

# 2017 IOU ADDITIONAL ACHIEVABLE ENERGY EFFICIENCY (AAEE) SCENARIOS

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PRESENTATION TO DAWG  
OCTOBER 31, 2017

# AAEE FOR 2017 IEPR

- Based on 2018 and Beyond Potential and Goals Study
  - PG Study examined 5 scenarios
  - Updated building stock and retail prices
  - Expanded consideration of BROs savings, AIMS ETs, and Low Income
  - Consideration of C/E Tests in scenario framework
- 2017 AAEE consists of 6 preliminary scenarios
  - First 5 scenarios are similar construction to the 2015 AAEE scenarios
    - Three scenarios that apply to the IEPR Mid case
    - One scenario each that applies to the IEPR Low and High Case
  - Adds a “High Plus” scenario.
- Program savings from 2018 onward

# OVERVIEW OF AEE SCENARIOS FOR 2017 IEPR

	IEPR Demand Case	High	Mid	Mid	Mid	Low	Mid	
	Savings Scenario	Low (Scenario 1)	Low (Scenario 2)	Mid (Scenario 3)	High (Scenario 4)	High (Scenario 5)	High Plus (Scenario 6)	
Global Inputs	Building Stock	High Demand Case	Mid Demand Case	Mid Demand Case	Mid Demand Case	Low Demand Case	Mid Demand Case	
	Retail Prices	High Demand Case	Mid Demand Case	Mid Demand Case	Mid Demand Case	Low Demand Case	Mid Demand Case	
Equipment	Res/Com ETs	50% of model Results	50% of model Results	100% of model results	150% of model results	150% of model results	150% of model results	
	AIMS ETs	Reference	Reference	Reference	Reference	Reference	Aggressive	
	Incentive Level	Reference	Reference	Reference	Reference	Reference	Aggressive	
	C/E Threshold	1	1	0.85	0.75	0.75	0.75	
	ET C/E Threshold	0.85	0.85	0.5	0.4	0.4	0.4	
	Cost-Effectiveness Test	mTRC (GHG Adder #1)	mTRC (GHG Adder #1)	mTRC (GHG Adder #1)	mTRC (GHG Adder #1)	mTRC (GHG Adder #1)	mTRC (GHG Adder #1)	PAC
	Marketing Effect	Reference	Reference	Reference	Aggressive	Aggressive	Aggressive	
Financing	Reference	Reference	Reference	Reference	Aggressive	Aggressive	Aggressive	
BROs	BROs Interventions	Reference	Reference	Reference	Reference	Reference	Aggressive	
Low Income	Low Income	First Time + 50% Retreatment	First Time + 50% Retreatment	First Time + Retreatment	First Time + Retreatment	First Time + Retreatment	First Time + 150% Retreatment	
Codes and Standards	Compliance Reduction	20% Compliance Rate Reduction	20% Compliance Rate Reduction	No Compliance Reduction	No Compliance Reduction	No Compliance Reduction	No Compliance Reduction	
	Standards Compliance	No Compliance Enhancements	No Compliance Enhancements	No Compliance Enhancements	Compliance Enhancements	Compliance Enhancements	Compliance Enhancements	
	Title 24	No additional Codes	2019 T24	2019 T24	2019 T24	2019 T24	2019 T24	
	Title 20	2018 T20	2018 T20	2018-2024 T20	2018-2024 T20	2018-2024 T20	2018-2024 T20	
	Federal Standards	On-the-books	On-the-books	On-the-books	On-the-books	On-the-books	On-the-books	

Internally Influenced  
Externally Influenced

# REFERENCE VS AGGRESSIVE (FROM 2018 PG STUDY)

Variable	Reference	Aggressive
<b>Incentive levels for Equipment</b>	Default \$/kWh Default \$/Therm Capped at 50% of incremental Cost	1.5x Default \$/kWh 1.5x Default \$/Therm Capped at 75% of incremental Cost
<b>Marketing &amp; Outreach for Equipment programs</b>	(default calibrated value)	Increased marketing strength
<b>BROs</b>	Continued offering of existing BROs interventions and planned new interventions based on policy directions	Increased adoption relative to reference case + Additional BROs interventions that had limited verified data though show promise for possible savings
<b>IOU financing programs</b>	No savings claimed from financing programs <sup>1</sup>	IOU financing programs broadly available to Residential and Commercial customers

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# **AAEE Preliminary Results**

October 31, 2017

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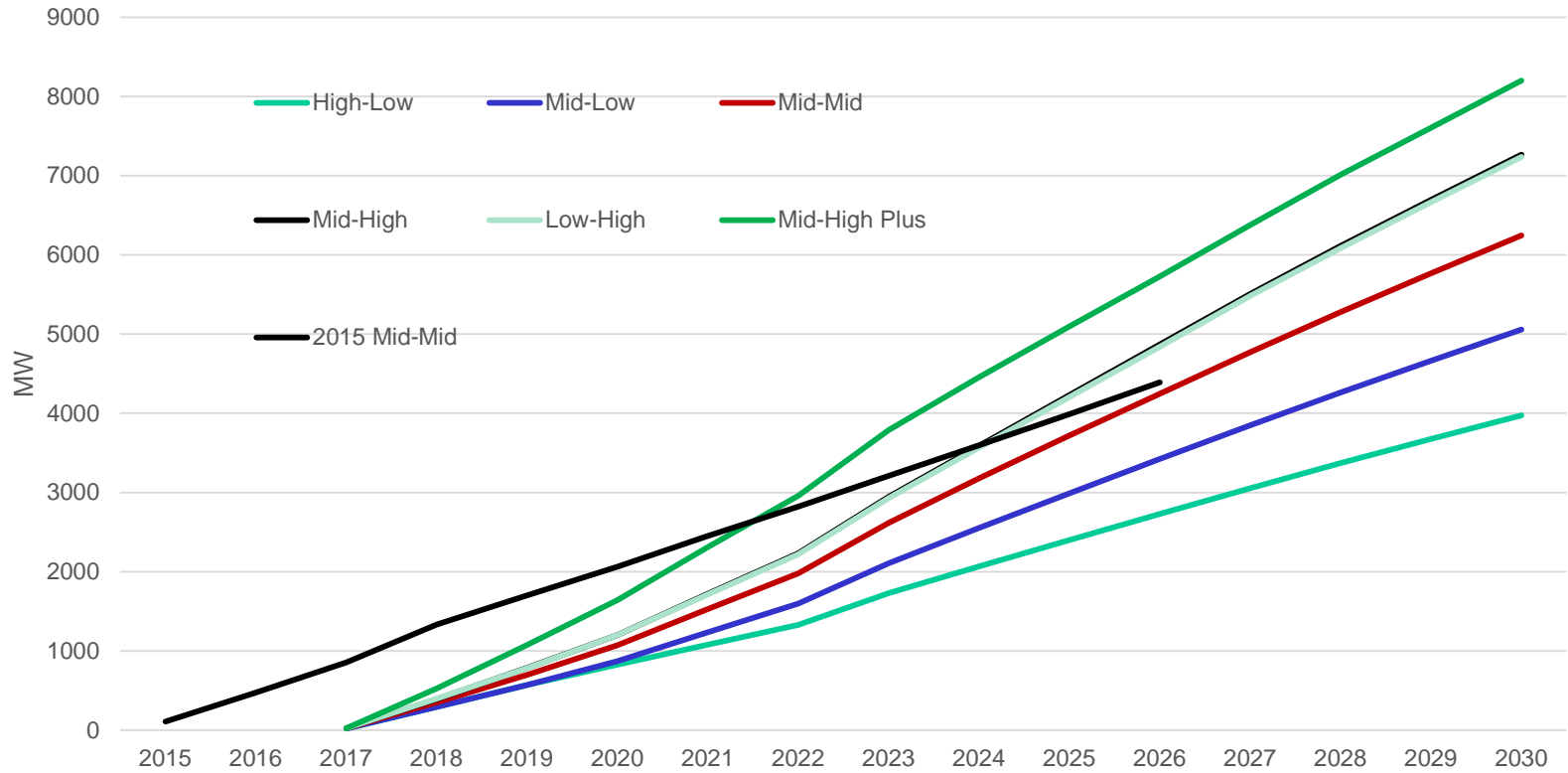


# Adjustments to Derive AAEE from CPUC Potential and Goals Study

- Omit standards through 2016
- Estimate total standards savings, not just IOU-credited portion
- Accumulate program savings starting in 2018
- Preliminary numbers presented here do not include any additional savings from CEC efficiency analysis for SB 350



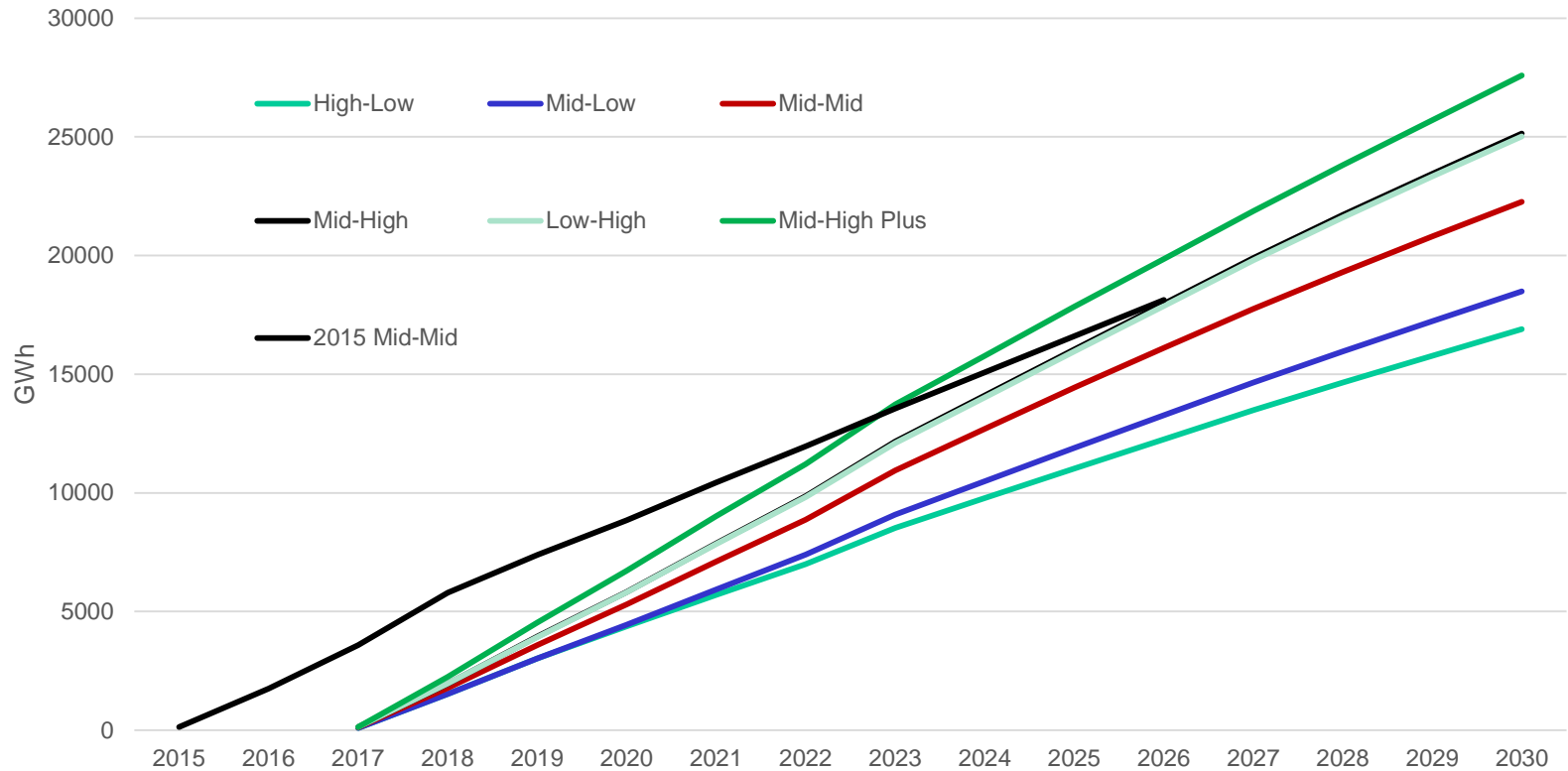
## MW Savings: Combined IOUs





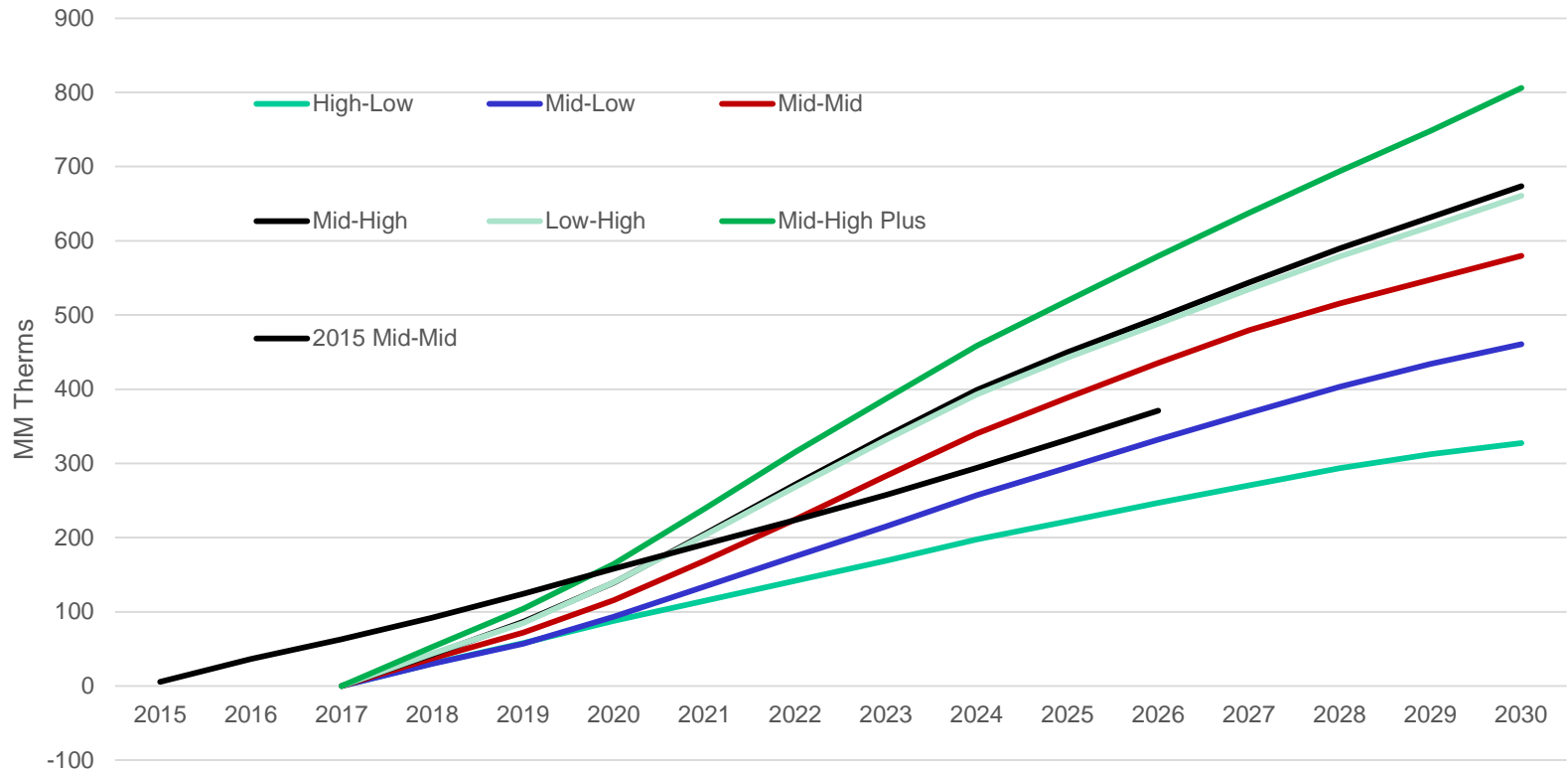


## GWh Savings: Combined IOUs



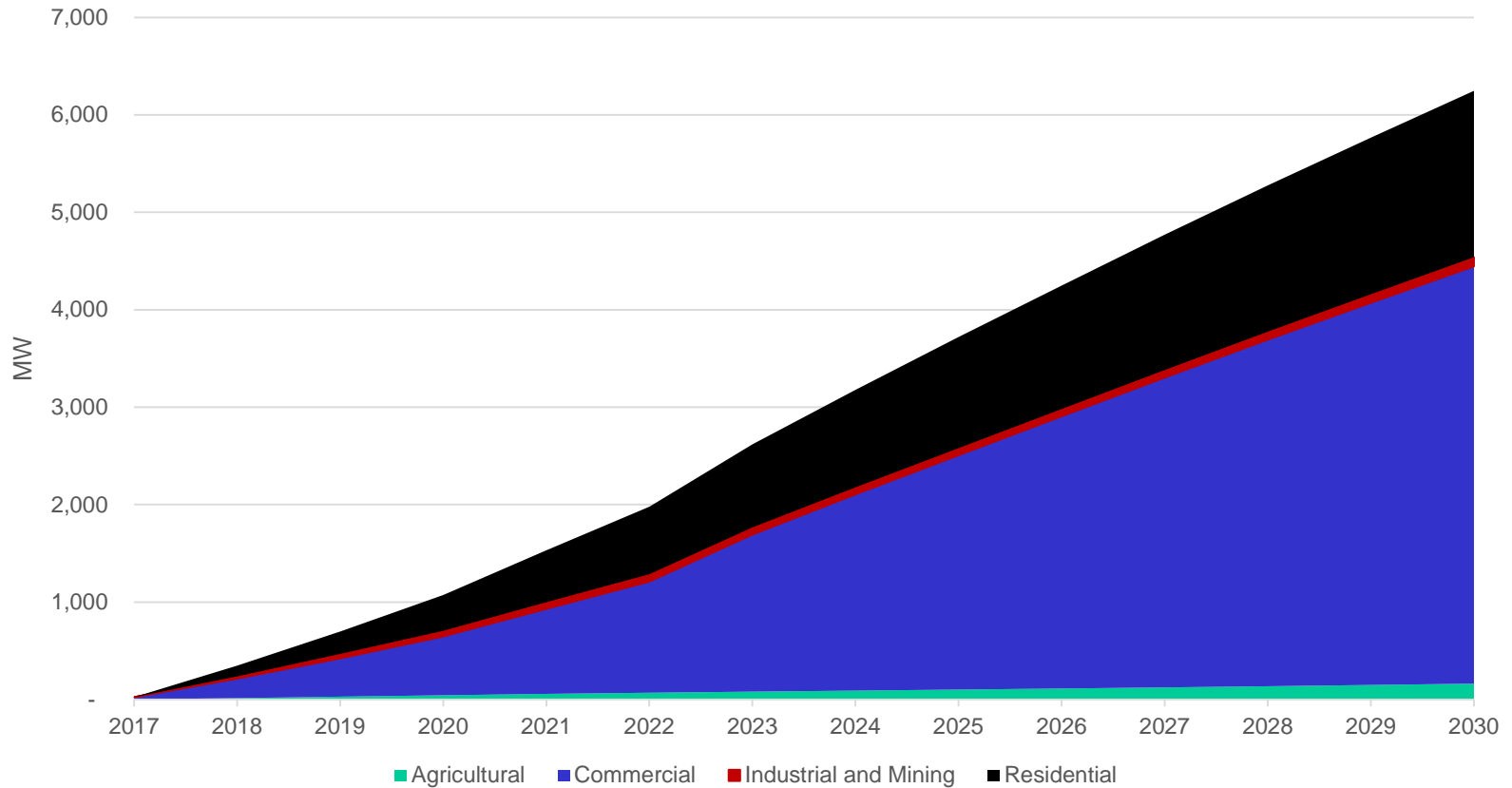


## MM Therm Savings: Combined IOUs



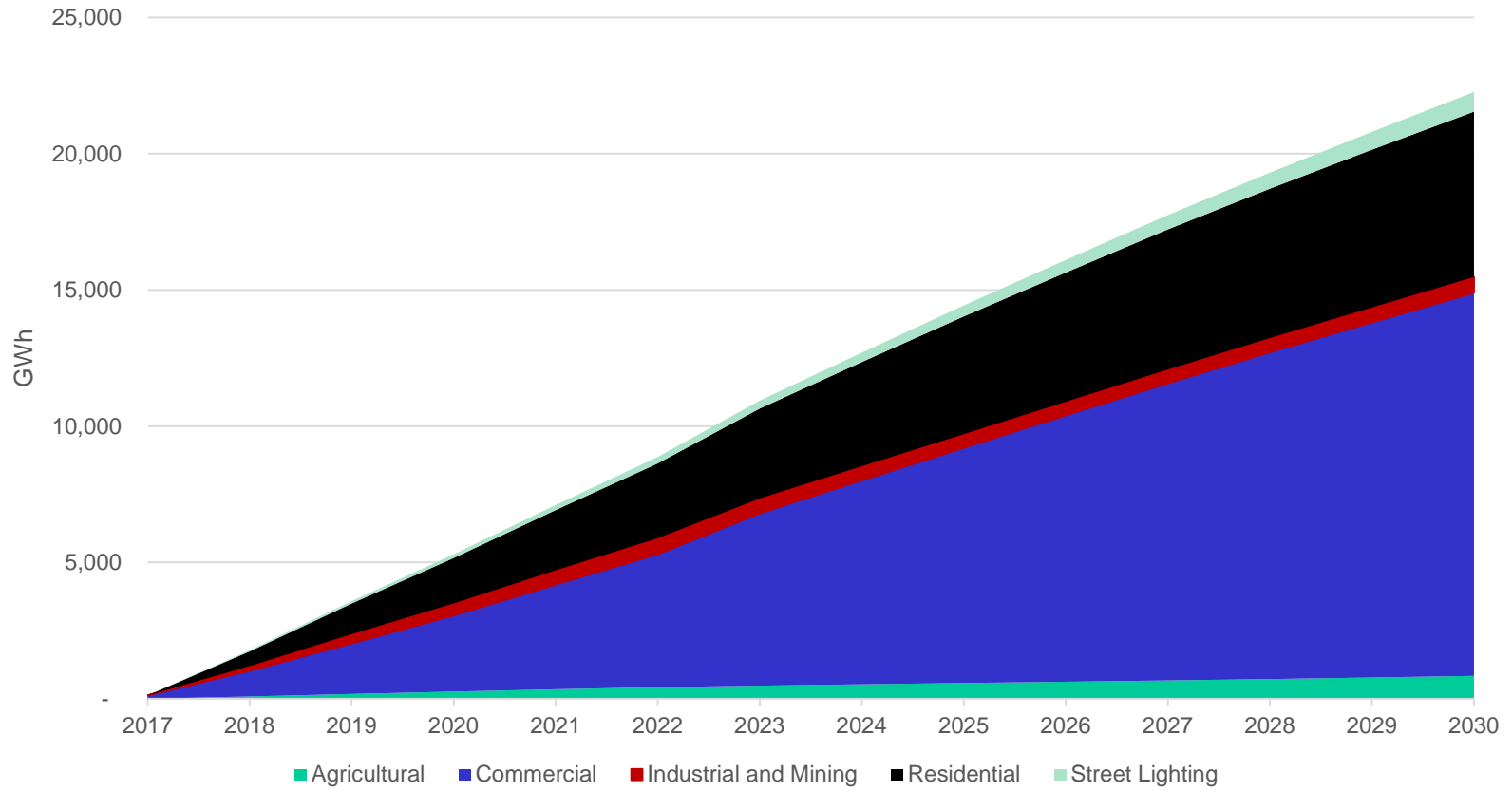


# Mid-Mid MW Savings by Sector: Combined IOUs



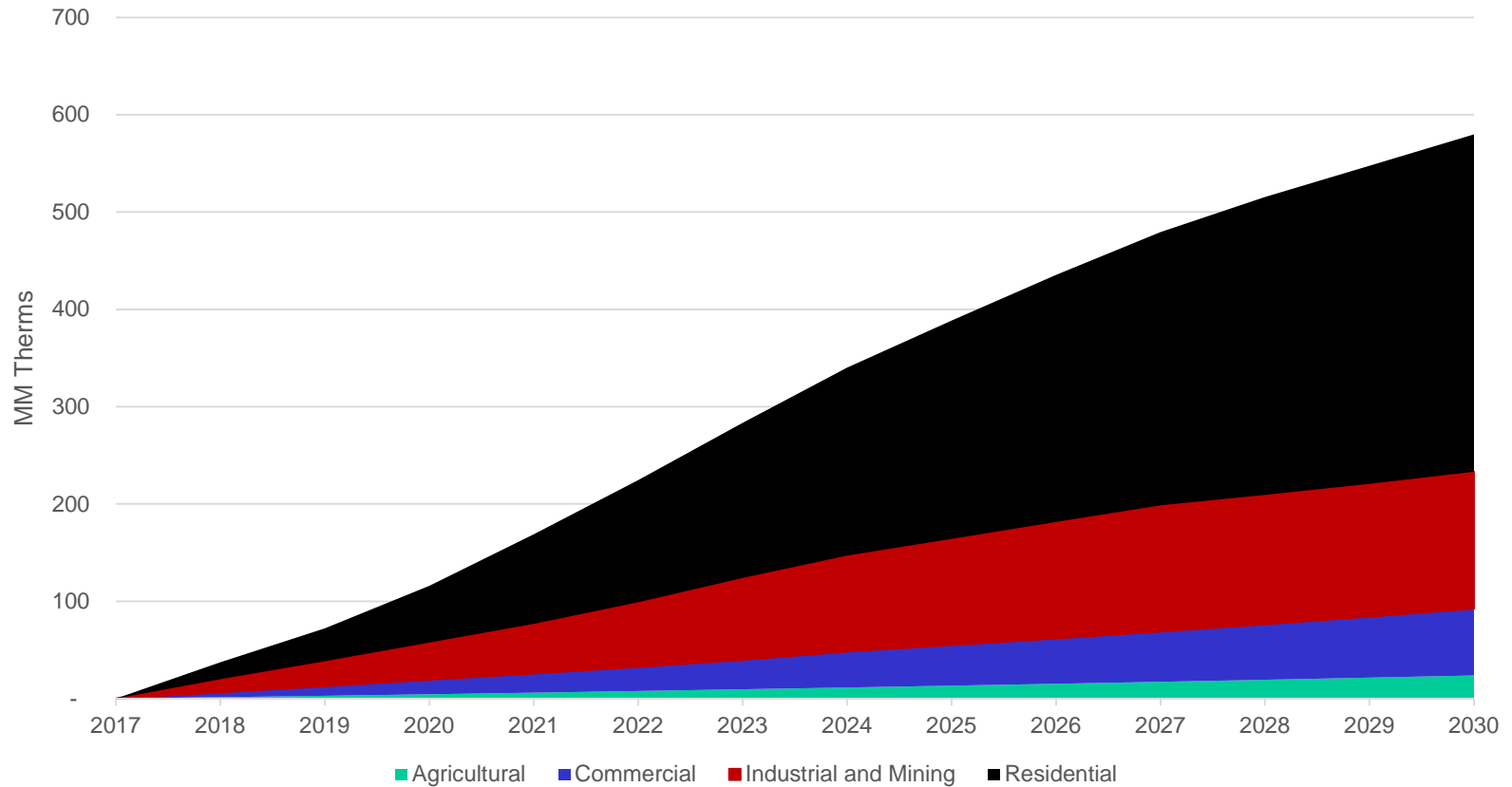


# Mid-Mid GWh Savings by Sector: Combined IOUs





# Mid-Mid MM Therms Savings by Sector: Combined IOUs





# MW Savings by Scenario: PG&E

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	8	8	11	11	11	11
2018	132	132	157	177	178	223
2019	255	254	314	351	347	445
2020	364	383	476	524	521	676
2021	471	541	673	745	738	956
2022	574	692	862	961	954	1,224
2023	742	908	1,134	1,268	1,258	1,575
2024	887	1,100	1,372	1,543	1,531	1,870
2025	1,027	1,287	1,602	1,815	1,801	2,154
2026	1,159	1,464	1,827	2,084	2,070	2,431
2027	1,289	1,637	2,048	2,352	2,337	2,703
2028	1,413	1,805	2,260	2,609	2,593	2,969
2029	1,531	1,965	2,461	2,853	2,836	3,219
2030	1,648	2,123	2,661	3,094	3,076	3,472



## GWh Savings by Scenario: PG&E

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	44	44	55	56	56	56
2018	713	713	828	921	926	1,034
2019	1,390	1,389	1,663	1,834	1,819	2,052
2020	1,990	2,017	2,438	2,649	2,637	3,001
2021	2,577	2,677	3,241	3,549	3,526	4,024
2022	3,138	3,310	4,009	4,420	4,392	4,990
2023	3,786	4,029	4,900	5,425	5,387	6,081
2024	4,340	4,651	5,660	6,283	6,238	6,993
2025	4,882	5,260	6,403	7,137	7,084	7,913
2026	5,384	5,826	7,127	7,974	7,917	8,820
2027	5,885	6,391	7,831	8,799	8,739	9,692
2028	6,366	6,935	8,491	9,574	9,509	10,521
2029	6,818	7,452	9,112	10,303	10,234	11,318
2030	7,279	7,970	9,726	11,023	10,950	12,129



# MM Therms Savings by Scenario: PG&E

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
2018	11.13	10.93	15.99	18.86	19.76	22.21
2019	19.95	19.59	30.38	38.54	37.94	43.33
2020	30.46	32.60	47.41	60.91	61.37	66.32
2021	40.99	48.30	68.85	87.82	87.21	95.92
2022	51.72	64.07	92.95	115.53	114.31	125.38
2023	62.09	79.43	117.10	143.05	141.14	155.31
2024	76.15	98.38	141.79	169.57	167.20	185.85
2025	89.71	116.71	162.96	190.30	187.27	212.20
2026	102.52	134.18	182.39	209.56	206.22	240.66
2027	113.13	149.34	200.12	230.25	226.53	266.04
2028	124.01	164.70	215.34	250.06	245.82	291.87
2029	133.24	178.33	228.32	267.46	262.58	315.13
2030	139.09	188.45	241.07	285.07	279.86	339.46





# Mid-Mid MW Savings by Source: PG&E

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					11	-	11
2018	23	5	50	14	64	-	157
2019	31	11	110	33	130	-	314
2020	36	16	165	45	190	25	476
2021	39	20	215	62	248	88	673
2022	42	24	264	80	302	151	862
2023	45	28	309	99	442	211	1,134
2024	47	32	341	119	562	271	1,372
2025	50	36	372	140	676	329	1,602
2026	52	39	404	161	785	386	1,827
2027	55	43	436	183	889	442	2,048
2028	58	46	469	206	984	496	2,260
2029	61	45	503	231	1,072	550	2,461
2030	64	44	538	256	1,156	603	2,661



# Mid-Mid GWh Savings by Source: PG&E

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					55	-	55
2018	123	29	290	56	329	-	828
2019	171	59	627	128	679	-	1,663
2020	204	88	940	172	995	38	2,438
2021	225	110	1,233	238	1,300	135	3,241
2022	243	132	1,509	307	1,590	229	4,009
2023	260	154	1,738	380	2,047	322	4,900
2024	276	175	1,922	457	2,417	413	5,660
2025	290	197	2,114	539	2,762	501	6,403
2026	306	215	2,317	622	3,079	588	7,127
2027	323	233	2,523	707	3,372	673	7,831
2028	340	250	2,739	797	3,608	756	8,491
2029	359	244	2,964	892	3,814	838	9,112
2030	379	237	3,195	991	4,004	919	9,726



## Mid-Mid MM Therms Savings by Source: PG&E

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					-0.01	0.00	-0.01
2018	4.33	2.15	8.23	2.38	-1.09	0.00	15.99
2019	5.75	4.38	17.36	5.63	-2.74	0.00	30.38
2020	6.74	6.60	27.15	7.38	-3.92	3.46	47.41
2021	7.35	8.23	38.27	9.80	-4.99	10.19	68.85
2022	7.83	9.85	51.93	12.43	-5.94	16.85	92.95
2023	8.27	11.48	65.22	15.29	-6.60	23.44	117.10
2024	8.71	13.11	78.36	18.43	-6.77	29.96	141.79
2025	9.10	14.73	87.78	21.86	-6.91	36.40	162.96
2026	9.54	16.13	95.50	25.47	-7.02	42.77	182.39
2027	10.01	17.52	101.21	29.39	-7.09	49.09	200.12
2028	10.55	18.90	103.88	33.70	-7.02	55.34	215.34
2029	11.12	18.44	105.74	38.42	-6.95	61.54	228.32
2030	11.76	17.90	106.93	43.65	-6.86	67.69	241.07



## MW Savings by Scenario: SCE

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	9	9	11	11	11	11
2018	131	131	157	177	181	246
2019	259	259	315	361	359	513
2020	377	398	488	559	561	787
2021	493	566	701	804	804	1,101
2022	610	734	912	1,042	1,041	1,406
2023	798	972	1,212	1,374	1,370	1,790
2024	950	1,173	1,472	1,672	1,666	2,082
2025	1,104	1,374	1,724	1,971	1,964	2,371
2026	1,262	1,579	1,967	2,270	2,262	2,657
2027	1,421	1,784	2,209	2,573	2,565	2,963
2028	1,573	1,981	2,445	2,853	2,845	3,268
2029	1,722	2,174	2,677	3,126	3,118	3,551
2030	1,865	2,361	2,903	3,391	3,383	3,830



## GWh Savings by Scenario: SCE

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	45	45	56	58	58	58
2018	677	678	786	852	858	997
2019	1,349	1,349	1,578	1,735	1,727	2,042
2020	1,970	1,999	2,344	2,612	2,610	3,042
2021	2,572	2,678	3,164	3,561	3,555	4,074
2022	3,170	3,351	3,972	4,463	4,453	5,074
2023	3,873	4,128	4,921	5,508	5,491	6,210
2024	4,422	4,750	5,731	6,375	6,353	7,117
2025	4,981	5,379	6,528	7,249	7,221	8,034
2026	5,560	6,026	7,284	8,120	8,091	8,922
2027	6,144	6,678	8,034	9,001	8,972	9,846
2028	6,691	7,292	8,749	9,830	9,800	10,744
2029	7,224	7,893	9,446	10,635	10,603	11,616
2030	7,739	8,473	10,118	11,408	11,375	12,482



# Mid-Mid MW Savings by Source: SCE

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					11	-	11
2018	13	4	60	13	66	-	157
2019	18	7	125	30	134	-	315
2020	23	11	189	43	196	26	488
2021	26	12	257	60	256	91	701
2022	29	13	326	77	311	155	912
2023	33	13	395	96	456	218	1,212
2024	36	14	449	113	580	279	1,472
2025	40	15	501	131	697	339	1,724
2026	45	15	551	149	809	398	1,967
2027	49	16	603	168	917	455	2,209
2028	54	17	660	189	1,015	512	2,445
2029	58	17	719	210	1,105	567	2,677
2030	62	14	779	234	1,192	622	2,903



## Mid-Mid GWh Savings by Source: SCE

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					56	-	56
2018	74	21	311	41	340	-	786
2019	107	41	636	94	700	-	1,578
2020	138	61	949	130	1,027	39	2,344
2021	157	65	1,282	180	1,341	139	3,164
2022	178	69	1,616	234	1,640	237	3,972
2023	200	73	1,912	292	2,111	332	4,921
2024	222	76	2,163	351	2,493	426	5,731
2025	246	80	2,421	414	2,849	517	6,528
2026	271	84	2,668	479	3,176	607	7,284
2027	297	88	2,929	548	3,478	694	8,034
2028	325	91	3,210	621	3,721	780	8,749
2029	355	89	3,503	700	3,934	865	9,446
2030	379	72	3,804	784	4,130	948	10,118



# MM Therms Savings by Scenario: SoCal Gas

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
2018	18.31	18.21	19.71	21.30	21.62	27.97
2019	35.95	35.48	38.79	43.80	42.67	55.53
2020	54.80	57.95	63.51	71.83	71.19	89.57
2021	70.35	81.52	92.71	107.37	105.78	131.18
2022	86.21	105.27	121.95	143.20	140.81	173.91
2023	102.11	129.00	154.49	178.41	175.20	212.85
2024	116.06	150.63	184.41	211.48	207.69	249.83
2025	126.23	168.33	209.56	239.65	235.08	281.09
2026	137.55	187.11	235.33	264.65	259.59	309.79
2027	149.39	206.28	259.89	289.51	283.85	339.45
2028	160.83	224.76	278.96	313.49	307.00	367.15
2029	169.64	240.55	296.60	336.32	328.89	395.39
2030	177.85	255.73	314.50	359.14	351.29	425.85





## California Energy Commission

# Mid-Mid MM Therms Savings by Source: SoCal Gas

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					-0.01	0.00	-0.01
2018	2.60	3.30	14.24	1.31	-1.74	0.00	19.71
2019	5.68	6.76	27.67	3.05	-4.38	0.00	38.79
2020	8.78	10.40	41.03	4.03	-6.27	5.54	63.51
2021	9.38	13.53	56.16	5.29	-7.98	16.32	92.71
2022	10.09	16.67	71.03	6.67	-9.51	26.99	121.95
2023	10.90	19.80	88.62	8.19	-10.57	37.54	154.49
2024	11.74	22.94	102.78	9.83	-10.85	47.97	184.41
2025	12.58	26.07	112.03	11.66	-11.07	58.29	209.56
2026	13.46	29.20	121.79	13.63	-11.24	68.50	235.33
2027	14.36	32.34	130.07	15.87	-11.36	78.60	259.89
2028	15.34	33.64	134.19	18.41	-11.24	88.62	278.96
2029	16.38	33.38	138.13	21.29	-11.12	98.55	296.60
2030	17.45	32.96	142.10	24.59	-10.99	108.40	314.50



# MW Savings by Scenario: SDG&E

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	2	2	2	3	3	3
2018	29	29	33	37	38	56
2019	58	58	69	76	76	115
2020	85	90	108	118	119	179
2021	114	130	156	172	172	253
2022	142	171	204	227	226	327
2023	188	228	273	305	304	423
2024	228	279	334	374	372	502
2025	268	330	394	444	441	572
2026	307	379	454	513	510	641
2027	346	428	513	583	580	709
2028	384	477	571	651	648	774
2029	423	525	628	716	713	837
2030	460	572	683	781	778	899



## California Energy Commission

# GWh Savings by Scenario: SDG&E

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	10	10	13	13	13	13
2018	140	140	164	183	184	214
2019	282	282	341	373	371	444
2020	414	422	516	555	556	674
2021	550	575	703	763	761	913
2022	692	734	890	972	970	1,151
2023	865	924	1,117	1,225	1,221	1,431
2024	1,015	1,090	1,309	1,442	1,436	1,665
2025	1,166	1,257	1,502	1,661	1,653	1,895
2026	1,310	1,417	1,693	1,879	1,871	2,118
2027	1,452	1,575	1,883	2,098	2,089	2,342
2028	1,594	1,732	2,066	2,306	2,297	2,555
2029	1,737	1,891	2,244	2,506	2,496	2,765
2030	1,874	2,043	2,419	2,702	2,692	2,970



# MM Therms Savings by Scenario: SDG&E

	High-Low	Mid-Low	Mid-Mid	Mid-High	Low-High	Mid-High Plus
2017	0.00	0.00	0.00	0.00	0.00	0.00
2018	1.05	1.05	1.60	2.09	2.24	2.64
2019	1.84	1.84	2.98	4.12	4.21	5.30
2020	2.62	2.93	4.93	6.65	6.96	8.54
2021	3.30	4.23	7.28	9.67	10.00	12.20
2022	3.95	5.48	9.61	12.97	13.32	16.05
2023	4.70	6.83	11.80	15.53	15.85	19.41
2024	5.52	8.24	13.94	17.85	18.15	22.86
2025	6.23	9.53	15.94	20.00	20.25	26.11
2026	6.94	10.81	17.68	22.01	22.23	29.08
2027	7.86	12.33	19.41	24.01	24.22	32.01
2028	8.79	13.86	21.16	25.89	26.06	34.88
2029	9.65	15.32	22.65	27.67	27.79	37.78
2030	10.42	16.69	24.22	29.50	29.60	40.54



# Mid-Mid MW Savings by Source: SDG&E

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					2	-	2
2018	3	1	13	1	15	-	33
2019	4	2	29	3	30	-	69
2020	6	3	45	4	44	6	108
2021	7	4	61	5	58	21	156
2022	9	5	77	7	71	35	204
2023	10	6	95	10	103	49	273
2024	11	8	109	12	132	63	334
2025	12	9	124	15	158	77	394
2026	13	10	140	18	184	90	454
2027	14	11	156	21	208	103	513
2028	15	12	174	24	230	116	571
2029	16	13	191	28	251	129	628
2030	18	14	208	32	271	141	683



# Mid-Mid GWh Savings by Source: SDG&E

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					13	-	13
2018	16	7	58	6	77	-	164
2019	26	15	128	13	159	-	341
2020	36	22	199	18	233	9	516
2021	44	29	268	26	304	32	703
2022	54	36	340	34	372	54	890
2023	60	43	416	43	479	75	1,117
2024	67	50	477	52	566	97	1,309
2025	73	57	545	63	647	117	1,502
2026	80	64	616	74	721	138	1,693
2027	87	72	691	86	789	158	1,883
2028	94	79	771	99	844	177	2,066
2029	102	86	854	113	893	196	2,244
2030	111	93	936	128	937	215	2,419



# Mid-Mid MM Therms Savings by Source: SDG&E

	BROs	Low Income	Equipment-Standard	Equipment-ET	Appliance Standards	Building Standards	Total
2017					0.00	-	0.00
2018	0.52	0.29	0.40	0.51	-0.12	-	1.60
2019	0.77	0.57	0.84	1.10	-0.31	-	2.98
2020	1.02	0.87	1.49	1.61	-0.45	0.39	4.93
2021	1.17	1.16	2.18	2.18	-0.57	1.16	7.28
2022	1.34	1.46	2.82	2.76	-0.67	1.92	9.61
2023	1.51	1.76	3.67	2.95	-0.75	2.66	11.80
2024	1.68	2.05	4.44	3.13	-0.77	3.40	13.94
2025	1.84	2.35	5.10	3.31	-0.79	4.14	15.94
2026	2.01	2.65	5.50	3.47	-0.80	4.86	17.68
2027	2.19	2.94	5.89	3.62	-0.81	5.58	19.41
2028	2.38	3.24	6.28	3.77	-0.80	6.29	21.16
2029	2.58	3.53	6.41	3.92	-0.79	6.99	22.65
2030	2.80	3.83	6.62	4.06	-0.78	7.69	24.22



# Comments?

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