Commercial Buildings in Communities with Different Income and Racial Characteristics

A Comparison of Energy Efficiency and Fuel Sources

May 2022

EPA

EXECUTIVE SUMMARY

DataTrends is an ongoing series of research and analysis from the U.S. Environmental Protection Agency (EPA) using data from the ENERGY STAR® Portfolio Manager® tool.

This analysis compares building performance, the prevalence of electrification, reliance on heating oil, and the use of on-site solar at buildings benchmarked in Portfolio Manager, across communities with different income and racial characteristics.

Using ENERGY STAR scores as a metric for building energy performance, the analysis shows that buildings overall in communities of color score an average of 2% lower than buildings in majority-white communities. Buildings in low-income communities score an average of 4% lower than those in moderate- and high-income communities. In low-income communities and communities of color, K-12 schools and multifamily housing buildings show the largest differences in ENERGY STAR scores compared to higher-income and majority-white communities, lower by roughly 9%.

The distribution of buildings that are all-electric, use heating oil, or have on-site solar may indicate how well positioned a community's buildings are for achieving low-carbon operation. For communities in cold to moderate climates with the highest proportion of residents of color (greater than 75%) the data reveal the following relative to communities with fewer residents of color:

- The proportion of all-electric buildings is roughly 50% lower.

- Heating oil is used more frequently, and,

- The proportion of K-12 schools using heating oil is 2 to 3 times higher.

The data also revealed that, in both communities with a majority of low-income residents and a majority of residents of color, a lower proportion of K-12 schools have onsite solar.
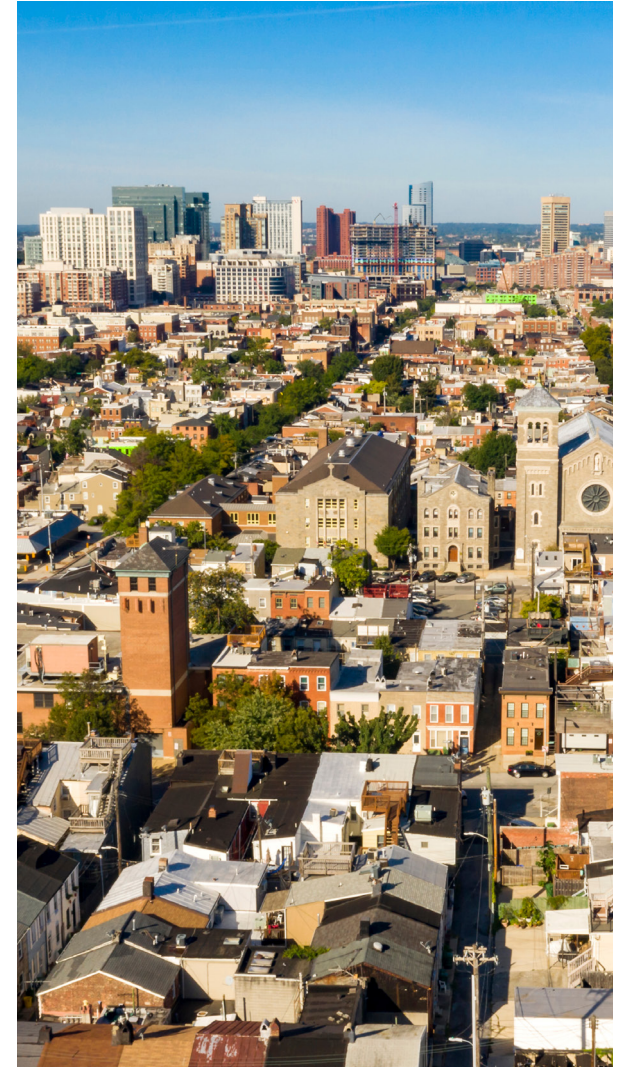
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INTRODUCTION

DataTrends is an ongoing series of research and analysis from the U.S. Environmental Protection Agency (EPA) using data from the ENERGY STAR® Portfolio Manager® tool. Hundreds of thousands of buildings use Portfolio Manager to track their energy use. EPA periodically compiles and shares observations from this vast database, with the hope that the information will inform and advance public understanding of the commercial building sector. This analysis compares building performance, the prevalence of electrification, heating oil use, and the use of on-site solar at buildings across low-income communities and communities of color (as defined by U.S. census block group area parameters), for buildings benchmarked in Portfolio Manager.

Achieving an equitable and just transition to an energy efficient, low-carbon commercial building sector will require that the benefits of improved building performance and clean energy sources are distributed equitably across all communities. Particular attention is therefore paid to communities of color and low-income communities, which often encounter financial disinvestment and additional market barriers. EPA's goal in developing this report is to inform discussions regarding policies and programs to achieve equitable performance and technology outcomes in the buildings that provide important services to the communities where they are located.

About ENERGY STAR Portfolio Manager

EPA's free online ENERGY STAR Portfolio Manager® tool is the industry standard for measuring and tracking energy performance within commercial buildings. In fact, the commercial buildings market has used Portfolio Manager to benchmark billions of square feet of commercial floor space across hundreds of thousands of buildings. The tool provides dozens of energy performance metrics, and some buildings can also receive a 1 – 100 ENERGY STAR score, which rates energy performance in comparison to similar buildings across the country. Learn more about benchmarking at energystar.gov/benchmark.

METHODOLOGY

The all-buildings results in this report reflect data from the 85 building types included in Portfolio Manager. In addition, sector-specific observations are highlighted for the four commercial building types most frequently benchmarked using Portfolio Manager: K-12 schools, multifamily housing, offices, and retail stores. We include data for 242,098 buildings spanning all 85 building types in Portfolio Manager and encompassing over 20 billion square feet of floor space. The analysis of energy performance using the ENERGY STAR score is based on a subset of 160,033 buildings of 22 different types for which a 1-100 score was calculated in Portfolio Manager.

We merged the Portfolio Manager data with census block group-level data from the EPA's Environmental Justice Screening and Mapping Tool, EJSCREEN, to create a merged dataset where buildings are organized based on demographic and socioeconomic characteristics of the communities in which they are located. There are a variety of indicators used by researchers to represent the demographic and socioeconomic characteristics of a population. The two EJSCREEN demographics used in this analysis are consistent with factors used across other EPA and U.S. government research efforts:

1. **Low Income:** The percentage of a community's residential population where the total income is less than or equal to twice the federal poverty level. We define a low-income community as a community where the majority of residents are low-income.

2. **Community of Color:** The percentage of individuals in a community who list their racial status as other than white alone and/or list their ethnicity as Hispanic or Latino. That is, all people other than non-Hispanic, white-alone individuals. The word "alone" in this case indicates that the person is of a single race, since multiracial individuals are tabulated in another category — for example, a non-Hispanic individual who is half white and half American Indian would be counted as a person of color by this definition. This analysis defines a community of color as one where the majority (51 to 100 percent) of residents are people of color.

[1]To develop this report, data was pulled for all buildings in Portfolio Manager that benchmarked their energy use in 2019. We then applied the following filters to the dataset: source energy use intensity (EUI) between 5 and 2,000 kBtu/ft2, grid electricity use greater than 0 kBtu, site EUI greater than 0 kBtu/ft2, and building gross floor area greater than 1,000 square feet.
[2]A degree days-based climate filtering process was used to account for regional differences in the use of all-electric heating systems. See Appendix A for further details on the climate filtering process.

LIMITATIONS

Limited public data is available on community demographics and commercial buildings, and Portfolio Manager contains information that can help to inform public understanding on this topic. However, we recommend that readers approach the findings with an understanding of the limitations of the data in Portfolio Manager and how they impact the results presented in this document:

- Data in Portfolio Manager is self-reported and largely unverified.

- Data may not be comprehensively representative of the national commercial building stock, all regions of the U.S., or of particular sectors.

- Results from the analysis of this data should not be assumed to reflect the national building stock.

- Data on energy costs are not required by Portfolio Manager, therefore the data available is insufficient to enable an evaluation of energy cost burdens in a manner that would parallel existing analyses of cost burdens in U.S. households.

- This analysis does not include comparisons of the buildings in Portfolio Manager to the total building stock within each community due to data limitations.

The analysis of all-electric buildings does not attempt to account for a broader range of considerations tied to beneficial electrification, such as the cost-effectiveness of various heating sources or specific technology choice decisions. We performed an analysis of cold and moderate climates, where fossil fuels are most commonly used for space heating, and a separate analysis of warm climates, where all-electric heating systems are more widespread and economically feasible due to lower heating loads.
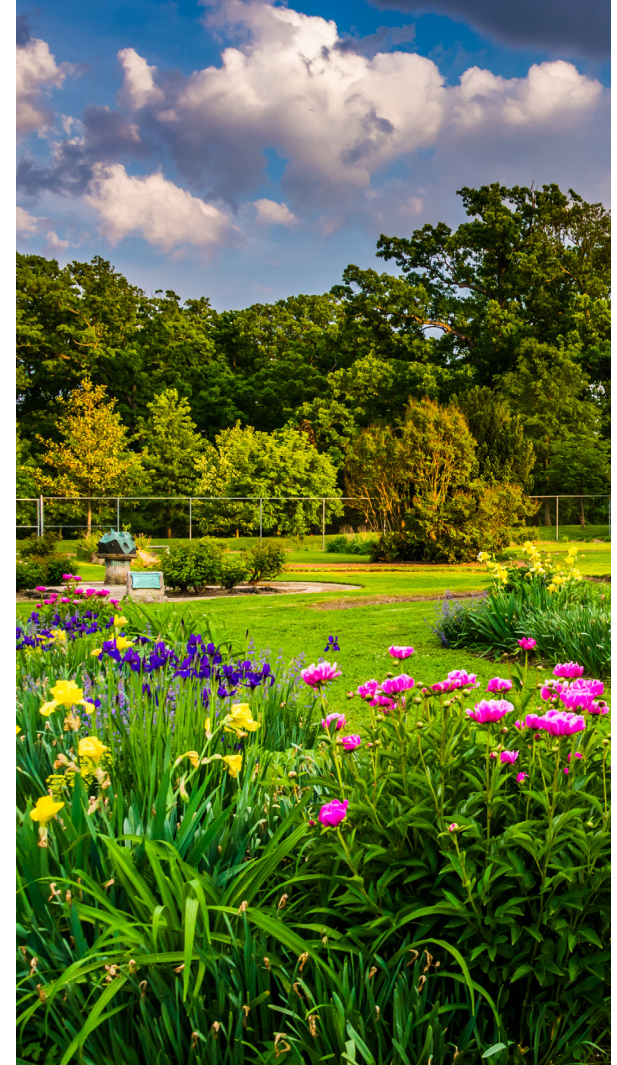
SECTION 1
BUILDING ENERGY PERFORMANCE

How does building performance differ across communities of different races?

Our analysis of Portfolio Manager data showed that, on average, buildings in communities of color have ENERGY STAR scores 1.3 points lower than all other buildings, a 2% difference.

Differences in average score based on race were statistically significant for all building types and for each of the building types listed on the graphs below.* K-12 schools and multifamily buildings show the largest differences in average ENERGY STAR scores, nearly a 9% difference.

About the ENERGY STAR score

The ENERGY STAR score, calculated on a scale of 1-100 points, is a simple, powerful tool to compare a building's energy performance to similar buildings nationwide while accounting for differences in operating conditions and regional climate and weather. Buildings with higher ENERGY STAR scores are more energy efficient, have lower utility bills, create less onsite air pollution, and produce fewer greenhouse gas emissions compared to their peers.

Average ENERGY STAR Score

Communities of Color	White Communities
57.5	58.8

Average ENERGY STAR Score, by Building Type

All Building Types
K-12 Schools
Multifamily Housing
Offices
Retail Stores

■ Communities of Color   ○ White Communities
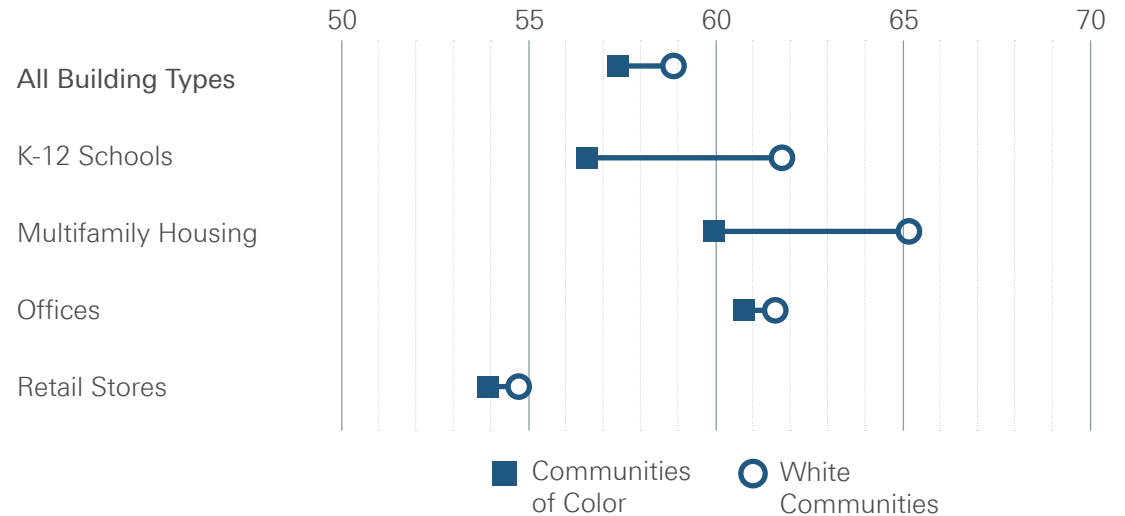
* See Appendix B for details on the statistical tests used to evaluate score differences.

How does building performance differ across communities with different levels of income?

On average, buildings in low-income communities score 2.3 points lower than other buildings, a 4% difference.

Differences in average score based on income were statistically significant for all building types and for each of the building types listed on the graphs below.* Again, K-12 schools and multifamily housing buildings show the largest differences in average ENERGY STAR scores: nearly 9%.

Average ENERGY STAR Score

Low-Income Communities	Moderate- and High-Income Communities
56.5	58.8

Average ENERGY STAR Score, by Building Type

All Building Types
K-12 Schools
Multifamily Housing
Offices
Retail Stores

■ Low-Income Communities   ○ Moderate- and High-Income Communities
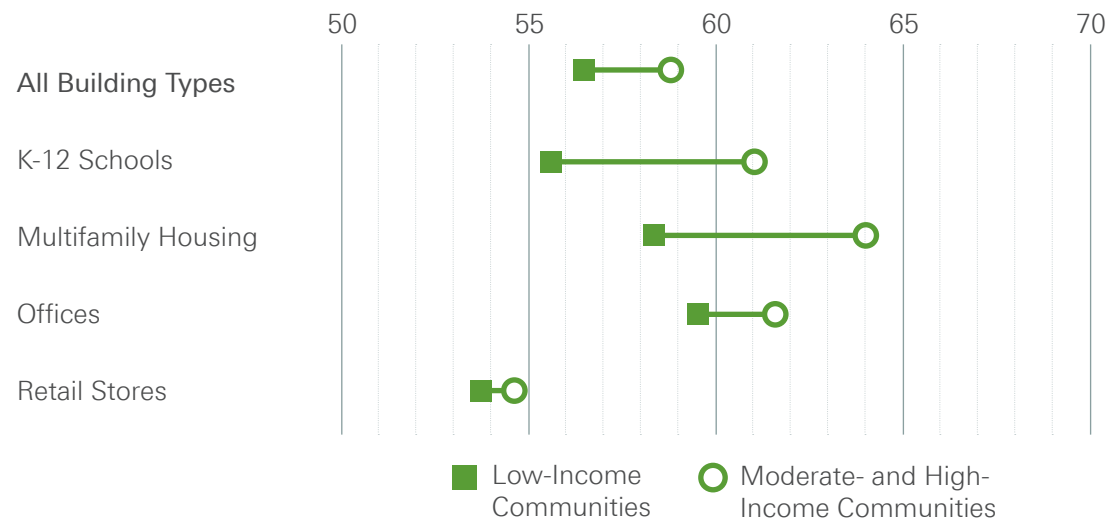
* See Appendix B for details on the statistical tests used to evaluate score differences.

SECTION 2
FUEL SOURCE

Which communities have the most all-electric buildings?

This analysis compares the prevalence of existing fully electrified buildings among communities. Importantly, the analysis does not include efficiency or cost data for electric heating or other end-use technologies.

In cold and moderate climates, the proportion of all-electric buildings in low-income communities is 4.7 percentage points lower than in moderate- and high-income communities. In warm climates, the difference is less than 1%.

Proportion of All-Electric Buildings

	Low-Income Communities	Moderate- and High-Income Communities
Cold and Moderate Climates	15.3%	20.0%
Warm Climates	39.5%	39.8%

Why Break Out Cold Vs. Warm Climates?

The prevalence of all-electric buildings varies substantially in relation to heating needs. In warm climates, all-electric heating systems are widespread and more feasible economically. In fact, all-electric buildings in Portfolio Manager are about twice as common in warm climates as in cold and moderate climates (approximately 40% vs 19%).

Which communities have the most all-electric buildings? (Cont.)

In cold and moderate climates, the proportion of all-electric buildings is 5.4 percentage points lower among buildings in communities of color (as defined on page 4) compared to white communities. Within warm climates, the difference is 4%.

Proportion of All-Electric Buildings

	Communities of Color	White Communities
Cold and Moderate Climates	15.2%	20.6%
Warm Climates	37.8%	41.8%

Proportion of All-Electric Buildings, by Race
(Cold and Moderate Climates)

Residents of Color in a Community

	Percentage of Buildings That Are All-Electric
75 – 100%	11.5%
50 – 75%	19.4%
25 – 50%	22.5%
0 – 25%	19.2%

Percentage of Buildings That Are All-Electric
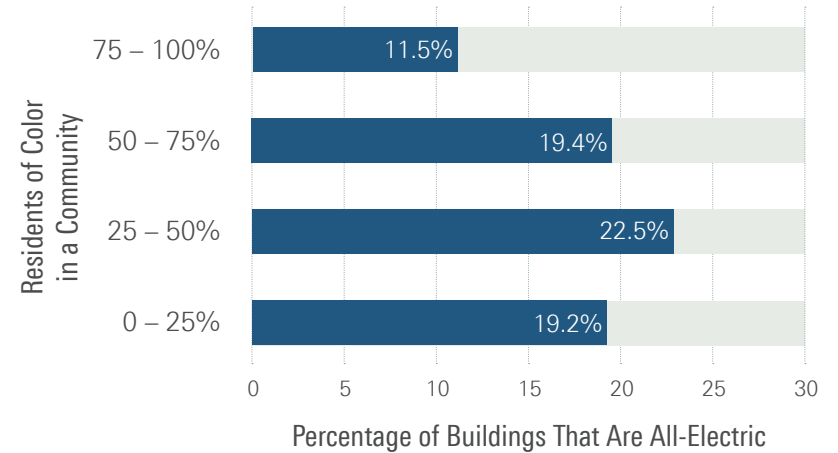
The average difference among communities is even greater when viewed by quartile. Just 11.5 percent of buildings in communities with 75-100 percent residents of color are fully electrified. This is substantially lower than the percentage of all-electric buildings in communities with fewer than 75 percent residents of color.

Sector Highlight: Building electrification and multifamily housing

Multifamily buildings face unique electrification challenges and pronounced trends are noticeable in the data.

Proportion of All-Electric Multifamily Buildings

	Communities of Color	White Communities
Cold and Moderate Climates	9.9%	18.9%
Warm Climates	23.4%	28.3%

	Low-Income Communities	Moderate- and High-Income Communities
Cold and Moderate Climates	10.8%	16.0%
Warm Climates	26.2%	24.8%

The data revealed a greater proportion of all-electric multifamily buildings in white communities compared to communities of color. In cold and moderate climates, the proportion of all-electric multifamily buildings in communities with a majority of residents of color is close to half the proportion in majority white communities.

In cold and moderate climates, the proportion of all-electric multifamily buildings in low-income communities is substantially lower than that in moderate and high-income communities. Conversely, in warm climates, the prevalence of all-electric buildings is slightly higher in low-income communities relative to moderate and high-income communities.

The data revealed a weaker, but similar, socioeconomic trend for offices. No strong trends were found for the remainder of the building types analyzed (Appendix E).

In which communities are buildings most reliant on heating oil?

Analysis of all Portfolio Manager buildings using heating oil in moderate and cold climates[3] found that they are evenly distributed across communities with varying proportions of low-income residents (a 0.3% difference). However, use of heating oil is disproportionately concentrated in communities with a large percentage of residents of color (a 3.3% difference).

Proportion of Buildings Using Heating Oil

Communities of Color	White Communities	Low-Income Communities	Moderate- and High-Income Communities
9.1%	5.8%	6.5%	6.8%

Why Does This Matter?

As fossil fuels used for heating are combusted in buildings, they release greenhouse gas emissions. Of the most common fossil fuel heating sources in the United States—natural gas, propane, and heating oil—combustion of heating oil has the highest carbon emissions intensity. Use of heating oil is primarily found in cold and moderate climates.

[3]A degree days-based climate filtering process was used to account for regional differences in the use of heating oil. See Appendix A for further details on the climate filtering process.

In which communities are buildings most reliant on heating oil? (Cont.)

In communities in cold and moderate climates, with 75 to 100 percent residents of color, 11.5 percent of all buildings use heating oil, in contrast to buildings in communities with fewer than 75 percent residents of color, where heating oil usage ranges from 5.1 to 6.4 percent.

Proportion of Buildings Using Heating Oil, by Race
(Cold and Moderate Climates)

Residents of Color in a Community	Percentage
75 – 100%	11.5%
50 – 75%	6.4%
25 – 50%	5.1%
0 – 25%	6.3%

Percentage of Buildings That Use Heating Oil (%)
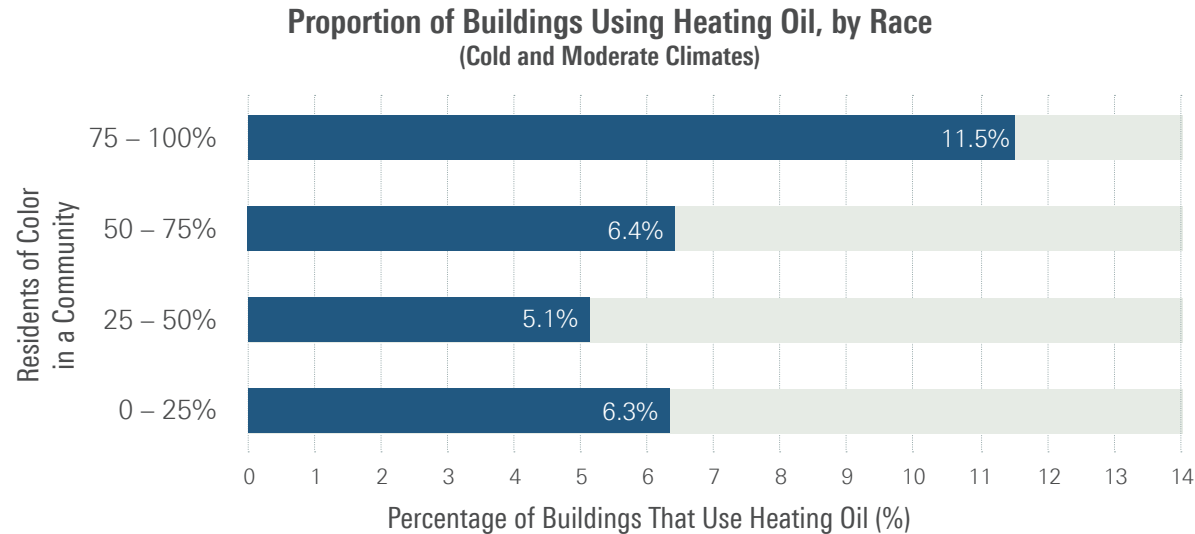
Sector Highlight: Heating oil and K-12 schools

K-12 schools show the greatest differences among communities in heating oil use. In cold and moderate climates, the proportion of K-12 schools using heating oil is 1.5 percentage points higher in low-income communities than in moderate- and high-income communities, while the proportion using heating oil in communities of color is 11.5 percentage points higher—or more than double—than in white communities.

Proportion of K-12 Schools Using Heating Oil

Communities of Color	White Communities
19.8%	8.3%

Low-Income Communities	Moderate- and High-Income Communities
12.8%	11.3%

Proportion of K-12 Schools Using Heating Oil, by Race
(Cold and Moderate Climates)

Residents of Color in a Community:
- 75 – 100%: 23.7%
- 50 – 75%: 13.7%
- 25 – 50%: 9.5%
- 0 – 25%: 7.8%

Percentage of K-12 Schools That Use Heating Oil (%)
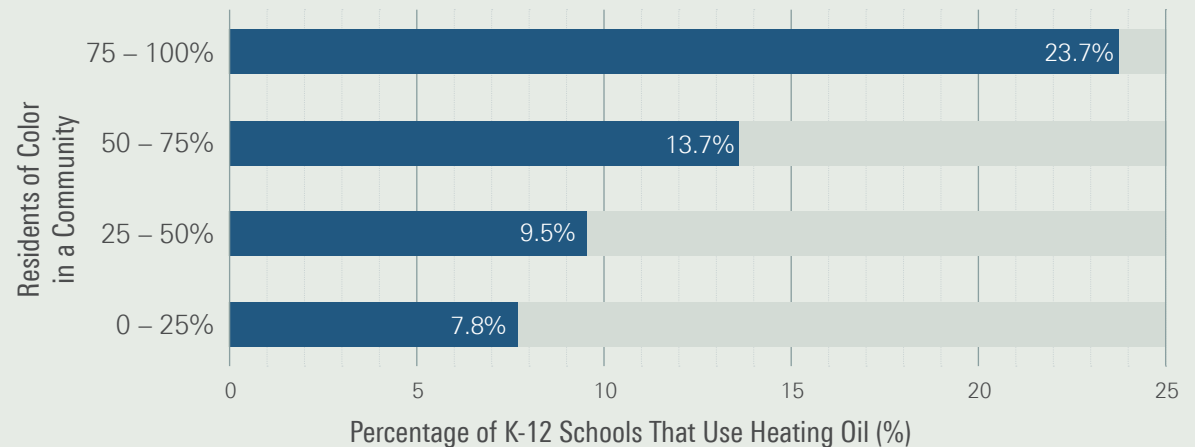
The analysis of data for K-12 schools in cold and moderate climates that use heating oil found that its use is disproportionately concentrated in communities with a high percentage of residents of color.

Other building types exhibited weak trends in heating oil use across communities (Appendix E).

Which communities have the most buildings with on-site solar energy?

Data for all buildings show that use of onsite solar energy is evenly distributed across communities with varying proportions of low-income residents and residents of color.

Proportion of Buildings Using On-Site Solar

Communities of Color	White Communities
1.0%	0.8%

Low-Income Communities	Moderate- and High-Income Communities
0.8%	0.9%

Sector Highlight: Which K-12 schools have on-site solar energy?

Portfolio Manager data on K-12 schools show that both communities with a majority of low-income residents and majority of residents of color have a lower proportion of schools with onsite solar. Weaker socioeconomic trends emerged regarding onsite solar for the remainder of the building types analyzed (Appendix E).

Proportion of K-12 Schools Using On-Site Solar

Communities of Color	White Communities
2.0%	2.6%

Low-Income Communities	Moderate- and High-Income Communities
1.7%	2.5%

SECTION 3
APPENDICES

COMMERCIAL BUILDINGS IN COMMUNITIES WITH DIFFERENT INCOME AND RACIAL CHARACTERISTICS

Appendix A: Climate Filtering

To account for differences in the use of heating oil and all-electric heating technologies, buildings were grouped and analyzed by climate zones. Buildings with fewer than 4,000 heating degree days (HDD) were categorized as warm-climate buildings and buildings with more than 4,000 HDD were categorized as moderate or cold climate buildings. The 4,000-degree day threshold is based on the 30-year average annual HDD in each building's zip code. The all-electric and heating oil analyses were then completed on buildings in warm climates and moderate or cold climates separately. For heating oil, this grouping allows for a comparison exclusively in moderate and cold climates where heating oil is commonly used.

Appendix B: Statistical Testing

A series of independent t-test were run to determine the statistical significance of differences in average ENERGY STAR scores based on race and income, across all building types analyzed in this report. All pooled independent t-tests results were statistically significant at the $P = 0.01$ percent level.

Appendix C: Data Sources

1. ENERGY STAR Portfolio Manager: This analysis uses a summary of Portfolio Manager data from 2019. This period of performance is used to control for abnormal energy consumption patterns caused by changes in building operations during the COVID-19 pandemic.
   a. Standard program and analytical filters are applied to the Portfolio Manager data to improve quality and robustness of the analysis.
   b. Based on the building taxonomy and quantity of data available in Portfolio Manager, this DataTrends analysis includes sector-specific results for the following building types most often benchmarked: K-12 schools, multifamily housing, retail, and offices.

2. EJ SCREEN: Demographic data from EJ SCREEN (https://www.epa.gov/ejscreen) is used to evaluate demographic factors relevant to the census block group that surrounds each Portfolio Manager building.

3. Geocoding Process: The Portfolio Manager dataset was geocoded using an address-based software tool to identify latitude and longitude values for each building. This data was used to assign a census block group to each building and merge the EJ SCREEN and Portfolio Manager datasets, using the census block group as the common datapoint.

Appendix D: ENERGY STAR Scores

Average ENERGY STAR score, by race.

	All Building Types		K-12 Schools		Multifamily Housing		Offices		Retail Stores	
	Total # of Buildings	ES Score	Total # of Buildings	ES Score	Total # of Buildings	ES Score	Total # of Buildings	ES Score	Total # of Buildings	ES Score
Community of Color	62,326	57.5	7,286	56.6	20,666	59.9	8,951	60.8	11,040	54.0
White Community	97,707	58.8	12,561	61.9	18,000	65.3	16,149	61.6	23,653	54.6
Total	160,033	58.3	19,847	59.9	38,666	62.4	25,100	61.3	34,693	54.4

Average ENERGY STAR score, by income.

	All Building Types		K-12 Schools		Multifamily Housing		Offices		Retail Stores	
	Total # of Buildings	ES Score	Total # of Buildings	ES Score	Total # of Buildings	ES Score	Total # of Buildings	ES Score	Total # of Buildings	ES Score
Low-Income Community	34,657	56.5	4,188	55.6	10,700	58.3	4,355	59.5	7,116	53.7
Moderate- and High- Income Community	125,376	58.8	15,659	61.1	27,966	64.0	20,745	61.7	27,577	54.6
Total	160,033	58.3	19,847	59.9	38,666	62.4	25,100	61.3	34,693	54.4

Appendix E: Proportional Fuel Type Percentages (Cold and Moderate Climates)

Cold and Moderate Climates

The proportion of all buildings, K-12 schools, and Multifamily housing using heating oil or are all-electric in cold and moderate climates, by income and race.

	All Building Types			K-12 Schools			Multifamily Housing		
	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric
Community of Color	41,629	9.1%	15.2%	3,884	19.8%	6.1%	16,584	13.2%	9.9%
White Community	101,874	5.8%	20.6%	9,683	8.3%	10.1%	18,558	9.8%	18.9%
Low-Income Community	30,026	6.5%	15.3%	2,635	12.8%	8.5%	9,715	11.1%	10.8%
Moderate- and High- Income Community	113,477	6.8%	20.0%	10,932	11.3%	9.1%	25,427	11.5%	16.0%

The proportion of all buildings, K-12 schools, and Multifamily housing using heating oil or are all-electric in cold and moderate climates by race quartiles.

	All Building Types			K-12 School			Multifamily Housing		
Race	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric
0-25% Community of Color	60,928	6.3%	19.2%	6,949	7.8%	10.9%	8,511	11.1%	18.8%
25-50% Community of Color	40,946	5.1%	22.5%	2,734	9.5%	8.2%	10,047	8.7%	18.9%
50-75% Community of Color	19,609	6.4%	19.4%	1,505	13.7%	5.9%	5,742	10.5%	14.5%
75-100% Community of Color	22,020	11.5%	11.5%	2,379	23.7%	6.2%	10,842	14.6%	7.4%

The proportion of all buildings, K-12 schools, and Multifamily housing using heating oil or are all-electric in cold and moderate climates by income quartiles.

	All Building Types			K-12 School			Multifamily Housing		
Income	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric
0-25% Low-income Community	63,960	6.8%	20.6%	6,299	10.5%	9.1%	13,447	12.4%	16.3%
25-50% Low-income Community	49,517	6.9%	19.2%	4,633	12.3%	9.0%	11,980	10.5%	15.7%
50-75% Low-income Community	23,967	6.8%	15.2%	2,114	12.8%	8.6%	7,662	11.6%	11.2%
75-100% Low-income Community	6,059	5.5%	15.7%	521	12.9%	8.1%	2,053	9.3%	9.5%

Appendix E: Proportional Fuel Type Percentages (Warm Climates)

Warm Climates

The proportion of all buildings, K-12 schools, and Multifamily housing using heating oil or are all-electric in warm climates, by income and race.

	All Building Types			K-12 Schools			Multifamily Housing		
	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric
Community of Color	51,000	0.5%	37.8%	3,500	0.9%	16.1%	9,736	0.8%	23.4%
White Community	47,595	1.4%	41.8%	3,154	3.6%	17.6%	5,468	1.7%	28.3%
Low-Income Community	23,144	0.9%	39.5%	1,607	2.1%	17.0%	4,337	1.0%	26.2%
Moderate- and High- Income Community	75,451	1.0%	39.8%	5,047	2.2%	16.8%	10,867	1.2%	24.8%

The proportion of all buildings, K-12 schools, and Multifamily housing using heating oil or are all-electric in warm climates by race quartiles.

Race	All Building Types			K-12 School			Multifamily Housing		
	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric
0-25% Community of Color	18,475	1.9%	45.7%	1,407	4.7%	18.9%	1,238	2.3%	34.5%
25-50% Community of Color	29,120	1.1%	39.3%	1,747	2.7%	16.5%	4,230	1.6%	26.4%
50-75% Community of Color	26,463	0.7%	37.3%	1,500	1.5%	14.6%	4,550	1.2%	24.7%
75-100% Community of Color	24,537	0.4%	38.4%	2,000	0.5%	17.3%	5,186	0.4%	22.3%

The proportion of all buildings, K-12 schools, and Multifamily housing using heating oil or are all-electric in warm climates by income quartiles.

Income	All Building Types			K-12 School			Multifamily Housing		
	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric	Total # of Buildings	% Using Heating Oil	% All Electric
0-25% Low-income Community	40,389	0.9%	39.6%	2,887	1.8%	16.3%	4,770	1.2%	25.0%
25-50% Low-income Community	35,062	1.1%	40.0%	2,160	2.8%	17.3%	6,097	1.1%	24.6%
50-75% Low-income Community	18,838	0.9%	39.6%	1,339	2.0%	17.5%	3,507	1.1%	25.4%
75-100% Low-income Community	4,306	0.6%	39.0%	268	2.2%	14.6%	830	0.8%	29.4%

Appendix E: Proportional Fuel Type Percentages (On-Site Solar Use)

The proportion of all buildings, K-12 schools, and Multifamily housing using on-site solar by income and race.

	All Building Types		K-12 Schools		Multifamily Housing	
	Total # of Buildings	% Using On-site Solar	Total # of Buildings	% Using On-site Solar	Total # of Buildings	% Using On-site Solar
Community of Color	92,629	1.0%	7,384	2.0%	26,320	0.5%
White Community	149,469	0.8%	12,837	2.6%	24,026	0.2%
Low-Income Community	53,170	0.8%	4,242	1.7%	14,052	0.5%
Moderate- and High- Income Community	188,928	0.9%	15,979	2.5%	36,294	0.4%

The proportion of all buildings, K-12 schools, and Multifamily housing using on-site solar by race quartiles.

Race	All Building Types		K-12 Schools		Multifamily Housing	
	Total # of Buildings	% Using On-site Solar	Total # of Buildings	% Using On-site Solar	Total # of Buildings	% Using On-site Solar
0-25% Community of Color	79,403	0.8%	8,356	2.6%	9,749	0.2%
25-50% Community of Color	70,066	0.9%	4,481	2.5%	14,277	0.3%
50-75% Community of Color	46,072	1.0%	3,005	2.1%	10,292	0.6%
75-100% Community of Color	46,557	1.0%	4,379	1.9%	16,028	0.5%

The proportion of all buildings, K-12 schools, and Multifamily housing using on-site solar by income quartiles.

Income	All Building Types		K-12 Schools		Multifamily Housing	
	Total # of Buildings	% Using On-site Solar	Total # of Buildings	% Using On-site Solar	Total # of Buildings	% Using On-site Solar
0-25% Low-income Community	104,349	1.0%	9,186	2.8%	18,217	0.3%
25-50% Low-income Community	84,579	0.9%	6,793	2.2%	18,077	0.4%
50-75% Low-income Community	42,805	0.8%	3,453	1.8%	11,169	0.5%
75-100% Low-income Community	10,365	0.8%	789	1.0%	2,883	0.6%

Citations

[I]U.S. Environmental Protection Agency (EPA), 2019. EJSCREEN Technical Documentation.

[II]Ibid i.

[III]U.S. Energy Information Administration (EIA), Department of Energy (DOE):

1. U.S. Energy Information Administration (EIA), 2020, Use of Hydrocarbon Gas Liquids, https://www.eia.gov/energyexplained/hydrocarbon-gas-liquids/uses-of-hydrocarbon-gas-liquids-in-depth.php.

2. U.S. Energy Information Administration (EIA), 2020. Use of Heating Oil, https://www.eia.gov/energyexplained/heating-oil/use-of-heating-oil.php.

3. U.S. Energy Information Administration (EIA), 2020. Use of Natural Gas, https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php.

[IV]U.S. Environmental Protection Agency (EPA), 2021. ENERGY STAR Portfolio Manager Greenhouse Gas Emissions Technical Reference.