D+R International

2024 Annual Report

Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes

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EXECUTIVE SUMMARY

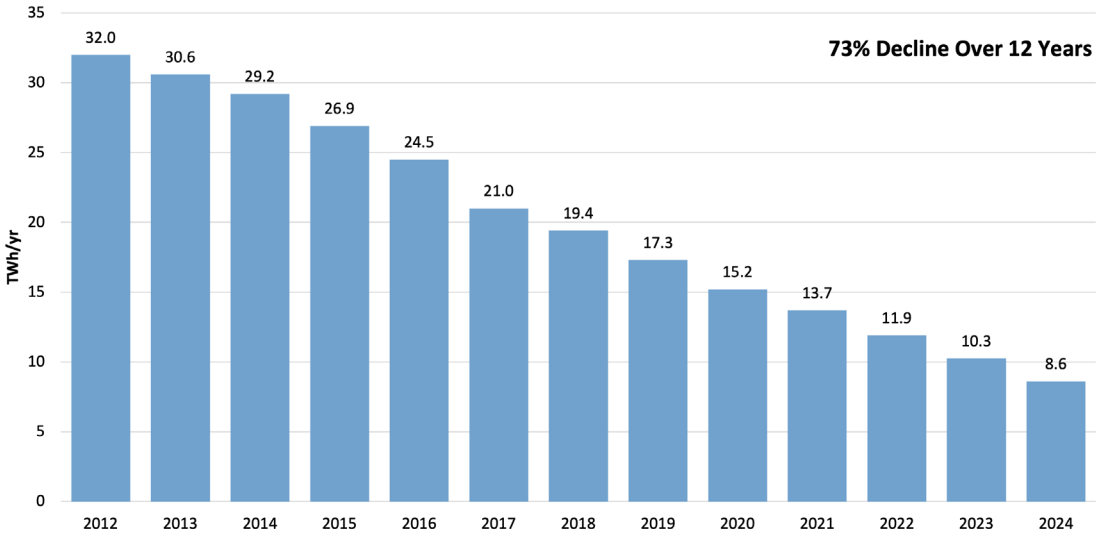
In 2012, the pay television industry, led by NCTA - The Internet & Television Association, the Consumer Technology Association, and CableLabs®, signed the Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes with the goal of increasing the energy efficiency of set-top boxes while protecting rapid innovation and timely introduction of new features. Signatories include major manufacturers of set-top boxes and the largest cable, satellite, and telco service providers, serving approximately 45 million U.S. video subscribers and accounting for over 95% of the traditional pay-television (pay-TV) market in 2024.

In 2013, leading Energy Advocates joined with the pay-TV industry in an expanded version of the Voluntary Agreement. One of the requirements of the Voluntary Agreement is the publication of an annual report by D+R International (D+R), acting as Independent Administrator and Independent Auditor of the Agreement. This twelfth annual report provides a summary of developments for the previous calendar year, 2024. Annual reports for the previous eleven years and energy information for consumers and other stakeholders can be found at www.energy-efficiency.us.

The primary commitment of the Agreement is that in each calendar year 90% of each service provider's new set-top box purchases meet prescribed energy-efficiency levels. These levels have been revised three times to become more rigorous, and this report for 2024 is the second in which the "Tier 4" levels have applied to the parties' commitments. In 2024, 100% of the service providers' new set-top box purchases met the applicable energy efficiency levels of the Voluntary Agreement.[1]

National set-top box annual energy consumption has declined by approximately 73% under the Voluntary Agreement, from 32 TWh in 2012 to 8.6 TWh in 2024 (as shown in Figure ES-1 below). While a significant portion of this decline is due to subscriber reductions, the new set-top boxes used by customers today are also much more efficient. The weighted average power usage of new devices decreased from 122 kWh/year in 2013 to 43 kWh/year in 2024, a decline of 65% even though functionality and features have increased.

Figure ES-1: Nationwide Annual Energy Used by Set-Top Boxes



[1] As set forth below, this calculation is based on 2024 procurement data submitted to D+R by service providers and corroborated by the results of independent verification testing and by the procurement audit conducted by D+R. The Voluntary Agreement prescribes third-party verification testing of randomly selected set-top boxes from each service provider signatory in each reported category. The 2025 verification testing successfully confirmed that the energy use of each of the tested models is consistent with the levels reported by the signatories. The signatories' performance in meeting their procurement commitments was also validated through D+R's review of procurement data of all signatories and D+R's successful detailed audit of one randomly selected party's records.

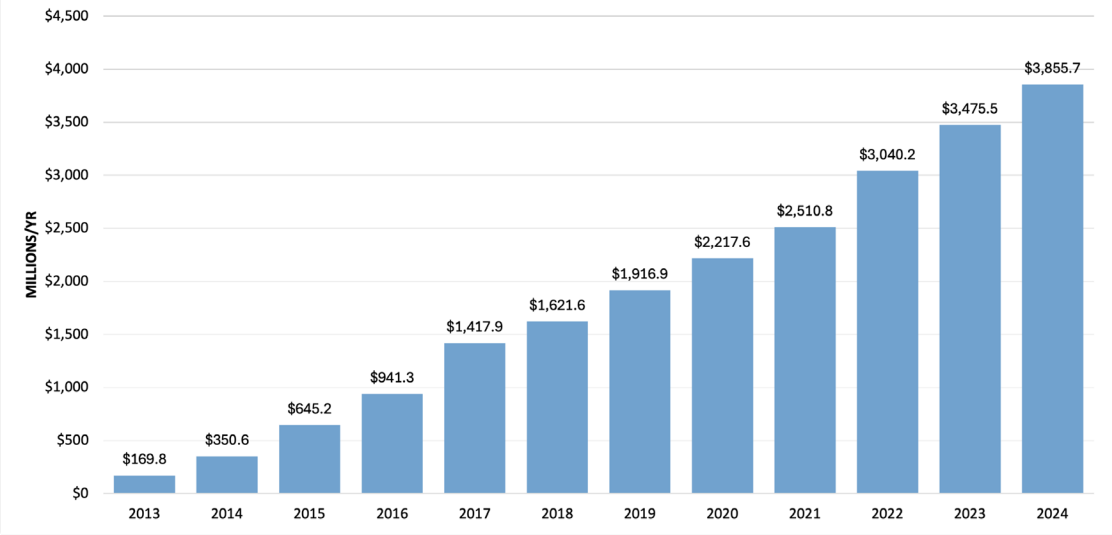
The 23.4 TWh reduction in annual national energy consumption by set-top boxes is nearly equivalent to the power generated by eight typical 500-megawatt coal-run power plants in a year.[2] In 2024, consumers spent $3.85 billion[3] less on their utility bills and there were 15.7 million fewer metric tons of CO_2 emissions from power plants than would have occurred if the power levels and volume of set-top boxes had remained unchanged from 2012 when the Voluntary Agreement was adopted.[4] The following table ES-1 and figure ES-2 present the cumulative effect of these year-over-year declines during the twelve years of the Voluntary Agreement, during which energy consumption has been reduced by an estimated 155.5 TWh, which represents approximately $22 billion in consumer electricity costs and avoidance of 109 million metric tons of CO_2 emissions.

Table ES-1: Energy Reduction Equivalencies, 2013-2024[5]

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Lifetime of VA
Total National Energy Consumed (TWh/yr)	30.6	29.2	26.9	24.5	21.0	19.4	17.3	15.2	13.7	11.9	10.3	8.6	228.5
Total National Energy Reduction (TWh/yr)	1.4	2.8	5.1	7.5	11.0	12.6	14.7	16.8	18.3	20.1	21.7	23.4	155.5
500 MW Power Plant Equivalents Saved (Rosenfelds)[a]	0.5	0.9	1.7	2.5	3.7	4.2	4.9	5.6	6.1	6.7	7.2	7.8	N/A
Electricity Costs Saved (Million$/yr)	$169.8	$350.6	$645.2	$941.3	$1,417.9	$1,621.6	$1,916.9	$2,217.6	$2,510.8	$3,040.2	$3,475.5	$3,855.7	$22,163.0
CO_2 Avoided (MMT)	1.0	1.9	3.5	5.3	8.2	8.9	10.4	11.9	13.0	14.3	15.4	15.7	109.4

[a]The electricity generated by a typical 500 MW power plant is measured in Rosenfelds, which represents annual electricity output. At the 2012 peak, set-top boxes used 10.6 Rosenfelds annually, and that figure declined to 2.9 Rosenfelds in 2024.

Figure ES-2: Value of Annual Electricity Consumption Reductions Under the Voluntary Agreement



The market for the purchase of new set-top boxes is fundamentally different than in 2012 when the Voluntary Agreement was adopted:

- Consumer broadband internet access services (nearly all of which are delivered by the service provider signatories) have enabled households that subscribed to pay-TV services to replace such services with third-party streaming services, thereby reducing the use of set-top boxes.
- In 2014, the signatories purchased more than 46 million set-top boxes, but in 2024, new purchases declined to only 5 million units.
- Approximately three-fourths of all purchases in 2024 were highly efficient IP Non-DVR set-top boxes, a category that was not defined when the Agreement began. The weighted average power usage of these new IP Non-DVR devices in 2024 was only 26.6 kWh/year.

[2] A common unit in measuring energy-efficiency savings is the "Rosenfeld" (3 terawatt hours per year), the same amount of electricity generated by a conventional 500-megawatt coal-run power plant each year. See https://www.scientificamerican.com/article/rosenfeld-energy-savings.

[3] This calculation is based on the national average residential energy cost of 16.48 cents per kWh for 2024. See U.S. Energy Information Administration, Short-Term Energy Outlook Figure 29, U.S. Residential Electricity Price, https://www.eia.gov/outlooks/steo/report/elec_coal_renew.php.

[4] Emission reduction estimates in this report are based on the U.S. Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[5] A few minor adjustments were made to the previous years' CO_2 avoided conversions due to updates to the conversion factors used to ensure the most accurate conversion factors were used in each corresponding year as outlined in the EPA greenhouse gas equivalencies calculator revision history, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator-revision-history.

By contrast, the primary concern of the Energy Advocates that led to the establishment of the Agreement were DVRs that at that time used an estimated 267 kWh/year.

- Purchases of DVRs have decreased significantly from 12.7 million in 2014 (27% of all purchases) to fewer than 830,000 in 2024 (16% of purchases) as service providers have shifted from deploying a DVR for each television to whole-home DVR services that use one DVR per home or cloud DVR services that do not require the use of DVR set-top boxes at all.

Meanwhile, set-top boxes have not only become far fewer in number, but those that remain are much more energy efficient. The most significant improvement in 2024 occurred in the category which had the most purchases, Non-DVRs. Non-DVRs represented approximately three-fourths of all set-top boxes purchased in 2024, and all Non-DVR purchases in 2024 were IP Non-DVRs. Because IP devices tend to be lower powered than non-IP devices, the weighted average TEC for Non-DVRs decreased by 16% in 2024 from the prior year and now has fallen by 78% from 2012 to 2024. Energy usage of the other two major categories of new set-top boxes has also declined over this period, as shown in Table ES-2 below.

Table ES-2: Weighted Average Typical Energy Consumption (TEC) for Major Set-Top Box Categories

Category	Weighted Average TEC (kWh/yr)		Percent Change in Weighted Average
	Pre-2013 Stock	2024 Purchases	Pre-2013 to 2024
DVR	267	115.1	-57%
Non-DVR	119	26.6	-78%
Thin Client	90	47.1	-48%

The combination of the significant decline in the number of deployed set-top boxes and the significant improvement in the energy efficiency of new devices is enabling the signatories to achieve the objectives of the Voluntary Agreement.

OVERVIEW OF THE VOLUNTARY AGREEMENT

Cable, satellite, and telco service providers offer pay television services to approximately 46.6 million U.S. households.[6] These services rely upon the use of customer-premises equipment, often referred to as set-top boxes, to make the services accessible to consumers' televisions. Each set-top box contains hardware and software to receive content from service providers and process it for home networks, display devices, and recording devices. The underlying delivery network and the types of service provided vary widely among service providers. As a result, set-top boxes are highly specialized equipment, and the devices have changed as the service providers introduced new technologies and services.

As with all electronic devices, set-top boxes must utilize power to operate. In aggregate, set-top boxes in the United States consumed an estimated 32 TWh of electricity in 2012, constituting 18% of residential consumer electronics electricity consumption and 2.2% of all residential electricity consumption.[7] To reduce the amount of energy consumed by set-top boxes while protecting rapid innovation and timely introduction of new features, the pay-TV industry crafted the Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes. The Voluntary Agreement provides a framework for the pay-TV industry to deliver market-based energy-efficiency gains that keep pace with technological innovation.

The signatories of the Voluntary Agreement represent all the major pay-TV service providers, equipment vendors, and related industry organizations in the United States. Combined, these companies reported providing multichannel video service to approximately 45 million American households in 2024, accounting for more than 95% of the traditional live pay-TV market. An expanded Voluntary Agreement was launched in 2013 with the entry of the Natural Resources Defense Council (NRDC) and the American Council for an Energy-Efficient Economy (ACEEE) as "Energy Advocates" that monitor and participate in all aspects of the program. The revised Voluntary Agreement included additional energy-efficiency commitments, coverage of whole-home multi-service gateway devices, and expanded provisions for transparency and accountability. The parties have unanimously extended the Voluntary Agreement three times, with the latest amendment extending its commitments through 2028.

[6] This figure is based on data provided by NCTA and CTA and does not include customer counts for third-party streaming services.
[7] Bryan Urban; Victoria Shmakova; Brian Lim; Kurt Roth, Energy Consumption of Consumer Electronics in U.S. Homes in 2013, Final Report to the Consumer Electronics Association (CEA®), Fraunhofer USA Center for Sustainable Energy Systems (2014). This report estimated 31 TWh of use in 2013, which is consistent with the annual report's estimate of ongoing declines under the Voluntary Agreement since set-top boxes used 32 TWh in 2012.

The primary commitment of the Agreement is that in each calendar year 90% of each service provider's new set-top box purchases meet prescribed energy-efficiency levels. These levels have been revised three times to become more rigorous, and this report for 2024 is the second in which the "Tier 4" levels, as listed in Table 12, have applied to the parties' commitments.

Voluntary Agreement Objectives

The primary objective of the Voluntary Agreement is to continue improvements in the energy efficiency of set-top boxes while preserving flexibility for innovation. As demonstrated below, the signatories are achieving these objectives. By the end of 2024, set-top boxes nationwide were consuming only one-quarter of the energy they consumed in 2012 when the Voluntary Agreement began (8.6 TWh down from 32 TWh), and the weighted energy consumption of the signatories' new 2024 purchases was 65% lower than the typical models of that earlier era even as the functionality of set-top boxes increased.

Voluntary Agreement Signatories and Steering Committee

The current signatories and participants in the Voluntary Agreement are listed below. Each of these entities participates in the Steering Committee.

Energy Advocates

- American Council for an Energy-Efficient Economy (ACEEE)
- Natural Resources Defense Council (NRDC)

Cable Service Providers

- Altice USA
- Charter Communications ("Spectrum")
- Comcast
- Cox Communications

Satellite Service Providers

- AT&T/DIRECTV
- DISH Network

Telco Service Providers

- AT&T
- Frontier
- Verizon

Manufacturers

- Sagemcom
- Vantiva

Other Organizations

- Cable Television Laboratories (CableLabs)
- Consumer Technology Association (CTA)
- NCTA – The Internet & Television Association

The Voluntary Agreement obligates the Steering Committee to designate an Independent Administrator and publish an annual report. The Steering Committee designated D+R International, Ltd. as the Independent Administrator and Auditor in 2013, and D+R has continued in this role.

The Voluntary Agreement requires that the Steering Committee meet at least once annually. The Steering Committee convened on June 13 and July 25, 2024.

Representatives of the signatories have continued to provide updates to state and federal regulators and other stakeholders regarding the ongoing execution of the Voluntary Agreement.

CTA and NCTA are required to provide the following two reports to the Independent Administrator, both of which were provided by the due date for this 2024 report:

- The estimated total number of U.S. residential multichannel video subscribers and the number served by service providers participating in the Voluntary Agreement during the reporting period (due by April 1 of each year); and
- Information on progress with respect to other energy-efficiency commitments (due by May 1 of each year).

Service Provider Commitments

The primary service provider commitment is that at least 90% of its set-top box purchases will meet specified energy-efficiency levels. The original levels were replaced by Tier 2 levels in 2017, Tier 3 levels in 2020, and Tier 4 levels in 2023. Service providers also commit to public posting of energy-efficiency information for consumers. Additional information on other service provider commitments is outlined in Report on Other Efficiency Commitments, below.

Independent Administrator and Auditor Role

The Voluntary Agreement obligates the Steering Committee to designate an Independent Administrator and an Independent Auditor. The Steering Committee designated D+R as the Independent Administrator and Auditor in 2013. D+R has continued in this role since its appointment. Under the Voluntary Agreement, the Independent Administrator must aggregate and compile confidential procurement data submitted by service providers and assess whether the service provider commitments have been met. If the commitments are not met, the Independent Administrator initiates a remediation process following the procedures set out in the Voluntary Agreement.

The Independent Administrator is required to publish its findings in an annual report. The 2024 Annual Report is the twelfth report published. D+R also oversees third-party lab verification of the energy use of selected models reported by each signatory and is required to conduct a random audit of one service provider's procurement figures each year. The 2024 procurement audit report is presented in Appendix C.

New Feature Allowances

The Voluntary Agreement includes a process that enables new features to be deployed without advance notice or permission, so that companies can secure the competitive benefits of first-mover advantages and so that consumers are not delayed from accessing new features. At the same time, the process assures that such new features are promptly and transparently brought within the bounds of the Voluntary Agreement's commitments to energy efficiency.

If a service provider deploys a set-top box that includes a new feature with no allowance, and the presence of the feature causes the set-top box to exceed the allowable TEC, the new feature process permits the service provider to set and report an appropriate initial allowance based upon its best estimate of the amount of energy consumed by the new feature. No new feature allowances were submitted for the 2024 reporting period.

INCREASED ENERGY EFFICIENCY OF SET-TOP BOXES

Table 1 demonstrates the continued progress made by the signatories in improving the energy efficiency of set-top boxes. DVR, Non-DVR and Thin Client all show decreases in weighted average Typical Energy Consumption (TEC) in 2024 compared to 2023.

Non-DVRs are the category with both the most significant improvement in 2024 as well as the most purchases. Non-DVRs represented three-fourths of all set-top boxes purchased in 2024, and 100% of these new Non-DVRs utilize efficient IP technology (compared to less than 90% in 2023). Because IP devices tend to be lower powered than non-IP devices, migration to IP devices has driven energy use down. The weighted average TEC for Non-DVRs decreased by 16% in 2024 from the prior year and overall has fallen by 78% from 2012 to 2024, as illustrated in Table 1 below.

Table 1: Weighted Average Typical Energy Consumption of New Purchases for Major Set-Top Box Categories

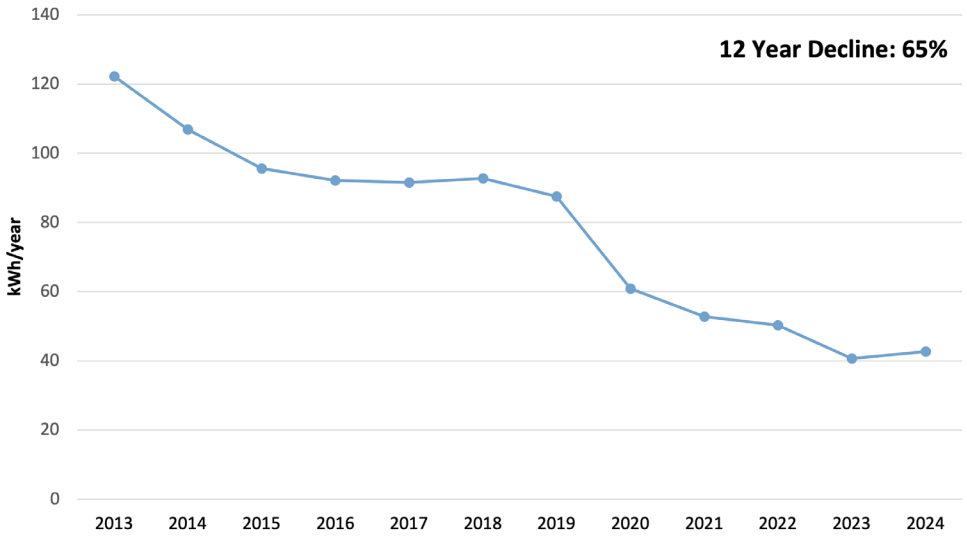
Category	Weighted Average TEC of New Purchases (kWh/yr)													Percent Change in Weighted Average
	Pre-VA	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2012 to 2024
DVR	267	195.4	179.4	170.6	161.3	142.9	138.7	134.4	144.8	146.5	143.6	128.9	115.1	-57%
Non-DVR	119	108.6	103.3	92.6	85.6	90.8	91.8	74.1	49.0	42.5	44.0	31.5	26.6	-78%
Thin Client	90	51.4	50.0	49.1	46.9	44.3	45.4	45.4	48.0	47.6	49.1	55.8	47.1	-48%

DTAs were not purchased in 2024.

The weighted average TEC of new DVRs purchased in 2024 decreased by more than 10% relative to 2023 purchases and has now fallen by more than half since the start of the Voluntary Agreement.

The overall annual weighted average TEC of all set-top box purchases has declined by 65% since the start of the Voluntary Agreement, as shown in Figure 1 below. This reduction is slightly less than the 67% reduction in 2023 purchases relative to 2012 due to a relative increase in DVR purchases in 2024 compared to 2023, but DVR purchases in each of these years are significantly lower than in the early years of the Voluntary Agreement. The decline from more than 122 kWh/year for the first reported purchases in 2013 to 43 kWh/year in 2024 corroborates the 73% reduction in national energy consumption over that same period as calculated below, since this metric is independent of stock estimates and subscriber count adjustments.

Figure 1: Weighted Average TEC of Purchased Set-Top Boxes by Year



REPORT ON PROCUREMENT COMMITMENTS

Under the Voluntary Agreement, the service providers committed that 90% of set-top boxes they purchased each year would meet applicable energy efficiency levels. In 2024, 100% of the set-top boxes they purchased met these levels. The total procurement figures for the reported categories of set-top boxes can be found in Table 2 below.

Table 2: Set-Top Box Procurement by Category in 2024

Category	Units Procured	Number Meeting Efficiency Levels	Percent Meeting Efficiency Levels
DVR	828,293	828,293	100.0%
Non-DVR (Non-IP)	0	N/A	N/A
Non-DVR (IP)	3,849,720	3,849,720	100.0%
Thin Client	478,018	478,018	100.0%
Total	**5,156,031**	**5,156,031**	**100.0%**

MEASURING THE REDUCTION IN NATIONAL ENERGY CONSUMPTION

In 2012, service providers began working with Energy Advocates to estimate the energy consumption of set-top boxes and the number of units installed in subscriber households. Using service provider and energy-efficiency advocate reports and data on product trends, the signatories developed the base case shown in Table 3, representing the market in 2012.

Table 3: Base Case – 2012 Estimated Energy Consumption

Segment	Category	TEC (kWh/yr)	Units (Millions)	National Energy Consumption (TWh/yr)	500 MW Power Plant Equivalents (Rosenfelds)
Cable	DVR	282	27	7.5	2.5
	Non-DVR	139	57	7.9	2.6
	Thin Client	90	2	0.1	0.0
	DTA	39	33	1.3	0.4
Satellite	DVR	283	21	5.9	2.0
	Non-DVR	110	58	6.4	2.1
Telco	DVR	140	6	0.8	0.3
	Non-DVR	90	21	1.9	0.6
U.S. Total		-	**225**	**32**	**10.6**

In this and in prior reports, D+R has used a multi-step approach to evaluate progress in reducing national set-top box energy consumption by comparing the estimated energy usage of deployed set-top boxes at the close of the reporting period with the 2012 base case. The first step is to estimate changes in set-top box stock levels. D+R collected comprehensive data from each signatory of their deployed inventory as of December 31, 2023, and as explained in the prior annual report, that data validated the accuracy of the model previously used to estimate changes in stock levels. D+R therefore returned to the modeled estimation approach for the 2024 national footprint estimate shown in Table 5 below, using the 2023 inventory data as a new starting point. The set-top box stock levels are adjusted to account for changes in subscriber levels, which are shown in Table 4 below.

Table 4: Change in Subscribers from 2012-2024

Segment	Percent Change[a]												
	2012 to 2013	2013 to 2014	2014 to 2015	2015 to 2016	2016 to 2017	2017 to 2018	2018 to 2019	2019 to 2020	2020 to 2021	2021 to 2022	2022 to 2023	2023 to 2024	2012 to 2024
Cable	-4.5%	-0.3%	-0.5%	-1.7%	-3.7%	-2.2%	-1.3%	-4.1%	-6.4%	-7.9%	-9.9%	-9.8%	-41.8%
Satellite	1.0%	0.1%	-1.9%	3.0%	-9.2%	-7.5%	-11.6%	-11.9%	-13.5%	-12.7%	-14.9%	-12.9%	-62.7%
Telco	25.4%	8.2%	-0.9%	-20.9%	2.0%	-3.5%	-13.6%	-12.1%	-14.4%	-13.7%	-13.8%	-15.5%	-57.1%

[a]Based on data provided by the Steering Committee (for 2012) and service providers (for 2013-2024).

The second step assumes that newly purchased devices generally replace older (less energy-efficient) equipment from the same category rather than add to total deployed stock. Finally, D+R incorporates additional information received from the service providers to refine the estimates. Based on these three factors, D+R's estimates for total stock levels as of the end of 2024 are shown in Table 5.

Table 5: Estimates of Total Deployed Units in the Market from 2013-2024

Category	Units[a]											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
DVR	54,038,000	54,599,000	53,890,000	52,674,000	49,892,000	47,672,000	44,412,000	40,901,000	36,898,000	33,163,000	32,501,000	28,662,000
Non-DVR	130,344,000	122,650,000	112,668,000	96,327,000	92,563,000	89,139,000	83,572,000	77,440,000	80,206,000	74,417,000	62,671,000	56,105,000
Thin Client	10,561,000	20,299,000	28,774,000	39,784,000	34,958,000	32,447,000	28,625,000	25,208,000	21,797,000	19,003,000	20,697,000	18,019,000
DTA	31,633,000	31,543,000	31,396,000	30,866,000	29,722,000	29,074,000	28,683,000	27,494,000	15,718,000	14,478,000	6,577,000	5,911,000
Total	**226,576,000**	**229,092,000**	**226,727,000**	**219,651,000**	**207,135,000**	**198,331,000**	**185,293,000**	**171,043,000**	**154,619,000**	**141,060,000**	**122,447,000**	**108,696,000**

[a]Units are rounded for this table, but D+R did not round any figures when calculating the national footprint estimate.

The next step in estimating national energy consumption is to account for products procured in 2024. The signatories purchased approximately 303,700 fewer set-top boxes in 2024 than in 2023, as shown in Table 6.

Table 6: Total Signatory Set-Top Box Units Procured in 2014 and from 2022-2024

Category	Total Units Procured				Percent Change
	2014	2022	2023	2024	2014 to 2024
DVR	12,710,777	442,828	387,936	828,293	-93%
Non-DVR	18,646,064	6,315,175	4,575,852	3,849,720	-79%
Thin Client	9,738,163	468,853	495,948	478,018	-95%
Subtotal	**46,296,336**	**7,300,716**	**5,459,736**	**5,156,031**	**-89%**

D+R assumes the 2024 set-top box procurements replaced the oldest deployed units. This methodology yields multiple sets of stock (one for each purchase year) each with its own weighted average TEC values. The remaining stock estimates for each of the purchase year sets are shown in Table 7.

Multiplying the number of units purchased each year that remained in the field at the end of 2024 and the average TEC for that category of device at the time of its purchase produces the estimated national energy consumption shown in Table 7. Table 8 displays the results of this calculation year-over-year for the lifetime of the Voluntary Agreement.

Table 7: 2024 National Energy Consumption Calculation

Category	Pre-VA (before 2013)"	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2024 National Energy Consumption (TWh)*
DVR Purchases from Each Year Remaining in Field	0	0	0	0	4,102,515	8,268,205	6,304,346	5,848,219	1,719,840	759,555	442,828	387,936	828,293	
DVR TEC Average (kWh/yr)	267.0	195.4	179.4	170.6	161.3	142.9	138.7	134.4	144.8	146.5	143.6	128.9	115.1	4.1
Non-DVR Purchases from Each Year Remaining in Field	0	0	0	0	0	5,995,205	10,066,928	8,319,044	10,537,923	6,444,722	6,315,175	4,575,852	3,849,720	
Non-DVR TEC Average (kWh/yr)	119.0	108.6	103.3	92.6	85.6	90.8	91.8	74.1	49.0	42.5	44.0	31.5	26.6	3.4
Thin Client Purchases from Each Year Remaining in Field	0	0	0	0	0	3,269,834	6,316,550	4,592,236	1,473,453	923,849	468,853	495,948	478,018	
Thin Client TEC Average (kWh/yr)	90.0	51.4	50.0	49.1	46.9	44.3	45.4	45.4	48.0	47.6	49.1	55.8	47.1	0.8
DTA Purchases from Each Year Remaining in Field	0	0	0	0	3,808,780	1,337,930	427,480	127,850	86,959	48,240	73,860	0	0	
DTA TEC Average (kWh/yr)	39.0	57.6	49.3	46.5	49.9	54.9	55.8	51.2	51.4	54.9	38.2	N/A	N/A	0.3
Total 2024 National Energy Consumption (TWh)														**8.6**

Table 8: National Energy Consumption of Installed Set-Top Boxes 2012-2024[8]

	2012 (Pre-VA)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Estimate of Total Deployed Units in the Market	225,000,000	226,576,000	229,092,000	226,727,000	219,651,000	207,135,000	198,331,000	185,293,000	171,043,000	154,619,000	140,481,000	122,447,000	108,696,000
National Energy Consumed (TWh/yr)	32.0	30.6	29.2	26.9	24.5	21.0	19.4	17.3	15.2	13.7	11.9	10.3	8.6
500 MW Power Plant Equivalents (Rosenfelds)	10.6	10.2	9.7	9.0	8.2	7.0	6.5	5.8	5.1	4.6	4.0	3.4	2.9
CO_2 Emitted (MMT)	22.6	21.6	20.1	18.5	17.2	15.6	13.7	12.2	10.7	9.7	5.1	4.3	3.4

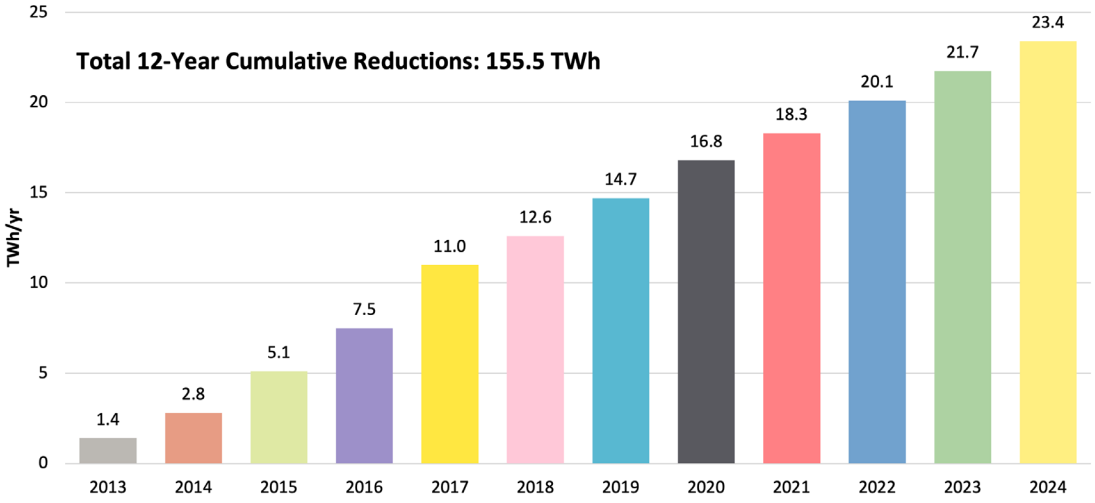
D+R therefore calculates that set-top boxes consumed 8.6 TWh in 2024 compared to 32 TWh in the base case year of 2012. As shown in Figure 2 below, during the twelve years of the Voluntary Agreement, cumulative energy consumption has declined by an estimated 155.5 TWh, which represents approximately $22 billion in consumer electricity costs and 109 million metric tons of CO_2 emissions. In 2024 alone, consumers spent $3.85 billion[9] less on their utility bills in 2024 and there were 15.7 million fewer metric tons of CO_2 emissions from power plants than would have occurred if the power levels and volume of set-top boxes had remained unchanged from 2012 when the Voluntary Agreement was adopted.[10]

[8] D+R used EPA's GHG Calculator for its calculations. D+R's 2023 STB VA Annual Report explained how changes to EPA methodologies resulted in a larger decrease in the estimated CO_2 emitted beginning in 2022. A few additional minor adjustments were made to the previous years' CO_2 emitted conversions due to updates to the conversion factors used to ensure the most accurate conversion factors were used in each corresponding year as outlined in the EPA greenhouse gas equivalencies calculator revision history, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator-revision-history.

[9] U.S. Energy Information Administration, supra note 3.

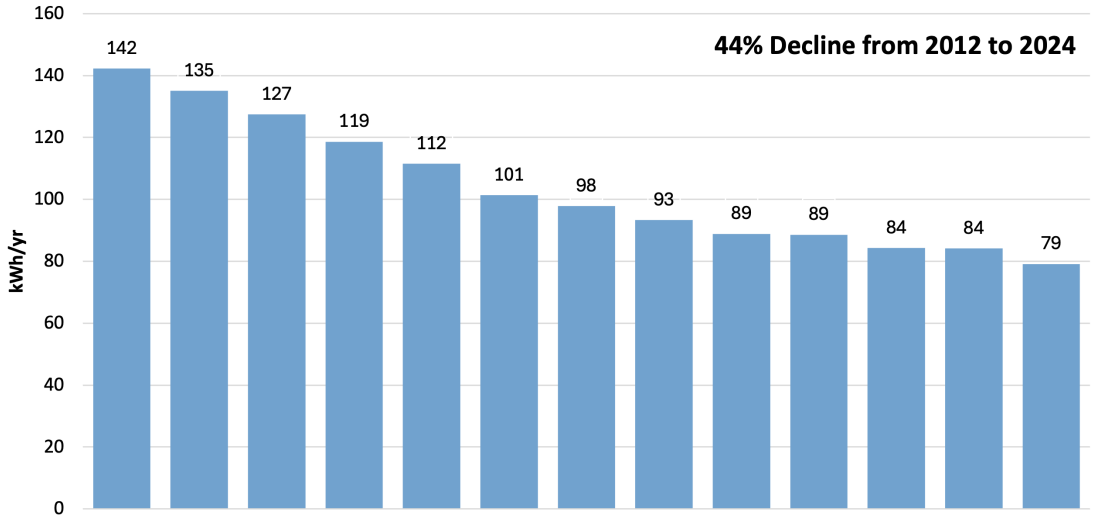
[10] U.S. Environmental Protection Agency, supra note 4.

Figure 2: Annual National Energy Reductions Compared to the Base Case



In prior reports, D+R has presented all these energy reductions as savings, but as previously acknowledged, a growing part of the reduction is associated with the significant decline in the number of video subscribers that began in 2017. However, much of the reduction is fairly considered to be savings attributable to the efforts of the signatories. First, the broadband networks that have enabled consumers to replace traditional pay-TV services with video streaming alternatives were largely built by signatories. More importantly, the reduction is driven by the greatly improved energy efficiency of newer devices procured to meet the commitments of the Voluntary Agreement. The weighted average TEC of new set-top boxes has declined by 65% since the start of the Voluntary Agreement, as shown in Figure 1 above. Over time, the significant year-over-year decline in energy usage of new models has caused a 44% reduction in the estimated average set-top box TEC over the entire footprint of deployed set-top boxes, from 142 kWh/year to 79 kWh/year. This trend over time is documented in Figure 3 below, which divides D+R's estimated national energy usage for each year by its estimate of the total number of deployed set-top boxes in that year.

Figure 3: Average Annual Energy Used Per Deployed Set-Top Box



The energy savings reflected in Figure 3 have been achieved through the reduced energy usage of devices purchased by service providers, independent of the impact of reduced subscribership. D+R has not attempted to allocate the credit for the reduction in consumption between device efficiency and reduced pay-TV subscribership; at best such an estimate would require significant speculation given that if subscribership had remained steady or increased, service providers would have purchased a greater number of newer devices that on average would have used less power. Whatever the allocation of credit, the success of the Voluntary Agreement is demonstrated by the 65% reduction in the power usage of new devices and the 73% overall reduction in the demand set-top boxes place on the nation's energy grid.

AUDIT AND VERIFICATION

Procurement Audit

D+R is required to conduct an audit of one randomly selected service provider's procurement figures each year. The audit report for the 2024 reporting year is presented in Appendix C. D+R determined that the data submitted by the service provider for the audit is consistent with the annual report submitted by that service provider.

Verification Testing

The Voluntary Agreement prescribes third-party verification testing of models chosen by the Independent Administrator. Every model tested measured within the applicable energy-efficiency levels, and 100% of the devices tested were at or below the values reported by the service providers. These results validate and support the findings in this report.

REPORT ON OTHER ENERGY-EFFICIENCY COMMITMENTS

The Voluntary Agreement established other energy-efficiency commitments described below.

Consumer Access to Energy-Efficiency Information

All service providers committed to provide subscribers and potential customers with reasonable access to energy-efficiency information for set-top boxes purchased since January 1, 2014. This information makes it easier for consumers to learn about energy-efficient set-top boxes and typical set-top box energy consumption. This information is posted on company websites from the links listed in Appendix B of this annual report and at www.energy-efficiency.us, which offers a single site from which the public may conveniently link to each service provider's information, the Independent Administrator's Annual Reports, the Voluntary Agreement, and related news and information. D+R again confirmed that this information is readily available to the public from the links listed in Appendix B of this report.

Viewing Without Operator-Supplied Set-Top Boxes

In its 2016 report, D+R observed that some portion of the decline in the total national energy usage of set-top boxes was attributable to consumer use of apps to access the signatories' video services without a set-top box, but that D+R lacked data on such app usage. Beginning with the 2017 report, the service provider signatories have reported the functionalities and usage of their apps to enable stakeholders to better understand the then-emerging viability of apps as alternatives to set-top boxes and their impact on national energy consumption. Today, it is no longer necessary to demonstrate that the service provider signatories are continuing to enable their customers to watch video programming without the use of operator-supplied set-top boxes through their support of apps. These apps can be used on hundreds of millions of consumer-owned Internet-connected devices, such as smartphones, tablets, personal computers, select smart TVs, game consoles, and low-power streaming devices such as Apple TV, Roku, Google Chromecast, and Amazon Fire. Apps have achieved nearly universal adoption, with ninety-three percent of U.S. households now reporting at least some use of streaming services to watch video. Nielson recently reported that "streaming reached a historic milestone in May [2025] as its share of total television usage outpaced the combined share of broadcast and cable for the first time ever."[12] Meanwhile, set-top boxes nationwide are consuming only one-quarter of the energy they consumed in 2012 when the Voluntary Agreement began. For these reasons, the signatories decided in 2025 that detailed reporting on apps is no longer constructive. D+R had already collected the data for 2024 and is presenting this information for a final time in this report.

Signatories reported that the number of unique customer-owned and managed devices used to access video services via apps was approximately 48.4 million in 2024, a 13% increase from 2023. An 11% reduction in pay-TV subscribers was seen during the same period.

[12] Nielson Reserch, Streaming Reaches Historic TV Milestone, Eclipses Combined Broadcast and Cable Viewing For First Time (June 2025), available at https://www.nielsen.com/news-center/2025/streaming-reaches-historic-tv-milestone-eclipses-combined-broadcast-and-cable-viewing-for-first-time.

Table 9 lists the supported TV and other platforms and devices used by consumers to view each service provider's content using its app without operator-supplied set-top boxes in 2024. The table indicates whether the service provider's app on each platform supports access to linear (live TV) content, on demand content, and/or recording capability, which are among the features that help make apps an attractive alternative to a set-top box.

App usage can replace or reduce demand for set-top boxes in a variety of ways. For example, the use of apps to view pay-TV and other video content on televisions can render a set-top box unnecessary for that television. Eighty-two percent of American households have at least one Smart TV.[13] Many Smart TVs that use Samsung, LG, Roku, Android, or Amazon Fire operating systems can access select service provider apps without set-top boxes. In addition, the use of non-TV mobile devices to access video service provider apps inside the home reduces the demand for additional set-top boxes on additional rooms around the home.

Set-top box usage has also declined as the number of subscribers to multichannel video services has decreased by 50% under the period covered by the Voluntary Agreement from 100 million in 2013 to 46 million in 2024. The significant decrease in new set-top box purchases tracked by D+R's reports reflects the impact of the continued decline in the number of traditional video subscribers and the increase in the use of alternative options to access video content. The combination of this decline and the significant improvement in the energy efficiency of the set-top boxes that remain in use has reduced the relevance of the set-top box category to national energy policy since the adoption of the Voluntary Agreement.

Table 9: Platforms and Apps Used by Customers to View Content Without Set-Top Boxes

Service Provider	Platform	App Name	Live TV	On-Demand	DVR
			Yes / No		
Altice USA	Android	Optimum TV	Yes	Yes	Yes
	Apple iOS	Optimum TV	Yes	Yes	Yes
	Apple TV	Optimum TV	Yes	Yes	Yes
Charter	Android	Spectrum TV	Yes	Yes	Yes
	Apple iOS	Spectrum TV	Yes	Yes	Yes
	Apple TV	Spectrum TV	Yes	Yes	Yes
	Google Chromecast	Spectrum TV	Yes	Yes	Yes
	MAC	Spectrum TV on Spectrum.net	Yes	Yes	Yes
	PC	Spectrum TV on Spectrum.net	Yes	Yes	Yes
	Roku	Spectrum TV	Yes	Yes	Yes
	Roku TV	Spectrum TV	Yes	Yes	Yes
	Samsung TV	Spectrum TV	Yes	Yes	Yes
	Xbox One	Spectrum TV	Yes	Yes	Yes
	Xumo	Spectrum TV	Yes	Yes	Yes
Comcast	Amazon Fire TV	Stream	Yes	Yes	Yes
	Amazon Kindle Fire HD	Stream	Yes	Yes	Yes
	Android	Stream	Yes	Yes	Yes
	Apple iOS	Stream	Yes	Yes	Yes
	Apple TV	Stream	Yes	Yes	Yes
	Google Chromecast	Stream	Yes	Yes	Yes
	LG TV	Stream	Yes	Yes	Yes
	MAC	Stream	Yes	Yes	Yes
	PC	Stream	Yes	Yes	Yes
	Roku	Stream	Yes	Yes	Yes
	Roku TV	Stream	Yes	Yes	Yes
	Samsung TV	Stream	Yes	Yes	Yes
	XClass TV	Stream	Yes	Yes	Yes

[13] Hub Entertainment Research, Connected Home 2025 (March 2025).

Service Provider	Platform	App Name	Live TV	On-Demand	DVR
			Yes / No		
Comcast	Xfinity Flex	Stream	Yes	Yes	Yes
	Xumo	Stream	Yes	Yes	Yes
Cox	Android	Contour	Yes	Yes	Yes
	Apple iOS	Contour	Yes	Yes	Yes
	MAC	Contour	Yes	Yes	Yes
	PC	Contour	Yes	Yes	Yes
DirecTV	Amazon Fire TV	DIRECTV, U-Verse, DIRECTV Stream	Yes	Yes	Yes
	Amazon Kindle Fire HD	DIRECTV, U-Verse, DIRECTV Stream	Yes	Yes	Yes
	Android	DIRECTV, U-Verse, DIRECTV Stream	Yes	Yes	Yes
	Android TV	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	Apple iOS	DIRECTV, U-Verse, DIRECTV Stream	Yes	Yes	Yes
	Apple TV	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	Google Chromecast	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	MAC	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	PC	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	Roku	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	Roku TV	DIRECTV, DIRECTV Stream	Yes	Yes	Yes
	Samsung TV	DIRECTV Stream	Yes	Yes	Yes
Dish	AirTV Mini	Sling	Yes	Yes	Yes
	Amazon Echo Show	Sling	Yes	Yes	Yes
	Amazon Fire Tablets	Sling	Yes	Yes	Yes
	Amazon Fire TV	Dish Anywhere	Yes	Yes	Yes
	Amazon Fire TV	Sling	Yes	Yes	Yes
	Android OS	Dish Anywhere	Yes	Yes	Yes
	Android OS	Sling	Yes	Yes	Yes
	Android TV	Dish Anywhere	Yes	Yes	Yes
	Android TV	Sling	Yes	Yes	Yes
	Apple iOS	Dish Anywhere	Yes	Yes	Yes
	Apple iOS	Sling	Yes	Yes	Yes
	Apple TV	Sling	Yes	Yes	Yes
	Cox Contour Stream Player	Sling	Yes	Yes	Yes
	Google Chromecast	Sling	Yes	Yes	Yes
	Google Nest Hub	Sling	Yes	Yes	Yes
	LG Smart TVs	Sling	Yes	Yes	Yes
	MAC	Dish Anywhere.com (website)	Yes	Yes	Yes
	MAC	Sling.com (website)	Yes	Yes	Yes
	PC	Dish Anywhere.com (website)	Yes	Yes	Yes
	PC	Sling.com (website)	Yes	Yes	Yes
	Roku	Sling	Yes	Yes	Yes
	Roku Smart TVs	Sling	Yes	Yes	Yes
	Samsung Smart TVs	Sling	Yes	Yes	Yes
	TiVo Stream	Sling	Yes	Yes	Yes
	Vizio Smart TVs	Sling	Yes	Yes	Yes
	Xbox	Sling	Yes	Yes	Yes
	Xfinity Flex	Sling	Yes	Yes	Yes
	Xfinity X1	Sling	Yes	Yes	Yes

Service Provider	Platform	App Name	Live TV	On-Demand	DVR
			Yes / No		
Verizon	Amazon Fire TV	fios tv home	Yes	Yes	Yes
	Android	fios mobile	Yes	Yes	Yes
	Android TV	fios tv home	Yes	Yes	Yes
	Apple iOS	fios mobile	Yes	Yes	Yes
	Apple TV	fios tv home	Yes	Yes	Yes
	MAC	tv.verizon.com	Yes	No	No
	PC	tv.verizon.com	Yes	Yes	No
Number of unique, customer-owned and managed devices that have accessed video services via apps during Reporting Period			48,369,480		

CONCLUSION

100% of the signatories' new purchases met the applicable energy-efficiency levels of the Voluntary Agreement, and the weighted energy consumption of those new 2024 purchases was 65% lower than the typical models purchased in 2013 even as the functionality of set-top boxes increased. Over time, the significant year-over-year declines in energy usage of new models has caused a 44% reduction in the estimated average set-top box energy usage over the entire footprint of deployed set-top boxes, from 142 kWh/year to 79 kWh/year.

As a result, by the end of 2024, set-top boxes nationwide were consuming only one-quarter of the energy they consumed in 2012 when the Voluntary Agreement began (8.6 TWh, down from 32 TWh), Consumers spent $3.85 billion less on their utility bills and there were 15.7 million fewer metric tons of CO_2 emissions from power plants in 2024 than would have occurred if the power levels and volume of set-top boxes had remained unchanged from 2012 when the Voluntary Agreement was adopted.

This analysis has been confirmed year-by-year through independent verification testing and procurement audits. The total energy footprint of set-top boxes in customers' homes used to access pay-TV services continues to decline as a result of improved energy efficiency, declining subscribership, and consumer use of apps as an alternative to set-top boxes.

APPENDIX A: SET-TOP BOXES PURCHASED BY VOLUNTARY AGREEMENT SERVICE PROVIDER SIGNATORIES IN 2024

Table 10 lists the reported typical energy consumption (TEC) for each model of set-top box purchased by Service Provider signatories in 2024. These values are reported TEC, rather than calculated TEC. In the Voluntary Agreement, service providers have the option to publish a "reported TEC" that rounds up calculated TEC values for reporting purposes to account for production variances. Reported TEC figures in this Appendix are rounded up to the next one-tenth digit (e.g., 99.11 kWh/year would be rounded up to 99.2 kWh/year). Please note that the same model could have variances in TEC for several reasons, including differences in reported versus calculated TEC, enabling of different product features, and/or deployment of the device by service providers running different software. The Voluntary Agreement calculates the maximum allowable TEC for a product using the base-type allowances outlined in Table 11 and the feature allowances outlined in Table 12. Table 12 also includes descriptions of the features abbreviated in Table 11 in the "Claimed Allowances" column. The Voluntary Agreement sets forth rules for claiming feature allowances, so the column for claimed allowances lists only the features used when calculating the maximum allowable TEC for the specific product to qualify toward meeting the signatory's commitment.

The data submitted by service providers is subject to third-party lab verification and procurement audits as described in the report. An asterisk indicates models that have been evaluated through third-party verification testing in the current year and/or in previous years under the Voluntary Agreement.

Table 10: Set-Top Boxes Procured by Voluntary Agreement Service Provider Signatories in 2024

Service Provider	Base Type	Primary Function	Manufacturer	Model No.	Claimed Allowances	Reported Modal Power (W)		TEC (kWh/yr)	Meets VA Levels
						On	Sleep		
Altice USA	IP	Non-DVR	Sagemcom	CS 50001*	HNI, WiFi (n) LP, WiFi (ac) LP, HEVP	2.65	2.28	21.9	Yes
AT&T/DIRECTV	Satellite	DVR	DIRECTV	HR54-500*	APD (hrs), DVR, DVR-A, HNI, M-HNI, Multi-room, MS, MS-A	12.66	12.64	110.8	Yes
AT&T/DIRECTV	Satellite	DVR	DIRECTV	HS17-500*	APD (hrs), DVR, DVR-A, M-HNI, Multi-room, MS, MS-A, XCD, WiFi (ac) HP, WiFi Addl HP(2), UHD-4	19.48	18.34	163.6	Yes
AT&T/DIRECTV	Thin Client	Thin Client	DIRECTV	C61-500*	APD (hrs), HNI, M-HNI	5.43	4.22	40.0	Yes
AT&T/DIRECTV	Thin Client	Thin Client	DIRECTV	C61W-400	APD (hrs), HNI, WiFi (ac) LP, WiFi Addl LP(2)	6.53	5.03	47.9	Yes
AT&T/DIRECTV	Thin Client	Thin Client	DIRECTV	C71KW-400 (GEM)*	HNI, WiFi (ac) LP, WiFi Addl LP(2), HEVP, UHD-4	6.69	5.91	55.8	Yes
Charter	IP	Non-DVR	Apple	A2843*	WiFi (n) LP, WiFi (ac) LP, HEVP	3.18	1.24	20.8	Yes
Charter	IP	Non-DVR	Sercomm	SCXI11BEI*	WiFi (n) LP, WiFi (ac) LP, HEVP	2.93	2.03	22.4	Yes
Charter	IP	Non-DVR	Sercomm	COESST11AEI*	WiFi (n) LP, WiFi (ac) LP, HEVP	2.41	1.88	19.2	Yes
Cox	IP	Non-DVR	Sercomm	SCXI11BEI	HNI, WiFi (n) LP, WiFi (ac) LP, HEVP	2.87	2.18	22.6	Yes
Cox	IP	Non-DVR	Sercomm	XUMO*	HNI, WiFi (n) LP, WiFi (ac) LP, HEVP	2.98	2.39	24.0	Yes
DISH	Thin Client	Thin Client	DISH	Joey 4*	APD (hrs), HNI, M-HNI, HEVP, UHD-4	6.40	5.90	53.0	Yes
DISH	Satellite	DVR	DISH	Hopper 3	APD (hrs), Adv Video-A, DVR, DVR-A(2), M-HNI, Multi-room, MS, MS-A(2), XCD, XCD-A, WiFi (n) LP, HEVP, UHD-4	24.43	23.28	206.6	Yes
DISH	Thin Client	Thin Client	DISH	Wireless Joey 4*	APD (hrs), HNI, WiFi (ac) HP, WiFi Addl HP, HEVP, UHD-4	6.83	6.33	56.7	Yes
Verizon	Cable	DVR	Vantiva	4100P2	APD (hrs), Adv Video-A, DVR, M-HNI, Multi-room, MS, MS-A, XCD, XCD-A, HEVP, UHD-4	19.70	15.50	146.5	Yes
Verizon	IP	Non-DVR	Vantiva	4100*	APD (hrs), HNI, M-HNI, WiFi (ac) HP, WiFi Addl HP(2), HEVP, UHD-4	8.80	6.00	59.7	Yes
Verizon	Cable	DVR	Vantiva	4100ATV*	Adv Video-A, DVR, M-HNI, Multi-room, MS, MS-A, XCD, XCD-A, HEVP, UHD-4	10.92	10.92	95.7	Yes
Verizon	IP	Non-DVR	Vantiva	F3544K49203*	APD (hrs), WiFi (n) LP, WiFi (ac) LP, HEVP, UHD-4	3.91	2.27	23.8	Yes
Verizon	IP	DVR	WNC	JS7E*	DVR, DVR-A, HNI, Multi-room, MS, HEVP, UHD-4	6.72	6.72	58.9	Yes

Table 11: Set-Top Box Base Allowances

Base Type (Use topmost if multiple apply)	Tier 4 Allowance (kWh/yr)
DTA	40
Cable (CBL)	45
Satellite (SAT)	50
Internet Protocol (IP)	15
Thin Client (TC)	25

Table 12 sets forth the features listed for set-top boxes and their feature allowances under Tier 4.

Table 12: Set-Top Box Feature Allowances

Set-Top Box Feature Allowances		
Feature	**Description**	**Tier 4 TEC Allowance (kWh/yr)**
Adv Video-A	Advanced Video Processing	8
APD (hrs)	Automatic Power Down (4 hrs)	-
D3	DOCSIS 3.0	40
D3 above 8x4	DOCSIS 3.0 above 8x4	11
DVR	Digital Video Recorder (DVR)	15
DVR-A	DVR Additional	10
HEVP	High Efficiency Video Processing	10
HNI	Home Network Interface	10
M-HNI	MoCA HNI	12
MS	Multi-stream	8

Set-Top Box Feature Allowances		
Feature	**Description**	**Tier 4 TEC Allowance (kWh/yr)**
MS-A	Multi-stream Additional	8
Multi-room	Multi-room	20
UHD-4	Ultra High Definition - 4K	5
WiFi (ac) HP	WiFi (ac) HP	20
WiFi (ac) LP	WiFi (ac) LP	16
WiFi (n) HP	WiFi (n) HP	10
WiFi (n) LP	WiFi (n) LP	9
WiFi Addl HP	WiFi above 2x2 HP	3
WiFi Addl LP	WiFi above 2x2 LP	3
XCD	Transcoding Base	13
XCD-A	Transcoding Additional	5

*APD (Automatic Power Down) is used to calculate TEC but does not have a specific allowance.

APPENDIX B: CONSUMER ACCESS TO SET-TOP BOX ENERGY-EFFICIENCY INFORMATION

Set-top box energy information for consumers is available at www.energy-efficiency.us, and for each service provider at the links below.

Table 13: Links for Consumer Access to Energy-Efficiency Information

Service Provider	Consumer Information Location
Altice USA	https://energy.cablelabs.com/alticeusa/
AT&T/DIRECTV	https://www.directv.com/support/satellite/article/000082048
Charter	https://energy.cablelabs.com/charter/
Comcast	https://www.xfinity.com/support/articles/set-top-box-energy-usage
Cox Communications	https://energy.cablelabs.com/cox/
DISH	https://support.dish.com/products/receivers/energy-efficiency
Frontier	https://content.frontier.com/-/media/documents/helpcenter/tv/fiber-tv/set-top-box-equipment-efficiency.pdfbox-equipment-efficiency.pdf
Verizon	https://www.verizon.com/support/residential/tv/equipment/stb-dvr

APPENDIX C: 2024 PROCUREMENT AUDIT REPORT

In 2012, the pay-TV industry signed a Voluntary Agreement with the goal of increasing the energy efficiency of set-top boxes, while protecting rapid innovation and timely introduction of new features. Signatories of the Voluntary Agreement include major manufacturers of set-top boxes and the largest cable, satellite, and telco service providers and leading Energy Advocates.

The Voluntary Agreement requires the service providers to submit annual procurement data to an Independent Administrator, who collects and analyzes the data, then publishes the findings in an annual report. Data from the individual service providers are aggregated for publication in the annual report to protect this highly confidential information. To verify the accuracy of the reported procurement data, the Voluntary Agreement requires a random audit of one service provider each year. In accordance with the confidentiality requirements of the Voluntary Agreement, the name of the service provider is not published.

D+R conducted an audit of the 2024 procurement data, which was used to develop the findings published in the 2024 Annual Report. D+R randomly selected the service provider by creating an Excel spreadsheet and using the "random" function, after excluding the signatory that was successfully audited last year in accordance with the terms of the Voluntary Agreement.

D+R requested raw data from the selected service provider to verify the procurement data submitted, which included invoice data and specification sheets. D+R determined that the data submitted by the service provider for the audit is consistent with the annual report submitted by that service provider.

D+R International