Demand Analysis Working Group (DAWG)

Additional Achievable Energy Efficiency (AAEE) Preliminary 2019 Savings Forecast



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Preliminary 2019 AAEE Definitions

Source	Lev	ver	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	Buildin	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			
2017 IEPK	Retail Prices		ZUIT/ IEPK HIgh-Case	ZU17 IEPK IVIIQ-Case	ZUI/ IEPK WIIG-Case	ZU17 IEPK IVIIG-Case	ZUI7 IEPK LOW-Case	ZUI7 IEPK IVIIG-Case			
	AIMS	S ETs	Reference		Reference	Average of Reference & Aggressive		Aggressive			
	Incentiv	re Levels	capped at 25% of incremental cost	capped at 50% of incremental cost	capped at 50% of incremental cost	capped at 50% c	of incremental cost	capped at 75% of incremental cost			
Navigant &	C-E Measure Screening Threshold using 2019 Av	(TRC		Datan	4: A L Dra			0.65			
CEC Processing	Marketing		De: ult cali	ated va	t a la Calibra ed value C		ec. Vike ig fer h	S			
of 2020 PG Study	Financing		No model	led impacts	No modeled impacts	IOUIfinance	ting programs broadly available to Res along	n customers			
Study	Tillalicing	Trograms	No model	Tea mipacis	No modered impacts	- Too milano	ang programs broadly available to ites and eor	ii customers			
	Low Ir	ncome	PG Study Res	ult Unchanged	PG Study Result Unchanged		PG Study Result Unchanged				
	BROs Program	n Assumptions	Refe	rence	Reference	Average of Refe	rence & Aggressive	Aggressive			
	Title 24	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance		Compliance Enhancements				
Navigant &	litie 24	Code Cycles (Vintages)	no additional micialed	2022 Nonresi	dential New Construction and A&A 2022 Resider	ntial A&A <i>BUWB</i>	same scope through 2025 Standards BU WB	same scope through 2028 Standards BU WB			
of 2020 PG	Compliance Reduction or Enhancement Title 20 Code Cycles (Vintages)			20% Compliance Rate Reduction	Reference Case Compliance		Compliance Enhancements				
Study AND CEC Processing of WA#2 Results			Code	20% Compliance Rate Reduction Compliance Enhancements Compliance Enhancements Compliance Enhancements Compliance Enhancements Compliance Enhancements PG Study & BU WB							
for BU Programs WB		Compliance Reduction or Enhancement	no additional included		Reference Case Compliance	Compliance Enhancements					
	Federal Standards	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 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 <i>PG Study</i> & <i>BU WB</i>			
	Prop 39			and the little hand a management of the little hand and management	of a constant of the contract						
	DGS Energ ECAA Fi		_ mia	: established programs with historical pe	rformance data and expected future funding allo	cations					
	GGRF: Water										
	GGRF: Low Incom				mid: limited historical data on a pilot or other subset of programs and reasoned		high				
	PACE Fi		- Id	ow	assumption on future funding allocations Program A property Program The program and reasoned assumption on future funding allocations as a future f		_				
CEC Processing of WA#2	Ü	d Public Disclosure	Dove				Covin	~ ~			
Results for BU	Fuel Sub		Beve)MALUI	HITV PE		-5344H				
Programs WB	Behavioral, Retrocommissi Local Governm	<u> </u>				9.411		mid: assumptions based on pilot or			
	Energy As			1	not included		low	proposed programs			
	Smart Meter I										
	Air Quality Man							maid, limited accommentions based on vilated			
		ultural strial			not included			mid: limited assumptions based on pilot or proposed programs			
	Conservation Voltage Reduction						proposed programs				
	Expand Measure List			erence			Add new measures				
CEC Processing of WA#1	Incentive Level Promotional Expenditures		Referen	nce x 3500	Restrance		Reference × 12				
Results based	Behavioral	<u> </u>	er ove r wl	v pla Land to For	tio"Ur	Mram	Se re e	70			
on 2017 CMUA	Early Retirem	ent Programs	efe	erend	ntialPro	Julaiii	I de ent Pro ar	43			
PG Study	IOU or POU					IOU					
	Re-participa	ation Rates						2			



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 Retail Prices	2017 IEPR High-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Low-Case	2017 IEPR Mid-Case
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 calik	orated value	Default calibrated value	Increased marketing strength		gth
Financing Programs	No modele	ed impacts	No modeled impacts	IOU financing pro	grams broadly availabl	e to Res and Com
Low Income	PG Study Result Unchanged		PG Study Result Unchanged	PG Study Result Unchanged		ed
BROs Program Assumptions	Refer	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	Refe	rence			Add new measures				
Incentive Level					Reference				
Promotional Expenditures	Reference x 75% Remove newly planned BROs Reference		Reference	Reference x 125%					
Behavioral Programs				Reference					
Early Retirement Programs				Implement ER Programs					
Net to Gross	1011								
Re-participation Rates	IOU								

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



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)	
	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Co	Compliance Enhancements		
Title 24	Code Cycles (Vintages)			ntial New Constructio Lesidential A&A <i>BUW</i>	•	same scope through 2025 Standards <i>BU WB</i>	same scope through 2028 Standards <i>BU WB</i>	
	Compliance Reduction or Enhancement			Reference Case Compliance				
Title 20	Code Cycles (Vintages)			Selected Stds. Through 2022 PG Study				
	Compliance Reduction or Enhancement			Reference Case Compliance				
Federal Standards	Code Cycles (Vintages)			through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump				
				PG Study				

T24 Building Standards ratchet end years							
New Con	struction	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

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)
	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Compliance Enhancements		
Title 24	Code Cycles (Vintages)		2022 Nonresidential New Construction and A&A Residential A&A <i>BUWB</i>			same scope through 2025 Standards <i>BU WB</i>	same scope through 2028 Standards <i>BU WB</i>
	Compliance Reduction or Enhancement	no additional	20% Compliance Rate Reduction	Reference Case Compliance	Co	Compliance Enhancements	
Title 20	Code Cycles (Vintages)	included	Selected Stds. Through 2022 PG Study	Selected Stds. Through 2022 PG Study	Selected Stds. Through 2022 <i>PG Study</i>	Selected Stds. Through 2027 PG Study & BU WB	
	Compliance Reduction or Enhancement	no additional included		Reference Case Compliance	Compliance Enhancements		
Federal Standards	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</i> 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

additional appliance measures modeled in the Beyond Utility analysis yield statewide savings



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)
	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Compliance Enhancements		
Title 24	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</i> <i>WB</i>
	Compliance Reduction or Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance	Co	mpliance Enhancements	
Title 20	Code Cycles (Vintages)		Selected Stds. Through 2022 PG Study	Selected Stds. Through 2022 PG Study	Selected Stds. Through 2022 <i>PG</i> Study	Selected Stds. Through 2027 PG Study & BU WB	
	Compliance Reduction or Enhancement	no additional included		Reference Case Compliance	Compliance Enhancements		
Federal Standards	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</i> 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

- 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 AAEE 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 : astablish	ed programs with	historical perform	nanco data and			
DGS Energy Retrofit	illia. Establisi	. •	unding allocations				
ECAA Financing		expected ruture i	unumg anocations				
GGRF: Water Energy Grant							
GGRF: Low Income Weatherization			mid: limited his	torical data on a	h	igh	
Local Government Ordinances	le	ow .	pilot or other su	bset of programs			
PACE Financing		, vv	and reasoned	assumption on			
Benchmarking and Public Disclosure			future funding allocations				
Fuel Substitution							
Behavioral, Retrocommissioning,						mid:	
Operational Savings			cluded		low	assumptions	
Local Government Challenge		not in				based on pilot or	
Energy Asset Rating						proposed	
Smart Meter Data Analytics						programs	
Air Quality Management District						mid: limited	
Agricultural			assumptions				
Industrial			not included			based on pilot or	
						proposed	
Conservation Voltage Reduction						programs	

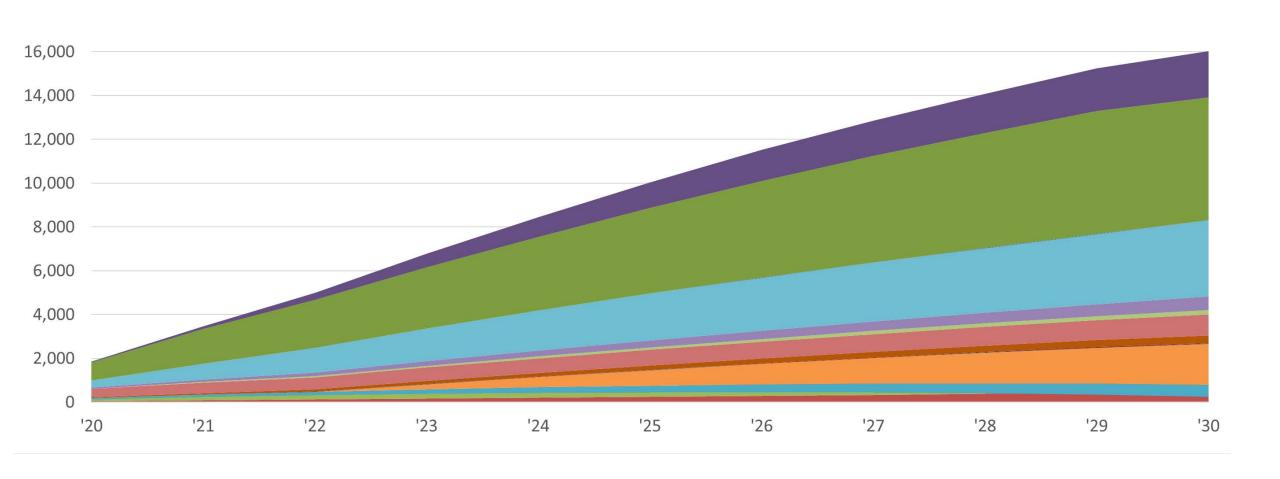
 Program specific levers are adjusted within each Beyond Utility program workbook and are grouped to define low, mid and high BU AAEE Scenarios.

Preliminary 2019 AAEE Definitions

Source	Lev	rer	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			
ZUIT IEPK	Retail I	Prices	ZUIT IEPK HIGH-Case	ZUI/ IEPK IVIIQ-Case	2017 IEPK IVIIG-Case	ZOTA IELY IAIIG-CG26	ZUIT TEPK LOW-Case	ZUI/ IEPK IVIIU-Case			
	AIMS	EIS	Refe	rence	Reference	Average of Refe	rence & Aggressive	Aggressive			
	Incentive	e Levels	capped at 25% of incremental cost	capped at 50% of incremental cost	capped at 50% of incremental cost	capped at 50% o	of incremental cost	capped at 75% of incremental cost			
	C-E Measure Screening Threshold	(TRC		D - 1				0.65			
Navigant & CEC Processing	using 2019 Avoided Costs)			PAtan	HAL PYA	aram	Sawina	C			
of 2020 PG	Marketing 8	& Outreach	Der ult cali	ated valle	t a 1 Dro	MIGHT	cre sed to ke ng aren th	3			
Study	Financing	Programs	No model	ed impacts	No modeled impacts	IOU financ	cing programs broadly available to Res all	m customers			
	Low In	come	PG Study Resu	ult Unchanged	PG Study Result Unchanged		PG Study Result Unchanged				
-	201111		i dottady nest		To start of the large		- Cottany nesure oriental ged				
	BROs Program	Assumptions	Refe	rence	Reference	Average of Refe	rence & Aggressive	Aggressive			
		Compliance Reduction or									
	Title 04	Enhancement	no additional included	20% Compliance Rate Reduction	Reference Case Compliance		Compliance Enhancements				
Novigent 9	Title 24	Code Cycles (Vintages)	no additional included	2022 Nonresio	dential New Construction and A&A: 2022 Resider	New Construction and A&A 2022 Residential A&A BUWB		same scope through 2028 Standards			
Navigant & CEC Processing		, , , ,			,		BU WB	BU WB			
of 2020 PG	Title 20	Compliance Reduction or Enhancement		20% Compliance Rate Reduction	Peterence Case Compliance		Compliance Enhancements				
Study AND CEC Processing of		Code Cycles (Vintages)	lo additio	Sected Stose rough 22	Sta Stas Dou 12 2	ct ISt Th u. 902		PG Study & BU WB			
WA#2 Results			VVUC			ai uo o	Sen ite sto if our 202	PO Study & BU WB			
for BU	Compliance Reduction or Enhancement				Reference Case Compliance		Compliance Enhancements				
Programs WB	Federal Standards	Ennancement	no addition	nal included		through 2023 (excluding 2020 GSL Std) +	through 2023 + 2026 Water Source Heat	all through 2026 Water Source Heat Pump +			
		Code Cycles (Vintages)			through 2023 (excluding 2020 GSL Std) + 2026 Water Source Heat Pump PG Study	2026 Water Source Heat Pump PG Study	Pump (including 2020 GSL Std expanded	selected standards through 2030 PG Study			
	Du 20		water source near rump P			& BU WB	scope) PG Study & BU WB	& BU WB			
	Prop 39 DGS Energy Retrofit		mid:	established programs with historical pe							
	ECAA Fir				,						
	GGRF: Water	0,						:_b			
	GGRF: Low Income				mid: limited historical data on a pilot or other subset of programs and reasoned			igh			
CEC Processing	PACE Fir		low assumption on future funding allocations								
of WA#2	Benchmarking and		Davis	Beyond Utility Program Savings							
Results for BU	Fuel Subs Behavioral, Retrocommission		DEVL								
Programs WB	Local Governm	0, 1			not included	- 3 . a	low	mid: assumptions based on pilot or			
	Energy Ass	-		·	io morado d		1044	proposed programs			
	Smart Meter D Air Quality Mana										
	Agricu		mid: limited assum								
	Industrial		not included proposed programs								
	Conservation Vo Expand Me		Reference Add new measures								
CEC Processing	Incentive				_		Reference				
of WA#1	Promotional I	<u>'</u>	Referen		Reference		Reference x 125%	01 0			
Results based on 2017 CMUA	Behavioral Early Retireme		Poder Protential Program Sale Production Pro								
PG Study	IOU or POU I							9			
	Re-participa										

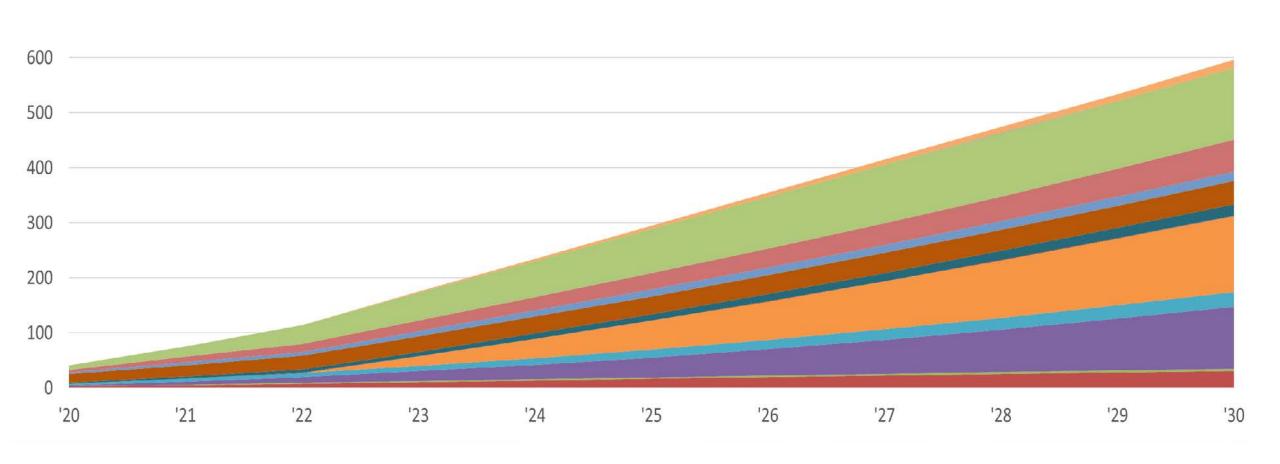


2019 Preliminary Annual Savings - Statewide GWh



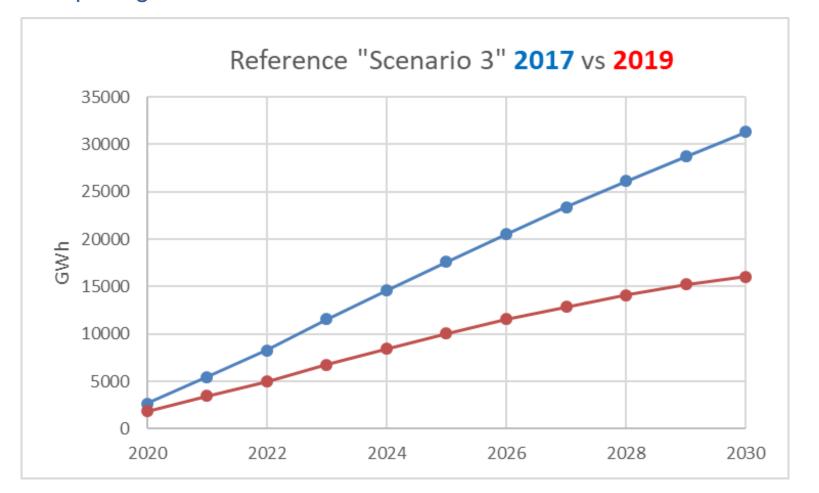


2019 Preliminary Annual Savings - Statewide MM Therms





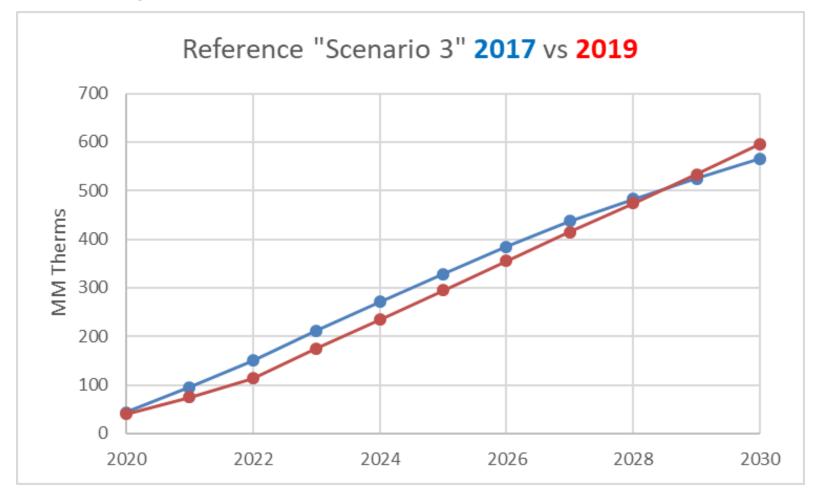
Comparing Total Statewide 2019 AAEE Reference Forecast to 2017 AAEE Reference Forecast



Total electric savings forecast by 2030 drops by 50%



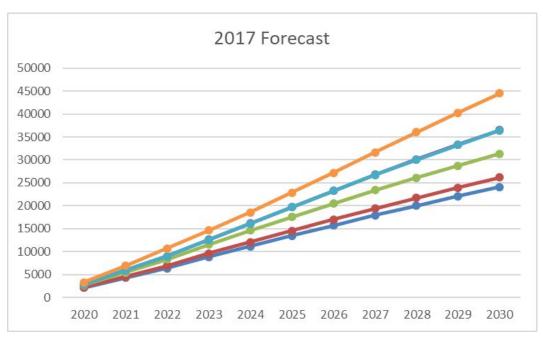
Comparing Total Statewide 2019 AAEE Reference Forecast to 2017 AAEE Reference Forecast

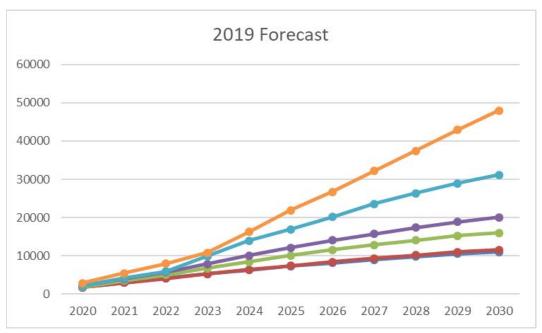


Total gas savings forecast by 2030 remain similar



Comparing Total Statewide 2019 AAEE Forecast to 2017 AAEE Forecast – all Scenarios GWh

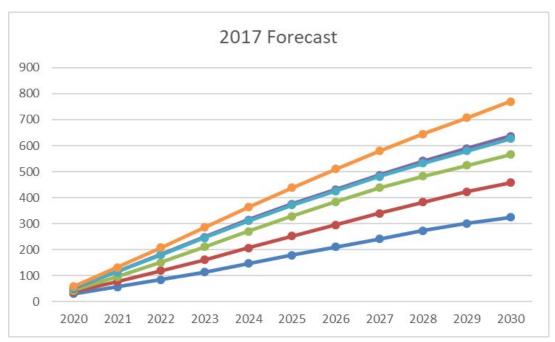


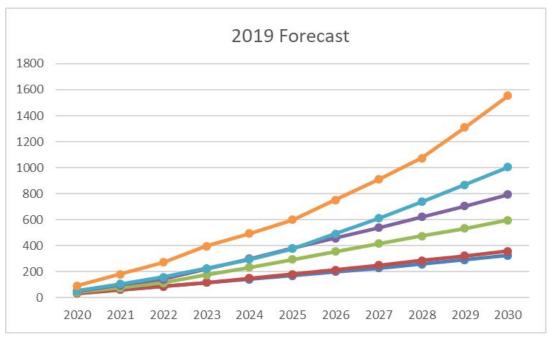


Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast



Comparing Total Statewide 2019 AAEE Forecast to 2017 AAEE Forecast – all Scenarios MM Therms



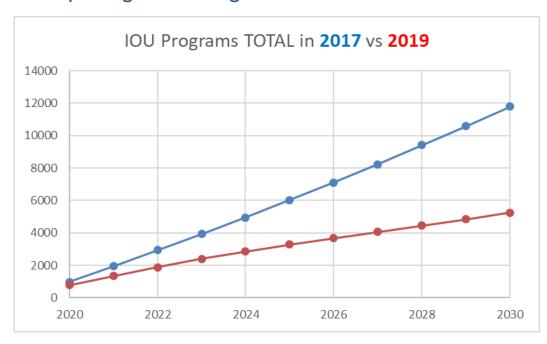


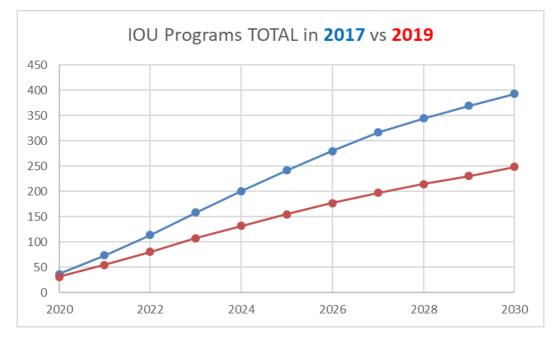
Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast



2019 Preliminary Annual Savings – IOU Programs

Comparing IOU Programs in the 2019 to the 2017 AAEE Reference Forecast – GWh & MM Therms





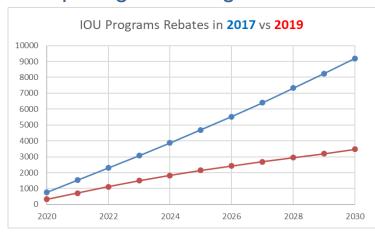
Total IOU electric savings forecast drops by more than 50%

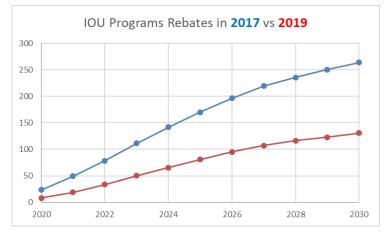
Total IOU gas savings forecast drops by 40%

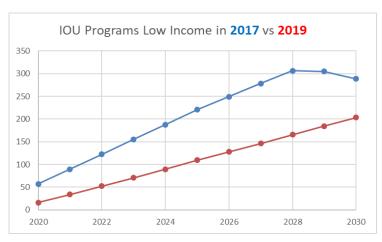


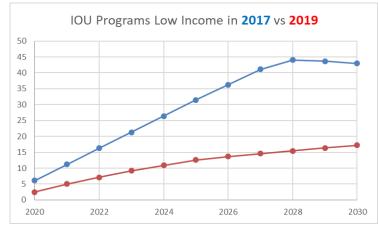
2019 Preliminary Annual Savings – IOU Programs

Comparing IOU Programs in the 2019 to the 2017 AAEE Reference Forecast – GWh & MM Therms









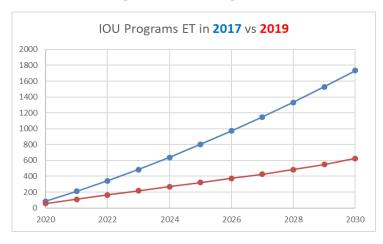
IOU rebate savings decrease due to

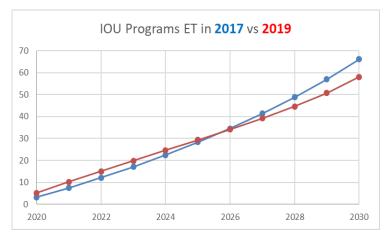
- 1) more stringent Codes & Standards
- 2) higher cost effectiveness threshold



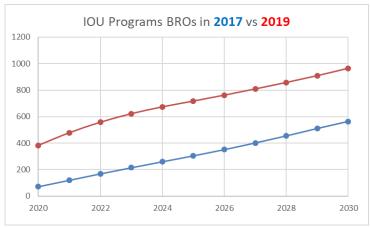
2019 Preliminary Annual Savings – IOU Programs

Comparing IOU Programs in the 2019 to the 2017 AAEE Reference Forecast – GWh & MM Therms





IOU electric savings from Emerging Technologies savings decrease to 1/3 while gas savings remain similar



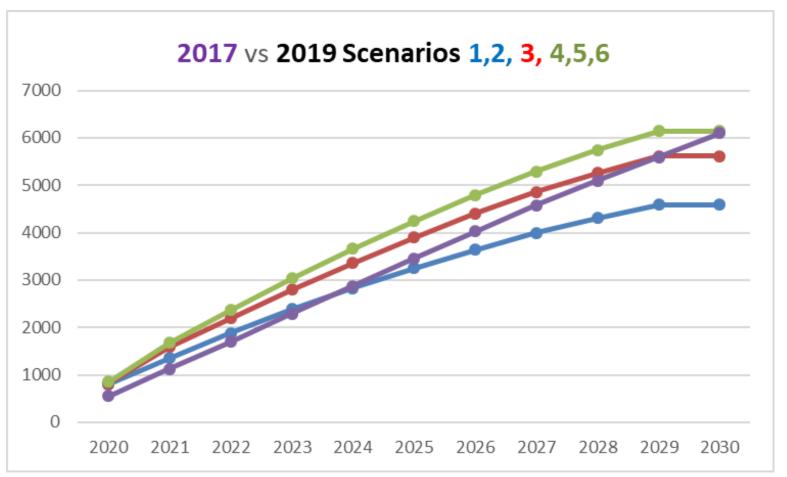


IOU savings from Behavioral, Retro-commissioning, and Operations increase dramatically



Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – POU Programs

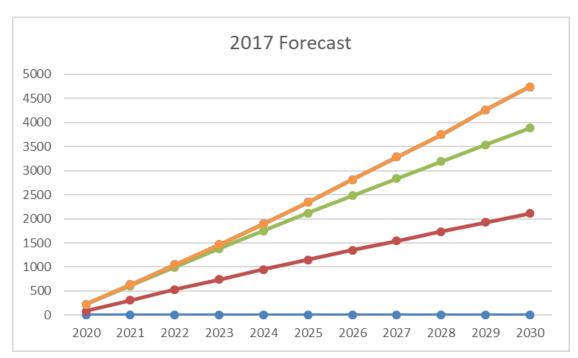
Comparing POU Programs in the 2019 to the 2017 AAEE Reference Forecast – GWh

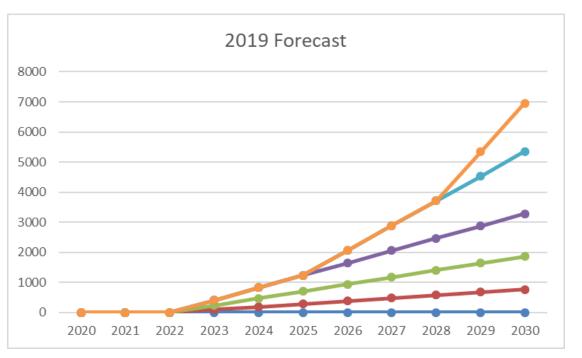


Total POU savings forecasts from 2017 and 2019 are similar



Comparing Title 24 Building Standards Savings from 2019 to 2017 AAEE Forecast – all Scenarios GWh

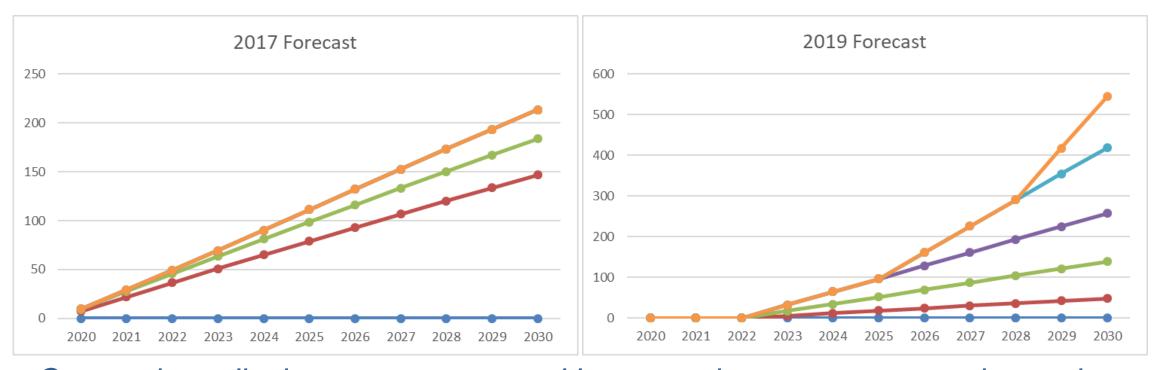




Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional Code Cycles are anticipated; high scenarios are much higher



Comparing Title 24 Building Standards Savings from 2019 to 2017 AAEE Forecast – all Scenarios MM Therms

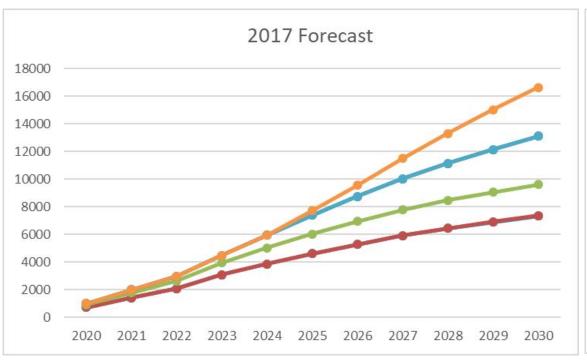


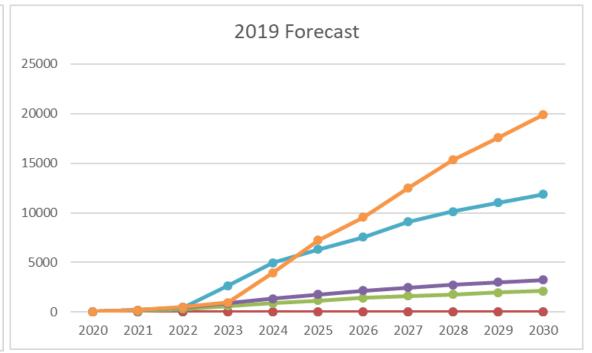
Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional Code Cycles are anticipated; high scenarios are twice as much



2019 Preliminary Annual Savings – Appliance Standards

Comparing Title 20 & Federal Appliance Standards Savings from 2019 to 2017 AAEE Forecast – all Scenarios GWh



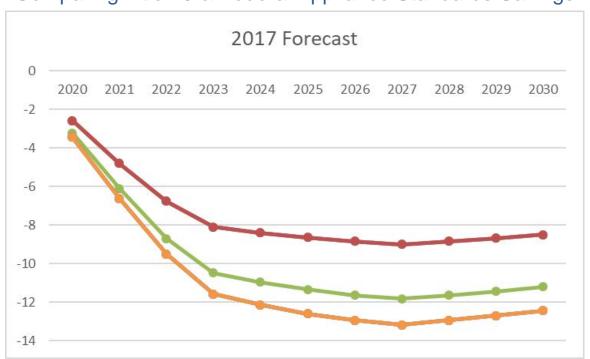


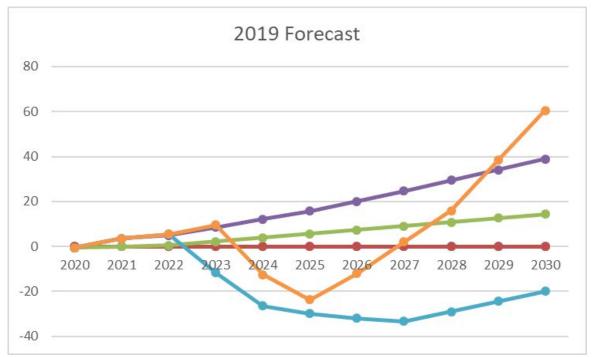
Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional measures are phased in



2019 Preliminary Annual Savings – Appliance Standards

Comparing Title 20 & Federal Appliance Standards Savings from 2019 to 2017 AAEE Forecast – all Scenarios MM Therms



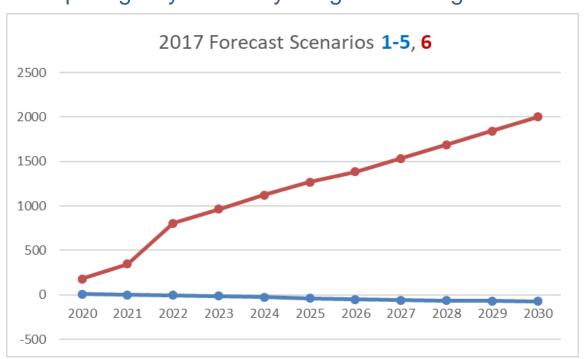


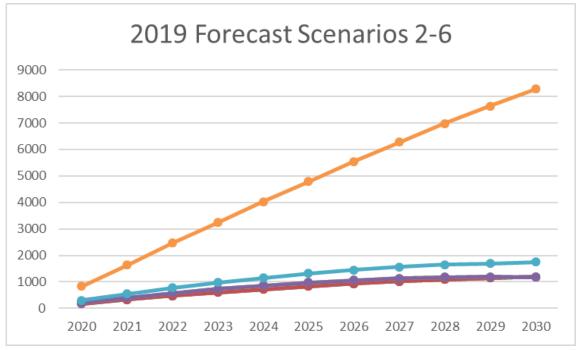
Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional Code Cycles are anticipated



Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Beyond Utility Programs

Comparing Beyond Utility Program Savings from 2019 to 2017 AAEE Forecast – all Scenarios GWh



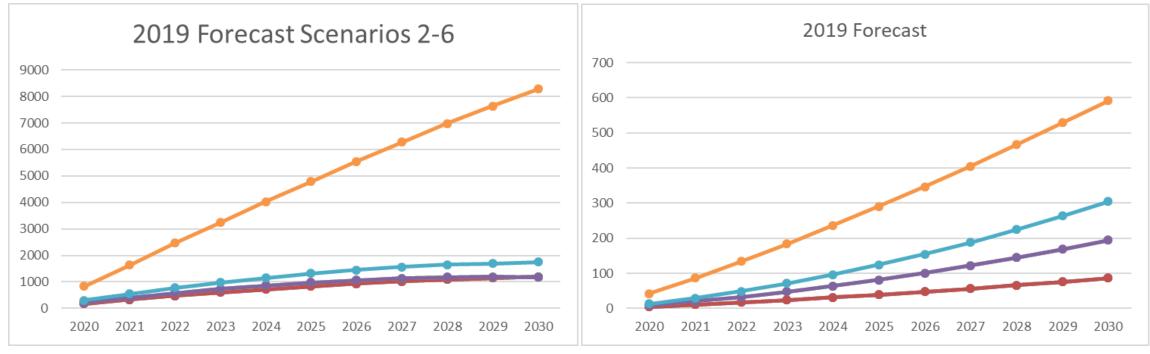


Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as scenarios were built using all available workbooks



Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Beyond Utility Programs

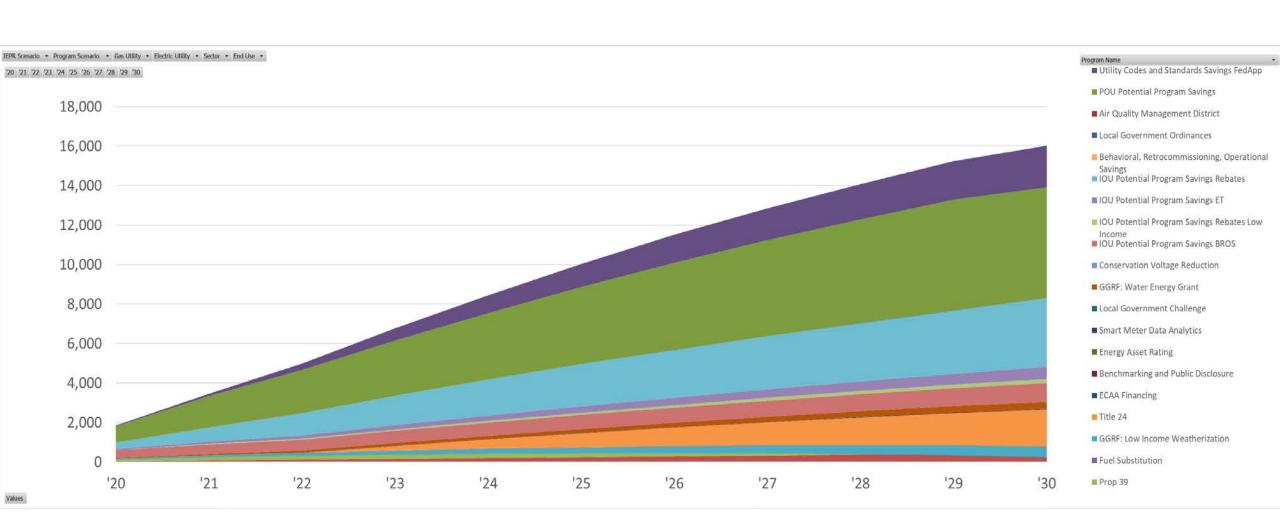
Beyond Utility Program Savings 2019 AAEE Forecast – all Scenarios GWh and MM Therms



Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as scenarios were built using all available workbooks



2019 Preliminary Annual Savings – Data Visualization Tool





2019 Preliminary Annual Savings – Data Visualization Tool

