		
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- Goal was to design a spread of **IOU Program AAEE Scenarios** from conservative to optimistic



POU AAEE Scenario Design

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Expand Measure List			Reference			
Incentive Level						
Promotional Expenditures						
Behavioral Programs						
Early Retirement Programs						
Net to Gross						
Re-participation Rates						

- Design **POU AAEE Scenarios** around the single potential savings case presented in the CMUA's 2017 PG Study



POU AAEE Scenario Design

Lever	High - Low (Scenario 1)	Mid - Low (Scenario 2)	Mid - Mid (Scenario 3)	Mid - High (Scenario 4)	Low - High (Scenario 5)	Mid - High Plus (Scenario 6)
Expand Measure List			Reference			
Incentive Level						
Promotional Expenditures						
Behavioral Programs						
Early Retirement Programs						
Net to Gross						
Re-participation Rates						

- savings projections for the largest 16 POUs were based on three sets of assumptions, consistent across all POUs run through the ELRAM model
- potential savings for the remaining 23 small POUs were extrapolated from the potential savings of the 16 larger POUs
- the decision was made for savings to be uniformly scaled by applying IOU rather than POU re-participation rates and net-to-gross ratios



POU AAEE Scenario Design

Lever	High - Low (Scenario 1)	Mid - Low (Scenario 2)	Mid - Mid (Scenario 3)	Mid - High (Scenario 4)	Low - High (Scenario 5)	Mid - High Plus (Scenario 6)
Expand Measure List	Reference		Reference	Add new measures		
Incentive Level	Reference x 75%			Reference		
Promotional Expenditures				Reference x 125%		
Behavioral Programs				Reference		
Early Retirement Programs	Reference			Implement ER Programs		
Net to Gross	IOU					
Re-participation Rates						

- Goal was to design a spread of POU AAEE Scenarios from conservative to optimistic



Code and Standards Scenario Design

- Begin **C&S Scenario** design around the scenario chosen by the CPUC as the Goal from the IOU PG Study Scenarios

Lever		High Low (Scenario 1)	Mid Low (Scenario 2)	Mid Mid (Scenario 3)	Mid High (Scenario 4)	Low High (Scenario 5)	Mid High Plus (Scenario 6)
Title 24	Compliance Reduction or Enhancement			Reference Case Compliance			
	Code Cycles (Vintages)			2022 Nonresidential New Construction and A&A; 2022 Residential A&A BUWB			
Title 20	Compliance Reduction or Enhancement			Reference Case Compliance			
	Code Cycles (Vintages)			Selected Stds. Through 2022 <i>PG Study</i>			
Federal Standards	Compliance Reduction or Enhancement			Reference Case Compliance			
	Code Cycles (Vintages)			through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump <i>PG Study</i>			



Code and Standards Scenario Design

- savings from future **Title 24** code cycles are modeled according to anticipated future ratchets in energy efficiency assessed as part of the Beyond Utility analysis

Lever		High - Low (Scenario 1)	Mid - Low (Scenario 2)	Mid - Mid (Scenario 3)	Mid - High (Scenario 4)	Low - High (Scenario 5)	Mid - High Plus (Scenario 6)
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T24 Building Standards ratchet end years			
New Construction		Additions & Alterations	
Residential Sector	Commercial Sector	Residential Sector	Commercial Sector



Code and Standards Scenario Design

- savings for the **Federal Appliance Standards** and **Title 20** are modeled by measure
- utilize both savings reported in IOU PG Study as well as additional measures analyzed as part of the BU assessment
- measure savings gleaned from the IOU PG Study were analyzed in a total savings mode and scaled up to statewide savings
- additional appliance measures modeled in the Beyond Utility analysis yield statewide savings

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Code and Standards Scenario Design

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	Code Cycles (Vintages)		through 2023 (excluding 2020 <i>GSL Std</i>) + 2026 Water Source Heat Pump <i>PG Study</i>	through 2023 (excluding 2020 <i>GSL Std</i>) + 2026 Water Source Heat Pump <i>PG Study & BUWB</i>	through 2023 + 2026 Water Source Heat Pump (including 2020 <i>GSL Std</i> expanded scope) <i>PG Study & BUWB</i>	all through 2026 Water Source Heat Pump + selected standards through 2030 <i>PG Study & BUWB</i>	

- statewide savings are allocated to each IOU, IRP POU or smaller POU grouping
 - essential for the small POU's inside CAISO planning area



Beyond Utility AEEE Scenario Design

Large contractual effort this cycle to update and expand the Beyond Utility Program workbooks

- Workbooks vary in level of sophistication but all have various savings parameters that can be adjusted
 - staff is able to design scenarios using low, mid, and high 2017 IEPR econ/demo drivers
 - Conservative, reference, and aggressive savings estimates defined for each program in the individual workbooks
 - individual weights are assigned for each of the BU programs included

Beyond Utility Programs
Prop 39
DGS Energy Retrofit
ECAA Financing
GGRF: Water Energy Grant
GGRF: Low Income Weatherization
Local Government Ordinances
PACE Financing
Benchmarking and Public Disclosure
Fuel Substitution
Behavioral, Retrocommissioning, Operational Savings
Local Government Challenge
Energy Asset Rating
Smart Meter Data Analytics
Air Quality Management District
Agricultural
Industrial
Conservation Voltage Reduction



Beyond Utility AEEE Scenario Design

Program Savings Scenario	High Low (Scenario 1)	Mid Low (Scenario 2)	Mid Mid (Scenario 3)	Mid High (Scenario 4)	Low High (Scenario 5)	Mid High Plus (Scenario 6)
Prop 39	mid: established programs with historical performance data and expected future funding allocations				high	
DGS Energy Retrofit						
ECAA Financing	low		mid: limited historical data on a pilot or other subset of programs and reasoned assumption on future funding allocations			
GGRF: Water Energy Grant						
GGRF: Low Income Weatherization						
Local Government Ordinances						
PACE Financing						
Benchmarking and Public Disclosure	not included				low	
Fuel Substitution						
Behavioral, Retrocommissioning, Operational Savings						
Local Government Challenge						
Energy Asset Rating	not included				mid: assumptions based on pilot or proposed programs	
Smart Meter Data Analytics						
Air Quality Management District						
Agricultural						
Industrial	not included				mid: limited assumptions based on pilot or proposed programs	
Conservation Voltage Reduction						

- Program specific levers are adjusted within each Beyond Utility program workbook and are grouped to define low, mid and high **BU AEEE Scenarios**.

Preliminary 2019 AAE Definitions

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	Re-participation Rates					IOU			

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	Re-participation Rates							

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		Code Cycles (Vintages)	Selected Standards through 2022		Selected Standards through 2022	Selected Standards through 2022	Selected Standards through 2022	PG Study & BU WB
	Federal Standards	Compliance Reduction or Enhancement	no additional included		Reference Case Compliance	Compliance Enhancements		
		Code Cycles (Vintages)			through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study	through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study & BU WB	through 2023 + 2026 Water Source Heat Pump (including 2020 GSL Std expanded scope) PG Study & BU WB	all through 2026 Water Source Heat Pump + selected standards through 2030 PG Study & BU WB
CEC Processing of WA#2 Results for BU Programs WB	Prop 39	mid: established programs with historical performance data and expected future funding allocations					high	
	DGS Energy Retrofit	low						
	ECAA Financing							
	GGRF: Water Energy Grant	mid: limited historical data on a pilot or other subset of programs and reasoned assumption on future funding allocations						
	GGRF: Low Income Weatherization							
	Local Government Ordinances	not included						
	PACE Financing							
	Benchmarking and Public Disclosure	mid: assumptions based on pilot or proposed programs						
	Fuel Substitution							
	Behavioral, Retrocommissioning, Operational Savings	low						
	Local Government Challenge							
	Energy Asset Rating	mid: limited assumptions based on pilot or proposed programs						
	Smart Meter Data Analytics							
	Air Quality Management District	not included						
Agricultural								
Industrial	not included							
Conservation Voltage Reduction								
CEC Processing of WA#1 Results based on 2017 CMUA PG Study	Expand Measure List	Reference		Reference		Add new measures		
	Incentive Level	Reference x 75%		Reference		Reference		
	Promotional Expenditures	Reference x 75%		Reference		Reference x 125%		
	Behavioral Programs	reference newly placed		reference		reference		
	Early Retirement Programs	reference		reference		reference		
	IOU or POU Net to Gross	reference		reference		reference		
Re-participation Rates	reference		reference		reference			

IOU Potential Program Savings

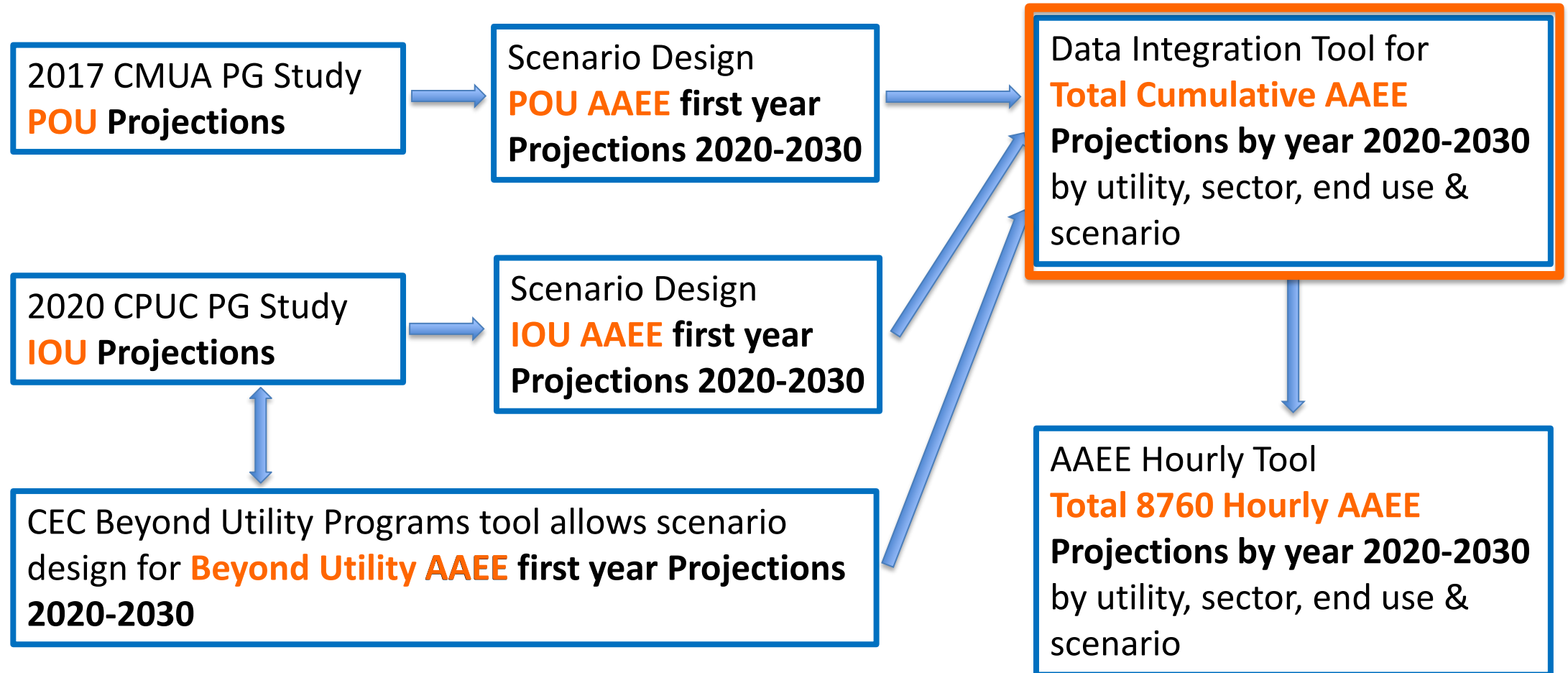
Codes and Standards Savings

Beyond Utility Program Savings

POU Potential Program Savings



Additional Achievable Energy Efficiency (AAEE) 2019 Process Flow Overview





Additional Achievable Energy Efficiency (AAEE) Hourly Tool Development

AAEE Hourly Tool

Total 8760 Hourly AAEE Projections by year 2020-2030

by utility, sector, end use & scenario

- Have mapped 48 named end uses to new ADM load shape profiles and supplemented with Navigant load profiles used in 2017 CED Forecast as needed
- Input menu allows for selection of:
 - Forecast start and end years
 - Utility: IOU's, named POU's, North and South small POU groupings
 - Simple by Sector or Detailed by End Use
 - include or omit Transmission and Distribution Losses
- Outputs are 8760 hourly results for each scenario for each forecast year



Additional Achievable Energy Efficiency (AAEE) 2019 Schedule

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- 9/26 CEC presents preliminary AAEE Scenario Designs at IEPR Workshop**
 - 10/1 internal deadline for CEC EE team to provide draft AAEE Annual Projections results to CEC Forecast Team**
 - 10/? DAWG Webinar on draft AAEE Projections**
 - 11/1 internal deadline for final AAEE Hourly Projections for use in revised 2019 Demand Forecast**
 - 11/21 DAWG Meeting on revised 2019 Demand Forecast including AAEE in Managed Forecast**
 - 12/2 Final Electricity and Natural Gas Forecast IEPR Workshop**