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Filer:	Raquel Kravitz
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IEPR Commissioner Workshop

Emerging Topics in Energy Demand Forecasting

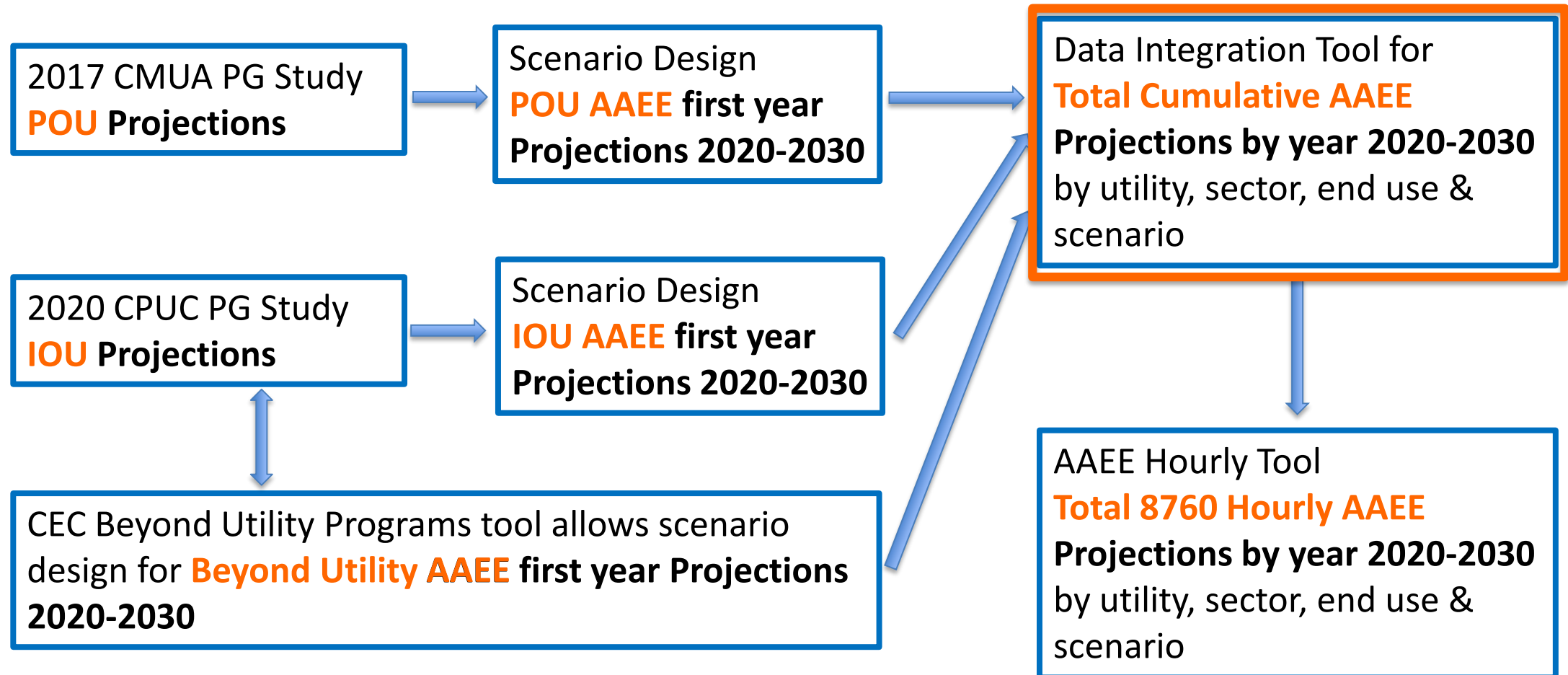
Additional Achievable Energy Efficiency (AAEE) Preliminary Definitions for 2019 CED Forecast



Ingrid.Neumann@energy.ca.gov
September 26, 2019
California Energy Commission



Additional Achievable Energy Efficiency (AAEE) 2019 Process Flow Overview



Preliminary 2019 AAEF Definitions

Source	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)
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	1	0.5	0.65	
	Marketing & Outreach		Default calibrated value	Default calibrated value	Default calibrated value	Increased marketing outreach		
	Financing Programs		No modeled impacts		No modeled impacts	IOU financing programs broadly available to Residential and commercial 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 BU WB	same scope through 2028 Standards BU WB
	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 PG Study	Selected Standards through 2022 PG Study	Selected Standards through 2022 PG Study	Selected Standards through 2024 PG Study & BU WB	
	Federal Standards	Compliance Reduction or Enhancement	no additional included	through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study	Reference Case Compliance	Compliance Enhancements		
		Code Cycles (Vintages)			through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study & BU WB	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							
	GGRF: Low Income Weatherization							
	Local Government Ordinances							
	PACE Financing							
	Benchmarking and Public Disclosure		mid: limited historical data on a pilot or other subset of programs and reasoned assumption on future funding allocations					
	Fuel Substitution							
	Behavioral, Retrocommissioning, Operational Savings							
	Local Government Challenge							
	Energy Asset Rating							
	Smart Meter Data Analytics		not included					
	Air Quality Management District							
	Agricultural							
Industrial								
Conservation Voltage Reduction		not included				mid: assumptions based on pilot or proposed programs		
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 125%			Reference		
	Promotional Expenditures		Reference		IOU	Reference x 125%		
	Behavioral Programs		Remove newly placed AC			Reference		
	Early Retirement Programs		Reference			Identified Program		
	IOU or POU Net to Gross							
	Re-participation Rates							

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IOU Potential Program Savings

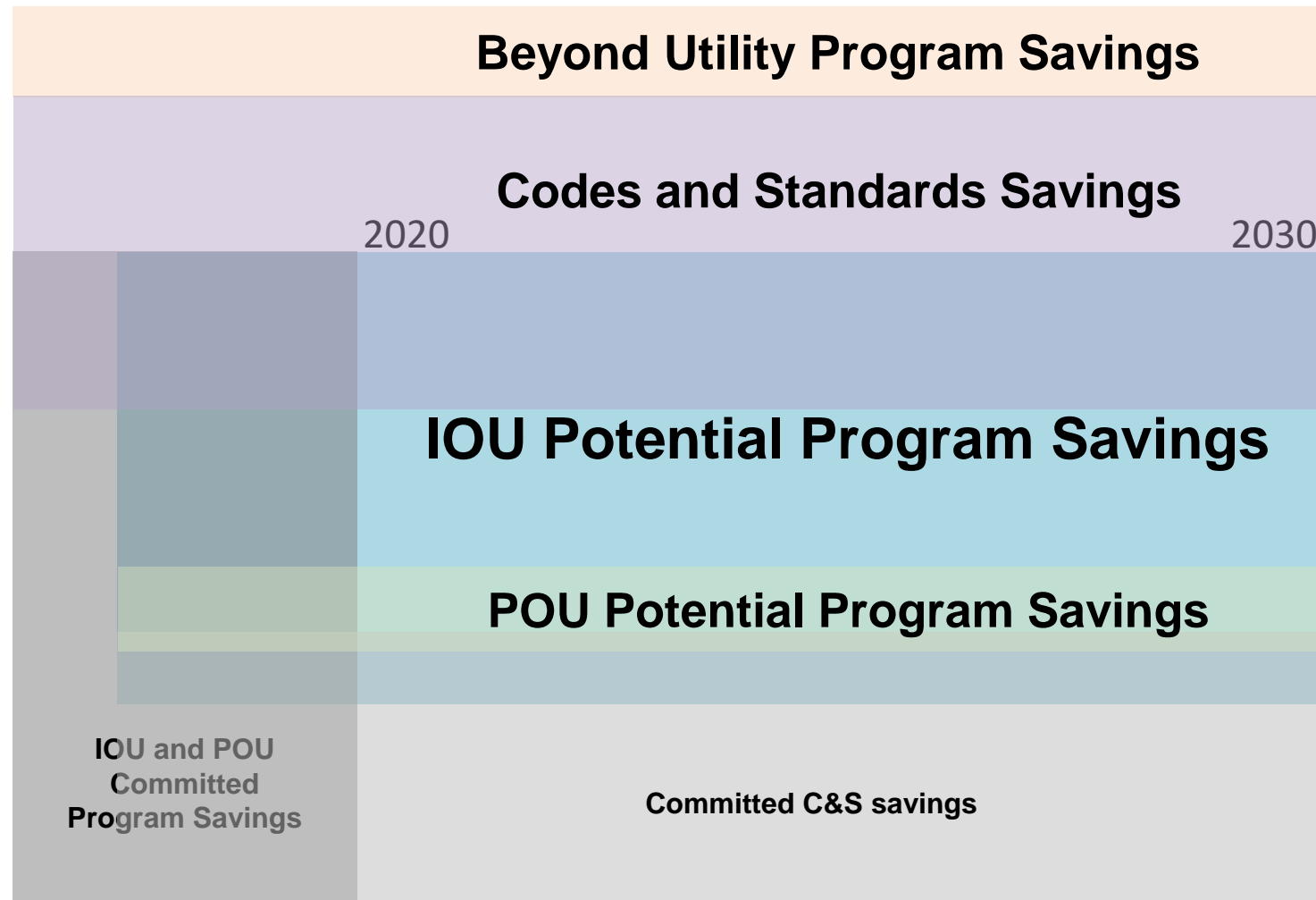
Codes and Standards Savings

Beyond Utility Program Savings

POU Potential Program Savings

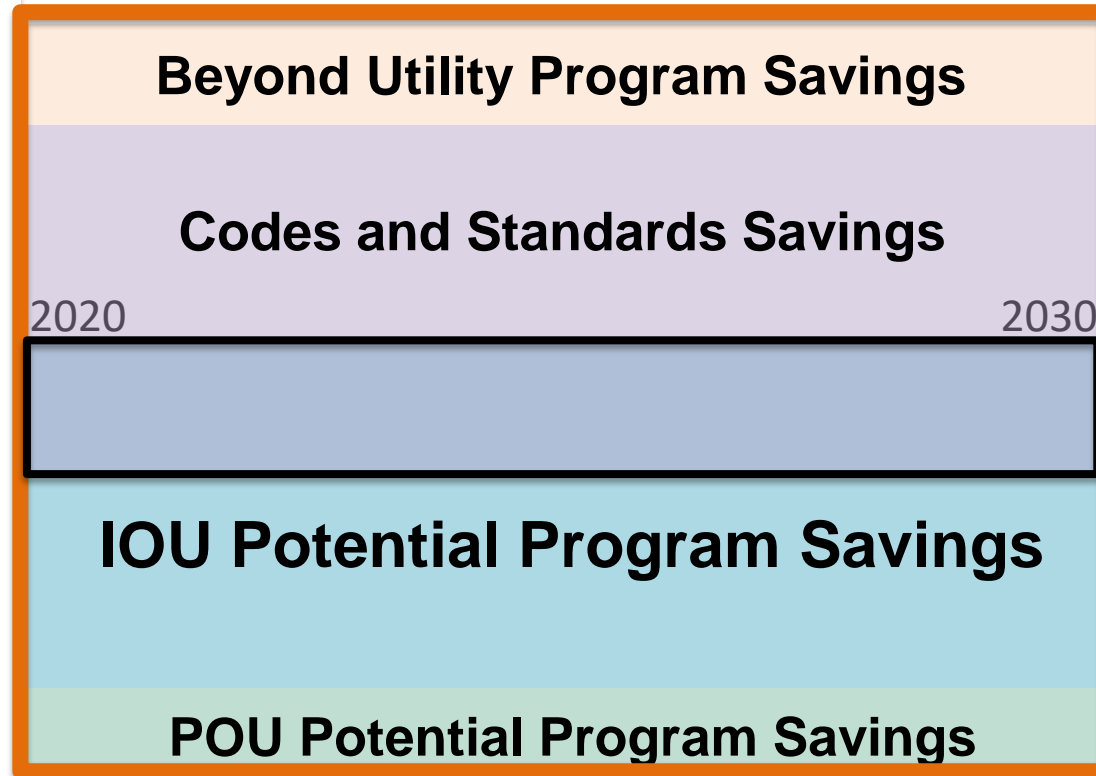


Additional Achievable Energy Efficiency (AAEE) 2019 Scenario Design





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			
Low Income			Unchanged			
BROs Program Assumptions			Reference			

- 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						
AIMS ETs			Reference			
Incentive Levels			capped at 50% of incremental cost			
C-E Measure Screening Threshold (TRC using 2019 Avoided Costs)			1			
Marketing & Outreach			Default calibrated value			
Financing Programs			No modeled impacts			
Low Income			PG Study Result Unchanged			
BROs Program Assumptions			Reference			

- 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 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			
Financing Programs	No modeled impacts		No modeled impacts	IOU financing programs broadly available to Res and Com			
Low Income	PG Study Result Unchanged		PG Study Result Unchanged	PG Study Result Unchanged			
BROs Program Assumptions	Reference		Reference	Average of Reference & Aggressive		Aggressive	

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



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	<div>Reference</div>					
Incentive Level						
Promotional Expenditures						
Behavioral Programs						
Early Retirement Programs						
Net to Gross						
Re-participation Rates						

- Design **POU Program 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 Program 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)
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 <i>BUWB</i>			same scope through 2025 Standards <i>BUWB</i>	same scope through 2028 Standards <i>BUWB</i>
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>			

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

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	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 <i>BUWB</i>			same scope through 2025 Standards <i>BU WB</i>	same scope through 2028 Standards <i>BU WB</i>
Title 20	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Compliance Enhancements		
	Code Cycles (Vintages)		Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2027 <i>PG Study & BU WB</i>	
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 <i>PG Study</i>	through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump <i>PG Study & BU WB</i>	through 2023 + 2026 Water Source Heat Pump (including 2020 GSL Std expanded scope) <i>PG Study & BU WB</i>	all through 2026 Water Source Heat Pump + selected standards through 2030 <i>PG Study & BU WB</i>



Code and Standards 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)
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 <i>BUWB</i>			same scope through 2025 Standards <i>BU WB</i>	same scope through 2028 Standards <i>BU WB</i>
Title 20	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Compliance Enhancements		
	Code Cycles (Vintages)		Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2027 <i>PG Study & BU WB</i>	
Federal Standards	Compliance Reduction or Enhancement	no additional included		Reference Case Compliance	Compliance Enhancements		
	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 & BU WB</i>	through 2023 + 2026 Water Source Heat Pump (including 2020 <i>GSL Std</i> expanded scope) <i>PG Study & BU WB</i>	all through 2026 Water Source Heat Pump + selected standards through 2030 <i>PG Study & BU WB</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 AAEF 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						
GGRF: Water Energy Grant						
GGRF: Low Income Weatherization						
Local Government Ordinances						
PACE Financing						
Benchmarking and Public Disclosure						
Fuel Substitution						
Behavioral, Retrocommissioning, Operational Savings	not included				low	mid: assumptions based on pilot or proposed programs
Local Government Challenge						
Energy Asset Rating						
Smart Meter Data Analytics						
Air Quality Management District	not included					mid: limited assumptions based on pilot or proposed programs
Agricultural						
Industrial						
Conservation Voltage Reduction						

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

Preliminary 2019 AAEF Definitions

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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		1.25		1	0.85		0.65
	Marketing & Outreach		Default calibrated value		Default calibrated value	Increased marketing strength		
	Financing Programs		No modeled impacts		No modeled impacts	IOU financing programs broadly available to Res and Com 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
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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							
	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: limited assumptions based on pilot or proposed programs	
	Smart Meter Data Analytics							
	Air Quality Management District							
	Agricultural							
Industrial								
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		
	Promotional Expenditures		Remove newly planned BROs			Reference x 125%		
	Behavioral Programs		Reference			Reference		
	Early Retirement Programs		Reference			Implement ER Programs		
	IOU or POU Net to Gross		IOU					
	Re-participation Rates		IOU					

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	PACE Financing													
	Benchmarking and Public Disclosure													
	Fuel Substitution													
	Behavioral, Retrocommissioning, Operational Savings		not included								low		mid: assumptions based on pilot or proposed programs	
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	Local Government Ordinances							
	PACE Financing							
	Benchmarking and Public Disclosure							
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	Behavioral, Retrocommissioning, Operational Savings							
	Local Government Challenge							
	Energy Asset Rating							
	Smart Meter Data Analytics		not included					
	Air Quality Management District							
	Agricultural							
Industrial		not included						
Conservation Voltage Reduction								
CEC Processing of WA#1 Results based on 2017 CMUA PG Study	Expand Measure List		Reference			Add new measures		
	Incentive Level		Reference					
	Promotional Expenditures		Reference x 75%					
	Behavioral Programs		remove newly placed programs		IOU	reference revenue		
	Early Retirement Programs		Reference			IOU incremental Program		
	IOU or POU Net to Gross							
	Re-participation Rates							

IOU Potential Program Savings

Codes and Standards Savings

Beyond Utility Program Savings

POU Potential Program Savings

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IOU Potential Program Savings

Codes and Standards Savings

Beyond Utility Program Savings

POU Potential Program Savings



Additional Achievable Energy Efficiency (AAEE) Summary

- Conceptually these AAEE Scenario definitions are very similar to those implemented in the 2017 IEPR
- The main improvement for 2019 is in the analysis of various EE savings streams
 - Avoid duplication
 - Fill in gaps
- Software improvements allow greater scenario design capability
 - Reduce manual processing
 - More rapid implementation



Additional Achievable Energy Efficiency (AAEE) 2019 Schedule

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 Revised Electricity and Natural Gas Forecast
IEPR Workshop**