

# Demand Analysis Working Group (DAWG)

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## Additional Achievable Energy Efficiency (AAEE) Preliminary 2019 Savings Forecast



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October 18, 2019

California Energy Commission

# 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	Default calibrated value	Aggressive 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 2024	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		
	DGS Energy Retrofit	low							
	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									
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 x 120%			
	Promotional Expenditures	Reference x 100%		Reference		Reference x 120%			
	Behavioral Programs	Remove newly placed AC		Reference		Reference			
	Early Retirement Programs	Reference		Reference		IOU			
	IOU or POU Net to Gross	Reference		Reference		IOU			
Re-participation Rates	Reference		Reference		IOU				

**IOU Potential Program Savings**

**Codes and Standards Savings**

**Beyond Utility Program Savings**

**POU Potential Program Savings**



# 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)
<b>Building Stock</b>	2017 IEPR High-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Low-Case	2017 IEPR Mid-Case
<b>Retail Prices</b>	2017 IEPR High-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Mid-Case	2017 IEPR Low-Case	2017 IEPR Mid-Case
<b>AIMS ETs</b>	Reference		Reference	Average of Reference & Aggressive		Aggressive
<b>Incentive Levels</b>	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
<b>C-E Measure Screening Threshold (TRC using 2019 Avoided Costs)</b>	1.25		1	0.85		0.65
<b>Marketing &amp; Outreach</b>	Default calibrated value		Default calibrated value	Increased marketing strength		
<b>Financing Programs</b>	No modeled impacts		No modeled impacts	IOU financing programs broadly available to Res and Com		
<b>Low Income</b>	PG Study Result Unchanged		PG Study Result Unchanged	PG Study Result Unchanged		
<b>BROs Program Assumptions</b>	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	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

- 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)
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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 &amp; BU WB</i>	through 2023 + 2026 Water Source Heat Pump (including 2020 <i>GSL Std</i> expanded scope) <i>PG Study &amp; BU WB</i>	all through 2026 Water Source Heat Pump + selected standards through 2030 <i>PG Study &amp; BU WB</i>



# Code and Standards Scenario Design

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- 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

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	low	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						
PACE Financing						
Benchmarking and Public Disclosure						
Fuel Substitution	not included				low	mid: assumptions based on pilot or proposed programs
Behavioral, Retrocommissioning, Operational Savings						
Local Government Challenge						
Energy Asset Rating						
Smart Meter Data Analytics	not included					mid: limited assumptions based on pilot or proposed programs
Air Quality Management District						
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 AEEE Scenarios**.



# Preliminary 2019 AAEF Definitions

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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  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			Add new measures			
	Incentive Level	Reference			Reference			
	Promotional Expenditures	Reference x 75%			Reference x 125%			
	Behavioral Programs	remove newly placed programs			reference programs			
	Early Retirement Programs	Reference			IOU			
	IOU or POU Net to Gross	Reference			IOU			
Re-participation Rates	Reference			IOU				

**IOU Potential Program Savings**

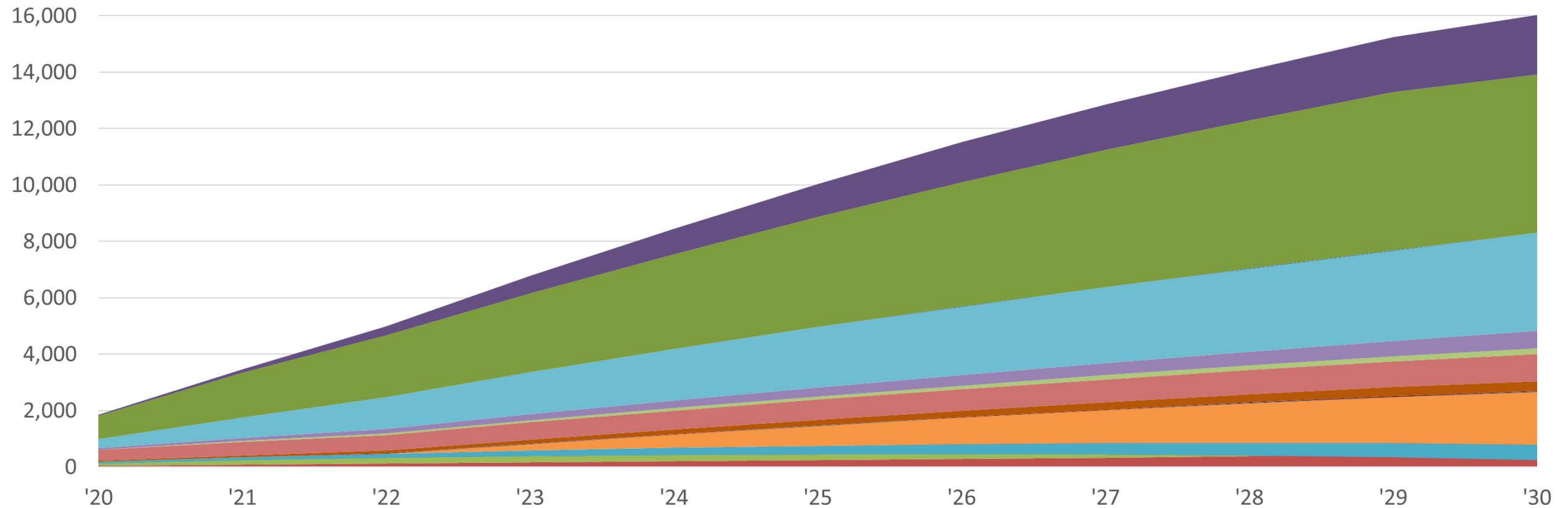
**Codes and Standards Savings**

**Beyond Utility Program Savings**

**POU Potential Program Savings**

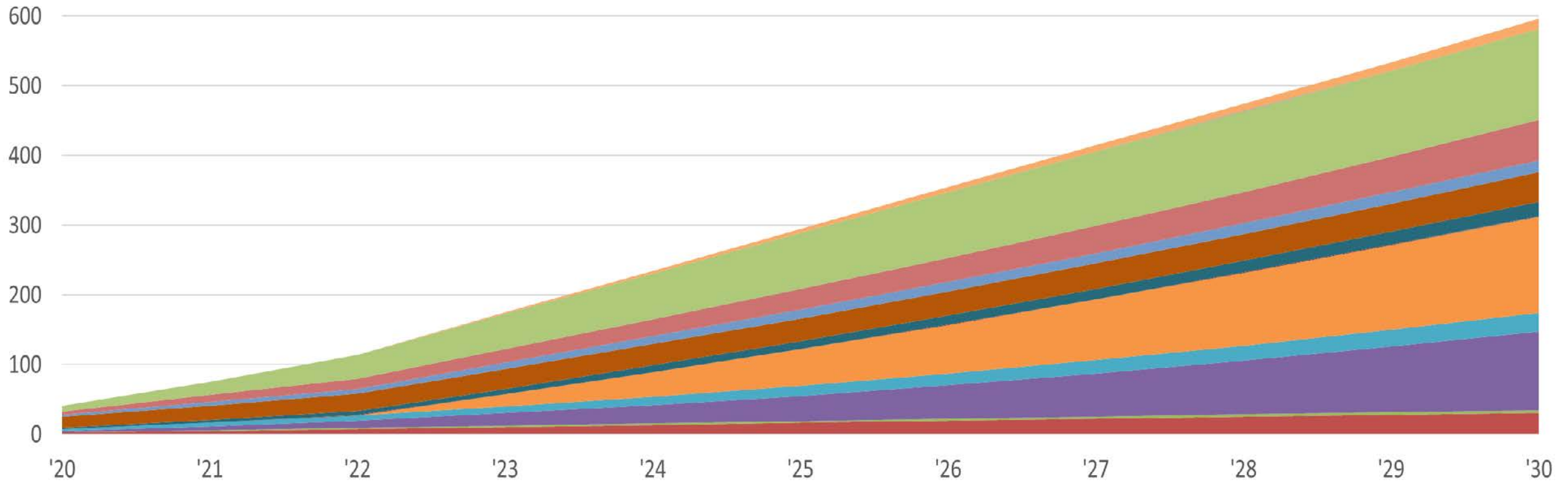


# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings - Statewide GWh





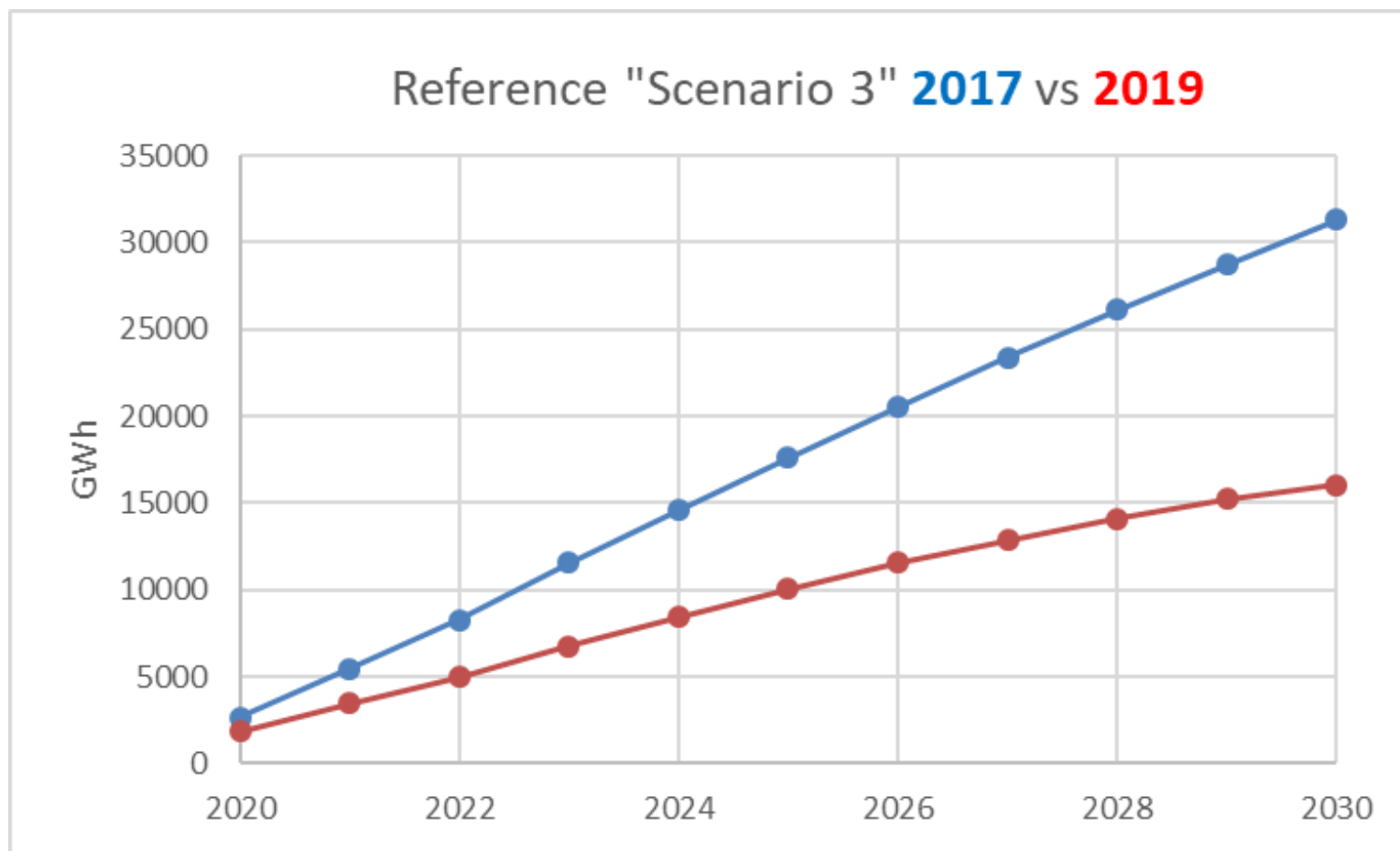
# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings - Statewide MM Therms





# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings - Statewide

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

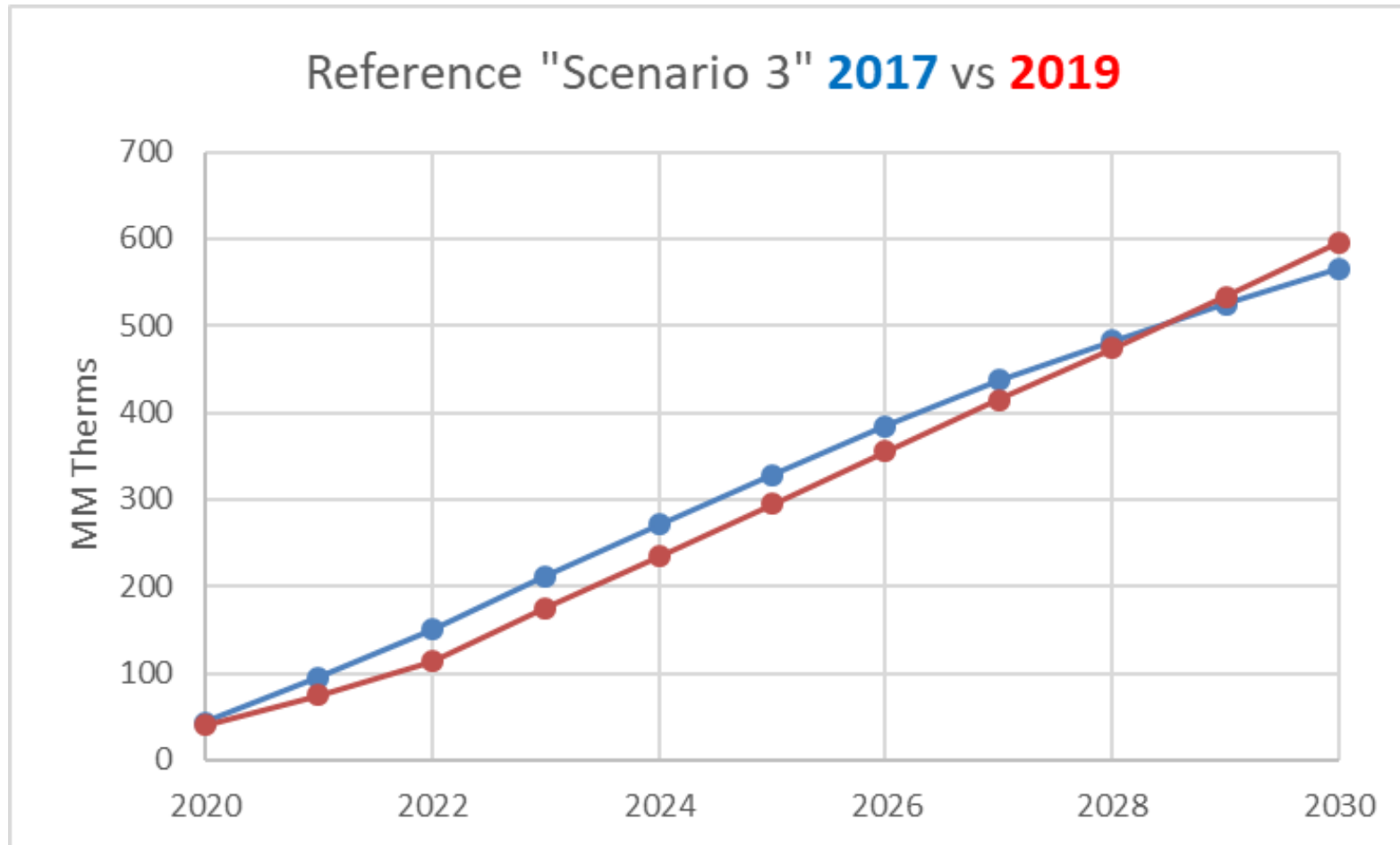


*Total electric savings forecast by 2030 drops by 50%*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings - Statewide

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

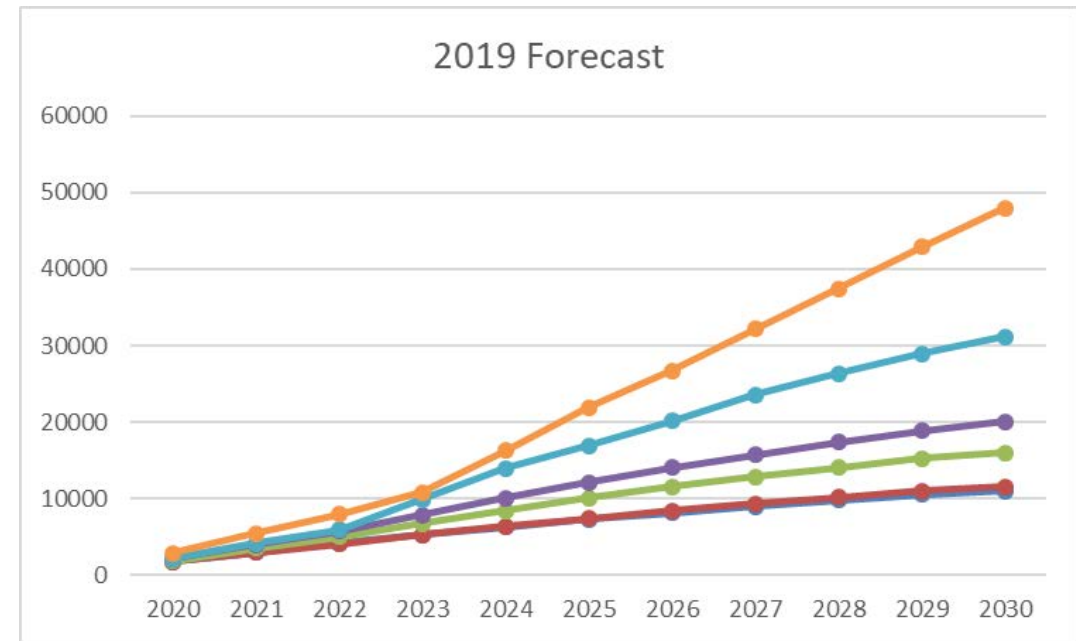
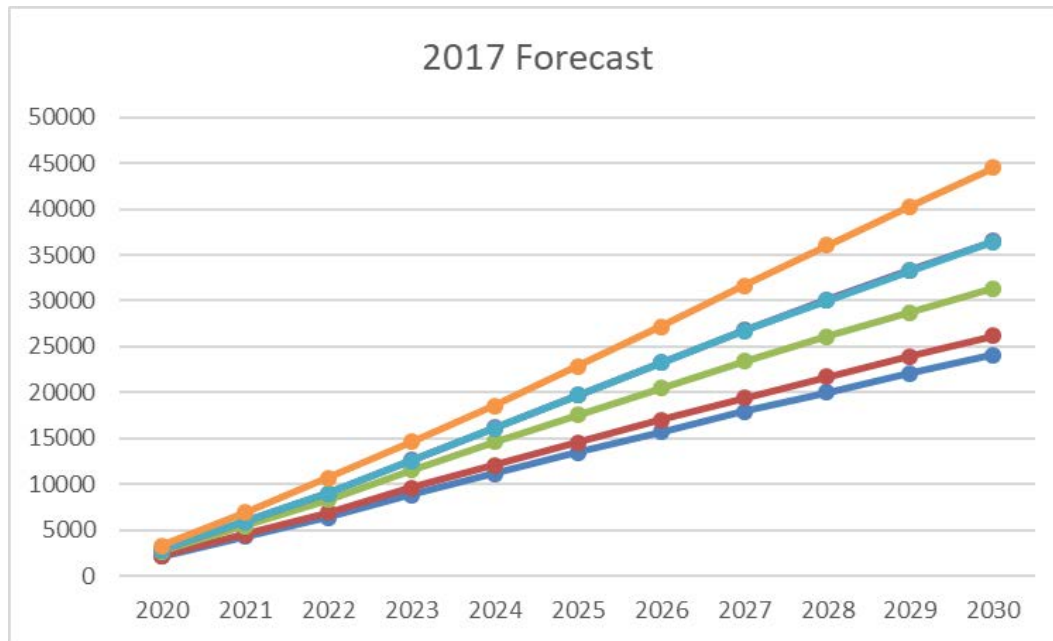


*Total gas savings forecast by 2030 remain similar*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings - Statewide

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

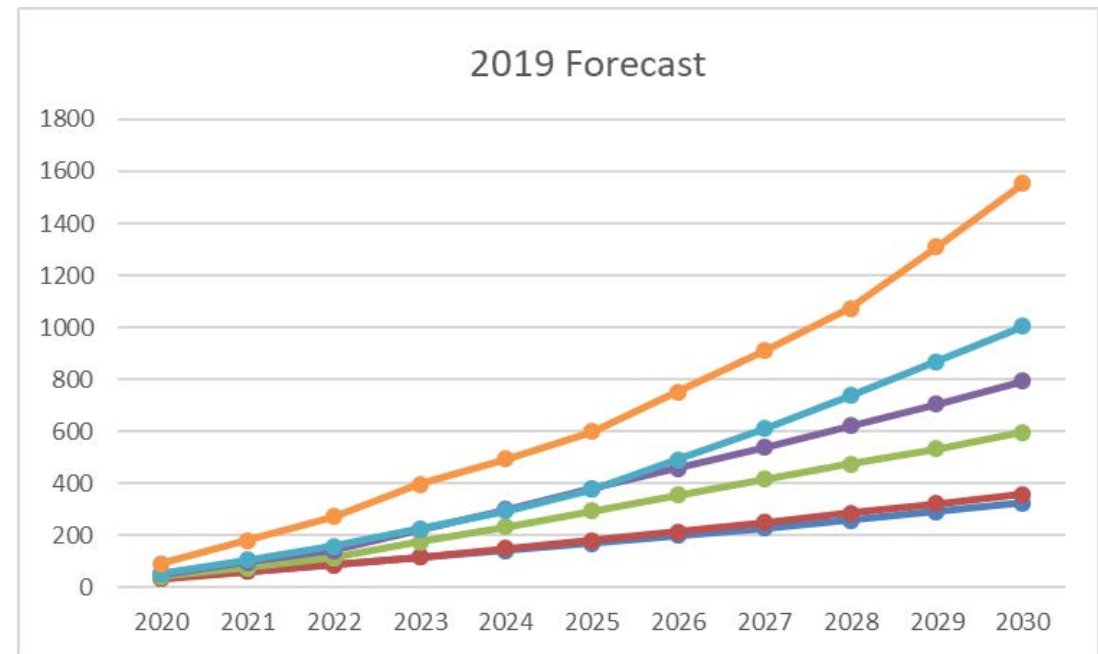
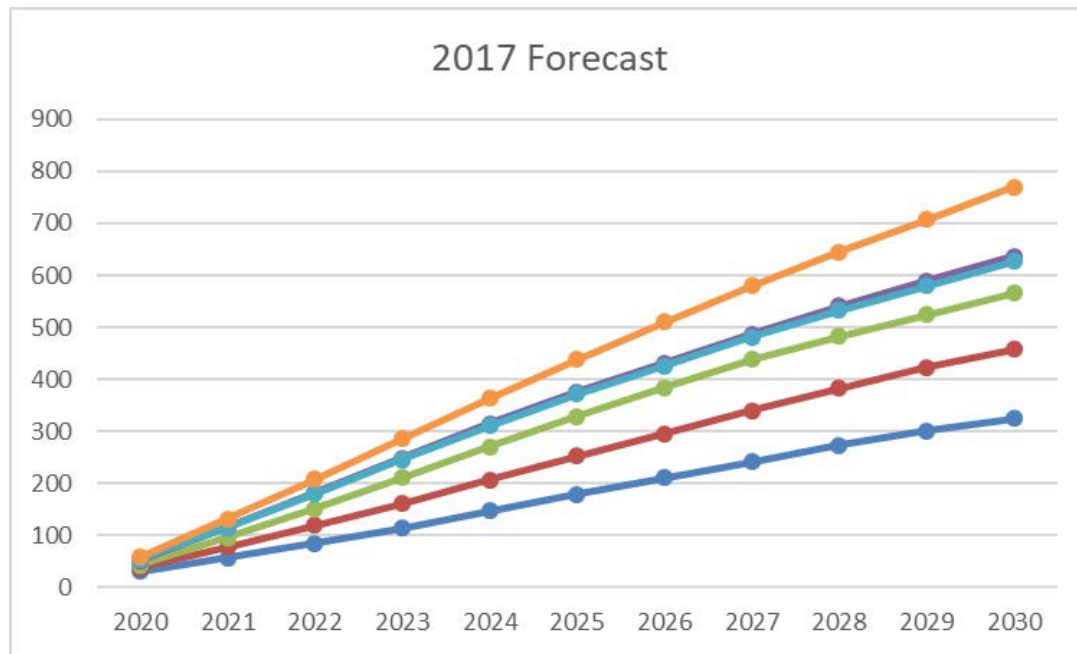


*Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings - Statewide

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

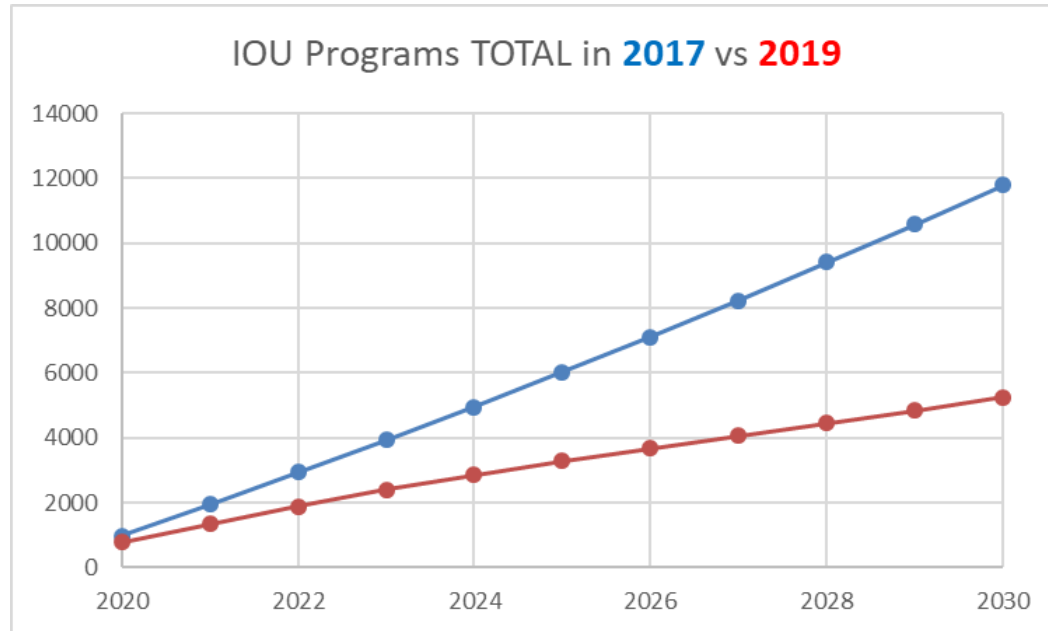


*Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast*

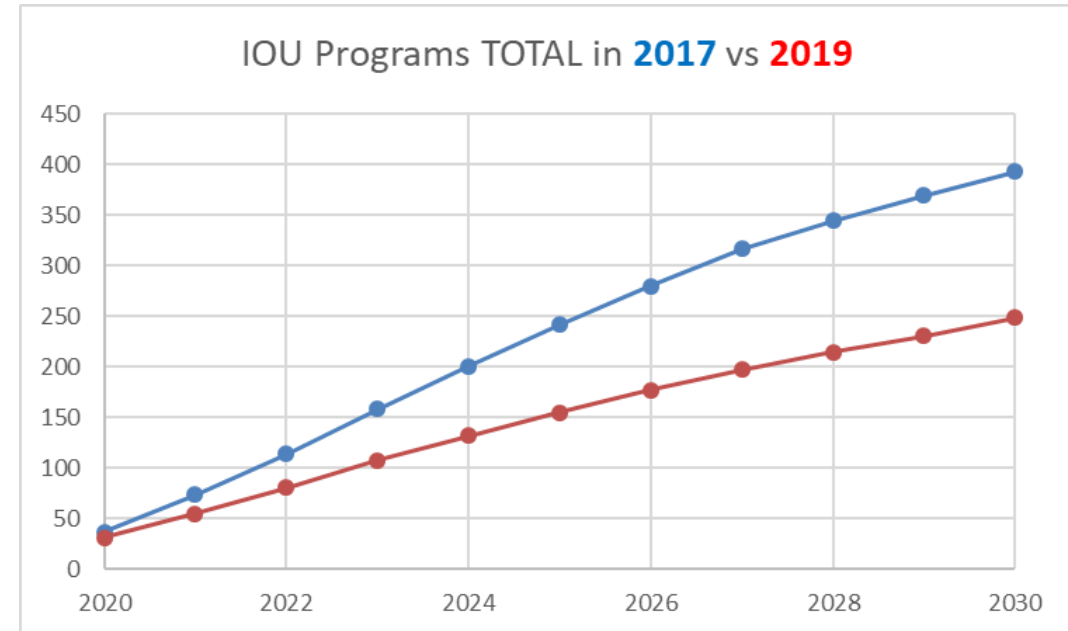


# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – IOU Programs

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%*



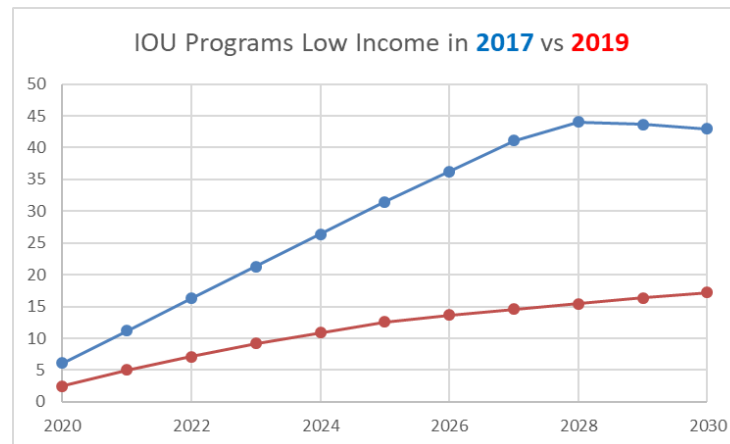
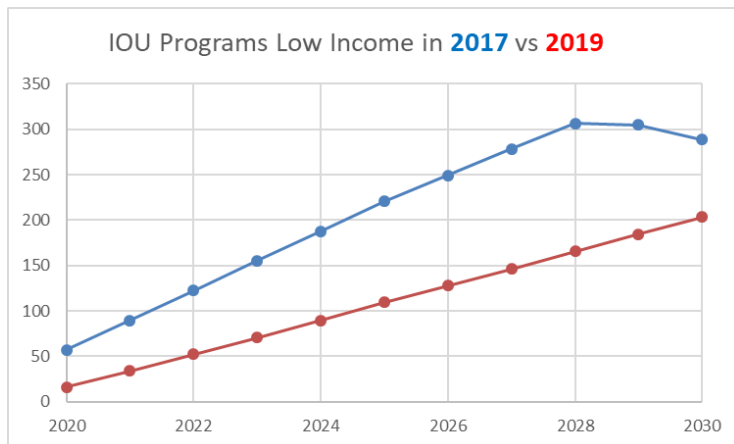
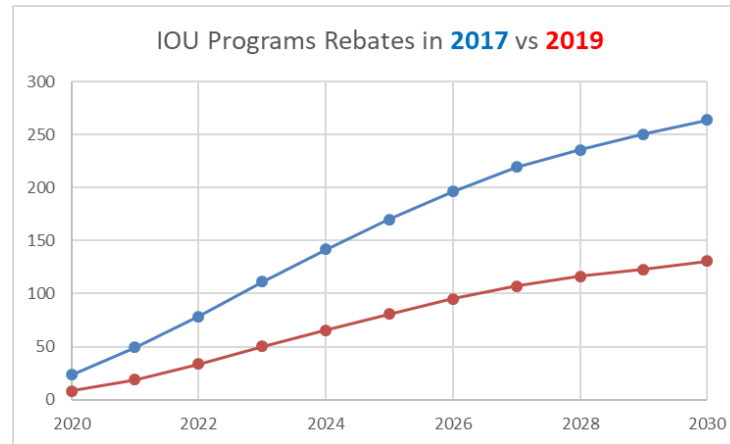
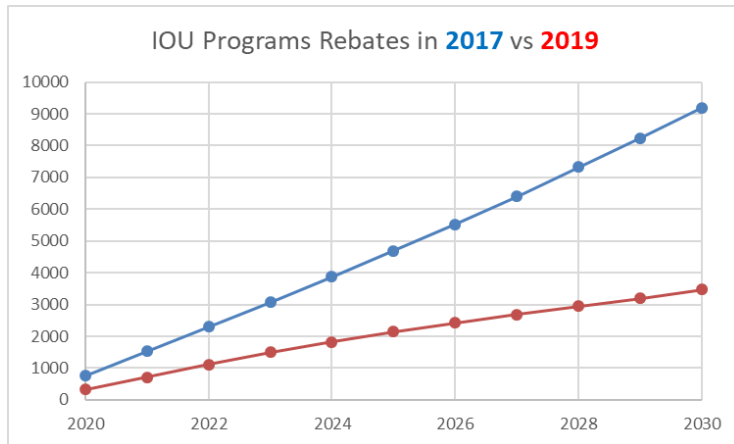
*Total IOU gas savings forecast drops by 40%*





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

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



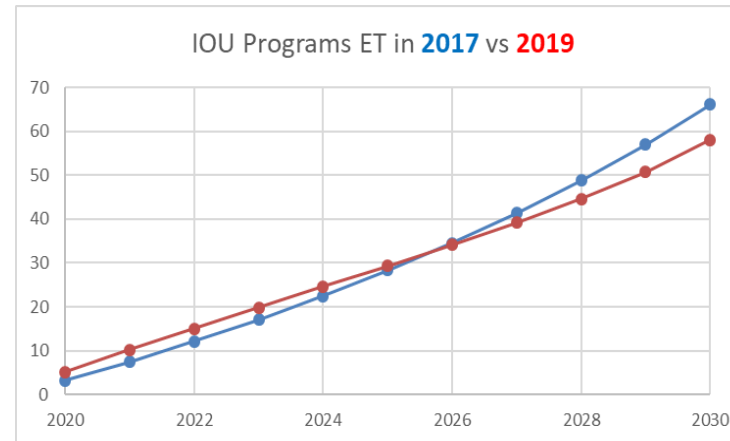
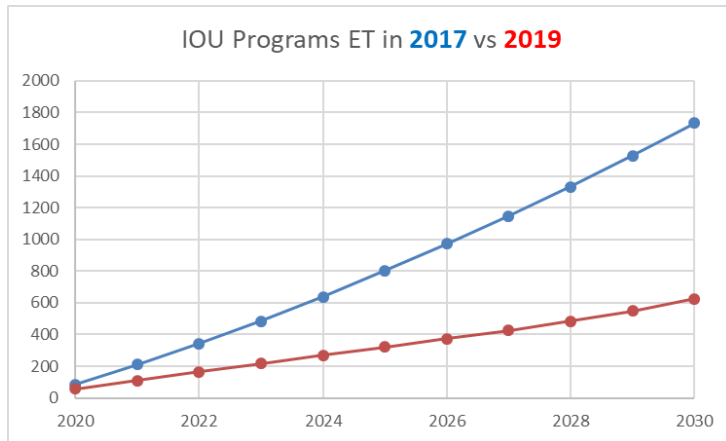
*IOU rebate savings decrease due to*

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

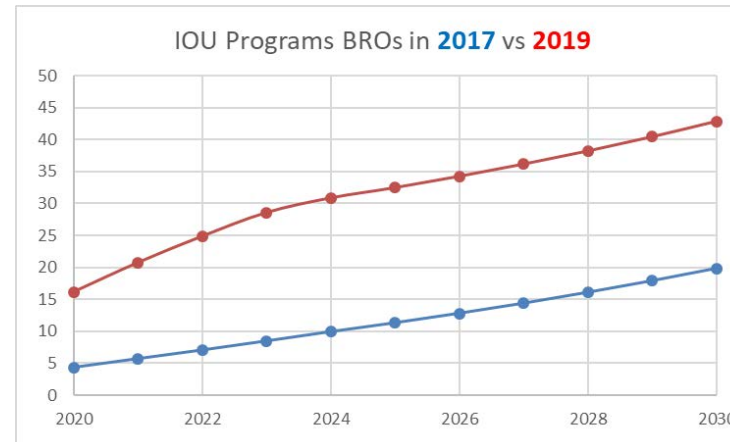
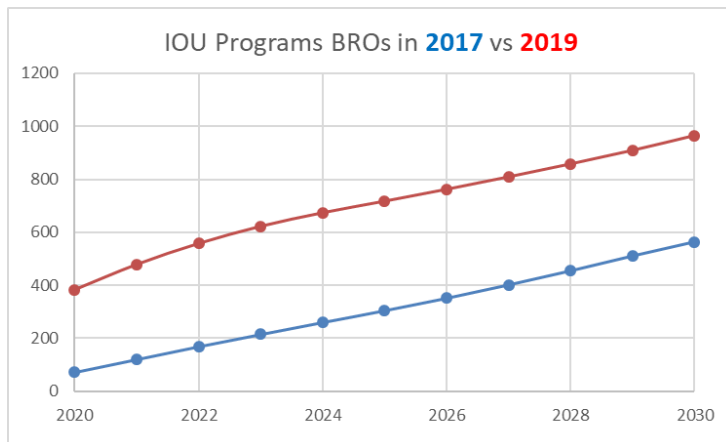


# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – IOU Programs

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*

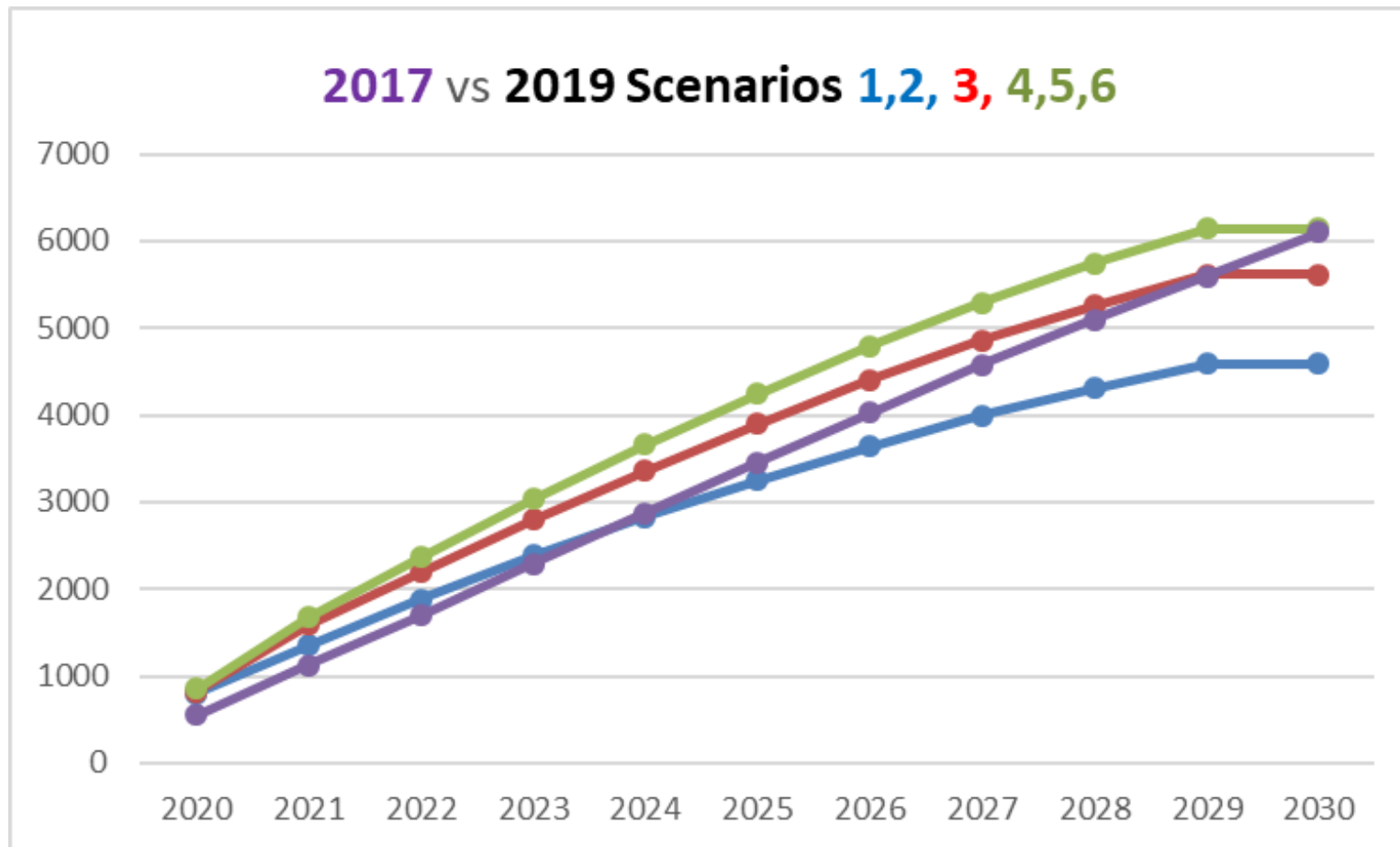


*IOU savings from Behavioral, Retro-commissioning, and Operations increase dramatically*



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

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

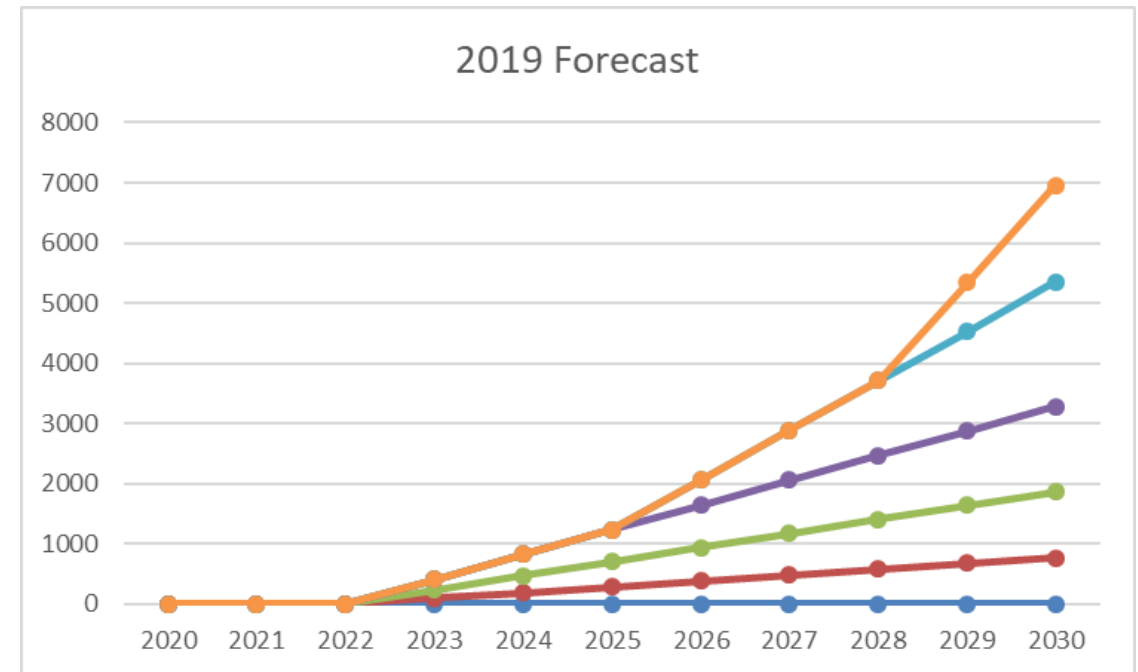
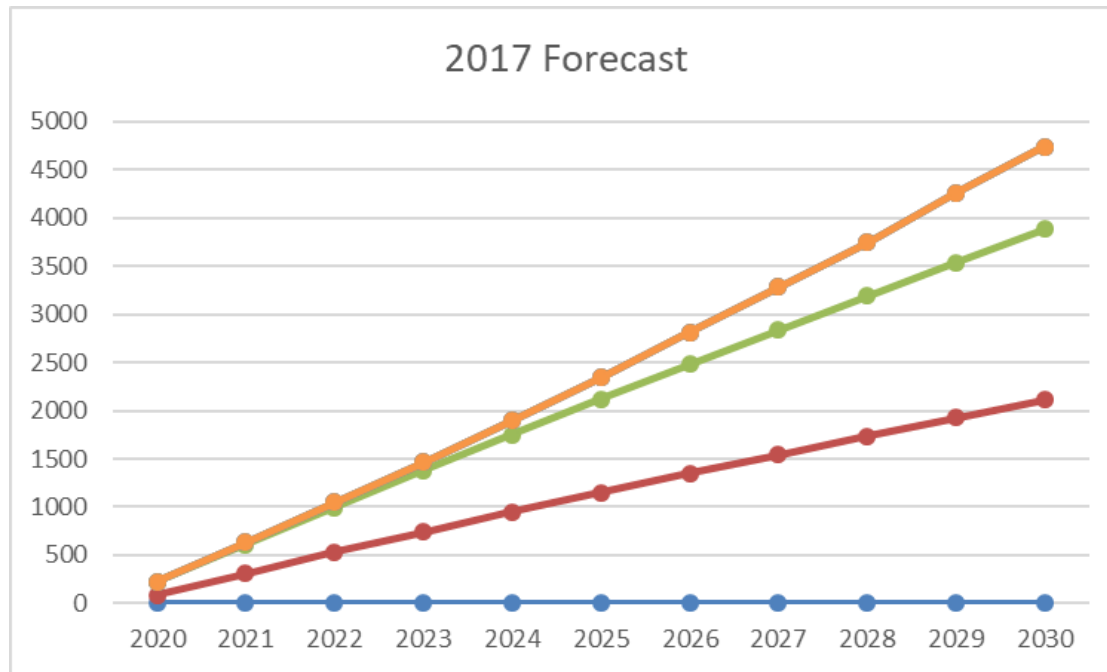


*Total POU savings forecasts from 2017 and 2019 are similar*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Title 24

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

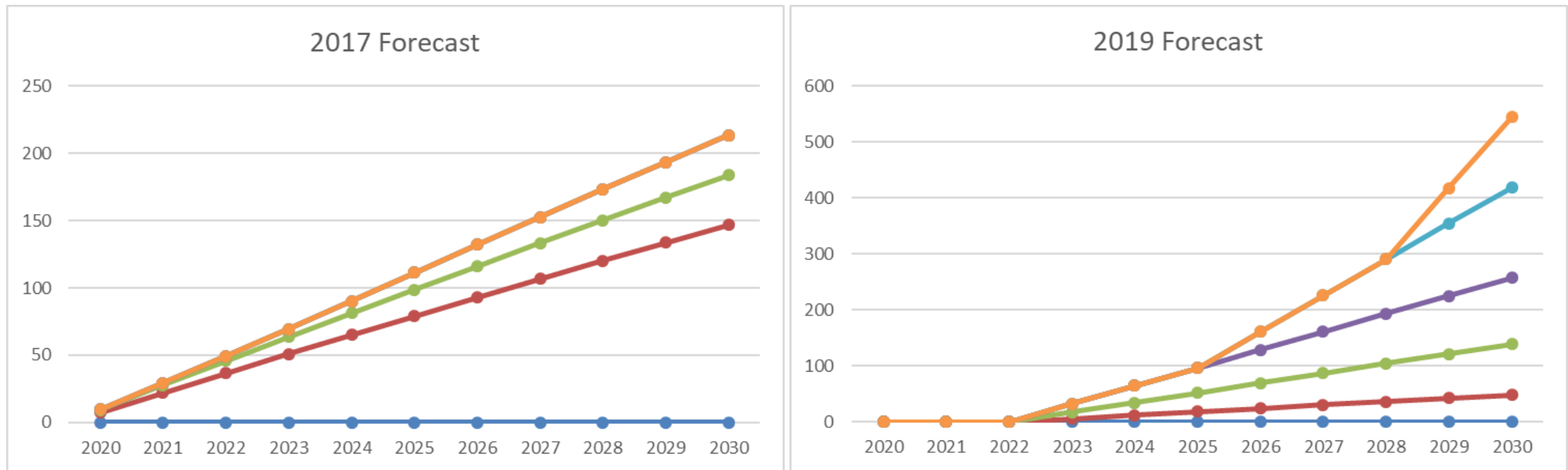


*Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional Code Cycles are anticipated; high scenarios are much higher*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Title 24

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

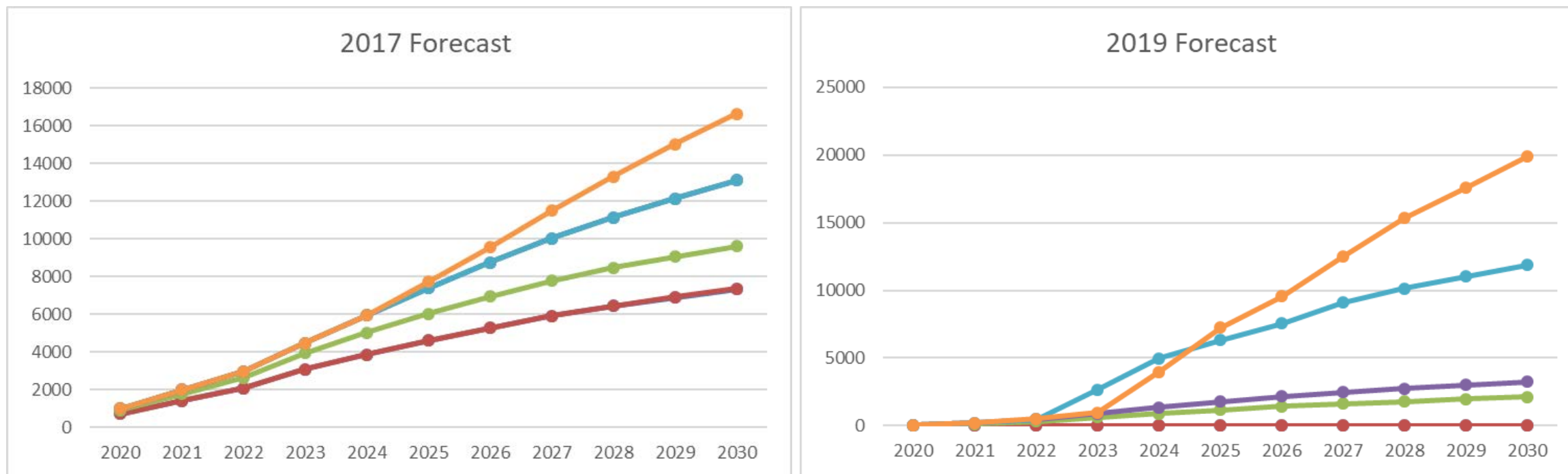


*Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional Code Cycles are anticipated; high scenarios are twice as much*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Appliance Standards

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

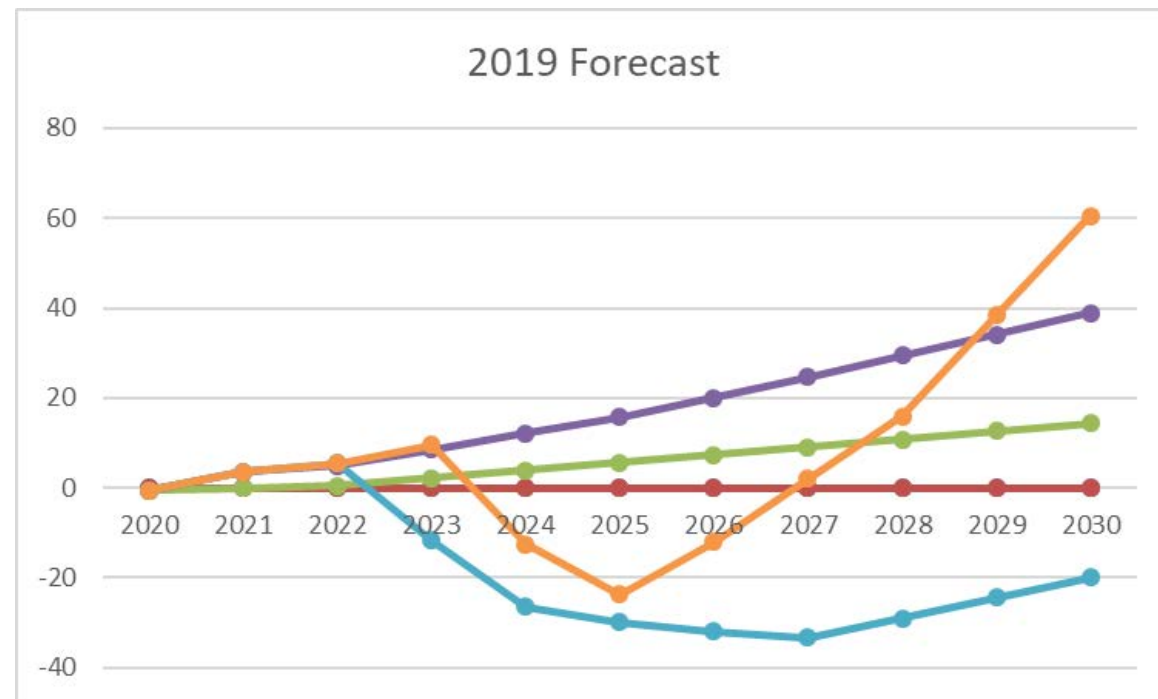


*Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional measures are phased in*



# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Appliance Standards

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

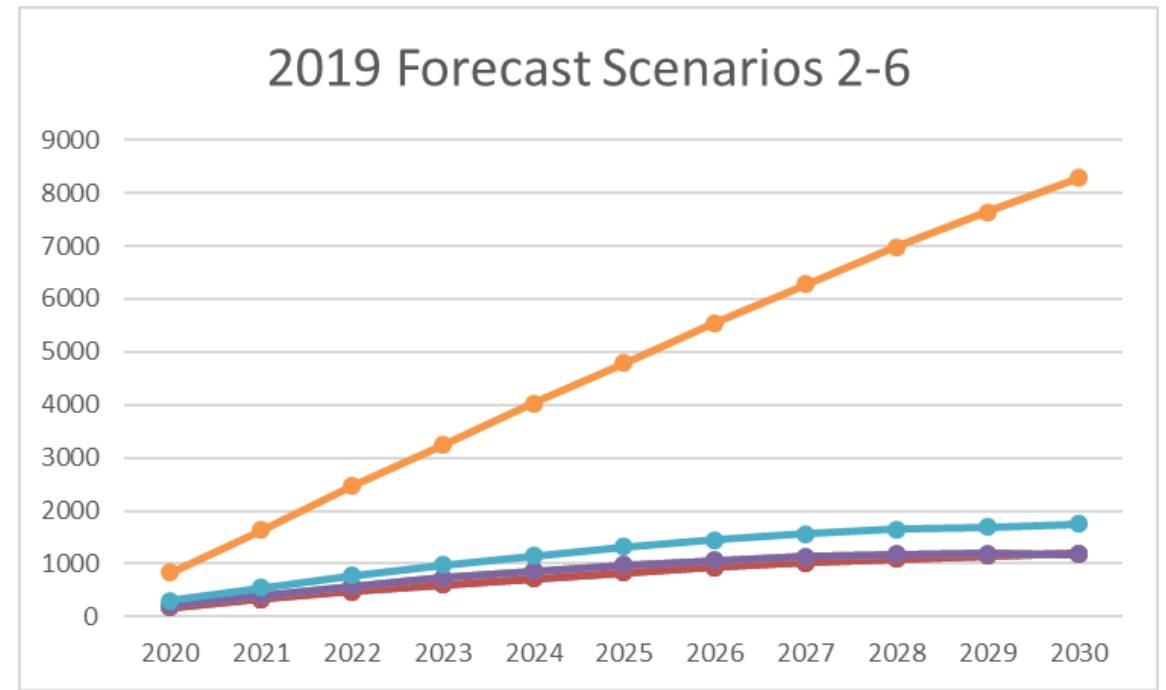
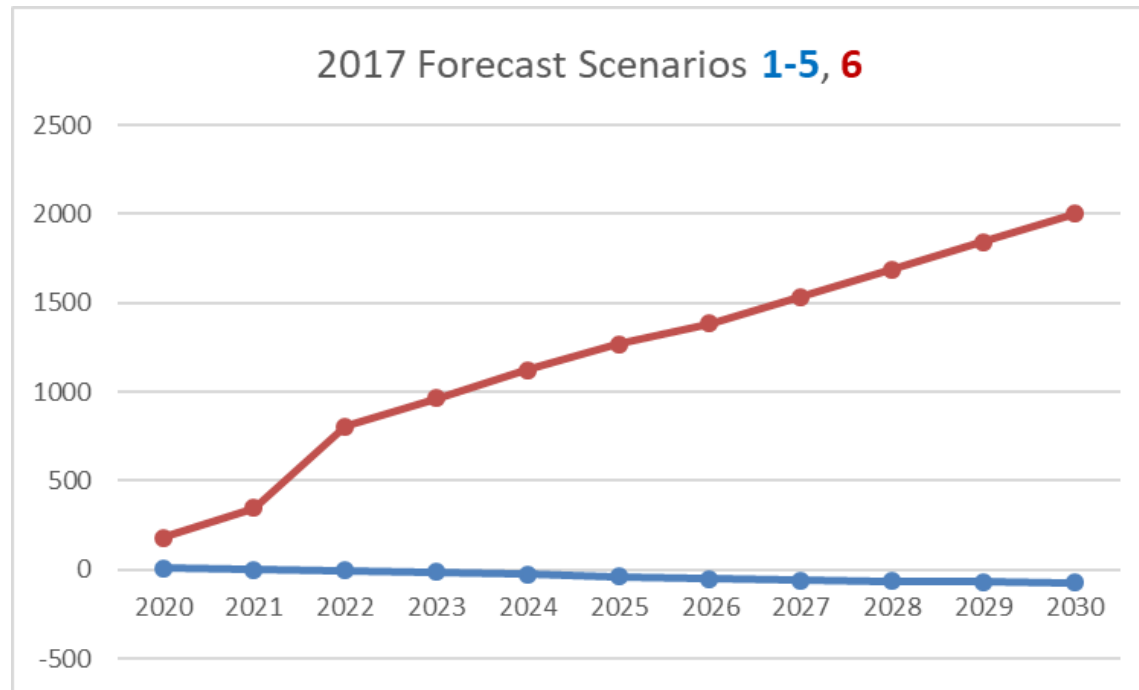


*Gas savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as additional Code Cycles are anticipated*



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

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



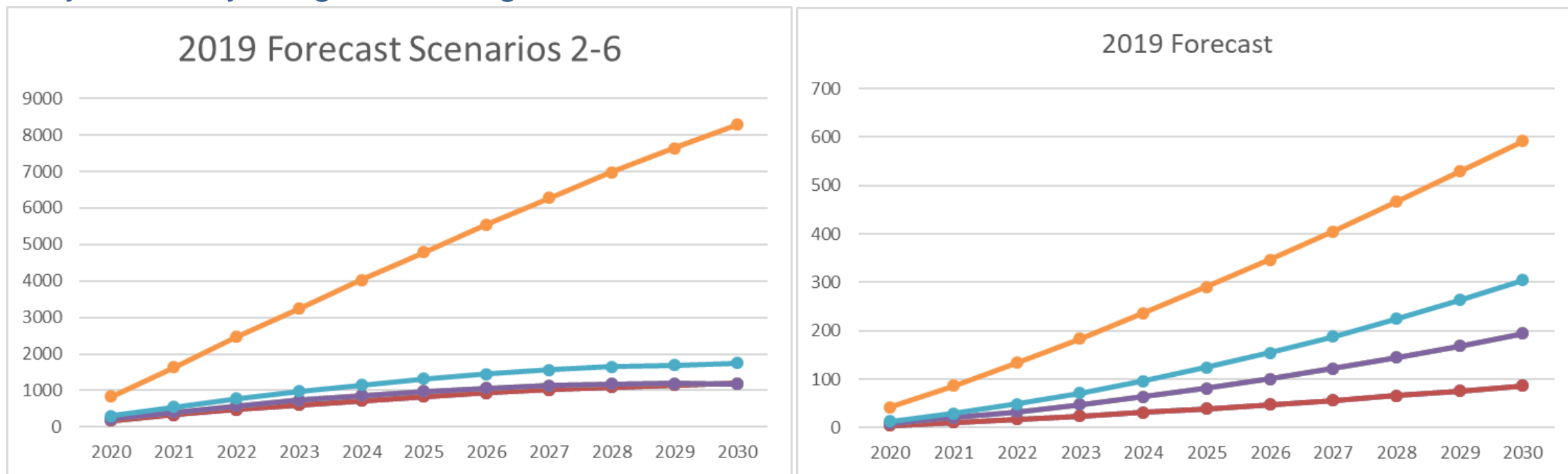
*Electric savings display a greater spread between the more conservative and optimistic scenarios in the 2019 AAEE forecast as scenarios were built using all available workbooks*





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

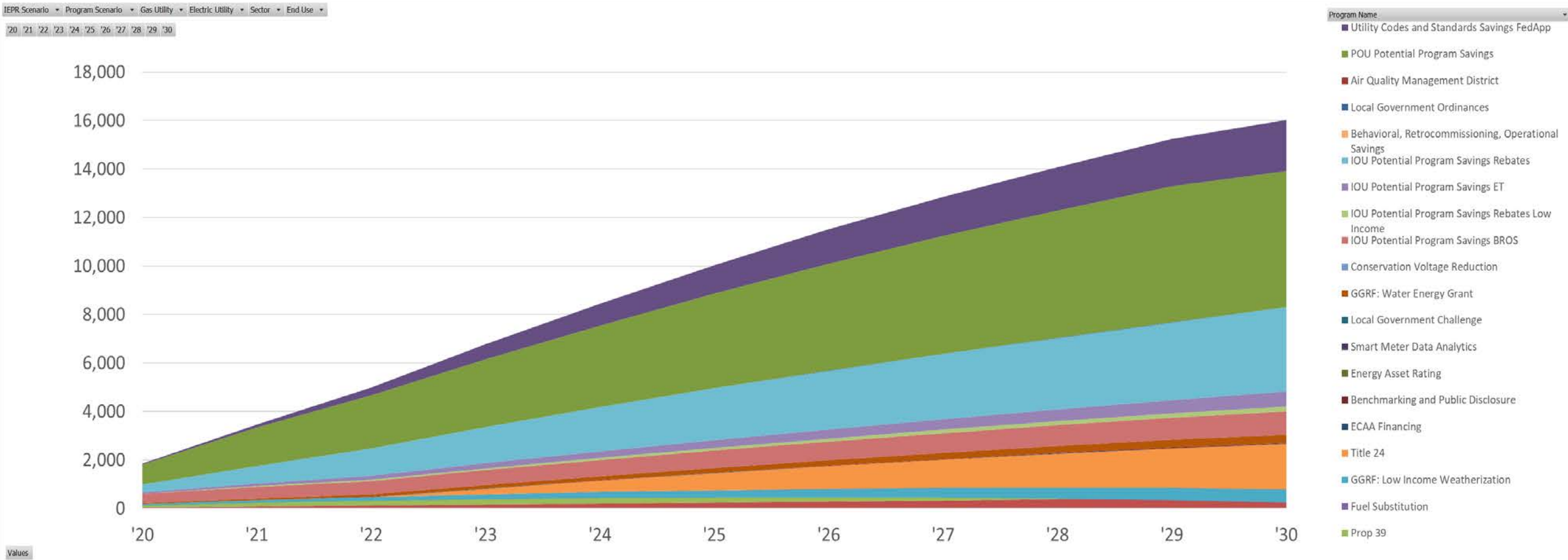
Beyond Utility Program Savings 2019 AAEE Forecast – all Scenarios GWh and MM Therms



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# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Data Visualization Tool





# Additional Achievable Energy Efficiency (AAEE) 2019 Preliminary Annual Savings – Data Visualization Tool

