



2013 California Energy Efficiency Potential and Goals Study

APPENDIX VOLUME III

Appendices O – Q – Additional Achievable Energy Savings

Prepared for:

California Public Utilities Commission



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**California Energy Commission
DRAFT STAFF REPORT**

**ESTIMATES OF ADDITIONAL
ACHIEVABLE ENERGY SAVINGS**

**Supplement to *California Energy
Demand 2014-2024 Revised Forecast***



CALIFORNIA
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Edmund G. Brown Jr., Governor

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Background

Committed efficiency savings reflect savings from initiatives that have been approved, finalized, and funded, whether already implemented or not. There are also likely additional savings from initiatives that are neither finalized nor funded but are reasonably expected to occur, including impacts from future updates of building codes and appliance standards and utility efficiency programs expected to be implemented after 2014 (program measures). These savings are referred to as *achievable*. Resource and transmission planners now require an adjustment to the Energy Commission's baseline forecasts (which include only committed savings) to account for these likely impacts.

Achievable savings estimates begin with a comprehensive efficiency potential study, as provided in the *2013 California Energy Efficiency Potential and Goals Study (2013 Potential Study)*, completed for the California Public Utilities Commission (CPUC) by Navigant Consulting, Inc., in August 2013.¹ The *2013 Potential Study* estimated energy efficiency savings that could be realized through utility programs as well as codes and standards within the investor-owned utility (IOU) service territories for 2006-2024,² given current or soon-to-be-available technologies. Because many of these savings are already incorporated in the Energy Commission's current forecast, the *California Energy Demand 2014-2024 Revised Forecast (CED 2013 Revised)*, Energy Commission staff needed to estimate the portion of savings from the *2013 Potential Study* not accounted for in the baseline forecast. These nonoverlapping savings are referred to as *additional achievable energy efficiency (AAEE)* impacts.

Staff developed five AAEE scenarios, based on recommendations from the Joint Agency Steering Committee³ and input from Navigant and forecast stakeholders through the Demand Analysis Working Group (DAWG). These scenarios varied by assumptions related to economic growth, changes in electricity and natural gas rates, and a host of inputs associated with efficiency measure adoption and the impact of building codes and appliance standards. These variations in input assumptions across the five scenarios are shown in Table 8.

This supplement summarizes the preliminary AAEE results, describes the scenarios and method used, shows adjusted forecasts, and gives detailed results for AAEE savings at the

¹ Available at

http://demandanalysisworkinggroup.org/documents/2013_08_16_ES_Pup_EE_Pot_final/CA_PGT_Model_2012_2013_Release_Aug_2013.ana.zip

² The analysis begins in 2006 because results are calibrated using the CPUC's Standard Program Tracking Database, which tracks program activities from 2006-2011.

³ The Joint Agency Steering Committee is composed of managerial representatives from the Energy Commission, the California Independent System Operator, and the California Public Utilities Commission and is committed to improving coordination and process alignment across state planning processes that use the Energy Commission's demand forecast.

utility level.⁴ AAEE electricity savings were estimated for the Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E) service territories. Natural gas savings were estimated for PG&E, SDG&E, and the Southern California Gas Company (SoCalGas) gas service territories.

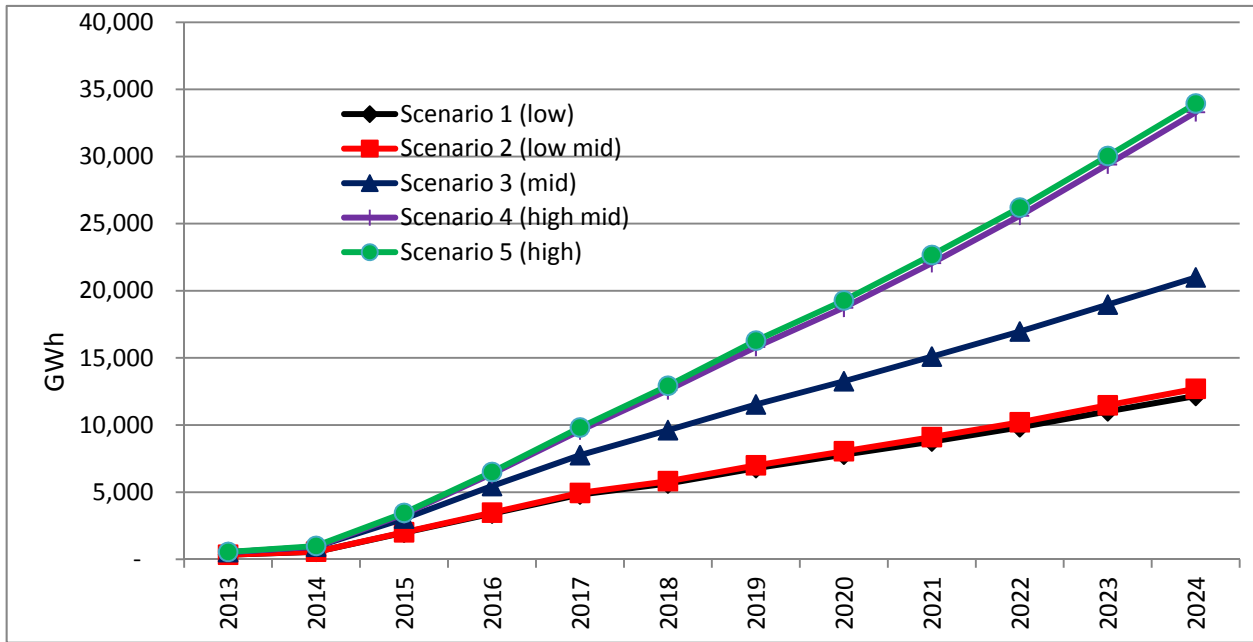
Summary of Results

Figure 1, Figure 2, and Figure 3 show estimated AAEE savings by scenario for the IOUs combined in gigawatt hours (GWh), megawatts (MW), and million therms, respectively. AAEE savings begin in 2013 because 2012 was the last recorded historical year for consumption and peak demand in *CED 2013 Revised*. As discussed in more detail in the next section, Scenario 3 represents a “most likely” (in terms of scenario definition), or mid case, while Scenario 1 (low savings) and Scenario 5 (high savings) are meant to provide a range of outcomes through pessimistic and optimistic assumptions, respectively, regarding efficiency measure adoption and standards implementation. Scenarios 2 (low mid savings) and 4 (high mid savings) are similar to Scenarios 1 and 5, respectively, but assume the same economic growth and energy prices as Scenario 3, and are constructed to provide alternatives to Scenario 3.

By 2024, AAEE savings reach almost 21,000 GWh, almost 5,000 MW, and more than 400 million therms in the mid case. The high case reaches around 34,000 GWh, 8,000 MW, and 500 million therms in this year, while projected totals in the low scenario are about 12,000 GWh, 3,000 MW, and 300 million therms in 2024. As indicated, totals for the low mid and high mid scenarios are very similar to the high and low cases, respectively. Natural gas savings are slightly negative in 2013 and 2014 in all scenarios, a reflection of *interactive* effects modeled in the *2013 Potential Study* that result from slightly higher gas heating requirements as lighting efficiencies improve.

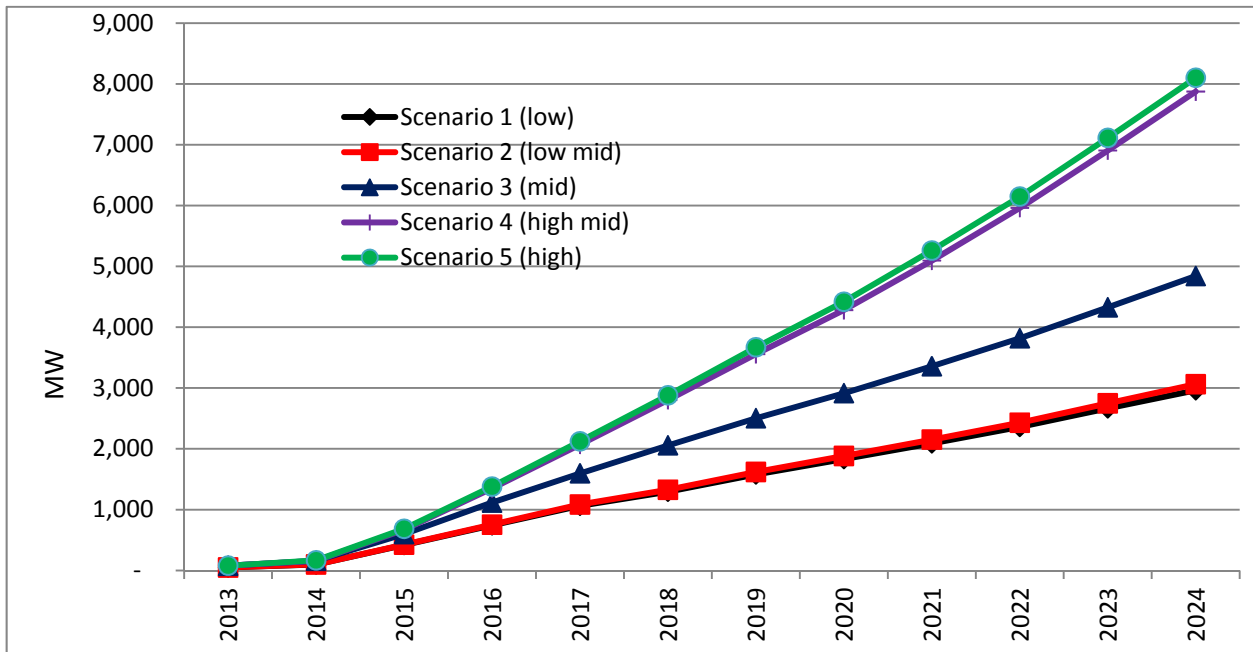
⁴ Final estimates of additional achievable energy efficiency savings will be incorporated into the *California Energy Demand 2014-2024* forecast report by the time it is adopted in December 2013.

Figure 1: AAEE Savings for Electricity (GWh) by Scenario, Combined IOUs



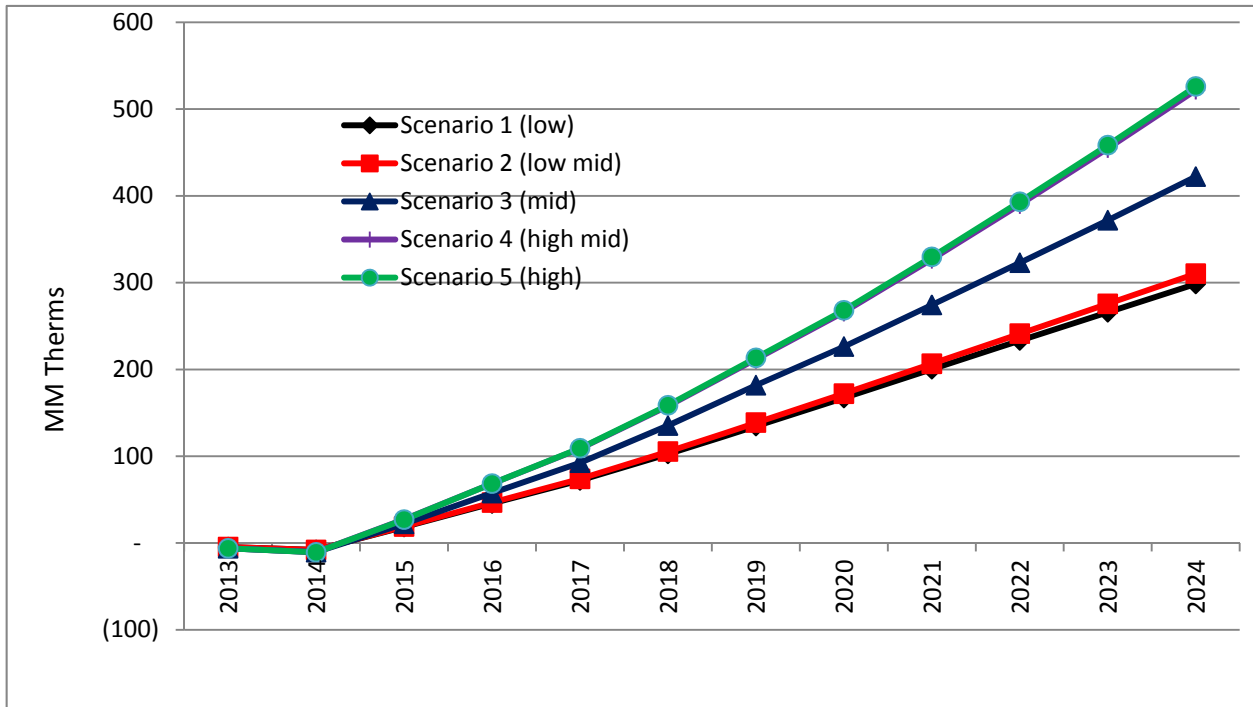
Source: California Energy Commission, Demand Analysis Office, 2013

Figure 2: AAEE Savings for Electricity Peak Demand (MW) by Scenario, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

Figure 3: AAEE Savings for Natural Gas (MM therms) by Scenario, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

Table 1 shows combined IOU AAEE savings by type (program measures and standards) in the mid scenario. The proportion of savings attributed to standards is reduced relative to the 2013 *Potential Study* since most of the overlapping lighting savings from *CED 2013 Revised* were deducted from standards. (See next section.) **Table 2** provides the totals by type in 2024 for all five scenarios. The standards proportion of savings increases in the higher scenarios (3-5) with the introduction of future Title 24 and Title 20 standards. In the low and low mid scenarios, the only AAEE standards savings comes from federal standards, and the associated lighting efficiency improvements result in negative natural gas savings throughout the forecast period. In 2013 and 2014, the only program measure savings comes from behavioral programs, and Navigant does not provide peak savings for this category.

Table 1: AAEE Savings by Type, Combined IOUs, Mid Savings Scenario

Year	GWh			MW			MM Therms		
	Program Measures	Standards	Total	Program Measures	Standards	Total	Program Measures	Standards	Total
2013	24	506	531	-	77	77	1	(7)	(6)
2014	48	883	931	-	157	157	2	(13)	(11)
2015	1,523	1,504	3,027	247	350	597	37	(15)	22
2016	3,058	2,393	5,451	500	614	1,115	72	(15)	57
2017	4,512	3,237	7,749	750	846	1,596	107	(14)	92
2018	5,461	4,154	9,614	942	1,114	2,056	145	(10)	135
2019	6,662	4,865	11,528	1,162	1,341	2,503	186	(4)	182
2020	7,700	5,558	13,258	1,339	1,575	2,914	224	3	226
2021	8,882	6,213	15,095	1,551	1,807	3,357	265	10	274
2022	10,141	6,822	16,963	1,783	2,035	3,818	307	16	323
2023	11,591	7,375	18,965	2,074	2,252	4,326	350	22	372
2024	13,094	7,896	20,990	2,379	2,462	4,841	394	28	422

NOTE: Individual entries may not sum to total due to rounding.
Source: California Energy Commission, Demand Analysis Office, 2013

Table 2: Combined IOU AAEE Savings by Type, 2024

		Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
GWh	Program Measures	8,160	8,538	13,094	21,255	21,269
	Standards	4,006	4,161	7,896	12,039	12,678
	Total	12,166	12,699	20,990	33,293	33,947
MW	Program Measures	1,495	1,570	2,379	4,136	4,175
	Standards	1,468	1,493	2,462	3,738	3,926
	Total	2,963	3,063	4,841	7,874	8,101
Million Therms	Program Measures	300	312	394	504	506
	Standards	(2)	(2)	28	18	20
	Total	298	310	422	522	526

NOTE: Individual entries may not sum to total due to rounding.
Source: California Energy Commission, Demand Analysis Office, 2013

Table 3 shows the combined IOU AAEE savings for the mid scenario by sector in selected years. The distribution reflects Navigant’s conclusion that the largest share of remaining energy efficiency potential resides in the commercial sector. For peak demand, residential savings are closer to commercial because the residential sector tends to have higher peak demand relative to average load. **Table 4** provides savings by sector for all scenarios in 2024.

Table 3: Combined IOU AAE Savings by Sector, Mid Savings Scenario

	Sector	2013	2016	2019	2022	2024
GWh	Residential	91	1,138	2,849	4,790	5,749
	Commercial	425	3,629	7,055	9,655	12,140
	Industrial	15	412	936	1,415	1,720
	Agricultural	-	208	529	854	1,071
	Street-Lighting	-	65	159	250	310
	All Sectors	531	5,451	11,528	16,963	20,990
MW	Residential	15	450	1,105	1,754	2,156
	Commercial	61	607	1,266	1,862	2,436
	Industrial	2	41	90	135	164
	Agricultural	-	17	42	68	85
	Street-Lighting	-	-	-	-	-
	All Sectors	77	1,115	2,503	3,818	4,841
Million Therms	Residential	(3)	11	55	110	150
	Commercial	(3)	8	33	66	90
	Industrial	-	35	85	134	165
	Agricultural	-	3	8	13	17
	Street-Lighting	-	-	-	-	-
	All Sectors	(6)	57	182	323	422

NOTE: Individual entries may not sum to total due to rounding.
Source: California Energy Commission, Demand Analysis Office, 2013

Table 4: Combined IOU AEE Savings by Sector, 2024

	Sector	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
GWh	Residential	2,727	2,786	5,749	7,288	7,550
	Commercial	7,117	7,584	12,140	21,498	21,853
	Industrial	1,345	1,348	1,720	2,516	2,547
	Agricultural	794	794	1,071	1,336	1,339
	Street-Lighting	184	187	310	655	657
	All Sectors	12,166	12,699	20,990	33,293	33,947
MW	Residential	1,421	1,424	2,156	2,465	2,598
	Commercial	1,347	1,443	2,436	5,097	5,188
	Industrial	131	132	164	207	209
	Agricultural	64	64	85	106	106
	Street-Lighting	-	-	-	-	-
	All Sectors	2,963	3,063	4,841	7,874	8,101
Million Therms	Residential	76	85	150	216	219
	Commercial	82	84	90	88	88
	Industrial	128	129	165	197	197
	Agricultural	12	12	17	21	21
	Street-Lighting	-	-	-	-	-
	All Sectors	298	310	422	522	526

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 5 shows the savings impact of emerging technologies across all scenarios for the combined IOUs in selected years. This category encompasses technologies that are not yet available in today’s market or at very low penetration levels but expected to become commercially viable during the forecast period. For electricity, most of the savings from emerging technologies comes from light-emitting diode (LED) lighting and new air-conditioning technologies. Natural gas savings come mainly from new furnace and dishwasher technologies.

As indicated in the next section, assumptions for emerging technologies varied significantly among the scenarios, both in terms of cost-benefit adoption criteria and adjustments to the Navigant model results. For GWh, the percentage of total AEE savings provided by emerging technologies ranges from 2 percent in Scenario 1 to 29 percent in Scenario 4.

Table 5: Combined IOU Emerging Technology Savings by Scenario

	Year	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
GWh	2015	10	20	99	291	290
	2018	53	107	613	1,704	1,754
	2020	102	206	1,201	3,583	3,677
	2022	176	356	2,127	6,320	6,322
	2024	281	599	3,369	9,735	9,660
MW	2015	1	1	9	31	30
	2018	6	12	77	258	259
	2020	14	28	174	597	597
	2022	27	55	341	1,123	1,127
	2024	47	96	575	1,841	1,827
Million	2015	0	0	0	0	0
Therms	2018	1	2	5	10	9
	2020	2	4	13	28	27
	2022	4	8	26	56	55
	2024	6	13	44	96	92

Source: California Energy Commission, Demand Analysis Office, 2013

Table 6 illustrates AAEE savings by individual IOU in the mid savings scenario for selected years. Total savings are generally a function of total sales or peak demand in each IOU, although electricity savings percentages (relative to sales or peak) are slightly lower for SDG&E because of less potential in the agricultural and industrial sectors. **Table 7** provides savings by IOU by scenario for 2024.

Table 6: AAEE Savings by IOU, Mid Savings Scenario

	Utility	2013	2016	2019	2022	2024
GWh	PG&E	225	2,335	4,998	7,431	9,208
	SCE	264	2,579	5,378	7,806	9,628
	SDG&E	42	538	1,152	1,727	2,154
	Total IOU	531	5,451	11,528	16,963	20,990
MW	PG&E	33	476	1,088	1,684	2,141
	SCE	38	523	1,152	1,728	2,183
	SDG&E	6	116	264	406	518
	Total IOU	77	1,115	2,503	3,818	4,841
Million Therms	PG&E	(2)	24	78	141	184
	SoCalGas	(4)	30	93	162	210
	SDG&E	(0)	3	11	21	28
	Total IOU	(6)	57	182	323	422

NOTE: Individual entries may not sum to total due to rounding.
Source: California Energy Commission, Demand Analysis Office, 2013

Table 7: AAEE Savings by IOU and Scenario, 2024

	Utility	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
GWh	PG&E	5,332	5,562	9,208	14,646	14,924
	SCE	5,554	5,748	9,628	15,205	15,492
	SDG&E	1,280	1,389	2,154	3,442	3,530
	Total IOU	12,166	12,699	20,990	33,293	33,947
MW	PG&E	1,274	1,319	2,141	3,514	3,613
	SCE	1,367	1,401	2,183	3,544	3,632
	SDG&E	322	342	518	816	856
	Total IOU	2,963	3,063	4,841	7,874	8,101
Million Therms	PG&E	131	137	184	229	229
	SoCalGas	147	152	210	254	256
	SDG&E	20	22	28	38	41
	Total IOU	298	310	422	522	526

NOTE: Individual entries may not sum to total due to rounding.
Source: California Energy Commission, Demand Analysis Office, 2013

Method and Scenarios

Navigant Consulting provided invaluable assistance in developing the AAEE savings estimates, including training Energy Commission staff in the use of the model employed in the CPUC’s 2013 *Potential Study*, referred to as the Potential, Goals, and Targets (PGT) model. The PGT model includes methodologies to estimate program measure savings, savings from codes and standards, and savings from behavioral programs. Navigant developed a modified version of the PGT model specifically for this effort.

For a user-defined scenario, the PGT model estimates gross and net⁵ first-year and cumulative technical, economic, and market potential efficiency impacts from the three sources of savings beginning in 2006 for electricity consumption, peak demand, and natural gas consumption.⁶ In general, the effort to characterize AAEE savings consists of determining the portion of estimated net market potential in a given scenario not incorporated in the *CED 2013 Revised* baseline forecast. For program measures, AAEE includes net accumulated market savings beginning in 2015,⁷ since *CED 2013 Revised* incorporates utility programs through 2014. For standards, AAEE consists of net savings from expected (or recently finalized) regulations not

⁵ Net savings equals gross savings minus naturally occurring market savings, or “free ridership” savings that would be expected to occur without any efficiency initiative.

⁶ Natural gas consumption savings estimates incorporate *interactive* effects and thus can be negative for certain categories in the detailed results.

⁷ There are a small amount of behavior-related savings included starting in 2013.

included in *CED 2013 Revised*, and the PGT model is set up to calculate estimated savings for the following:

- 2016 Title 20 standards
- Adopted and future federal appliance standards
- 2016, 2019, and 2022 Title 24 standards.

Specific elements assumed for each set of standards are provided in the *2013 Potential Study* report. As shown below, specific standards included varied with the scenario.

The *CED 2013 Revised* forecasts include a substantial amount of lighting savings in anticipation of the effects of Assembly Bill 1109 (AB 1109, Huffman, Chapter 534, Statutes of 2007) through future programs and Title 20 standards. These savings can be expected to overlap with lighting savings estimated in any given PGT-modeled scenario. To account for this overlap, Energy Commission staff subtracted *CED 2013 Revised* lighting savings accumulating during the forecast period from future standards and program lighting savings estimated by the PGT model for each scenario.

The PGT model requires a variety of inputs and input assumptions from which savings scenarios can be developed. The following summarizes the parameters used in constructing the five scenarios. More information can be found in the *2013 Potential Study* report.

1. *Incremental Costs*: Incremental costs are the difference in costs between code- or standard-level equipment and the higher-efficiency equipment under consideration. The incremental costs for efficient technologies come from the Database for Energy Efficiency Resources (DEER) – the CPUC-approved database for various energy savings parameters.
2. *Implied Discount Rate*: The implied discount rate is the effective discount rate that consumers apply when making a purchase decision; it determines the value of savings in a future period relative to the present. The implied discount rate is higher than standard discount rates used in other analyses because it is meant to account for market barriers that may impact customer decisions.
3. *Marketing and Word of Mouth Effects*: The base factors for market adoption are a customer's willingness to adopt and awareness of efficient technologies, which were derived from a regression analysis of technology adoptions from several studies on technology diffusion. Each end use in each sector was assigned marketing and word-of-mouth effectiveness factors corresponding to diffusion rates in the studies.
4. *TRC Threshold*: The Total Resource Cost (TRC) is the primary cost-effectiveness indicator that the CPUC uses to determine funding levels and adoption thresholds for energy efficiency. The TRC test measures the net resource benefits from the perspective of all ratepayers by combining the net benefits of the program to participants and nonparticipants. A TRC threshold of 1.0 means that the benefits of a program or measure must at least equal the costs. The CPUC uses a TRC of 0.85 as a "rule of thumb," allowing

programs to include marginal yet promising measures. For emerging technologies, an even lower threshold is typically used.

5. *Efficient Measure Density*: Measure density is defined as the number of units of a technology per unit area. Higher densities for efficient technologies mean more familiarity and a greater likelihood of adoption, all else equal. Specifically, measure density is categorized as follows:
 - *Baseline measure density*: the number of units of a baseline technology per home for the residential sector, or per unit of floor space for the commercial sector.
 - *Energy-efficient measure density*: the number of energy-efficient units existing per home for the residential sector, or per unit of floor space for the commercial sector.
 - *Total measure density*: typically the sum of the baseline and efficient measure density. When two or more efficient measures compete to replace the same baseline measure, then the total density is equal to the sum of the baseline density and all applicable energy-efficient technology densities.
6. *Unit Energy Savings*: Unit energy savings (UES) is the estimated difference in annual energy consumption between a measure, group of technologies, or processes and the baseline, expressed as kWh for electric technologies and therms for gas technologies.
7. *Incentive Level*: The incentive level is the amount or percentage of incremental cost that is offset for a targeted efficient measure. While the IOUs may vary the incentive level from measure to measure, they must work within their authorized budget to maximize savings, and their incentives typically average out to be about 50 percent of the incremental cost.

In addition, assumptions regarding future standards and associated compliance rates, economic growth (in the form of increases in building stock), energy prices, and avoided costs varied among the scenarios.

Table 8 shows the input assumptions for the five scenarios. For the low, mid, and high savings cases, building stock, prices, and avoided costs were designed to be consistent with the three baseline *CED 2013 Revised* scenarios, which combine high economic growth, lower efficiency program savings, and lower rates in the high demand case and lower growth, higher program savings, and higher rates in the low demand case. For the adjusted forecasts, therefore, the low AEEE savings case is paired with the high demand baseline and the high savings case with the low demand baseline. The low mid and high mid cases (Scenarios 2 and 4) use the same building stock and price assumptions as the mid savings case to provide consistent alternatives to the mid savings case with respect to these assumptions for planning purposes.

The low and low mid savings cases assume a 20 percent decrease in compliance rates compared to base compliance rates developed by Navigant.⁸ The high savings case assumes compliance

⁸ Base compliance rates are derived from CPUC. *Final Evaluation Report, Codes & Standards (C&S) Programs Impact Evaluation, California Investor Owned Utilities' Codes and Standards Program Evaluation for Program Years 2006-2008*. Prepared by KEMA, Inc., The Cadmus Group, Inc., Itron, Inc., and Nexus Market Research, Inc.

rates that increase above the base levels, to a maximum of 100 percent by the end of the forecast period.⁹ In the high mid and high cases, additional likely (but not adopted) federal appliance standards are introduced.

Future lighting savings in *CED 2013 Revised* varied by baseline demand scenario, so the amount of overlapping lighting savings to be subtracted from future lighting savings output by the PGT model depended on the savings scenario. In the low savings case, future lighting savings associated with the high demand baseline forecast were deducted, while savings from the low demand baseline forecast were deducted in the high savings case (and mid demand savings in the three mid savings scenarios).¹⁰

⁹ Whether 100 percent compliance is reached depends on the date of introduction of the standards.

¹⁰ The amount of overlapping lighting savings increased over the forecast period, reaching 3,100 GWh in the *CED 2013 Revised* low demand forecast, 3,200 GWh in the mid demand case, and 3,350 GWh in the high case in 2024. Associated peak demand overlap reached 430 MW, 450 MW, and 470 MW, respectively.

Table 8: AAEE Savings Scenarios

Scenario Number	1	2	3	4	5
Scenario Name	Low Savings	Low Mid Savings	Mid Savings	High Mid Savings	High Savings
ET's	25% of model Results	50% of model Results	100% of model results	150% of Model Results	150% of Model Results
Building Stock	High Demand Case from 2011 IEPR	Mid Case from 2011 IEPR	Mid Case from 2011 IEPR	Mid Case from 2011 IEPR	Low Demand Case from 2011 IEPR
Retail Prices	High Demand Case from 2011 IEPR	Mid Case from 2011 IEPR	Mid Case from 2011 IEPR	Mid Case from 2011 IEPR	Low Demand Case from 2011 IEPR
Avoided Costs	High Demand Case from 2011 IEPR	Mid Case from 2011 IEPR	Mid Case from 2011 IEPR	Mid Case from 2011 IEPR	Low Demand Case from 2011 IEPR
UES	Estimate minus 25%	Estimate minus 25%	Best Estimate UES	Estimate plus 25%	Estimate plus 25%
Incremental Costs	Estimate plus 20%	Estimate plus 20%	Best Estimate Costs	Estimate minus 20%	Estimate minus 20%
Incentive Level	50% of incremental cost	50% of incremental cost	50% of incremental cost	50% of incremental cost	50% of incremental cost
TRC Threshold	1	1	0.85	0.75	0.75
ET TRC Threshold	0.85	0.85	0.5	0.4	0.4
Measure Densities	Estimate minus 20%	Estimate minus 20%	Best Estimate Costs	Estimate plus 20%	Estimate plus 20%
Word of Mouth Effect*	39%	39%	43%	47%	47%
Marketing Effect*	1%	1%	2%	3%	3%
Implied Discount Rate	20%	20%	18%	14%	14%
Standards Compliance	No Compliance Enhancements, Compliance Rates Reduced by 20 percent	No Compliance Enhancements, Compliance Rates Reduced by 20 percent	No Compliance Enhancements	No Compliance Enhancements	Compliance Enhancements
Title 24 Updates	None	None	2016, 2019, 2022	2016, 2019, 2022	2016, 2019, 2022
Title 20 Updates	None	None	2016-2018	2016-2018	2016-2018
Federal Standards	Already adopted	Already adopted	Already adopted	Future Federal Standards	Future Federal Standards

Sources: Navigant Consulting and California Energy Commission, Demand Analysis Office, 2013

To arrive at a final set of scenarios, staff first solicited stakeholder input through the DAWG. Stakeholders were provided a preliminary set of savings scenarios based on three cases presented in the *2013 Potential Study* report as well as additional scenarios developed by Energy Commission staff as variations around the *2013 Potential Study* mid case results. In this manner, stakeholders expressed their preferences for a specific scenario and commented on individual input assumptions. Eight stakeholder groups submitted written comments: the Efficiency Council, the Natural Resources Defense Council, the California Independent System Operator, the Independent Energy Producers, PG&E, SCE, SDG&E, and SoCalGas. Stakeholder comments are posted on the DAWG website.¹¹ The Joint Agency Steering Committee reviewed these comments and, through discussions with CPUC and Energy Commission staff, developed proposed recommendations for the scenarios.

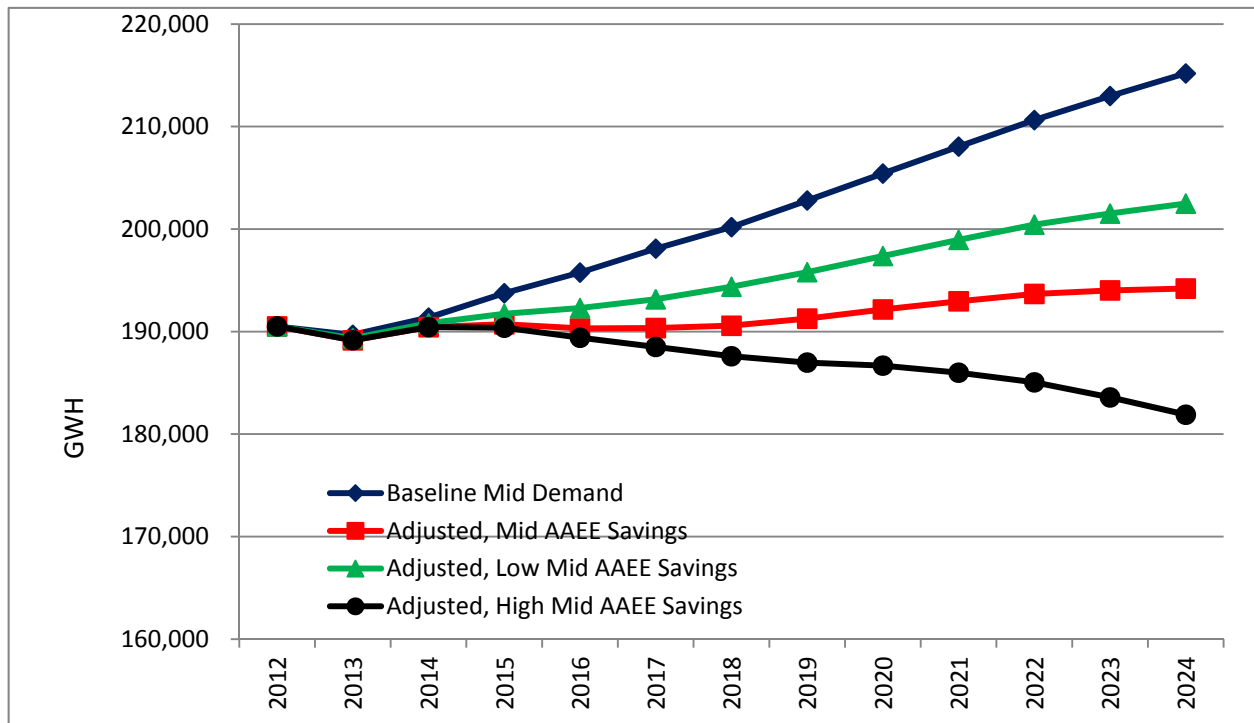
Adjusted Forecasts

Staff develops the baseline forecasts for consumption, sales, and peak demand at the planning area level. However, the AAEE savings presented in this supplement are meant to be applied to service territories, which are a subset of the associated planning areas in the case of PG&E, SCE, and SoCalGas. To develop baseline forecasts for these service territories, staff applies a similar rate of growth as the planning areas to service territory sales and peak in the last historical year (2012). Adjusted forecasts presented in this section are for the four IOU service territories (or the sum of service territories). The baseline forecasts may be adjusted slightly between the revised and adopted versions.

Figure 4, Figure 5, and Figure 6 show the effects of the estimated low mid, mid, and high mid AAEE savings on *CED 2013 Revised* mid baseline demand for the combined IOU service territories for electricity sales, peak demand, and end-user natural gas sales. Adjusted electricity sales and peak demand increase slightly using the low mid AAEE scenario, are relatively flat using the mid savings case, and decline with the low mid savings case. Natural gas sales, already relatively flat in the mid baseline forecast, decline after adjustments with all AAEE three savings scenarios.

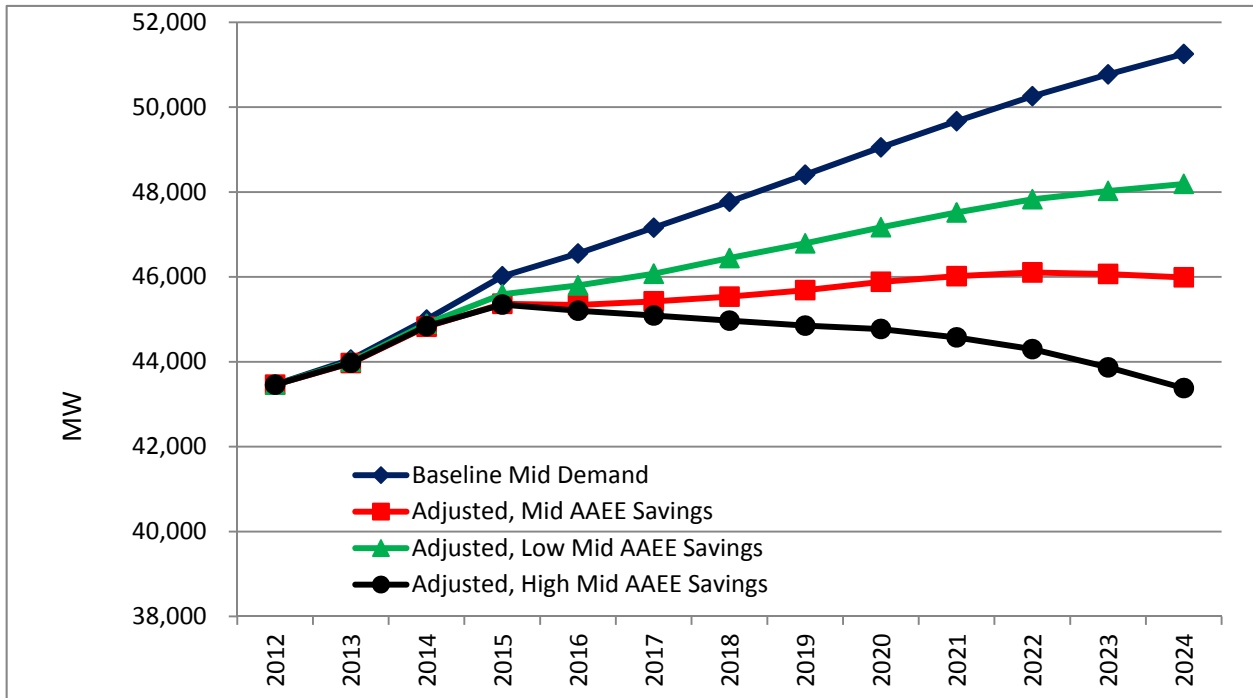
¹¹ <http://demandanalysisworkinggroup.org/?p=844>

Figure 4: Baseline Mid Demand Electricity and Adjusted Sales, Combined IOUs



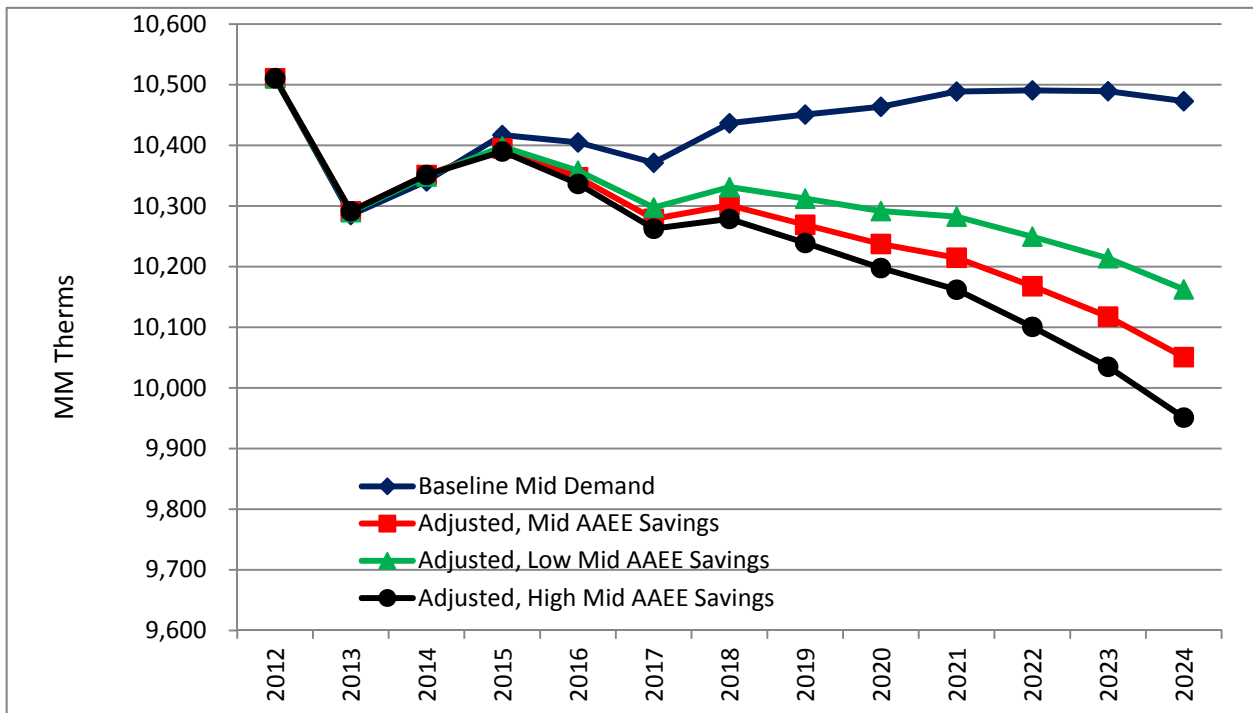
Source: California Energy Commission, Demand Analysis Office, 2013

Figure 5: Baseline Mid Demand and Adjusted Peaks, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

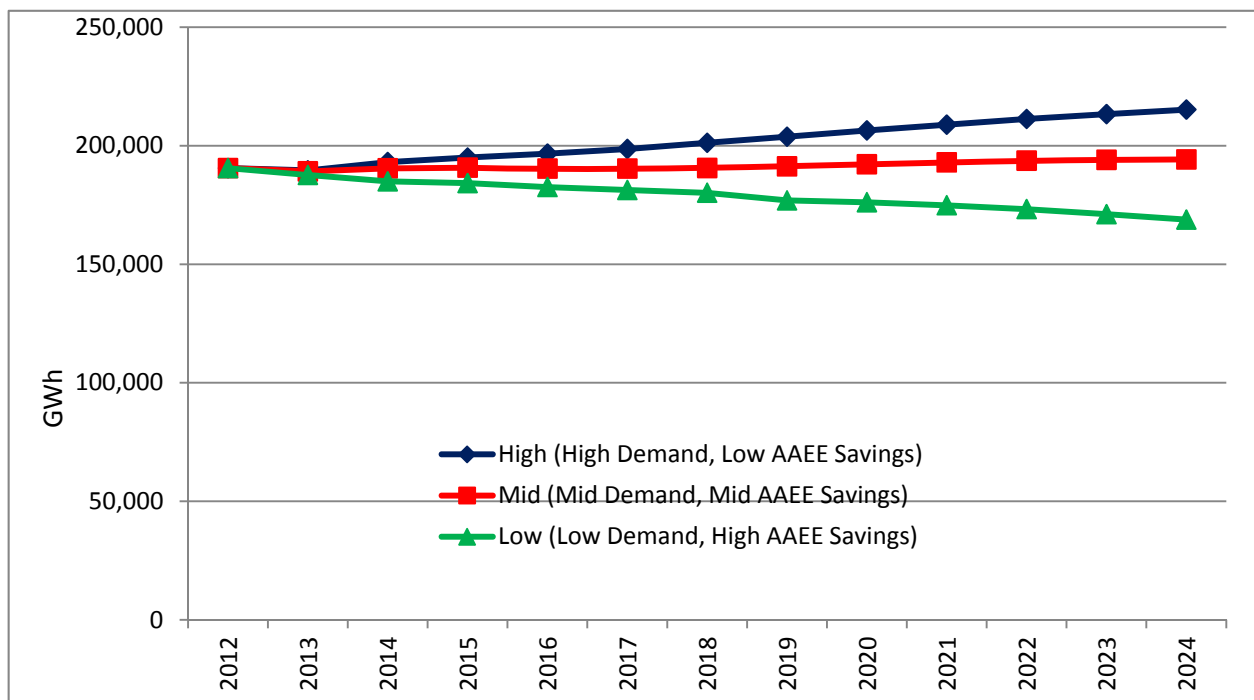
Figure 6: Baseline Mid Demand and Adjusted End-User Natural Gas Sales, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

Figure 7, Figure 8, and Figure 9 show the *CED 2013 Revised* high demand, mid demand, and low demand baseline forecasts as adjusted by low AAEE savings, mid savings, and high savings, respectively, for the combined IOUs. For sales, annual growth for 2013-2024 averages 1.16 percent, 0.24 percent, and -0.96 percent in the high, mid, and low adjusted forecasts, respectively. Peak demand growth per year averages 1.35 percent, 0.41 percent, and -0.89 percent over this period. Natural gas sales decline in all three adjusted scenarios, by an average of 0.13 percent, 0.21 percent, and 0.24 percent per year.¹²

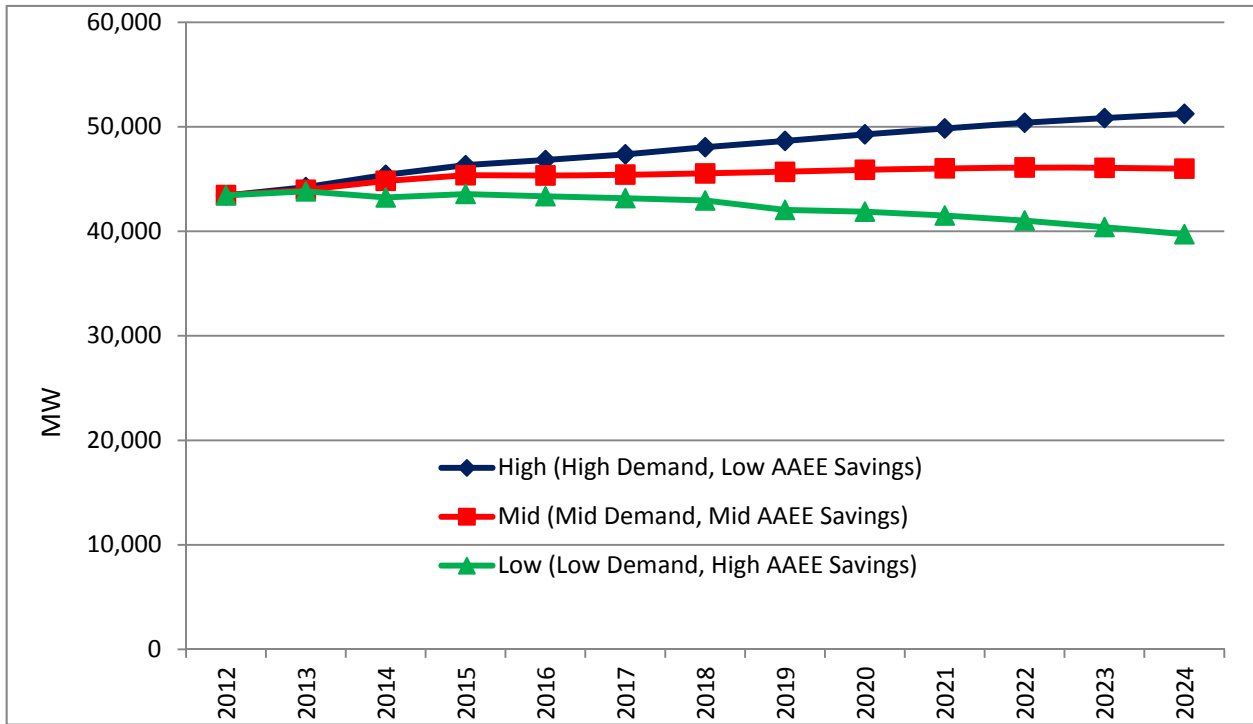
Figure 7: Adjusted Baseline Demand Scenarios for Electricity Sales, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

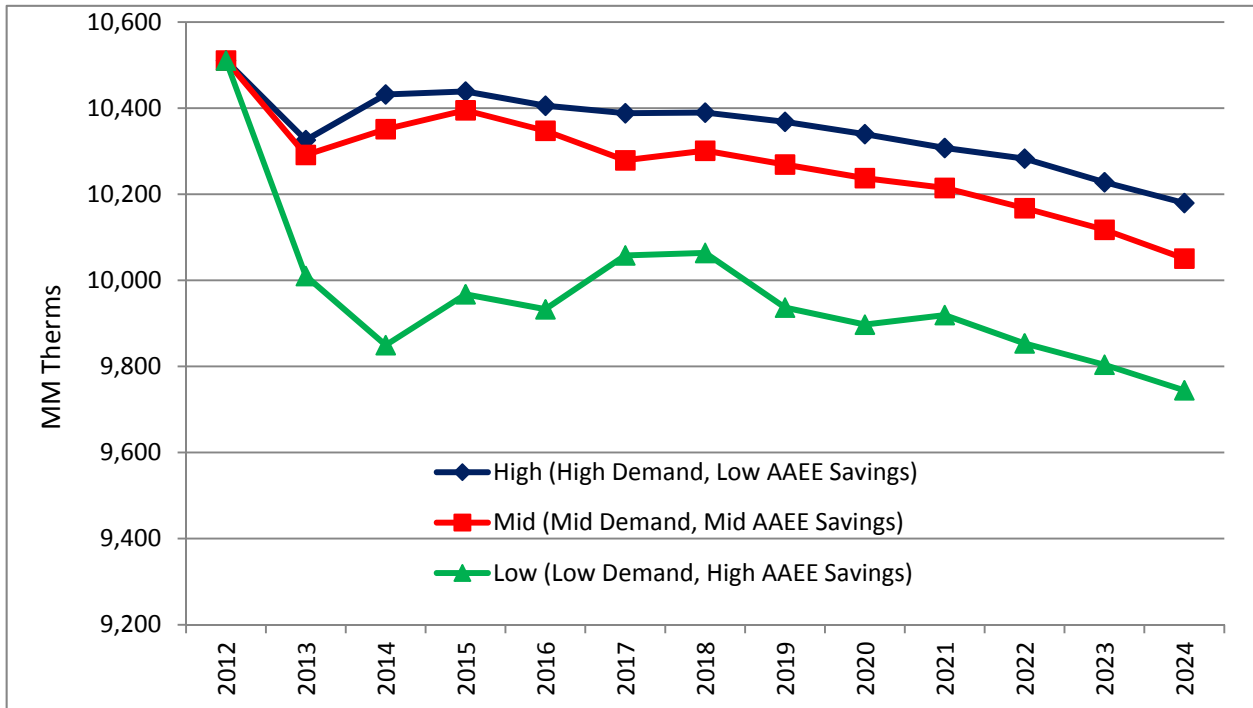
¹² The volatility of projected natural gas prices (from the Energy Commission’s North American Gas Trade Model) in the early years of the forecasts leads to variation in the natural gas forecast trajectories, particularly in the low case.

Figure 8: Adjusted Baseline Demand Scenarios for Peak, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

Figure 9: Adjusted Baseline Demand Scenarios for End-User Natural Gas Sales, Combined IOUs



Source: California Energy Commission, Demand Analysis Office, 2013

The remainder of this section provides utility service territory adjusted forecasts using the same groupings as above: (1) high baseline demand with low AAEE savings; (2) mid baseline demand with low mid savings; (3) mid baseline demand with mid savings; (4) mid baseline demand with high mid savings, and (5) low baseline demand with high savings.

Table 9: PG&E Adjusted Forecasts

Electricity Sales (GWh)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	84,064	85,524	86,278	86,950	87,808	88,903	89,983	91,099	92,102	93,128	93,970	94,753
2. Mid Demand, Low Mid AAEE	84,023	84,681	85,044	85,318	85,720	86,259	86,870	87,542	88,198	88,875	89,335	89,746
3. Mid Demand, Mid AAEE	83,936	84,517	84,608	84,470	84,517	84,626	84,921	85,286	85,590	85,920	86,048	86,100
4. Mid Demand, High Mid AAEE	83,936	84,517	84,456	84,063	83,696	83,299	83,013	82,846	82,503	82,102	81,432	80,662
5. Low Demand, High AAEE	83,267	82,154	81,809	81,180	80,717	80,291	78,904	78,525	77,925	77,250	76,313	75,289
Peak Demand (MW)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	19,503	20,018	20,440	20,633	20,853	21,145	21,402	21,672	21,905	22,141	22,324	22,493
2. Mid Demand, Low Mid AAEE	19,368	19,770	20,105	20,193	20,303	20,472	20,628	20,798	20,947	21,094	21,185	21,262
3. Mid Demand, Mid AAEE	19,355	19,744	20,029	20,036	20,077	20,148	20,234	20,332	20,397	20,457	20,458	20,440
4. Mid Demand, High Mid AAEE	19,355	19,744	19,990	19,919	19,852	19,797	19,742	19,699	19,600	19,479	19,286	19,067
5. Low Demand, High AAEE	19,343	19,106	19,281	19,192	19,108	19,034	18,641	18,557	18,391	18,192	17,926	17,634
End-User Natural Gas Sales (MM Therms)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	4,577	4,611	4,619	4,619	4,620	4,627	4,625	4,617	4,606	4,599	4,578	4,563
2. Mid Demand, Low Mid AAEE	4,554	4,576	4,599	4,573	4,543	4,569	4,565	4,558	4,559	4,547	4,534	4,511
3. Mid Demand, Mid AAEE	4,554	4,577	4,597	4,568	4,534	4,556	4,545	4,534	4,530	4,512	4,493	4,464
4. Mid Demand, High Mid AAEE	4,554	4,577	4,595	4,563	4,527	4,546	4,532	4,516	4,506	4,482	4,455	4,418
5. Low Demand, High AAEE	4,397	4,325	4,395	4,369	4,432	4,425	4,359	4,342	4,361	4,333	4,315	4,292

Source: California Energy Commission, Demand Analysis Office, 2013

Table 10: SCE Adjusted Forecasts

Electricity Sales (GWh)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	85,465	87,019	87,828	88,533	89,275	90,339	91,441	92,634	93,750	94,842	95,810	96,704
2. Mid Demand, Low Mid AAEE	85,368	85,956	86,370	86,559	86,811	87,269	87,863	88,591	89,338	89,995	90,502	90,951
3. Mid Demand, Mid AAEE	85,278	85,787	85,895	85,627	85,490	85,485	85,729	86,138	86,525	86,826	86,992	87,071
4. Mid Demand, High Mid AAEE	85,278	85,787	85,751	85,225	84,665	84,143	83,797	83,663	83,371	82,919	82,261	81,494
5. Low Demand, High AAEE	84,582	83,311	82,973	82,165	81,438	80,742	79,179	78,835	78,302	77,543	76,569	75,510
Peak Demand (MW)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	20,002	20,547	20,934	21,169	21,417	21,718	21,996	22,298	22,573	22,841	23,068	23,276
2. Mid Demand, Low Mid AAEE	19,933	20,343	20,621	20,721	20,839	20,994	21,149	21,337	21,517	21,668	21,774	21,863
3. Mid Demand, Mid AAEE	19,920	20,316	20,542	20,554	20,607	20,664	20,750	20,875	20,981	21,054	21,079	21,081
4. Mid Demand, High Mid AAEE	19,920	20,316	20,517	20,461	20,406	20,343	20,292	20,277	20,213	20,100	19,926	19,720
5. Low Demand, High AAEE	19,805	19,538	19,660	19,572	19,482	19,354	18,933	18,870	18,731	18,518	18,243	17,944

Source: California Energy Commission, Demand Analysis Office, 2013

Table 11: SoCalGas Adjusted Forecasts

End-User Natural Gas Sales (MM Therms)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	5,254	5,317	5,313	5,279	5,258	5,250	5,231	5,212	5,191	5,174	5,142	5,111
2. Mid Demand, Low Mid AAEE	5,241	5,272	5,294	5,279	5,248	5,252	5,236	5,223	5,212	5,191	5,170	5,142
3. Mid Demand, Mid AAEE	5,242	5,274	5,293	5,273	5,238	5,237	5,215	5,195	5,176	5,149	5,120	5,084
4. Mid Demand, High Mid AAEE	5,242	5,274	5,290	5,268	5,230	5,226	5,200	5,176	5,152	5,118	5,083	5,040
5. Low Demand, High AAEE	5,125	5,040	5,079	5,066	5,122	5,132	5,077	5,054	5,056	5,020	4,991	4,957

Source: California Energy Commission, Demand Analysis Office, 2013

Table 12: SDG&E Adjusted Forecasts

Electricity Sales (GWh)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	20,047	20,540	20,877	21,162	21,527	21,953	22,335	22,685	22,998	23,282	23,530	23,765
2. Mid Demand, Low Mid AAEE	19,961	20,172	20,319	20,418	20,621	20,848	21,064	21,240	21,412	21,566	21,678	21,792
3. Mid Demand, Mid AAEE	19,941	20,134	20,213	20,212	20,336	20,465	20,615	20,736	20,838	20,927	20,980	21,027
4. Mid Demand, High Mid AAEE	19,941	20,134	20,175	20,116	20,142	20,158	20,169	20,170	20,119	20,030	19,889	19,739
5. Low Demand, High AAEE	19,778	19,493	19,409	19,214	19,146	19,089	18,814	18,767	18,628	18,450	18,226	18,006
Peak Demand (MW)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	4,721	4,841	4,957	5,018	5,095	5,179	5,247	5,308	5,359	5,405	5,437	5,468
2. Mid Demand, Low Mid AAEE	4,703	4,783	4,865	4,885	4,932	4,977	5,012	5,034	5,053	5,066	5,065	5,066
3. Mid Demand, Mid AAEE	4,700	4,777	4,846	4,846	4,878	4,901	4,920	4,930	4,932	4,928	4,909	4,890
4. Mid Demand, High Mid AAEE	4,700	4,777	4,840	4,823	4,831	4,828	4,816	4,796	4,761	4,717	4,655	4,592
5. Low Demand, High AAEE	4,667	4,593	4,628	4,591	4,581	4,560	4,475	4,444	4,386	4,315	4,229	4,142
End-User Natural Gas Sales (MM Therms)												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. High Demand, Low AAEE	495	503	507	508	511	512	512	511	511	510	508	505
2. Mid Demand, Low Mid AAEE	495	501	505	506	507	510	511	511	511	511	510	509
3. Mid Demand, Mid AAEE	495	501	505	506	506	509	509	509	508	507	505	503
4. Mid Demand, High Mid AAEE	495	501	505	505	505	507	506	505	503	501	497	493
5. Low Demand, High AAEE	488	484	493	498	504	507	501	502	502	500	498	496

Source: California Energy Commission, Demand Analysis Office, 2013

Utility Results for AEE Savings

Tables 13-32 provide estimated AEE savings results for the four IOU service territories, categorized by standards, emerging technologies, and other program measures. Results are provided by IOU and scenario for electricity consumption, electricity peak demand, and end-user natural gas consumption.

Table 13: PG&E Service Territory AAE Savings – Low Savings Case (Scenario 1)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	127	201	368	535	704	743	913	1,081	1,250	1,419	1,576	1,722
Program Measures: Emerging Technologies	-	-	4	8	14	21	31	42	56	74	95	119
Program Measures: Other	11	23	472	921	1,366	1,685	2,017	2,287	2,539	2,828	3,166	3,491
Total Program Measures	11	23	476	930	1,380	1,707	2,048	2,329	2,596	2,902	3,261	3,610
Total IAAE Savings	138	224	844	1,464	2,084	2,450	2,961	3,411	3,846	4,320	4,837	5,332
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	20	40	101	161	221	266	330	393	457	520	581	641
Program Measures: Emerging Technologies	-	-	0	1	2	3	4	6	9	12	16	21
Program Measures: Other	-	-	76	153	230	284	342	388	434	485	550	612
Total Program Measures	-	-	77	154	232	287	346	394	442	497	566	634
Total IAAE Savings	20	40	177	315	453	553	676	788	899	1,017	1,147	1,274
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(2.2)	(3.8)	(4.4)	(4.8)	(5.2)	(5.1)	(4.3)	(3.6)	(2.8)	(2.2)	(1.5)	(0.8)
Program Measures: Emerging Technologies	-	-	0.0	0.1	0.2	0.3	0.6	0.9	1.3	1.8	2.4	3.1
Program Measures: Other	0.5	1.0	12.1	23.1	34.2	47.4	60.5	74.4	88.2	102.3	115.6	128.7
Total Program Measures	0.5	1.0	12.1	23.2	34.4	47.7	61.1	75.3	89.6	104.2	118.0	131.7
Total IAAE Savings	(1.6)	(2.8)	7.6	18.4	29.2	42.6	56.8	71.8	86.7	102.0	116.5	131.0

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 14: PG&E Service Territory AAE Savings – Low Mid Savings Case (Scenario 2)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	126	205	375	546	728	779	952	1,125	1,299	1,475	1,641	1,795
Program Measures: Emerging Technologies	-	-	7	17	28	43	61	85	114	150	193	243
Program Measures: Other	11	23	476	924	1,372	1,696	2,035	2,311	2,573	2,850	3,194	3,525
Total Program Measures	11	23	483	941	1,400	1,739	2,096	2,396	2,687	3,000	3,387	3,767
Total IAAE Savings	138	228	858	1,487	2,128	2,518	3,049	3,521	3,987	4,476	5,029	5,562
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	20	41	101	162	225	271	335	399	463	527	589	650
Program Measures: Emerging Technologies	-	-	1	2	3	5	8	13	18	25	33	43
Program Measures: Other	-	-	77	155	233	290	350	398	445	495	561	626
Total Program Measures	-	-	78	156	236	295	359	410	463	520	595	669
Total IAAE Savings	20	41	179	319	461	566	694	809	926	1,047	1,184	1,319
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(2.2)	(3.8)	(4.4)	(4.8)	(5.2)	(5.1)	(4.3)	(3.6)	(2.8)	(2.2)	(1.5)	(0.8)
Program Measures: Emerging Technologies	-	-	0.0	0.1	0.4	0.7	1.2	1.9	2.8	3.8	5.1	6.6
Program Measures: Other	0.5	1.0	12.2	23.3	34.5	48.1	61.7	75.8	89.7	103.8	117.3	130.7
Total Program Measures	0.5	1.0	12.2	23.4	34.8	48.8	62.9	77.7	92.5	107.6	122.4	137.3
Total IAAE Savings	(1.6)	(2.8)	7.8	18.7	29.7	43.8	58.6	74.1	89.7	105.5	120.9	136.5

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 15: PG&E Service Territory AAE Savings – Mid Savings Case (Scenario 3)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	213	369	676	1,065	1,436	1,850	2,159	2,453	2,742	3,011	3,242	3,458
Program Measures: Emerging Technologies	-	-	39	93	167	255	366	510	688	904	1,159	1,447
Program Measures: Other	11	23	579	1,177	1,728	2,045	2,473	2,814	3,165	3,515	3,915	4,302
Total Program Measures	11	23	618	1,269	1,895	2,301	2,839	3,324	3,853	4,420	5,074	5,749
Total IAAE Savings	225	392	1,294	2,335	3,331	4,151	4,998	5,777	6,595	7,431	8,316	9,208
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	33	67	154	271	373	487	589	697	800	897	989	1,079
Program Measures: Emerging Technologies	-	-	4	10	19	32	51	75	112	153	202	258
Program Measures: Other	-	-	97	195	294	371	448	504	564	634	720	803
Total Program Measures	-	-	101	204	313	403	498	578	676	787	923	1,062
Total IAAE Savings	33	67	255	476	687	890	1,088	1,275	1,476	1,684	1,911	2,141
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(2.7)	(4.8)	(5.5)	(5.4)	(5.3)	(3.7)	(1.4)	1.0	3.5	5.8	8.0	10.2
Program Measures: Emerging Technologies	-	-	0.0	0.2	0.8	1.8	3.6	5.8	8.6	12.0	16.1	20.9
Program Measures: Other	0.5	1.0	15.0	28.9	42.5	58.7	75.7	91.1	107.0	122.8	138.0	153.1
Total Program Measures	0.5	1.0	15.0	29.1	43.2	60.5	79.3	96.9	115.6	134.8	154.1	173.9
Total IAAE Savings	(2.2)	(3.8)	9.4	23.7	38.0	56.8	77.9	97.9	119.1	140.6	162.1	184.2

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 16: PG&E Service Territory AAE Savings –High Mid Savings Case (Scenario 4)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	213	369	676	1,198	1,835	2,461	3,060	3,552	4,025	4,476	4,889	5,287
Program Measures: Emerging Technologies	-	-	104	243	428	659	998	1,475	2,043	2,706	3,412	4,185
Program Measures: Other	11	23	665	1,301	1,889	2,359	2,848	3,190	3,615	4,067	4,631	5,175
Total Program Measures	11	23	770	1,544	2,317	3,018	3,846	4,665	5,658	6,773	8,044	9,359
Total IAAE Savings	225	392	1,446	2,742	4,152	5,478	6,906	8,217	9,682	11,249	12,932	14,646
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	33	67	155	309	478	661	835	1,007	1,174	1,334	1,489	1,642
Program Measures: Emerging Technologies	-	-	13	34	67	113	174	254	359	492	646	815
Program Measures: Other	-	-	126	250	367	467	570	648	739	835	947	1,057
Total Program Measures	-	-	139	284	434	580	745	901	1,099	1,328	1,594	1,872
Total IAAE Savings	33	67	294	593	912	1,241	1,580	1,908	2,273	2,662	3,083	3,514
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(2.7)	(4.8)	(5.8)	(6.0)	(6.4)	(5.6)	(3.9)	(1.8)	0.5	2.5	4.5	6.5
Program Measures: Emerging Technologies	-	-	(0.3)	(0.3)	0.3	2.6	6.0	10.7	16.5	23.5	31.7	41.4
Program Measures: Other	0.5	1.0	17.9	34.9	51.6	70.2	88.8	106.6	125.6	144.7	163.2	181.5
Total Program Measures	0.5	1.0	17.6	34.6	51.9	72.7	94.8	117.3	142.1	168.2	194.9	222.9
Total IAAE Savings	(2.2)	(3.8)	11.8	28.6	45.4	67.1	90.9	115.5	142.6	170.7	199.4	229.3

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 17: PG&E Service Territory AAE Savings – High Savings Case (Scenario 5)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	219	396	714	1,245	1,900	2,551	3,160	3,680	4,182	4,664	5,104	5,530
Program Measures: Emerging Technologies	-	-	104	244	442	665	1,054	1,533	2,099	2,697	3,394	4,157
Program Measures: Other	11	23	671	1,316	1,914	2,394	2,888	3,231	3,657	4,144	4,702	5,237
Total Program Measures	11	23	775	1,560	2,356	3,060	3,942	4,763	5,756	6,840	8,096	9,394
Total IAAE Savings	230	419	1,489	2,805	4,255	5,611	7,102	8,443	9,938	11,504	13,200	14,924
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	33	71	161	319	493	684	870	1,052	1,221	1,391	1,556	1,719
Program Measures: Emerging Technologies	-	-	12	34	66	112	173	256	366	498	647	809
Program Measures: Other	-	-	130	257	383	486	591	670	763	857	972	1,085
Total Program Measures	-	-	142	291	449	598	765	925	1,129	1,356	1,619	1,894
Total IAAE Savings	33	71	303	610	942	1,281	1,635	1,977	2,350	2,747	3,176	3,613
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(2.7)	(4.8)	(5.9)	(6.1)	(6.6)	(5.8)	(3.9)	(1.7)	0.8	3.1	5.3	7.5
Program Measures: Emerging Technologies	-	-	(0.3)	(0.3)	0.3	2.5	6.0	10.6	16.3	23.3	31.4	40.8
Program Measures: Other	0.5	1.0	17.8	34.8	51.5	70.2	88.8	106.6	125.5	144.3	162.7	180.9
Total Program Measures	0.5	1.0	17.5	34.5	51.8	72.7	94.8	117.2	141.9	167.6	194.1	221.7
Total IAAE Savings	(2.2)	(3.8)	11.6	28.4	45.2	67.0	90.9	115.5	142.7	170.7	199.4	229.2

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 18: SCE Service Territory AAE Savings – Low Savings Case (Scenario 1)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	163	275	477	674	872	943	1,114	1,284	1,455	1,625	1,784	1,933
Program Measures: Emerging Technologies	-	-	5	11	18	27	37	50	67	86	109	136
Program Measures: Other	11	21	482	939	1,391	1,694	2,016	2,269	2,517	2,789	3,139	3,485
Total Program Measures	11	21	488	950	1,409	1,720	2,053	2,319	2,584	2,875	3,248	3,621
Total IAAE Savings	174	296	965	1,624	2,281	2,663	3,167	3,603	4,039	4,500	5,032	5,554
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	25	51	118	184	250	301	367	432	497	562	625	686
Program Measures: Emerging Technologies	-	-	0	1	2	3	4	6	9	12	17	22
Program Measures: Other	-	-	84	168	250	305	367	413	461	516	588	659
Total Program Measures	-	-	84	169	252	308	371	420	470	528	604	681
Total IAAE Savings	25	51	202	353	502	610	738	852	967	1,090	1,229	1,367

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 19: SCE Service Territory AAEE Savings – Low Mid Savings Case (Scenario 2)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	163	279	480	680	889	973	1,149	1,325	1,502	1,682	1,851	1,978
Program Measures: Emerging Technologies	-	-	10	23	38	54	75	101	134	172	219	302
Program Measures: Other	11	21	480	945	1,401	1,701	2,020	2,272	2,527	2,782	3,129	3,468
Total Program Measures	11	21	491	968	1,438	1,755	2,095	2,373	2,661	2,955	3,348	3,770
Total IAEE Savings	174	300	970	1,647	2,327	2,728	3,244	3,698	4,162	4,637	5,199	5,748
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	25	51	118	185	253	306	372	438	504	570	634	697
Program Measures: Emerging Technologies	-	-	1	2	3	6	9	13	18	25	33	43
Program Measures: Other	-	-	84	169	253	309	372	419	468	519	590	661
Total Program Measures	-	-	84	171	256	315	380	432	487	544	624	704
Total IAEE Savings	25	51	203	356	510	621	753	870	991	1,114	1,258	1,401

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 20: SCE Service Territory AAE Savings – Mid Savings Case (Scenario 3)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	253	448	697	1,099	1,481	1,909	2,227	2,531	2,829	3,106	3,374	3,628
Program Measures: Emerging Technologies	-	-	52	120	209	310	434	594	790	1,021	1,292	1,598
Program Measures: Other	11	21	696	1,359	1,957	2,292	2,717	3,026	3,356	3,678	4,043	4,402
Total Program Measures	11	21	748	1,480	2,166	2,603	3,151	3,620	4,146	4,699	5,335	6,000
Total IAAE Savings	264	469	1,445	2,579	3,648	4,512	5,378	6,151	6,975	7,806	8,709	9,628
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	38	78	164	285	392	521	622	723	826	932	1,033	1,130
Program Measures: Emerging Technologies	-	-	4	11	22	37	57	83	116	157	206	262
Program Measures: Other	-	-	114	227	328	393	473	526	584	639	714	790
Total Program Measures	-	-	118	238	350	430	530	609	701	796	921	1,052
Total IAAE Savings	38	78	282	523	742	951	1,152	1,332	1,527	1,728	1,953	2,183

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 21: SCE Service Territory AAE Savings – High Mid Savings Case (Scenario 4)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	253	448	741	1,260	1,898	2,603	3,157	3,665	4,152	4,618	5,073	5,515
Program Measures: Emerging Technologies	-	-	163	381	659	902	1,341	1,811	2,373	3,028	3,781	4,597
Program Measures: Other	11	21	686	1,340	1,916	2,350	2,812	3,150	3,604	4,066	4,586	5,093
Total Program Measures	11	21	849	1,721	2,575	3,252	4,153	4,962	5,977	7,095	8,367	9,691
Total IAAE Savings	264	469	1,589	2,981	4,473	5,854	7,310	8,626	10,129	11,713	13,440	15,205
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	38	78	169	330	508	709	877	1,044	1,212	1,383	1,549	1,712
Program Measures: Emerging Technologies	-	-	15	41	78	119	194	286	395	525	679	848
Program Measures: Other	-	-	123	245	357	444	538	600	688	773	879	985
Total Program Measures	-	-	138	287	435	563	732	886	1,083	1,298	1,557	1,833
Total IAAE Savings	38	78	307	616	943	1,272	1,610	1,930	2,295	2,682	3,106	3,544

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 22: SCE Service Territory AEE Savings – High Savings Case (Scenario 5)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	259	475	763	1,289	1,948	2,679	3,260	3,797	4,338	4,883	5,380	5,854
Program Measures: Emerging Technologies	-	-	161	381	666	943	1,357	1,825	2,383	3,021	3,758	4,559
Program Measures: Other	11	21	695	1,368	1,960	2,388	2,908	3,249	3,681	4,081	4,583	5,080
Total Program Measures	11	21	856	1,749	2,626	3,330	4,266	5,074	6,064	7,102	8,341	9,639
Total IAAE Savings	269	496	1,619	3,037	4,574	6,009	7,525	8,870	10,402	11,985	13,721	15,492
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	39	82	175	337	521	729	906	1,086	1,271	1,453	1,630	1,804
Program Measures: Emerging Technologies	-	-	15	40	79	121	198	285	393	522	673	840
Program Measures: Other	-	-	122	249	361	451	549	613	696	779	884	988
Total Program Measures	-	-	137	289	440	572	747	898	1,089	1,301	1,557	1,828
Total IAAE Savings	39	82	312	626	961	1,301	1,653	1,984	2,360	2,755	3,187	3,632

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 23: SoCalGas Service Territory AAE Savings – Low Savings Case (Scenario 1)

MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(3.5)	(6.1)	(7.1)	(7.6)	(8.3)	(8.1)	(6.9)	(5.7)	(4.5)	(3.5)	(2.4)	(1.2)
Program Measures: Emerging Technologies	-	-	0.0	0.1	0.2	0.3	0.5	0.8	1.1	1.4	1.9	2.4
Program Measures: Other	0.6	1.2	16.6	31.8	46.7	61.4	75.9	89.5	103.8	117.9	132.0	146.0
Total Program Measures	0.6	1.2	16.7	31.9	46.9	61.8	76.4	90.2	104.8	119.4	133.9	148.4
Total IAAE Savings	(2.8)	(4.9)	9.6	24.3	38.6	53.6	69.5	84.5	100.3	115.9	131.5	147.2

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 24: SoCalGas Service Territory AAE Savings – Low Mid Savings Case (Scenario 2)

MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(3.5)	(6.1)	(7.1)	(7.6)	(8.3)	(8.1)	(6.9)	(5.7)	(4.5)	(3.5)	(2.4)	(1.2)
Program Measures: Emerging Technologies	-	-	0.0	0.2	0.4	0.6	1.1	1.6	2.2	3.0	3.9	5.0
Program Measures: Other	0.6	1.2	16.9	32.4	47.5	62.3	76.9	90.6	105.1	119.5	133.7	147.9
Total Program Measures	0.6	1.2	17.0	32.6	47.9	63.0	78.0	92.1	107.3	122.5	137.7	153.0
Total IAAE Savings	(2.8)	(4.9)	9.9	25.0	39.6	54.9	71.0	86.4	102.8	119.0	135.3	151.7

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 25: SoCalGas Service Territory AAEE Savings – Mid Savings Case (Scenario 3)

MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(4.3)	(7.6)	(8.9)	(8.6)	(8.4)	(5.9)	(2.2)	1.6	5.6	9.3	12.9	16.4
Program Measures: Emerging Technologies	-	-	0.1	0.5	1.2	2.3	3.7	5.5	7.8	10.5	13.8	17.5
Program Measures: Other	0.6	1.2	19.9	38.4	56.4	74.1	91.3	107.2	124.5	141.7	158.9	176.0
Total Program Measures	0.6	1.2	20.0	39.0	57.6	76.4	95.0	112.8	132.3	152.2	172.6	193.6
Total IAEE Savings	(3.7)	(6.4)	11.1	30.3	49.2	70.4	92.7	114.4	137.9	161.5	185.5	210.0

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 26: SoCalGas Service Territory AAEE Savings – High Mid Savings Case (Scenario 4)

MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(4.3)	(7.6)	(9.3)	(9.5)	(10.3)	(9.0)	(6.2)	(2.9)	0.7	4.0	7.2	10.3
Program Measures: Emerging Technologies	-	-	0.4	1.4	3.1	5.7	9.3	13.8	19.4	26.0	33.8	42.7
Program Measures: Other	0.6	1.2	22.6	43.8	64.1	84.2	104.1	122.1	142.0	161.8	181.5	201.2
Total Program Measures	0.6	1.2	23.0	45.2	67.3	89.9	113.4	135.9	161.4	187.8	215.3	243.9
Total IAEE Savings	(3.7)	(6.4)	13.7	35.7	56.9	80.9	107.2	133.0	162.1	191.8	222.5	254.2

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 27: SoCalGas Service Territory AAE Savings – High Savings Case (Scenario 5)

MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(4.4)	(7.7)	(9.5)	(9.8)	(10.6)	(9.3)	(6.2)	(2.7)	1.3	4.9	8.5	12.0
Program Measures: Emerging Technologies	-	-	0.4	1.4	3.1	5.7	9.2	13.7	19.1	25.7	33.3	42.0
Program Measures: Other	0.6	1.2	22.7	44.2	64.9	85.3	105.2	123.1	143.0	162.8	182.5	202.2
Total Program Measures	0.6	1.2	23.0	45.6	68.0	90.9	114.4	136.8	162.2	188.5	215.9	244.2
Total IAE Savings	(3.7)	(6.5)	13.6	35.8	57.4	81.7	108.2	134.1	163.4	193.5	224.3	256.2

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 28: SDG&E Service Territory AAE Savings – Low Savings Case (Scenario 1)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	20	26	56	86	117	114	155	196	236	277	315	351
Program Measures: Emerging Technologies	-	-	1	2	3	5	7	9	12	16	20	25
Program Measures: Other	2	4	114	225	336	412	496	566	635	718	813	904
Total Program Measures	2	4	115	227	340	417	503	576	647	734	834	929
Total IAAE Savings	22	30	171	313	456	531	658	772	884	1,011	1,149	1,280
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	3	6	19	32	44	53	68	83	98	113	127	141
Program Measures: Emerging Technologies	-	-	0	0	0	1	1	1	2	3	3	4
Program Measures: Other	-	-	21	42	63	78	95	109	123	138	158	176
Total Program Measures	-	-	21	42	64	79	96	110	125	141	161	181
Total IAAE Savings	3	6	40	74	108	132	164	193	222	254	288	322
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(0.2)	(0.4)	(0.5)	(0.5)	(0.6)	(0.6)	(0.5)	(0.4)	(0.3)	(0.2)	(0.2)	(0.1)
Program Measures: Emerging Technologies	-	-	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.6	0.7
Program Measures: Other	0.1	0.1	1.7	3.3	4.8	6.8	8.8	11.0	13.1	15.3	17.5	19.6
Total Program Measures	0.1	0.1	1.7	3.3	4.8	6.9	9.0	11.2	13.4	15.8	18.0	20.3
Total IAAE Savings	(0.2)	(0.3)	1.2	2.7	4.2	6.3	8.5	10.8	13.1	15.5	17.9	20.2

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 29: SDG&E Service Territory AEE Savings – Low Mid Savings Case (Scenario 2)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	20	27	59	92	128	131	174	218	262	306	348	388
Program Measures: Emerging Technologies	-	-	2	5	7	10	14	19	26	34	43	54
Program Measures: Other	2	4	121	235	350	427	515	589	664	748	851	947
Total Program Measures	2	4	123	240	357	437	529	608	690	782	894	1,001
Total IAAE Savings	22	32	182	332	485	568	703	826	951	1,088	1,242	1,389
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	3	7	20	33	46	55	71	86	101	116	131	146
Program Measures: Emerging Technologies	-	-	0	0	1	1	2	3	4	5	7	9
Program Measures: Other	-	-	22	44	66	82	100	114	129	146	167	187
Total Program Measures	-	-	22	44	67	83	102	117	133	152	174	197
Total IAAE Savings	3	7	42	77	113	139	172	203	234	268	306	342
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(0.2)	(0.4)	(0.5)	(0.5)	(0.6)	(0.6)	(0.5)	(0.4)	(0.3)	(0.2)	(0.2)	(0.1)
Program Measures: Emerging Technologies	-	-	0.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.6
Program Measures: Other	0.1	0.1	1.9	3.5	5.0	7.1	9.2	11.4	13.7	16.0	18.3	20.5
Total Program Measures	0.1	0.1	1.9	3.5	5.1	7.3	9.5	11.9	14.4	16.9	19.5	22.1
Total IAAE Savings	(0.2)	(0.3)	1.4	3.0	4.6	6.7	9.0	11.5	14.0	16.7	19.3	22.0

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 30: SDG&E Service Territory AAE Savings – Mid Savings Case (Scenario 3)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	40	66	131	228	320	394	480	574	642	705	759	809
Program Measures: Emerging Technologies	-	-	9	19	32	48	69	97	154	202	260	325
Program Measures: Other	2	4	149	291	419	510	603	659	729	819	922	1,020
Total Program Measures	2	4	157	310	451	557	672	756	883	1,022	1,182	1,345
Total IAAE Savings	42	70	288	538	770	951	1,152	1,330	1,525	1,727	1,940	2,154
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	6	13	32	58	81	106	130	155	181	207	231	252
Program Measures: Emerging Technologies	-	-	1	2	4	7	11	16	23	31	41	55
Program Measures: Other	-	-	28	56	82	102	123	135	151	169	190	211
Total Program Measures	-	-	29	58	86	109	134	152	174	200	231	265
Total IAAE Savings	6	13	61	116	167	215	264	307	355	406	462	518
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(0.3)	(0.5)	(0.6)	(0.6)	(0.6)	(0.4)	(0.2)	0.1	0.4	0.7	0.9	1.2
Program Measures: Emerging Technologies	-	-	0.0	0.1	0.3	0.6	1.1	1.6	2.3	3.2	4.2	5.4
Program Measures: Other	0.1	0.1	2.1	3.9	5.5	7.8	10.2	12.2	14.5	16.9	19.1	21.4
Total Program Measures	0.1	0.1	2.1	4.0	5.9	8.4	11.3	13.9	16.8	20.1	23.3	26.8
Total IAAE Savings	(0.2)	(0.4)	1.5	3.4	5.3	8.0	11.2	14.0	17.2	20.7	24.3	27.9

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 31: SDG&E Service Territory AAE Savings – High Mid Savings Case (Scenario 4)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	40	66	135	254	401	539	694	831	942	1,047	1,144	1,237
Program Measures: Emerging Technologies	-	-	24	54	94	143	207	297	429	586	762	953
Program Measures: Other	2	4	168	326	469	576	697	768	873	991	1,125	1,251
Total Program Measures	2	4	191	380	563	719	904	1,064	1,302	1,577	1,887	2,205
Total IAAE Savings	42	70	326	634	964	1,258	1,598	1,896	2,244	2,624	3,031	3,442
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	6	13	32	68	107	148	189	230	271	312	348	384
Program Measures: Emerging Technologies	-	-	3	8	15	26	40	57	79	106	140	178
Program Measures: Other	-	-	32	63	92	114	139	154	176	200	227	254
Total Program Measures	-	-	35	71	107	140	179	211	255	305	367	432
Total IAAE Savings	6	13	67	139	214	288	368	441	526	617	716	816
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(0.3)	(0.5)	(0.7)	(0.7)	(0.7)	(0.6)	(0.4)	(0.2)	0.1	0.3	0.5	0.7
Program Measures: Emerging Technologies	-	-	0.0	0.2	0.5	1.2	2.2	3.5	5.0	6.9	9.1	11.6
Program Measures: Other	0.1	0.1	2.4	4.6	6.6	9.2	11.9	14.3	17.2	20.2	23.1	26.0
Total Program Measures	0.1	0.1	2.4	4.8	7.1	10.4	14.1	17.8	22.2	27.1	32.2	37.5
Total IAAE Savings	(0.2)	(0.4)	1.8	4.1	6.4	9.8	13.7	17.6	22.3	27.4	32.7	38.3

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Table 32: SDG&E Service Territory AAE Savings – High Savings Case (Scenario 5)

GWh												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	41	73	145	267	419	565	735	861	979	1,091	1,194	1,294
Program Measures: Emerging Technologies	-	-	25	56	96	147	211	319	452	605	770	945
Program Measures: Other	2	4	171	335	480	589	713	783	892	1,007	1,151	1,291
Total Program Measures	2	4	195	391	576	735	923	1,102	1,343	1,611	1,920	2,236
Total IAAE Savings	44	77	341	658	995	1,300	1,659	1,963	2,322	2,703	3,115	3,530
MW												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	6	14	34	70	110	154	198	241	285	326	364	402
Program Measures: Emerging Technologies	-	-	3	8	15	26	39	57	78	107	141	178
Program Measures: Other	-	-	33	65	94	117	144	161	187	214	245	275
Total Program Measures	-	-	35	72	109	142	183	218	265	321	386	453
Total IAAE Savings	6	14	70	143	220	296	381	459	550	646	750	856
MM Therms												
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Standards	(0.3)	(0.5)	(0.7)	(0.7)	(0.8)	(0.7)	(0.4)	(0.2)	0.1	0.4	0.6	0.9
Program Measures: Emerging Technologies	-	-	0.0	0.2	0.5	1.2	2.1	3.1	4.3	5.8	7.5	9.6
Program Measures: Other	0.1	0.1	2.5	4.7	6.8	9.5	12.5	15.5	19.1	22.8	26.5	30.2
Total Program Measures	0.1	0.1	2.5	4.9	7.4	10.7	14.7	18.6	23.4	28.6	34.1	39.7
Total IAAE Savings	(0.2)	(0.4)	1.8	4.2	6.6	10.0	14.2	18.4	23.5	29.0	34.7	40.6

NOTE: Individual entries may not sum to total due to rounding.
 Source: California Energy Commission, Demand Analysis Office, 2013

Appendix P. Details on Additional Achievable Energy Efficiency Scenarios

The purpose of this appendix is to provide background and further detail on the five scenarios recommended by JASC, including (a) the scenario inputs that make up the mid case variations and high / low cases the relative MW impacts of these inputs; (b) a summary of stakeholder process and comments received on this issue, and (c) a timeline for incorporating these scenarios into the 2013 IEPR process.

P.1 Scenario Structure

Five additional achievable energy efficiency scenarios were structure around two types of uncertainty:

- (1) Economic and demographic (“econ-demo”) inputs: specifically, building stock growth rate, retail electricity rates, and avoided cost variables. These same variables are inputs to the IEPR base forecast;
- (2) Non-econ-demo inputs: specifically, variables related to emerging technologies, code compliance, Title 24 code adoption dates, incremental measure cost, implied discount rate, marketing effect, cost-effectiveness (“Total Resource Cost”) threshold, unit energy savings, word of mouth effect, and other variables. (See Section IV below for detailed descriptions of each of these variables.)

First, a set of three scenarios was constructed, varying the non-econ-demo inputs using the same mid-case IEPR base forecast assumptions for econ-demo inputs (See Section IV below for a description of the three variations on the mid-case.) Second, a set of two scenarios was constructed, varying the econ-demo inputs, using the mostly same non-econ-demo inputs as in the “mid-mid” case, with two exceptions. (See Section V below for a description of these high / low cases).

P.2 Stakeholder Process to Review Additional Achievable EE Forecast Scenarios

The Additional Achievable EE forecast scenarios were developed from the CPUC’s Potential and Goals (P&G) Study model, prepared by Navigant Consulting. DAWG has been actively involved in the study since its inception in 2011, reviewing its methodology and inputs and providing quality control review of the publicly accessible model. Prior to the review process of the scenarios, Navigant had incorporated multiple iterations of stakeholder comments into the model.

In the Potential and Goals Study, Navigant originally proposed high, mid and low case scenarios. CEC ran four additional scenarios in order to prepare a sensitivity analysis and scenario options for JASC. The scenario analysis, which provided savings impacts, was presented to DAWG for written comments. Eight stakeholder groups submitted written comments: Efficiency Council, Natural Resources Defense Council, CAISO, Independent Energy Producers, PG&E, SCE, SDG&E, and SCG, which JASC reviewed and discussed in its deliberations over recommendations. The stakeholders coalesced around two out of the seven scenarios (Note: these were all slightly different from the 5 final JASC-recommended scenarios) to recommend a mid-case to JASC.

For the most part, stakeholders were in agreement that Navigant’s assumptions were reasonable and based on the best available information. The discussion focused on two key components in the forecast that presented uncertainty. Besides IEP, all stakeholders agreed on all assumptions except for the

following two components, which are presented in the following table and further described in the next section:

- Title 24 code compliance: NRDC, PG&E and SCE stated that 100% of emerging technology potential should be included in the mid case, which assumes that that risk factor discount in the potential model sufficiently reduces projected savings for emerging technologies. CAISO, IEP, SCG and SDG&E recommended reducing emerging technology savings by 50% in the mid case.
- Savings from emerging technologies: NRDC, PG&E and SCE stated that 100% of emerging technology potential should be included in the mid case, which assumes that that risk factor discount in the potential model sufficiently reduces projected savings for emerging technologies. CAISO, IEP, SCG and SDG&E recommended reducing emerging technology savings by 50% in the mid case.

P.3 Variations on the Mid Case Scenario

Table 1 below presents three variations on mid-case recommended by JASC, including a summary of scenario inputs and the modeled outputs (total GWh and MW). The table below contains an assessment of the MW impact of individual scenario components relative to the mid-case assumptions (See also Figure 1. Tornado Chart Showing Model Sensitivities to Changes in Key Variables from Navigant’s P&G Study characterizing the sensitivity analysis they conducted.)

Table 1. Proposed Mid-Case Scenarios for Additional Achievable Efficiency, 2013 IEPR Forecast

	Scenario Component Impact as % of EE forecast		Variations on the IEPR Mid Case Scenario In order of impact on impact on Scenario's Variables: Highest impact on top, Lowest impact on bottom)		
	% Impact of Scenario Component in	% Impact of Scenario Component in	Low EE penetration (Mid IEPR, low EE variables)	Mid EE penetration (Mid IEPR, mid EE variables)	High EE penetration (Mid IEPR, high EE variables)
Code compliance	-11.50%	1.80%	No Compliance Enhancements, 20% reduction	No Compliance enhancements	No Compliance enhancements
Incremental Costs	-9.50%	6.90%	Best Estimate in Mid Case plus 25%	Best Estimate from past evaluated results	Best Estimate in Mid Case minus 25%
Emerging Technologies	-8.30%	N/A ²	50% of model results	100% of ET model results	150% of ET model results
Implied Discount Rate	-3.50%	7.40%	20%	18%	14%
Marketing Effect	-4.40%	5.00%	1%	2%	3%
TRC threshold	-6.80%	1.00%	2	0.85	0.75
Measure Densities	-1.40%	3.30%	Estimate plus 20%	Best Estimate Costs	Estimate minus 20%
Unit Energy Savings	-1.30%	1.90%	Best Estimate in Mid Case minus 25%	Best Estimate from past evaluated results	Best Estimate in Mid Case plus 25%
Title 24 Adoption Dates	N/A ²	1.80%	2005, 2008, 2013	2005, 2008, 2013, 2016, 2019, 2022	2005, 2008, 2013, 2016, 2019, 2022
Word of Mouth Effect	-1.40%	1.20%	39%	43%	47%
Emerging Technology TRC	-0.10%	0.00%	0.85	0.5	0.4
Incentive Level	-	-	50% of incremental cost	50% of incremental cost	50% of incremental cost
2024 Savings (GWh)			12,645	20,935	33,307
2024 Savings (MW)			3,055	4,833	7,877

¹ Scenario Component Impact is based on Navigant's sensitivity analysis, using GWh, except for mid-case variations, which are emerging technologies, code compliance and Title 24 adoptions dates. Navigant's sensitivity analysis is based on the impact of the component relative to market potential and was subsequently adjusted to reflect its impact on the mid-case forecast.

² Low case Title 24 updates and high case for emerging technologies were not included in the original sensitivity analyses, and thus not available in time for this memo.

Definitions of Components

- 1) **Code Compliance:** The P&G study decrements savings from Title 24 and 20 codes, and federal appliance standards based on informed assumptions regarding code compliance. However, evaluation research on code compliance is limited, and the compliance rate varies by sector and measure groups, but the common default rate is 85%. The mid-case scenario has been run with the following variations:

- a) **Reduce code compliance by 20%:** This option produced a flat reduction to code compliance across all measure types and sectors, which results in an approximately 12% reduction in savings by 2024. DAWG stakeholders agreed that a 20% reduction on code compliance was not appropriate for the mid-case scenario. JASC recommends one mid case option that includes reduced code compliance.
 - b) **Remove compliance enhancements:** Navigant developed a scenario option for “compliance enhancements,” to meet the Strategic Plan goal to increase Title 24 compliance through aggressive statewide enforcement. This policy initiative is also reflective of compliance improvement having been identified as a “foundational strategy” in the CEC’s draft AB 758 plan (Comprehensive Program for Existing Buildings EE Retrofits). The compliance enhancement option assumes that code compliance would increase to 100% over a period of 6 years for Title 24 codes, 10 years for Title 20 standards, and 5 years for federal appliance standards. Except for NRDC, all DAWG stakeholders agreed that the compliance enhancement assumption was not reasonable for the mid case. JASC does not consider the compliance enhancements assumption to be reasonable in the mid case scenario, but does include it in the high case scenario.
- 2) **Emerging Technologies:** New energy efficiency technologies, systems, or practices that have significant energy savings potential but have not yet achieved sufficient market share (for a variety of reasons) to be considered self-sustaining or commercially viable. Emerging technologies include late stage prototypes or under-utilized but commercially available hardware, software, design tools or energy services that if implemented appropriately should result in energy savings. The single largest source of emerging technology savings is expected to be from LED lighting in the commercial sector. Navigant modeled the high end of efficiency for each measure group by identifying the technology that met the following criteria:
- a) Not commercially available in today’s market, but expected to be available in the next three to five years
 - b) Commercially available but representing less than 5 percent of the existing market share
 - c) Measures that are currently not cost effective, but cost and/or performance are expected to substantially improve in the future.

Since the energy savings potential is based on technologies that have not achieved significant market penetration and/or cost effectiveness, Navigant applied a risk factor to each measure to decrement the savings, which is captured in the mid-case scenario. Navigant further adjusts emerging technology savings in the low and high case scenarios through the Unit Energy Savings adjustment and the Emerging Technology Total Resource Cost (TRC) threshold, discussed in the next section.

In the scenario review process, there was general consensus among all stakeholders that some level of emerging technologies should be included in the demand forecast. NRDC, PG&E and SCE stated that 100% of emerging technology potential should be included in the mid case, which assumes that that risk factor discount in the potential model sufficiently reduces projected savings for emerging technologies. CAISO, IEP, SCG and SDG&E recommended reducing emerging technology savings by 50% in the mid case. They go further to argue that the uncertainty regarding LEDs also has an upward effect, and there could be much greater savings from emerging technologies than was modeled. In response to comments, JASC set the mid case scenarios at 50% for mid case 1, 100%, for mid case 2 and 150% for mid case 3.

- 3) **Incremental Costs:** Incremental costs are the difference in costs between code level equipment and the high efficiency equipment. The incremental costs for efficient technologies are from Database on Energy Efficiency Resources (DEER) – the CPUC-approved database of energy savings parameter – and the model adjusts the incremental costs across all technologies to account for changes over time. Adjustments to incremental costs between scenarios apply to all measures. JASC did not change Navigant’s proposed assumptions to adjust the incremental costs by 25% for the low and high case scenarios.
- 4) **Implied Discount Rate:** The implied discount rate is the effective discount rate that consumers apply when making a purchase decision; it determines the amount the customer is willing to pay for an EE investment. The implied discount rate is much higher than the standard discount rate used for making investment decisions because it accounts for other market barriers which may impact the customer decision.

The mid-case and the high and low variations were determined based on existing literature on the implied discount rate for energy efficiency adoption and the range of uncertainty. JASC did not change Navigant’s proposed assumptions for the low and high forecast.

- 5) **Marketing Effect:** The base factors for market adoption are customer’s willingness and awareness, which was derived from a regression analysis of technology adoptions from several studies on technology diffusion. Each end use in each sector was assigned marketing and word of mouth effectiveness factors corresponding to diffusion rates in the studies. The high and low scenario varies these customer adoption rates as part of scenario analysis to assess changes in the level and timing of customer adoption. JASC did not change Navigant’s proposed assumptions for the low and high forecast.
- 6) **TRC Threshold:** The Total Resource Cost (TRC) is the primary cost-effectiveness methodology that the Commission uses to determine to set funding levels and adoption thresholds for energy efficiency. The TRC test measures the net resource benefits from the perspective of all ratepayers by combining the net benefits of the program to participants and non-participants.

The benefits are the avoided costs of the supply-side resources avoided or deferred. A TRC Threshold of 1.0 is defined as the costs and benefits of a measure are equal. If the measure does not pass the threshold, it will not be counted for market potential. However, market potential is a further screen that considers the cost effectiveness of the measure, as part of the calculation of customer’s willingness and awareness to adopt. The mid-case scenario set a cost-effectiveness threshold of 0.85 TRC since the overall energy efficiency portfolio can include less cost effective measures, for which their cost is offset by the more cost effective measures. A 0.85 TRC threshold is the established rule of thumb for screening energy efficiency measures, because the excess benefits of more cost effective measures in the portfolio subsidize the additional costs of certain measures that are close to being cost effective, but slightly below 1.0

IEP recommended increasing the TRC threshold to 1 for the mid case scenario, however, this recommendation would effectively change existing CPUC policy. JASC did not change Navigant’s proposed assumptions for this variable.

- 7) **Efficient Measure Density:** Measure density is defined as the number of units of a technology per unit area. Specifically, measure density is categorized as follows:
- a) *Baseline measure density:* This is the number of units of a baseline technology per unit home for the residential sector, or per unit area for the commercial sector.
 - b) *Energy efficient measure density:* This is the number of energy efficient units existing per unit home for the residential sector, or per unit area for the commercial sector.
 - c) *Total measure density:* This is usually the sum of the baseline and efficient measure density. When two or more efficient measures compete to replace the same baseline measure, then the total density is equal to the sum of the baseline density and all applicable energy efficient technology densities.

Measure densities are initially set based on market data such as Residential Appliance Saturation Study (RASS) and Commercial End Use Survey (CEUS). We then make adjustments based on Evaluation, Measurement and Verification (EM&V) results for programs that have installed measures since the initial market studies were done. For example, RASS was updated in 2009 so we used this to help set densities, but also adjusted RASS numbers to account for the 2010, 2011, and 2012 programs. The final densities we settle on are different for each measure or measure category. The adjustment made to the model scenarios are simple multipliers of the densities used in the mid-case. JASC did not change Navigant's proposed assumptions for this variable.

- 8) **Unit Energy Savings:** Unit Energy Savings is the estimated difference in annual energy consumption between a measure, group of technologies or processes and baseline, expressed as kWh for electric technologies and therms for gas technologies. Adjustments to Unit Energy Savings to the high and low scenario apply only to emerging technology measures. Since savings estimates for emerging technologies can be uncertain, this multiplier allows the user to examine the effects of varying the calculated Unit Energy Savings for emerging technologies.

The Unit Energy Savings values come from DEER. The scenarios simply increase or reduce the savings values by 25%.

- 9) **Future Code Updates:** Navigant's initial mid case scenario includes Title 20, 24 and federal appliance standards updates that were in the process of being adopted but not yet a law. These include 2005, 2008, 2013, and 2016. Navigant did not include the 2019 and 2022 Title 24 updates in the mid case scenario because they were based on very limited measure level analysis. While the early year code updates are mostly embedded in the forecast, and not part of the incremental EE savings, savings from past code accrue over the life of a measure, as the existing equipment is assumed to be replaced upon burnout.

The impact of 2019 and 2022 codes is minimal because savings begin to accrue 3-4 years after the code update year. However, compliance dates and efficiency level have not been formally established.

- 10) **Emerging Technology TRC Threshold:** The Total Resource Cost (TRC) threshold – a cost-effectiveness screen – for emerging technologies is different than it is for other measures, because just as more highly cost effective measures subsidize less cost effective measures, they also do so for

emerging technologies. These specific technologies have been identified to receive additional support in order to help drive their market adoption. The adjustment varies the cost-benefit threshold that emerging technology measures must meet.

The Emerging Technology TRC Threshold was reduced to 0.5 for the mid case scenario and to 0.4 for the high case scenario. In the year that an emerging technology passes the Emerging Technology TRC threshold, the model begins to calculate technical and economic potential for that emerging technology. However, market potential for an emerging technology that barely passes a TRC would likely be low since awareness is low and willingness is low - willingness is correlated with TRC even though it is calculated differently. Over time, as avoided costs and energy prices increase, and as emerging technology equipment costs decrease, both the TRC and willingness/awareness will improve all resulting in increased market potential.

- 11) **Incentive Level:** The incentive level is a policy question for the CPUC to consider in the portfolio guidance proceeding. Program incentive levels have not been defined by established Commission requirements; IOUs may set incentive levels to best meet their goals. However, past goals were based on a flat incentive level of 50% across all measures. To meet these goals, the IOUs file a program portfolio application, which defines an incentive level for each measure and demonstrates that the sum of the incentive costs are cost effective in total. Based on this cost-effectiveness showing, the CPUC authorizes an EE budget that the IOU collects in their rates. While the IOUs may vary the incentive level from measure to measure, they must work within their authorized budget to maximize savings, so their incentives on average, balance out to be approximately 50% of the incremental cost. Navigant had originally proposed adjustments to the incentive level as an option in optimize savings. However the results of the analysis suggested that the current incentive level is the most cost effective option, so the CPUC is not going to consider this adjustment as a policy option in the next portfolio decision. Hence, there is no uncertainty in this component and all scenarios were set at 50% of incremental cost.

P.4 Low, Mid and High Case Scenarios

Table 2 outlines the components that were adjusted in order to generate the scenarios for the low, mid and high IEPR demand forecast. Except for where otherwise indicated, the variables used for the mid-case 1, 2 and 3 in the previous section correlate with the low, mid and high cases below. There are three additional variables in these scenarios, which are based on the 2011 IEPR demand forecast.

Table 2. Proposed Scenarios for Additional Achievable Efficiency, 2013 IEPR Forecast

	Scenario Component Impact as % of EE forecast		Variations on the IEPR Mid Case Scenario In order of impact on Scenario's Variables: Highest impact on top, Lowest impact on bottom)		
	% Impact of Scenario Component in low case*	% Impact of Scenario Component in high case	Low EE penetration	Mid EE penetration	High EE penetration
			(Mid IEPR, low EE variables)	(Mid IEPR, mid EE variables)	(Mid IEPR, high EE variables)
Code compliance	-11.50%	1.80%	No Compliance Enhancements, 20% reduction	No Compliance enhancements	Compliance enhancements Included
Emerging Technologies	-8.30%	N/A2	25% of model results	100% of ET model results	150% of ET model results
Incremental Costs	-9.50%	0.069	Best Estimate in Mid Case plus 25%	Best Estimate from past evaluated results	Best Estimate in Mid Case minus 25%
Implied Discount Rate	-3.50%	7.40%	20%	18%	14%
Marketing Effect	-4.40%	5.00%	1%	2%	3%
TRC threshold	-6.80%	1.00%	1	0.85	0.75
Avoided Costs	-6.00%	0.30%	Mid case adjusted by the retail rates in high case scenario	Results of the E3 Avoided Cost Calculator	Mid case adjusted by the retail rates in low case scenario
Measure Densities	-1.40%	3.30%	Estimate plus 20%	Best Estimate Costs	Estimate minus 20%
Unit Energy Savings	-0.013	1.90%	Best Estimate in Mid Case minus 25%	Best Estimate from past evaluated results	Best Estimate in Mid Case plus 25%
Title 24 Adoption Dates	N/A2	1.80%	2005, 2008, 2013	2005, 2008, 2013, 2016, 2019, 2022	2005, 2008, 2013, 2016, 2019, 2022
Retail Energy Rates	-0.90%	1.70%	High retail energy rate scenario in most recent IEPR demand forecast	Mid retail energy rate scenario in most recent IEPR demand forecast	Low retail energy rate scenario in most recent IEPR demand forecast
Word of Mouth Effect	-0.014	0.012	0.39	0.43	0.47
Building Stock Growth Rate	-0.021	0.004	High growth in building stock in low case in most recent IEPR forecast	Mid growth in building stock in mid case in most recent IEPR forecast	Low growth in building stock in mid case in most recent IEPR forecast
Emerging Technology TRC	-0.10%	0.00%	85%	50%	40%
Incentive Level	-	-	50% of incremental cost	50% of incremental cost	50% of incremental cost
2024 Savings (GWh)	-0.57	0.33	12086	20935	33904
2024 Savings (MW)			2,952	4,833	8,095

¹ Scenario Component Impact is based on Navigant's sensitivity analysis, using GWh, except for mid-case variations, which are emerging technologies, code compliance and Title 24 adoptions dates. Navigant's sensitivity analysis is based on the impact of the component relative to market potential and was subsequently adjusted to reflect its impact on the mid-case forecast.

² Low case Title 24 updates and high case for emerging technologies were not included in the original sensitivity analyses, and thus not available in time for this memo.

Definitions of Components

Unless otherwise indicated the same variables are applied to the proposed low mid and high IEPR demand forecasts as were the mid case options in the first section.

- 1) **Code Compliance:** The high case scenario includes the compliance enhancements discussed in the prior section.
- 2) **Emerging Technologies:** The low case scenario applies 25% of emerging technology savings instead of 50%.
- 3) **Avoided Costs:** Avoided costs refers to the incremental costs avoided by the investor-owned utility when it defers or avoids generation from existing/new utility supply-side investments or energy purchases in the market. Avoided costs also encompass the deferral or avoidance of transmission and distribution-related costs. Avoided costs are an essential component of the cost-effectiveness calculations, representing the primary part of the “benefit” side of the equation. This not only determines the economic potential for EE, but is a key factor in the market adoption calculation for market potential.

The mid case avoided cost estimates were based on the 2012 vintage of the E3 avoided cost calculator. The Navigant team used the uncertainty (low and high variations) in the 2011 IEPR retail price forecast to calculate low and high ranges for the avoided costs. This assumes that the uncertainty about the avoided costs would correlate with the uncertainty about the 2011 IEPR retail price forecast.

- 4) **Retail Energy Rates:** The retail rates are the projected energy rates to the ratepayer. The P&G Study uses the high, mid and low retail rate forecast developed in the 2011 IEPR report for the EE potential scenarios. The JASC recommendation means that the 2011 IEPR high forecast would be used for developing the High EE building stock forecast and the 2011 IEPR low forecast would be used for the Low EE building stock forecast.
- 5) **Building Stock Forecast:** The building stock forecast provides scenario of growth in the state building stock based on variable economic conditions. Like the retail rate forecast, Navigant uses the scenarios developed in the 2011 IEPR demand forecast. The JASC recommendation means that the 2011 IEPR high forecast would be used for developing the High EE building stock forecast and the 2011 IEPR low forecast would be used for the Low EE building stock forecast.

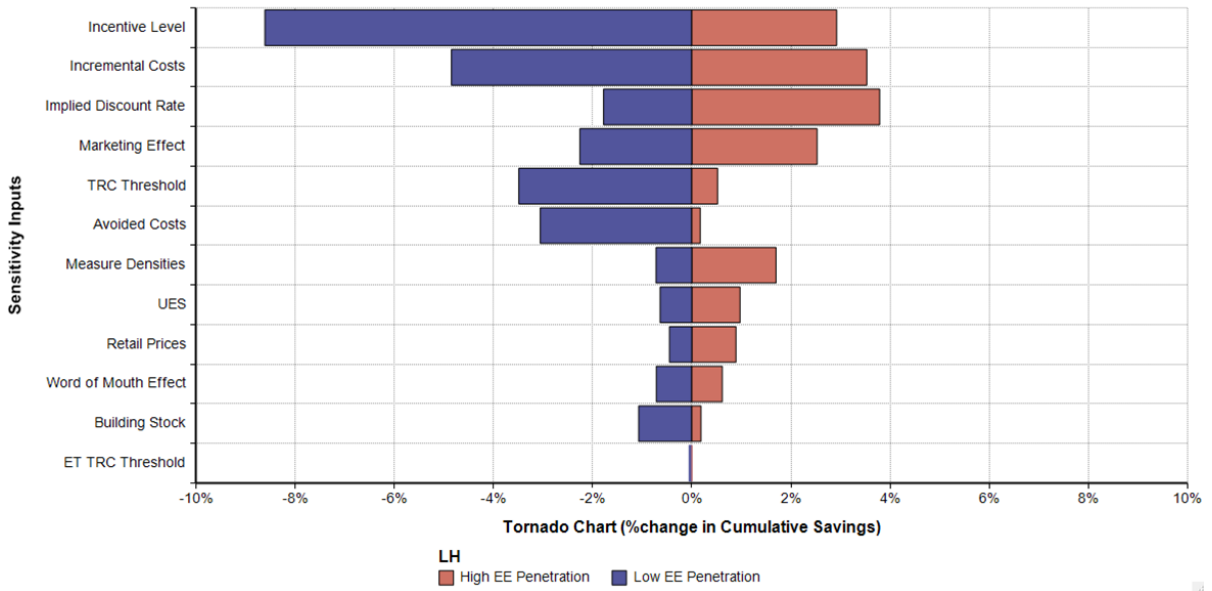
P.5 Timeline for 2013 IEPR Demand Forecast Completion (California Energy Demand 2014-2024)

Event/Task	Date
Energy Commission Business Meeting to adopt 2013 IEPR	December 11
California Energy Demand 2014-2024 adopted as a Commission Report	December 11
California Energy Demand 2014-2024 published with any revisions	November 26
Executive Oversight Committee (EOC) decision on single, managed forecast	By November 2
JASC final recommendation to EOC on single, managed forecast	By November 15
*** [Expected dates above assume no changes are made to forecast scenarios after workshop]***	
Loop back in with Commissioner McAllister (Lead for IEPR) after comments received	By October 25
Workshop on Revised Forecast, including Additional Energy Efficiency Scenarios	October 1
Workshop on Draft 2013 IEPR	September 25
Public release of draft Revised Forecast report	September 20
Draft Revised Forecast report completed and starts publication review	September 6
EOC decision on three additional efficiency (AEE) scenarios for forecast	By August 30
Loop back in with Commissioner McAllister	By August 30
JASC recommendation to EOC on three AEE scenarios for forecast	August 27
Loop back in with Commissioner McAllister on scenarios	By August 23
Comments from DAWG participants on scenarios	August 21
JASC discussion on scenario recommendation	August 10
DAWG Energy Savings Sub-Group to discuss revised scenarios and results	August 16
Loop in Commissioner McAllister on scenario changes	August 12
Re-run an additional scenario and any other changes	August 9

P.6 Tornado Chart in P&G Study

Figure 1 is a tornado chart was produced by Navigant for the P&G Study, to show the relative importance of several model inputs on the range of market potential from the scenarios. This chart was developed by varying one input assumption at a time, leaving the values of all other variables consistent with those in the Mid-Energy Efficiency Penetration scenario. The x-axis in the tornado chart shows the percent change in cumulative market potential in a specific year caused by changing the value of that single variable from the Mid to the High scenario (in red) or the Mid to the Low scenario (in purple). The variables with the bigger bars have a more significant impact on the results of the analysis. The chart only includes the original variables that Navigant adjusted for the high and low forecasts, and does not include the exclusion of Emerging Technologies, code compliance adjustments or inclusion of T24 2019 and 22 updates.

Figure 1. Tornado Chart Showing Model Sensitivities to Changes in Key Variables



Note: This chart shows results for the Commercial sector; results in the Residential sector are similar.

Source: PG Model release on 5/22/20

Appendix Q. Additional Data Supporting the AAEE Scenarios

This appendix provides the savings results with data supporting JASC and IEPR low, medium and high additional achievable energy efficiency (AAEE)

Q.1 All IOU territory, data supporting JASC and IEPR low, medium, and high AAEE scenarios

Table 3. GWh Savings in all IOU Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	334	334	531	531	544
2014	551	559	931	931	992
2015	1,979	2,010	3,027	3,361	3,449
2016	3,400	3,466	5,451	6,358	6,500
2017	4,822	4,940	7,749	9,588	9,824
2018	5,644	5,814	9,614	12,591	12,920
2019	6,786	6,996	11,528	15,815	16,286
2020	7,786	8,045	13,258	18,739	19,277
2021	8,768	9,100	15,095	22,056	22,662
2022	9,831	10,200	16,963	25,586	26,192
2023	11,017	11,470	18,965	29,404	30,036
2024	12,166	12,699	20,990	33,293	33,947

Figure 2. GWh Savings in all IOU Territory Supporting JASC and IEPR AAEE scenarios

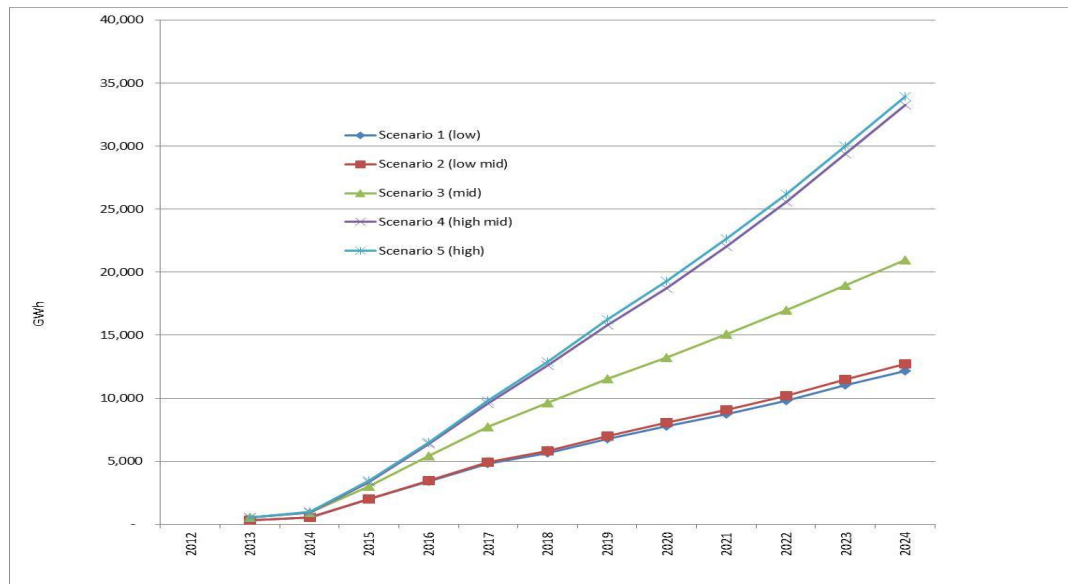


Table 4. MW Savings in all IOU Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	53	53	84	84	86
2014	106	107	171	171	181
2015	456	461	649	726	744
2016	806	817	1,212	1,466	1,499
2017	1,156	1,178	1,735	2,249	2,308
2018	1,408	1,442	2,235	3,046	3,131
2019	1,716	1,760	2,721	3,868	3,990
2020	1,992	2,046	3,168	4,654	4,807
2021	2,271	2,339	3,651	5,539	5,720
2022	2,566	2,641	4,152	6,482	6,685
2023	2,897	2,987	4,704	7,509	7,735
2024	3,222	3,330	5,264	8,563	8,810

Figure 3. MW Savings in all IOU Territory Supporting JASC and IEPR AAEE scenarios

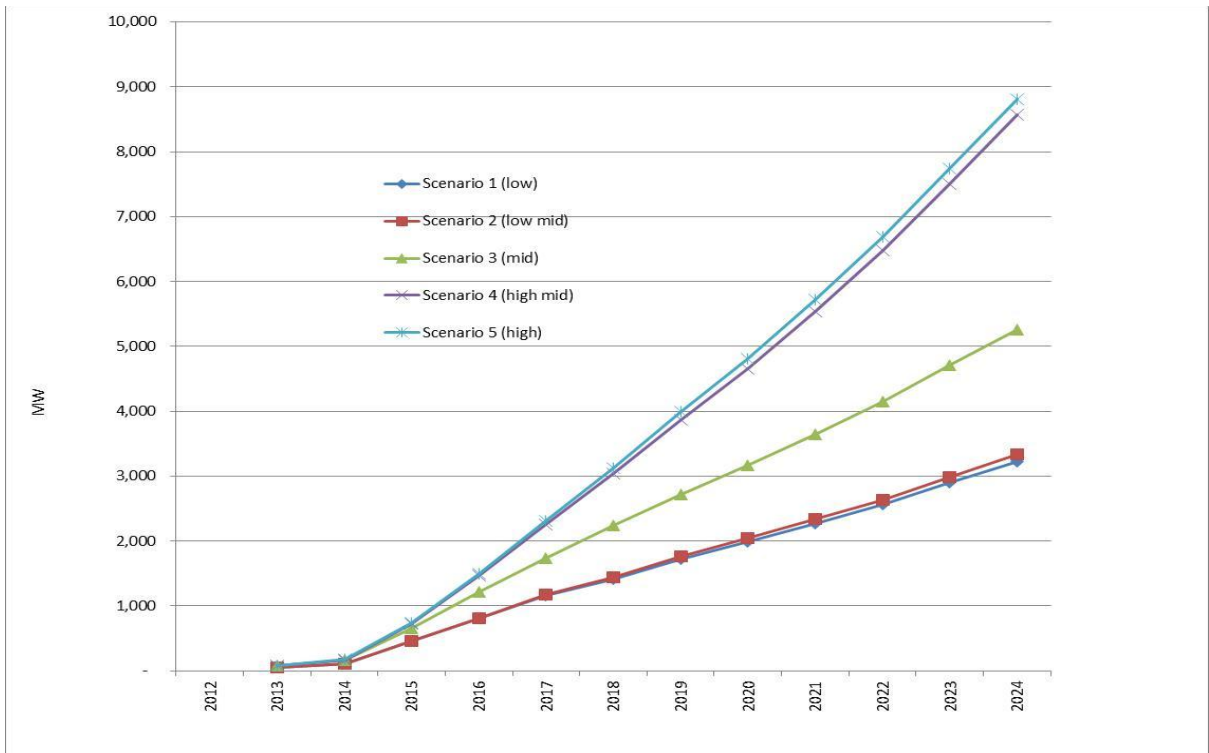
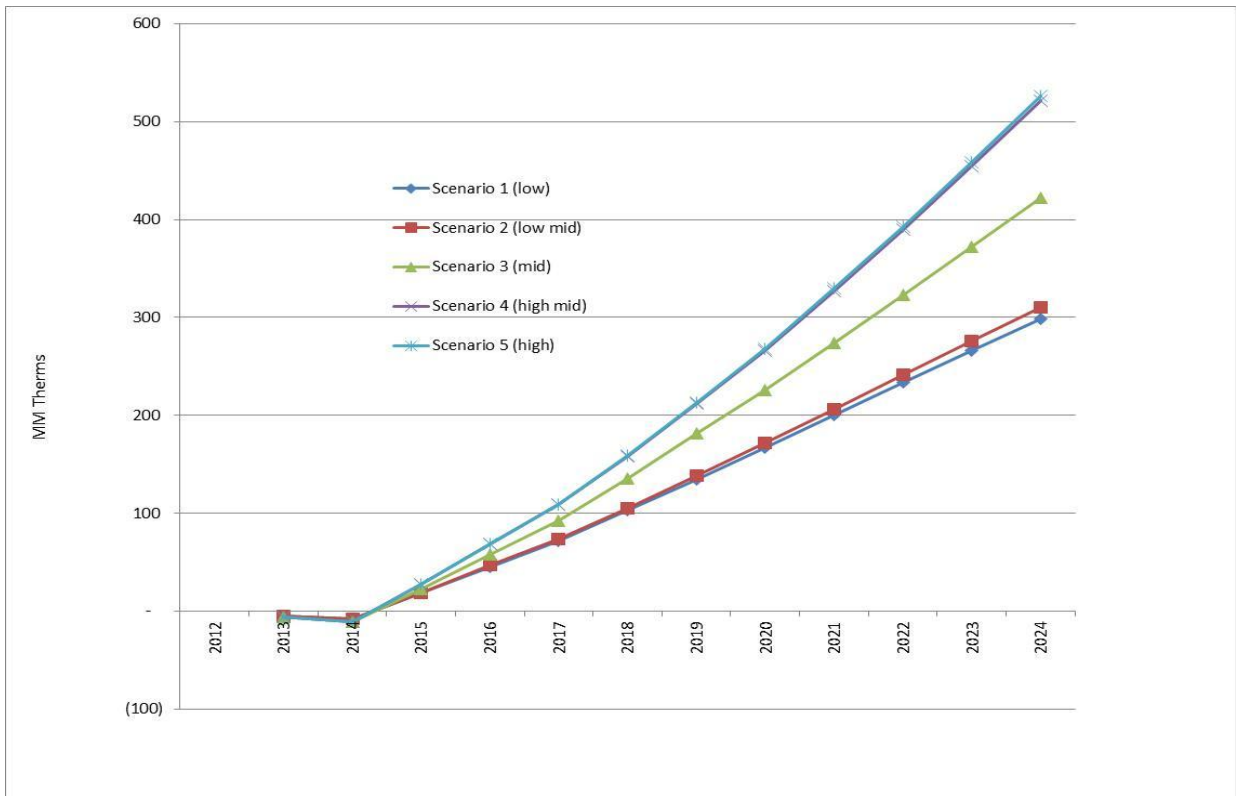


Table 5. MM Therm Savings in all IOU Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	-5	-5	-6	-6	-6
2014	-8	-8	-11	-11	-11
2015	18	19	22	27	27
2016	45	47	57	68	68
2017	72	74	92	109	109
2018	103	105	135	158	159
2019	135	139	182	212	213
2020	167	172	226	266	268
2021	200	206	274	327	330
2022	233	241	323	390	393
2023	266	276	372	455	458
2024	298	310	422	522	526

Figure 4. MM Therm Savings in all IOU Territory Supporting JASC and IEPR AAEE scenarios



Q.2 PG&E Territory savings with data supporting JASC and IEPR low, medium, and high AAEE scenarios

Table 6. GWh Savings in Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	138	138	225	225	230
2014	224	228	392	392	419
2015	844	858	1,294	1,446	1,489
2016	1,464	1,487	2,335	2,742	2,805
2017	2,084	2,128	3,331	4,152	4,255
2018	2,450	2,518	4,151	5,478	5,611
2019	2,961	3,049	4,998	6,906	7,102
2020	3,411	3,521	5,777	8,217	8,443
2021	3,846	3,987	6,595	9,682	9,938
2022	4,320	4,476	7,431	11,249	11,504
2023	4,837	5,029	8,316	12,932	13,200
2024	5,332	5,562	9,208	14,646	14,924

Table 7. MW Savings in PG&E Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	22	22	36	36	37
2014	44	45	73	73	77
2015	194	197	279	322	332
2016	345	349	522	651	669
2017	497	506	753	1,000	1,033
2018	607	621	976	1,361	1,406
2019	742	761	1,193	1,733	1,794
2020	864	888	1,399	2,093	2,169
2021	986	1,016	1,619	2,494	2,578
2022	1,115	1,148	1,847	2,920	3,013
2023	1,258	1,299	2,097	3,382	3,484
2024	1,398	1,447	2,348	3,855	3,964

Table 8. MM Therm Savings in PG&E Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	-2	-2	-2	-2	-2
2014	-3	-3	-4	-4	-4
2015	8	8	9	12	12
2016	18	19	24	29	28
2017	29	30	38	45	45
2018	43	44	57	67	67
2019	57	59	78	91	91
2020	72	74	98	115	116
2021	87	90	119	143	143
2022	102	105	141	171	171
2023	117	121	162	199	199
2024	131	137	184	229	229

Q.3 SCE Territory savings with data supporting JASC and IEPR low, medium, and high AAEE scenarios

Table 9. GWh Savings in SCE Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	174	174	264	264	269
2014	296	300	469	469	496
2015	965	970	1,445	1,589	1,619
2016	1,624	1,647	2,579	2,981	3,037
2017	2,281	2,327	3,648	4,473	4,574
2018	2,663	2,728	4,512	5,854	6,009
2019	3,167	3,244	5,378	7,310	7,525
2020	3,603	3,698	6,151	8,626	8,870
2021	4,039	4,162	6,975	10,129	10,402
2022	4,500	4,637	7,806	11,713	11,985
2023	5,032	5,199	8,709	13,440	13,721
2024	5,554	5,748	9,628	15,205	15,492

Table 10. MW Savings in SCE Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	27	27	41	41	42
2014	55	55	84	84	88
2015	217	218	303	330	336
2016	380	383	562	663	674
2017	540	548	799	1,014	1,034
2018	656	669	1,024	1,369	1,400
2019	794	810	1,239	1,732	1,779
2020	916	936	1,433	2,077	2,135
2021	1,041	1,066	1,643	2,469	2,539
2022	1,173	1,199	1,860	2,886	2,964
2023	1,323	1,354	2,102	3,342	3,429
2024	1,471	1,508	2,349	3,814	3,908

Q.4 *SDG&E Territory savings with data supporting JASC and IEPR low, medium, and high AAEE scenarios*

Table 11. GWh Savings in SDG&E Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	22	22	42	42	44
2014	30	32	70	70	77
2015	171	182	288	326	341
2016	313	332	538	634	658
2017	456	485	770	964	995
2018	531	568	951	1,258	1,300
2019	658	703	1,152	1,598	1,659
2020	772	826	1,330	1,896	1,963
2021	884	951	1,525	2,244	2,322
2022	1,011	1,088	1,727	2,624	2,703
2023	1,149	1,242	1,940	3,031	3,115
2024	1,280	1,389	2,154	3,442	3,530

Table 12. MW Savings in SDG&E Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	4	4	7	7	7
2014	7	7	14	14	15
2015	44	46	66	74	76
2016	81	84	127	152	157
2017	118	124	183	234	241
2018	145	152	236	316	325
2019	180	189	289	403	418
2020	212	222	337	483	503
2021	244	257	390	576	603
2022	278	294	445	676	708
2023	316	335	506	784	822
2024	353	375	567	895	938

Table 13. MM Therm Savings in SDG&E Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	-0.2	-0.2	-0.2	-0.2	-0.2
2014	-0.3	-0.3	-0.4	-0.4	-0.4
2015	1.2	1.4	1.5	1.8	1.8
2016	2.7	3	3.4	4.1	4.2
2017	4.2	4.6	5.3	6.4	6.6
2018	6.3	6.7	8	9.8	10
2019	8.5	9	11.2	13.7	14.2
2020	10.8	11.5	14	17.6	18.4
2021	13.1	14	17.2	22.3	23.5
2022	15.5	16.7	20.7	27.4	29
2023	17.9	19.3	24.3	32.7	34.7
2024	20.2	22	27.9	38.3	40.6

Q.5 SCG Territory savings with data supporting JASC and IEPR low, medium, and high AAEE scenarios

Table 14. MM Therms Savings in SCG Territory Supporting JASC and IEPR AAEE scenarios

	Scenario 1 (low)	Scenario 2 (low mid)	Scenario 3 (mid)	Scenario 4 (high mid)	Scenario 5 (high)
2012					
2013	-3	-3	-4	-4	-4
2014	-5	-5	-6	-6	-7
2015	10	10	11	14	14
2016	24	25	30	36	36
2017	39	40	49	57	57
2018	54	55	70	81	82
2019	69	71	93	107	108
2020	84	86	114	133	134
2021	100	103	138	162	163
2022	116	119	162	192	193
2023	131	135	185	222	224
2024	147	152	210	254	256