Massachusetts Residential Baseline Study

Appendix C.1 - Draft Heating Season Results Plots

April 20, 2018

Prepared for:

Prepared by:

NAVIGANT

Contents

1 Terminology **5**

2 ISO-NE Winter Peak Demand **6**
2.1 Average Whole Home ISO-NE Winter Peak Demand by Demographic . . . 6
2.2 Population Average ISO-NE Winter Peak Demand by End Use Category . . . 7
2.3 Population Average ISO-NE Winter Peak Demand by End Use . . . 8
2.4 Average ISO-NE Winter Peak Demand by End Use for Homes With End Use . . . 9
2.5 Population Average ISO-NE Winter Peak Demand by End Use Category and Demographic . . . 10

3 Residential Winter Peak Demand **11**
3.1 Average Whole Home Residential Winter Peak Demand by Demographic . . . 11
3.2 Population Average Residential Winter Peak Demand by End Use Category . . . 12
3.3 Population Average Residential Winter Peak Demand by End Use . . . 13
3.4 Average Residential Winter Peak Demand by End Use for Homes With End Use . . . 14
3.5 Population Average Residential Winter Peak Demand by End Use Category and Demographic . . . 15

4 Winter Energy Consumption **16**
4.1 Average Whole Home Winter Energy Consumption by Demographic . . . 16
4.2 Population Average Winter Energy Consumption by End Use Category . . . 17
4.3 Population Average Winter Energy Consumption by End Use . . . 18
4.4 Average Winter Energy Consumption by End Use for Homes With End Use . . . 19
4.5 Population Average Winter Energy Consumption by End Use Category and Demographic . . . 20

5 Monthly Energy Consumption **21**
5.1 Population Total Monthly Energy Consumption by End Use Category . . . 21
5.2 Population Monthly Energy Consumption Per Day by End Use Category . . . 22
5.3 Population Total Monthly Energy Consumption by End Use . . . 23
5.4 Population Monthly Energy Consumption Per Day by End Use . . . 24
5.5 Total Monthly Energy Consumption by End Use for Homes With End Use . . . 25
5.6 Monthly Energy Consumption Per Day by End Use for Homes With End Use . . . 26

6 Winter Peak Day Load Shapes **27**
6.1 Population Winter Peak Day Load Shape by End Use Category . . . 27
6.2 Population Winter Peak Day Load Shape by End Use . . . 28
6.3 Winter Peak Day HVAC Load Shapes for Homes With End Use . . . 29
6.4 Winter Peak Day Water Heating Load Shapes for Homes With End Use . . . 30
6.5 Winter Peak Day Kitchen Load Shapes for Homes With End Use . . . 31
6.6 Winter Peak Day Laundry Load Shapes for Homes With End Use . . . 32
6.7 Winter Peak Day Miscellaneous Load Shapes for Homes With End Use . . . 33

7 Distributions and High Users **34**
7.1 Distribution of ISO-NE Winter Peak Demand by End Use for Homes With End Use . . . 34
7.2 Average ISO-NE Winter Peak Demand by End Use for Top 25% of Homes With End Use . . . 35
7.3 Percent of Homes (With End Use) with Average ISO-NE Winter Peak Demand > 0.2 kW by End Use . . . 36
7.4 Percent of Population Homes with Average ISO-NE Winter Peak Demand > 0.2 kW by End Use . . . 37
7.5 Distribution of Residential Winter Peak Demand by End Use for Homes With End Use . . . 38
7.6 Average Residential Winter Peak Demand by End Use for Top 25% of Homes With End Use . . . 39
7.7 Percent of Homes (With End Use) with Average Residential Winter Peak Demand > 0.2 kW by End Use . . . 40
7.8 Percent of Population Homes with Average Residential Winter Peak Demand > 0.2 kW by End Use . . . 41
7.9 Distribution of Winter Energy Consumption by End Use for Homes With End Use . . . 42
7.10 Average Winter Energy Consumption by End Use for Top 25% of Homes With End Use . . . 43

8 Monthly Load Shapes by End Use Category **44**
8.1 Monthly Weekday HVAC Load Shapes for Homes With End Use . . . 44
8.2 Monthly Weekend HVAC Load Shapes for Homes With End Use . . . 45
8.3 Monthly Weekday Water Heating Load Shapes for Homes With End Use . . . 46
8.4 Monthly Weekend Water Heating Load Shapes for Homes With End Use . . . 47
8.5 Monthly Weekday Kitchen Load Shapes for Homes With End Use . . . 48

©2018 Navigant Consulting, Inc. All Rights Reserved

8.6 Monthly Weekend Kitchen Load Shapes for Homes With End Use . . . 49
8.7 Monthly Weekday Laundry Load Shapes for Homes With End Use . . . 50
8.8 Monthly Weekend Laundry Load Shapes for Homes With End Use . . . 51
8.9 Monthly Weekday Miscellaneous Load Shapes for Homes With End Use . . . 52
8.10 Monthly Weekend Miscellaneous Load Shapes for Homes With End Use . . . 53

9 End Use Data Split by Demographic . . . 54
9.1 Population ISO-NE Winter Peak Demand . . . 54
9.1.1 Population Average ISO-NE Winter Peak Demand by End Use and Age . . . 54
9.1.2 Population Average ISO-NE Winter Peak Demand by End Use and Building Type . . . 55
9.1.3 Population Average ISO-NE Winter Peak Demand by End Use and Education Level . . . 56
9.1.4 Population Average ISO-NE Winter Peak Demand by End Use and Heating Fuel . . . 57
9.1.5 Population Average ISO-NE Winter Peak Demand by End Use and Income . . . 58
9.1.6 Population Average ISO-NE Winter Peak Demand by End Use and Language . . . 59
9.1.7 Population Average ISO-NE Winter Peak Demand by End Use and Number of Occupants . . . 60
9.1.8 Population Average ISO-NE Winter Peak Demand by End Use and Occupancy Type . . . 61
9.1.9 Population Average ISO-NE Winter Peak Demand by End Use and Program Participation . . . 62
9.1.10 Population Average ISO-NE Winter Peak Demand by End Use and Weekday Occupancy . . . 63
9.2 ISO-NE Winter Peak Demand for Homes With End Use . . . 64
9.2.1 Average ISO-NE Winter Peak HVAC Demand by End Use and Demographic for Homes With End Use . . . 64
9.2.2 Average ISO-NE Winter Peak Water Heating Demand by End Use and Demographic for Homes With End Use . . . 65
9.2.3 Average ISO-NE Winter Peak Kitchen Demand by End Use and Demographic for Homes With End Use . . . 66
9.2.4 Average ISO-NE Winter Peak Laundry Demand by End Use and Demographic for Homes With End Use . . . 67
9.2.5 Average ISO-NE Winter Peak Miscellaneous Demand by End Use and Demographic for Homes With End Use . . . 68
9.3 Population Residential Winter Peak Demand . . . 69
9.3.1 Population Average Residential Winter Peak Demand by End Use and Age . . . 69
9.3.2 Population Average Residential Winter Peak Demand by End Use and Building Type . . . 70
9.3.3 Population Average Residential Winter Peak Demand by End Use and Education Level . . . 71
9.3.4 Population Average Residential Winter Peak Demand by End Use and Heating Fuel . . . 72
9.3.5 Population Average Residential Winter Peak Demand by End Use and Income . . . 73
9.3.6 Population Average Residential Winter Peak Demand by End Use and Language . . . 74
9.3.7 Population Average Residential Winter Peak Demand by End Use and Number of Occupants . . . 75
9.3.8 Population Average Residential Winter Peak Demand by End Use and Occupancy Type . . . 76
9.3.9 Population Average Residential Winter Peak Demand by End Use and Program Participation . . . 77
9.3.10 Population Average Residential Winter Peak Demand by End Use and Weekday Occupancy . . . 78
9.4 Residential Winter Peak Demand for Homes With End Use . . . 79
9.4.1 Average Residential Winter Peak HVAC Demand by End Use and Demographic for Homes With End Use . . . 79
9.4.2 Average Residential Winter Peak Water Heating Demand by End Use and Demographic for Homes With End Use . . . 80
9.4.3 Average Residential Winter Peak Kitchen Demand by End Use and Demographic for Homes With End Use . . . 81
9.4.4 Average Residential Winter Peak Laundry Demand by End Use and Demographic for Homes With End Use . . . 82
9.4.5 Average Residential Winter Peak Miscellaneous Demand by End Use and Demographic for Homes With End Use . . . 83
9.5 Population Winter Energy Consumption . . . 84
9.5.1 Population Average Winter Energy Consumption by End Use and Age . . . 84
9.5.2 Population Average Winter Energy Consumption by End Use and Building Type . . . 85
9.5.3 Population Average Winter Energy Consumption by End Use and Education Level . . . 86
9.5.4 Population Average Winter Energy Consumption by End Use and Heating Fuel . . . 87
9.5.5 Population Average Winter Energy Consumption by End Use and Income . . . 88
9.5.6 Population Average Winter Energy Consumption by End Use and Language . . . 89
9.5.7 Population Average Winter Energy Consumption by End Use and Number of Occupants . . . 90
9.5.8 Population Average Winter Energy Consumption by End Use and Occupancy Type . . . 91
9.5.9 Population Average Winter Energy Consumption by End Use and Program Participation . . . 92
9.5.10 Population Average Winter Energy Consumption by End Use and Weekday Occupancy . . . 93
9.6 Winter Energy Consumption for Homes With End Use . . . 94
9.6.1 Average Winter HVAC Energy Consumption by End Use and Demographic for Homes With End Use . . . 94
9.6.2 Average Winter Water Heating Energy Consumption by End Use and Demographic for Homes With End Use . . . 95
9.6.3 Average Winter Kitchen Energy Consumption by End Use and Demographic for Homes With End Use . . . 96
9.6.4 Average Winter Laundry Energy Consumption by End Use and Demographic for Homes With End Use . . . 97
9.6.5 Average Winter Miscellaneous Energy Consumption by End Use and Demographic for Homes With End Use . . . 98

©2018 Navigant Consulting, Inc. All Rights Reserved

9.7 Winter Peak Day Load Shapes . . . 99
9.7.1 Population Winter Peak Day Load Shape by End Use Category and Age . . . 99
9.7.2 Population Winter Peak Day Load Shape by End Use Category and Building Type . . . 100
9.7.3 Population Winter Peak Day Load Shape by End Use Category and Education Level . . . 101
9.7.4 Population Winter Peak Day Load Shape by End Use Category and Heating Fuel . . . 102
9.7.5 Population Winter Peak Day Load Shape by End Use Category and Income . . . 103
9.7.6 Population Winter Peak Day Load Shape by End Use Category and Language . . . 104
9.7.7 Population Winter Peak Day Load Shape by End Use Category and Number of Occupants . . . 105
9.7.8 Population Winter Peak Day Load Shape by End Use Category and Occupancy Type . . . 106
9.7.9 Population Winter Peak Day Load Shape by End Use Category and Program Participation . . . 107
9.7.10 Population Winter Peak Day Load Shape by End Use Category and Weekday Occupancy . . . 108

©2018 Navigant Consulting, Inc. All Rights Reserved

1 Terminology

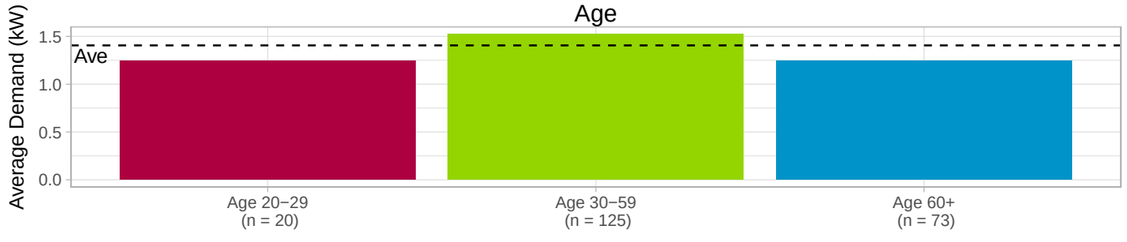
Throughout this report, the research results are referenced with various terminology, including:

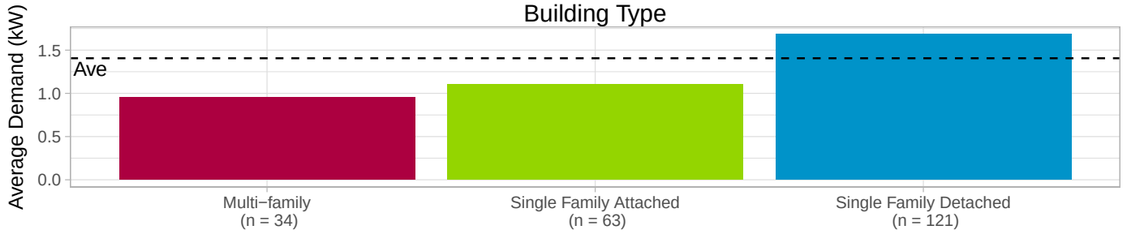
- **Population:** These results are scaled by saturation and show the overall impact to the system on average by home, but do not represent the impact from an individual appliance.
- **For Homes with End Use:** These results only include homes with the relevant end use installed, irrespective of the saturation of that end use in the population.
- **Winter:** To calculate winter-only results, the team has used the metered data from November 1, 2017 to March 13, 2018.
- **ISO-NE Winter Peak:** For the purposes of this report, ISO-NE winter peak is approximated as 5-7 p.m. on the 3 days with highest ISO-NE system peak loads in 2017-2018 (December 28, January 2, January 5).
- **Expanded Winter Peak:** For the purposes of this report, expanded winter peak is defined as 5-7 p.m. on the 3 days with highest ISO-NE system peak loads in 2017-2018.
- **Winter Peak Days:** These results include data only from the 3 days identified as peak days (December 28, January 2, January 5).
- **Building Type:** Either Single-Family Detached, Single-Family Attached (2-4 units), or Multi-family (5+ units)
- **Number of Occupants:** number of permanent residents (adults and children) living in the home

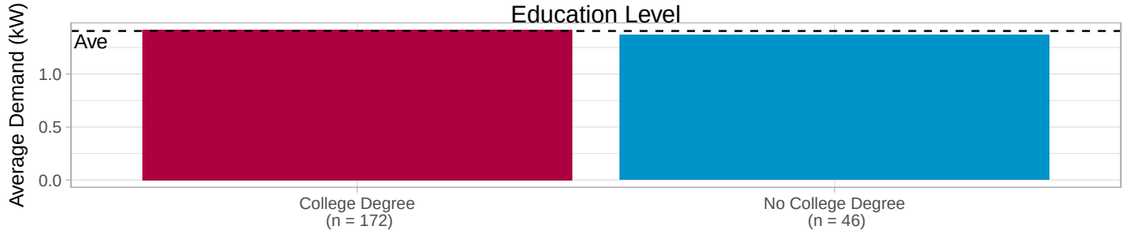
©2018 Navigant Consulting, Inc. All Rights Reserved

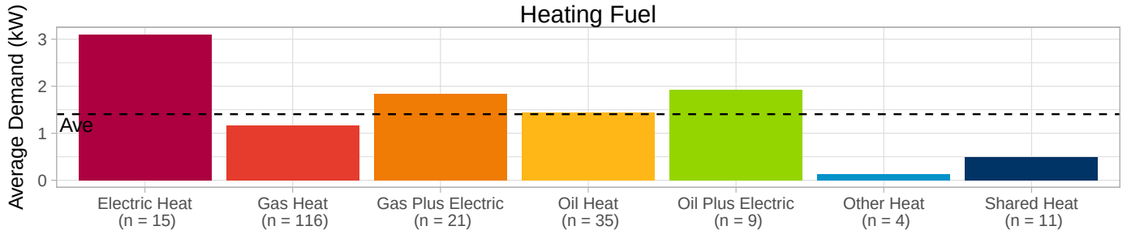
2 ISO-NE Winter Peak Demand

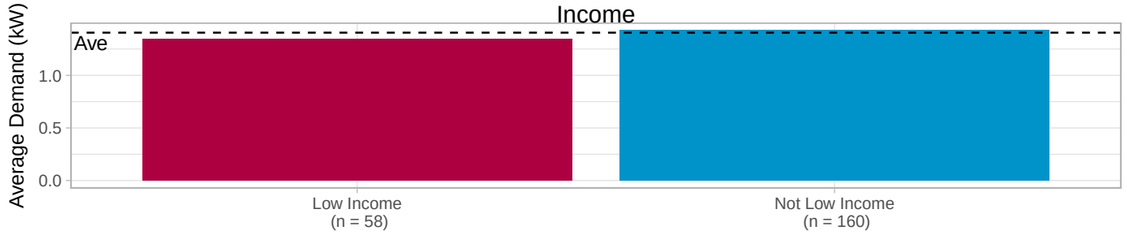
2.1 Average Whole Home ISO-NE Winter Peak Demand by Demographic

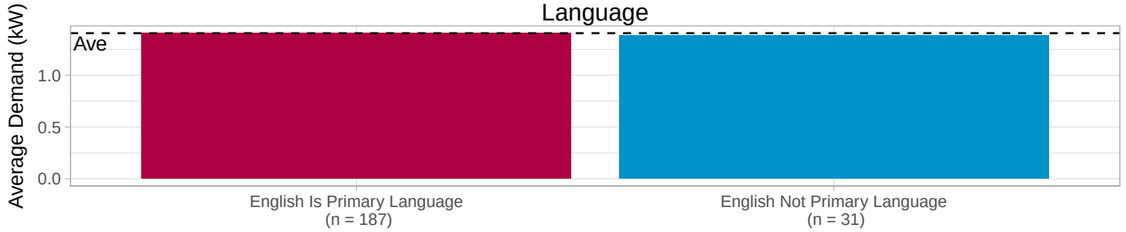


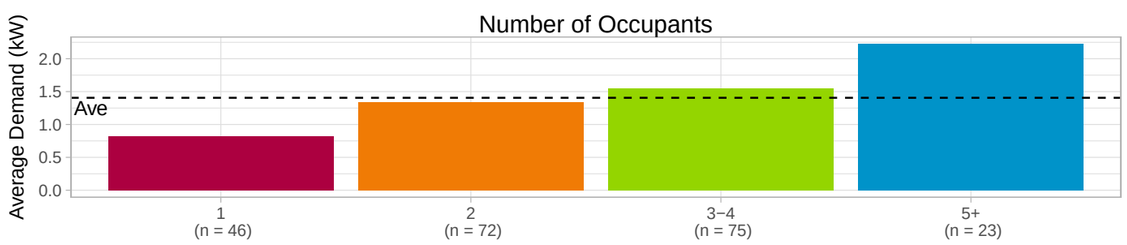


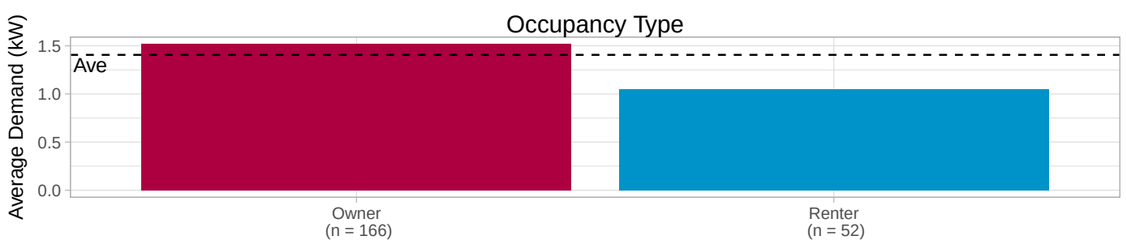


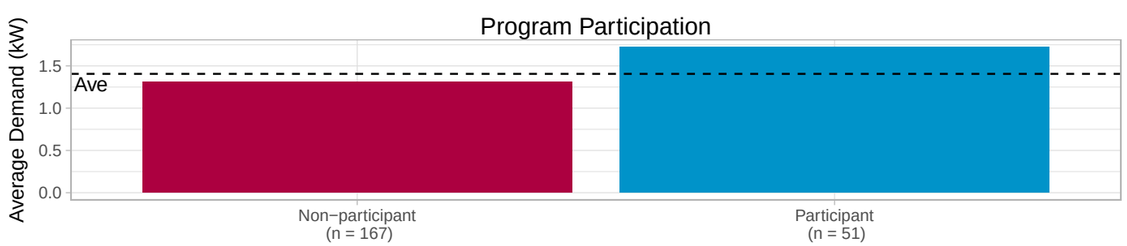


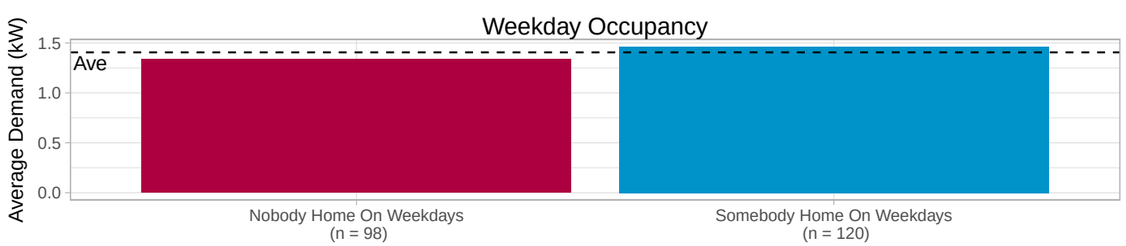








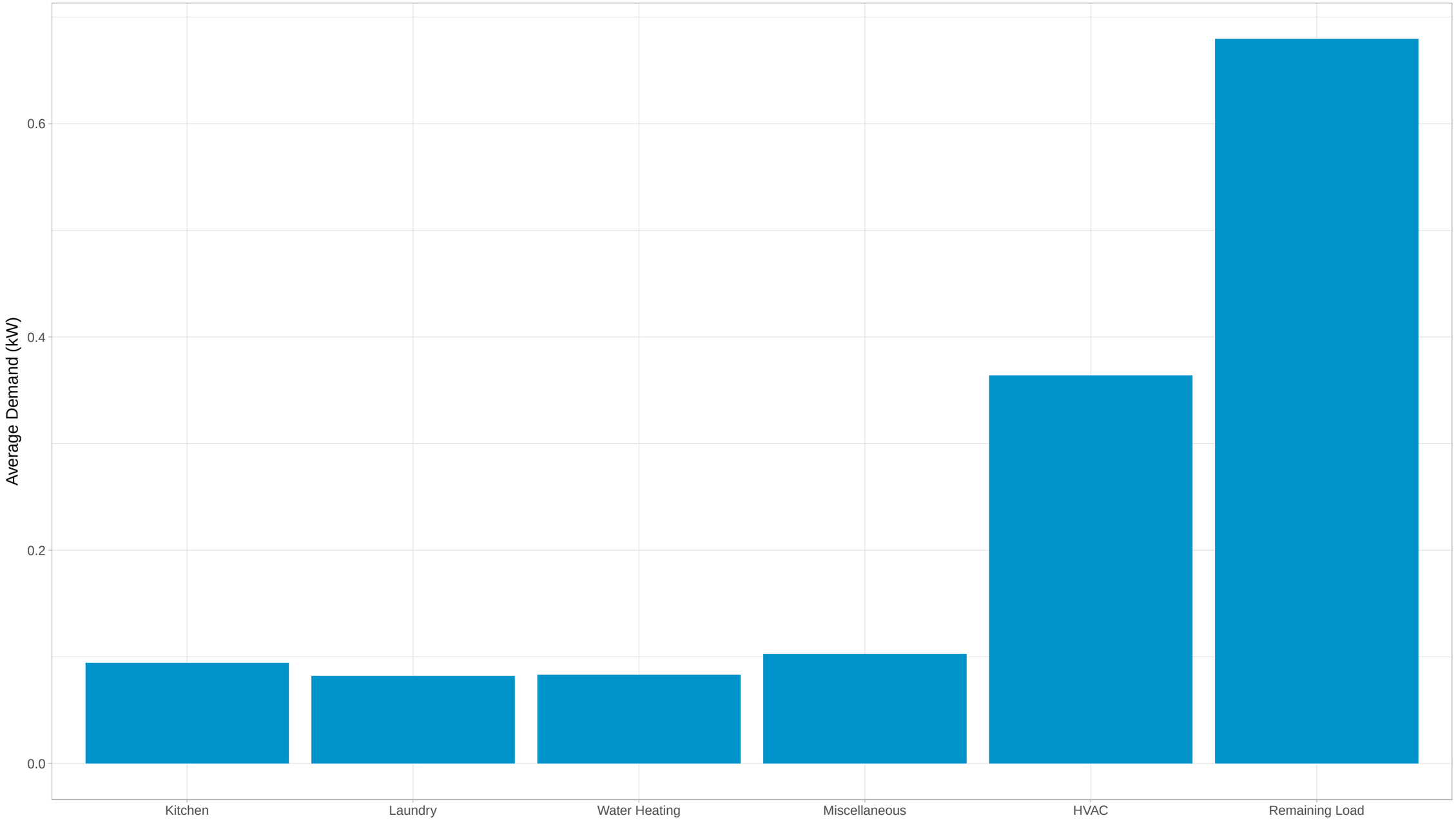




Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

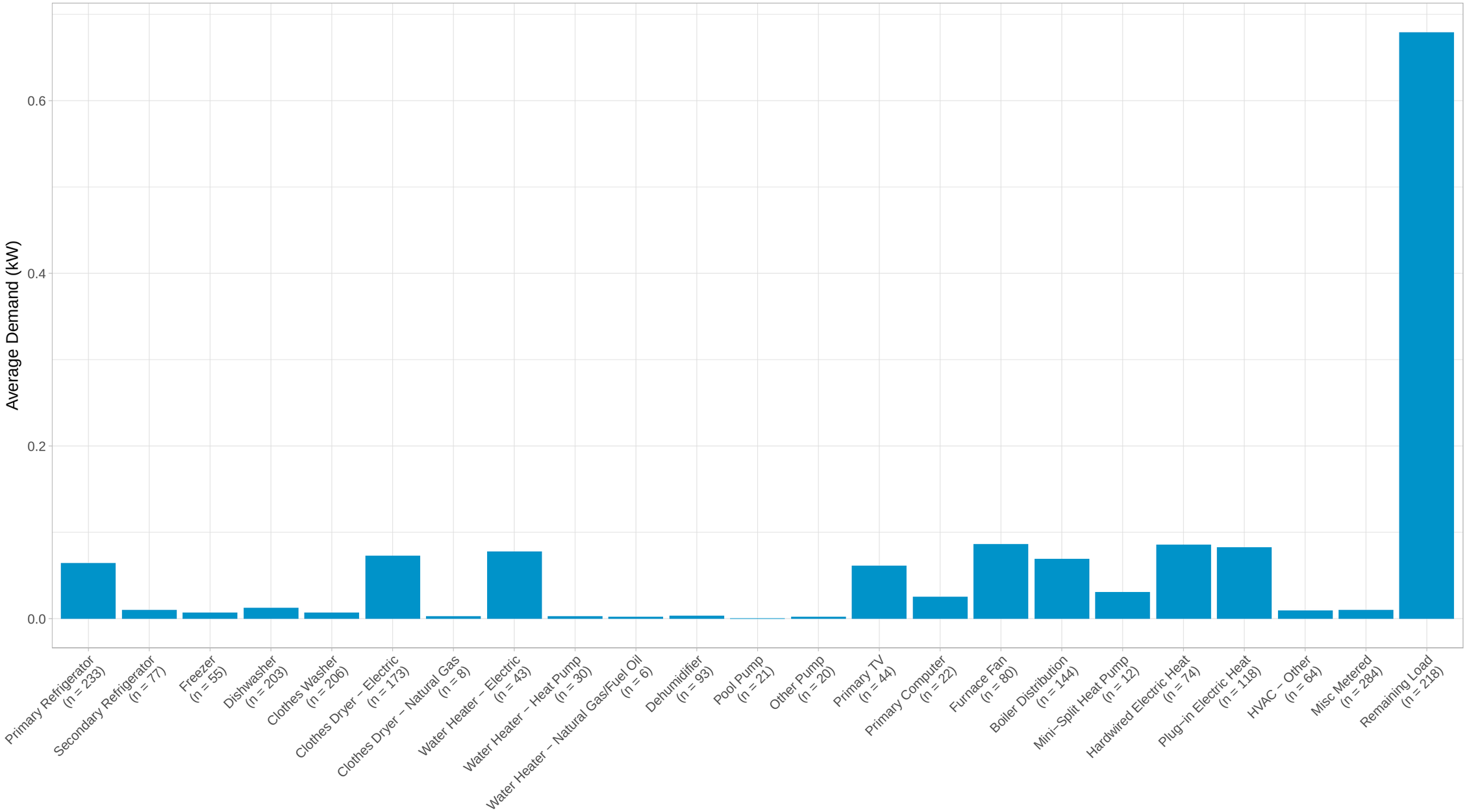
2.2 Population Average ISO-NE Winter Peak Demand by End Use Category



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

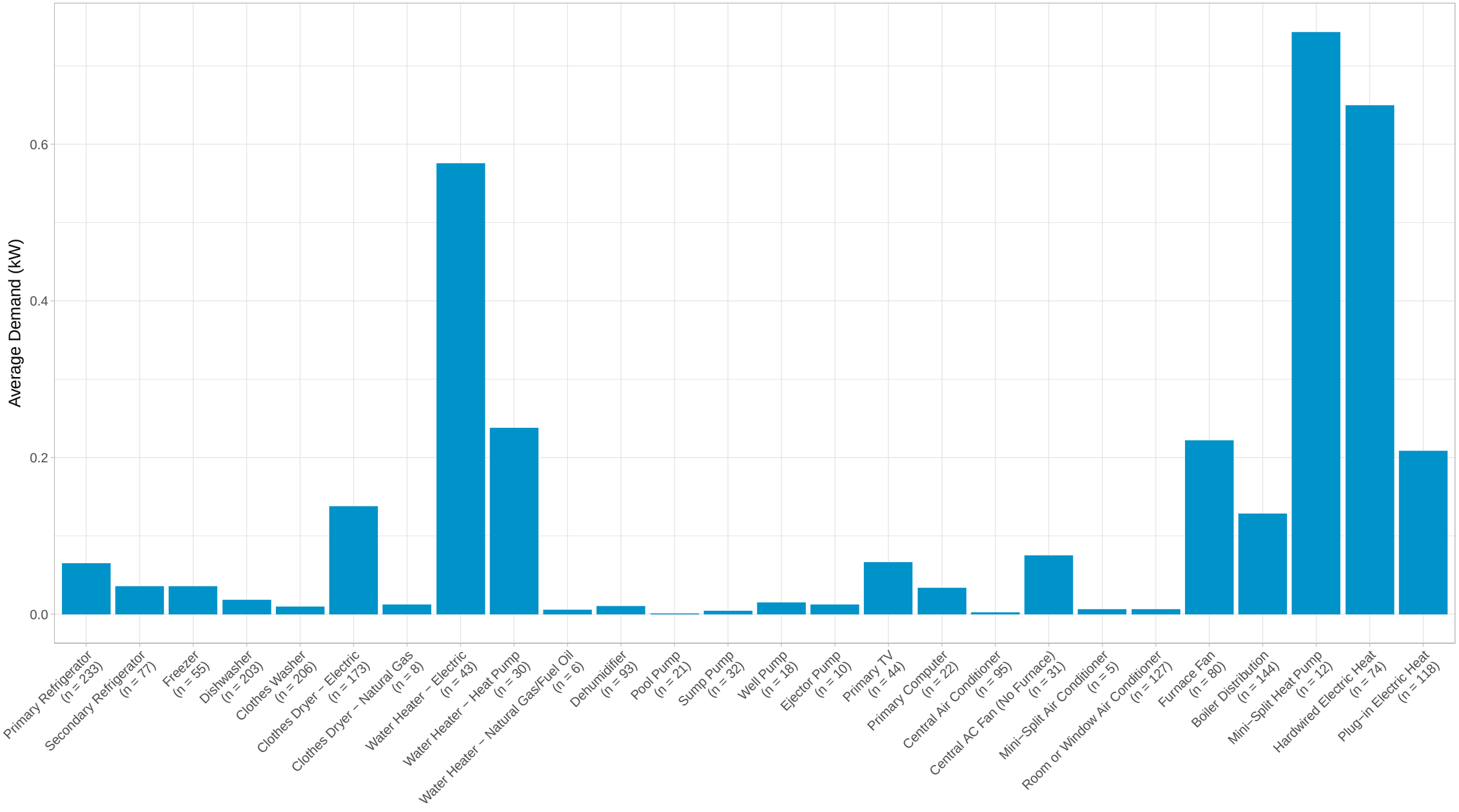
2.3 Population Average ISO-NE Winter Peak Demand by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

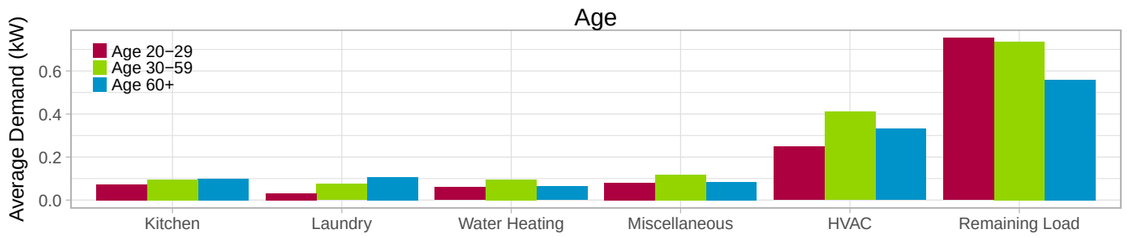
2.4 Average ISO-NE Winter Peak Demand by End Use for Homes With End Use

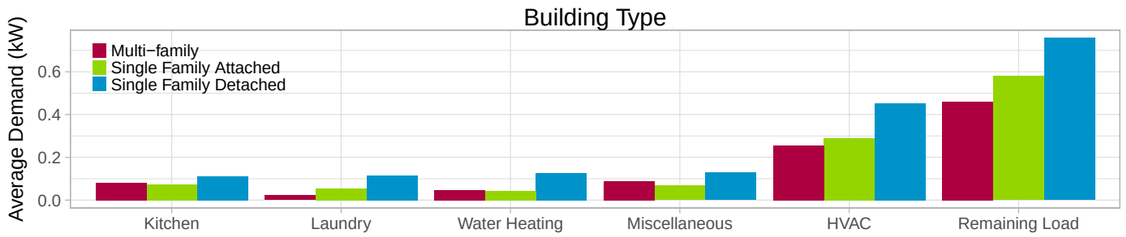


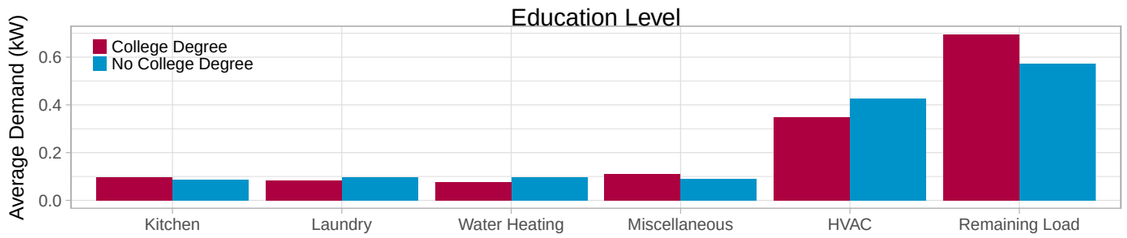
Source: Navigant Analysis

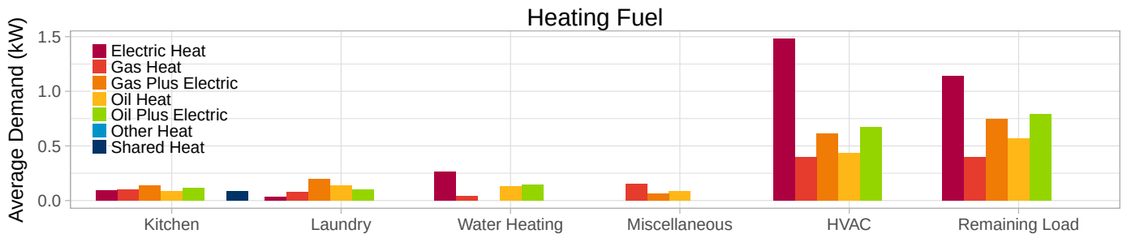
©2018 Navigant Consulting, Inc. All Rights Reserved

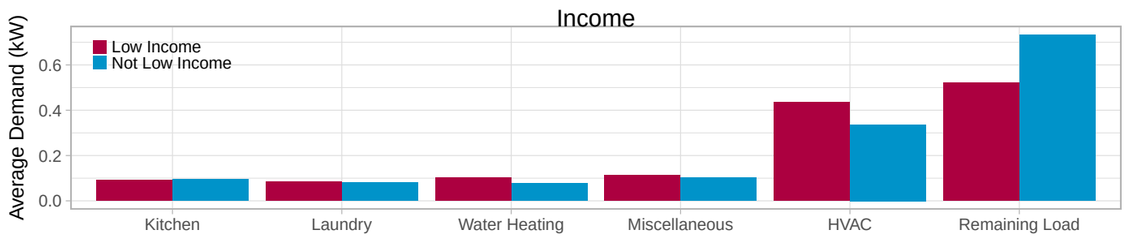
2.5 Population Average ISO-NE Winter Peak Demand by End Use Category and Demographic

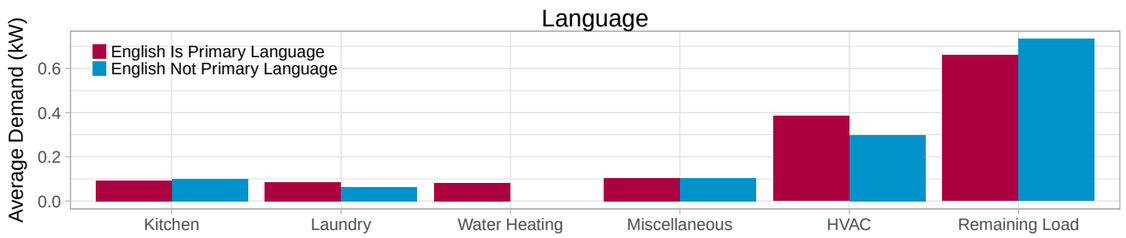


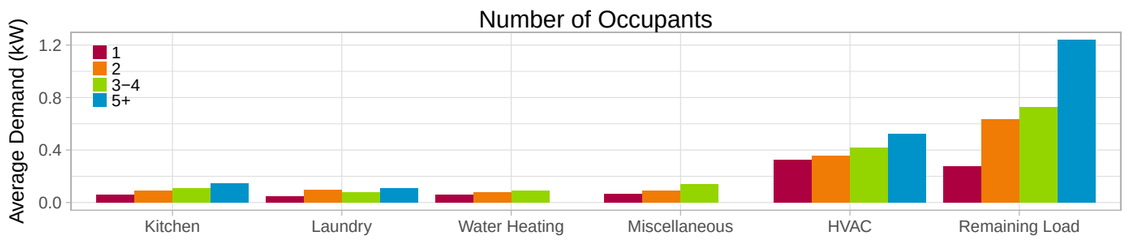


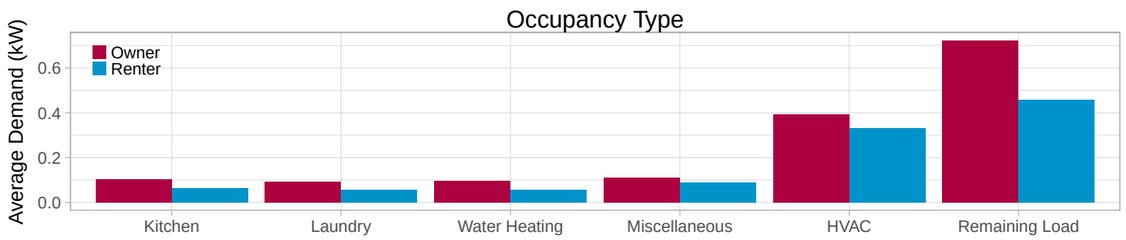


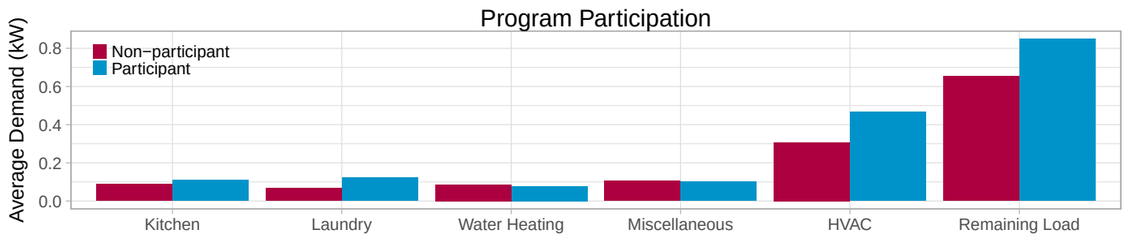


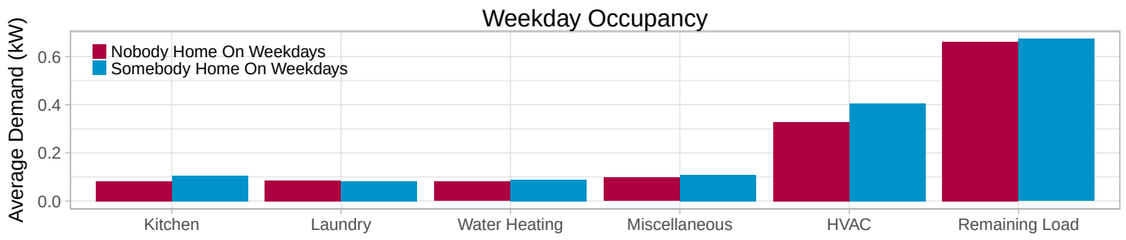










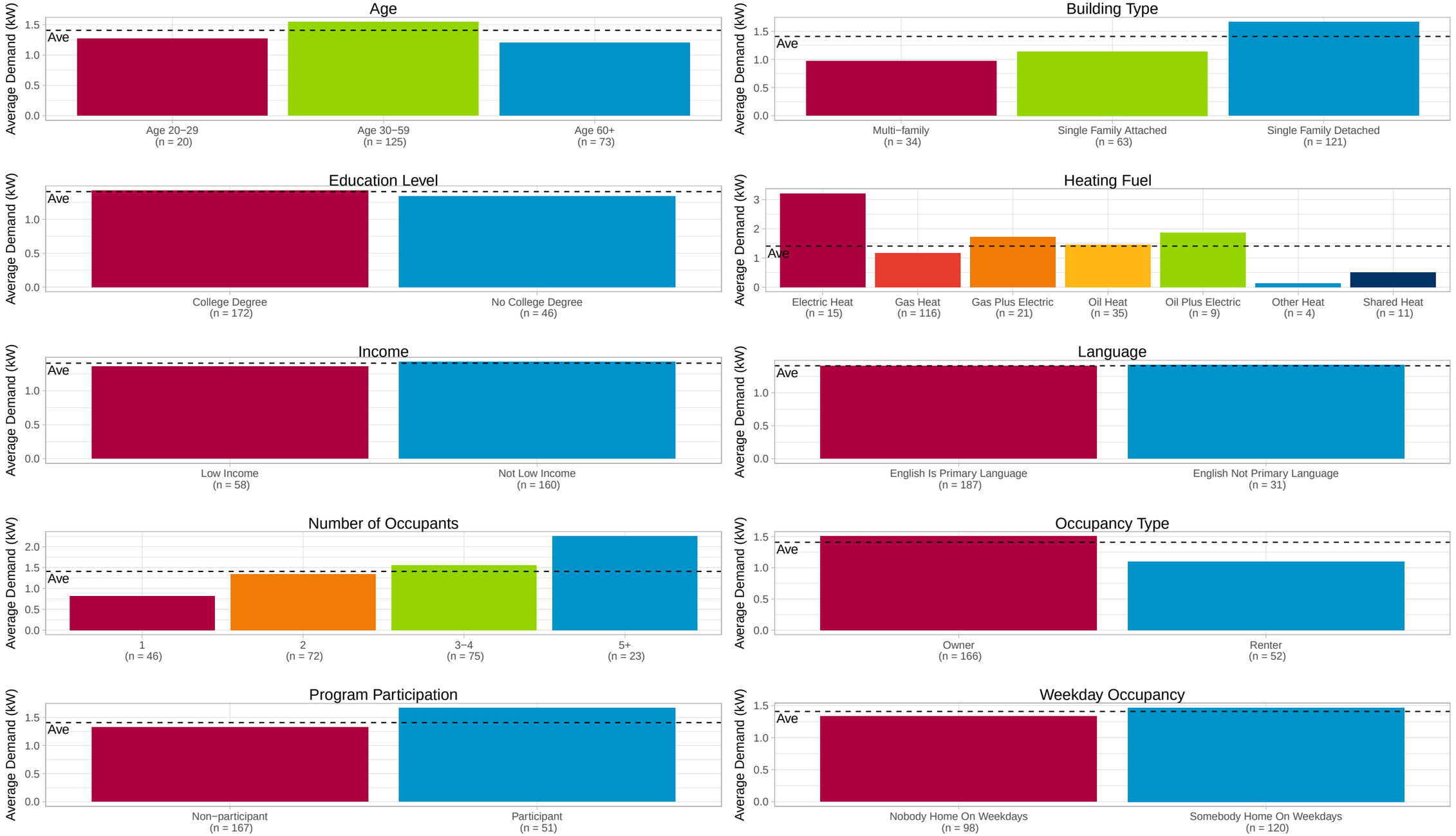


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

3 Residential Winter Peak Demand

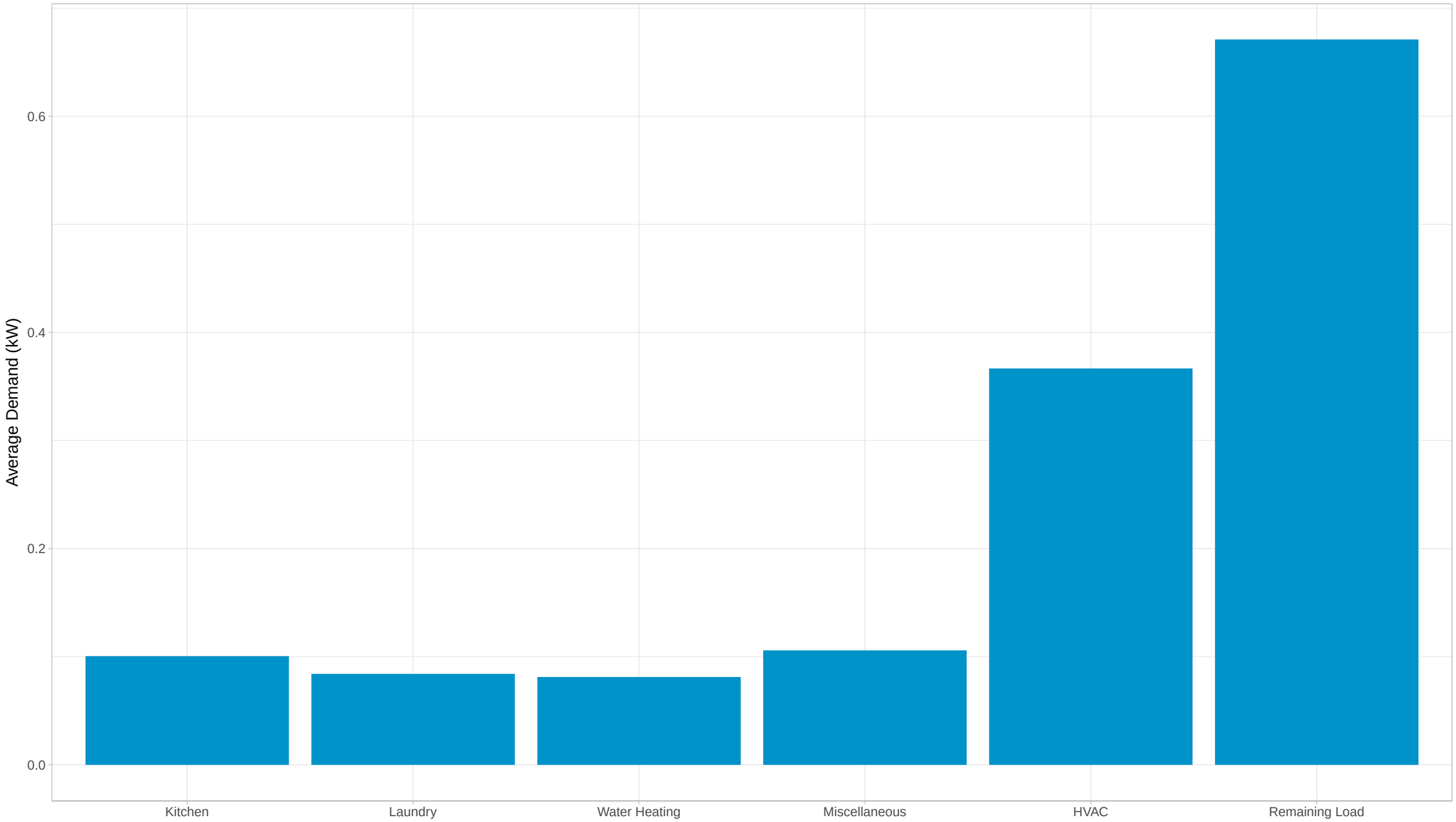
3.1 Average Whole Home Residential Winter Peak Demand by Demographic



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

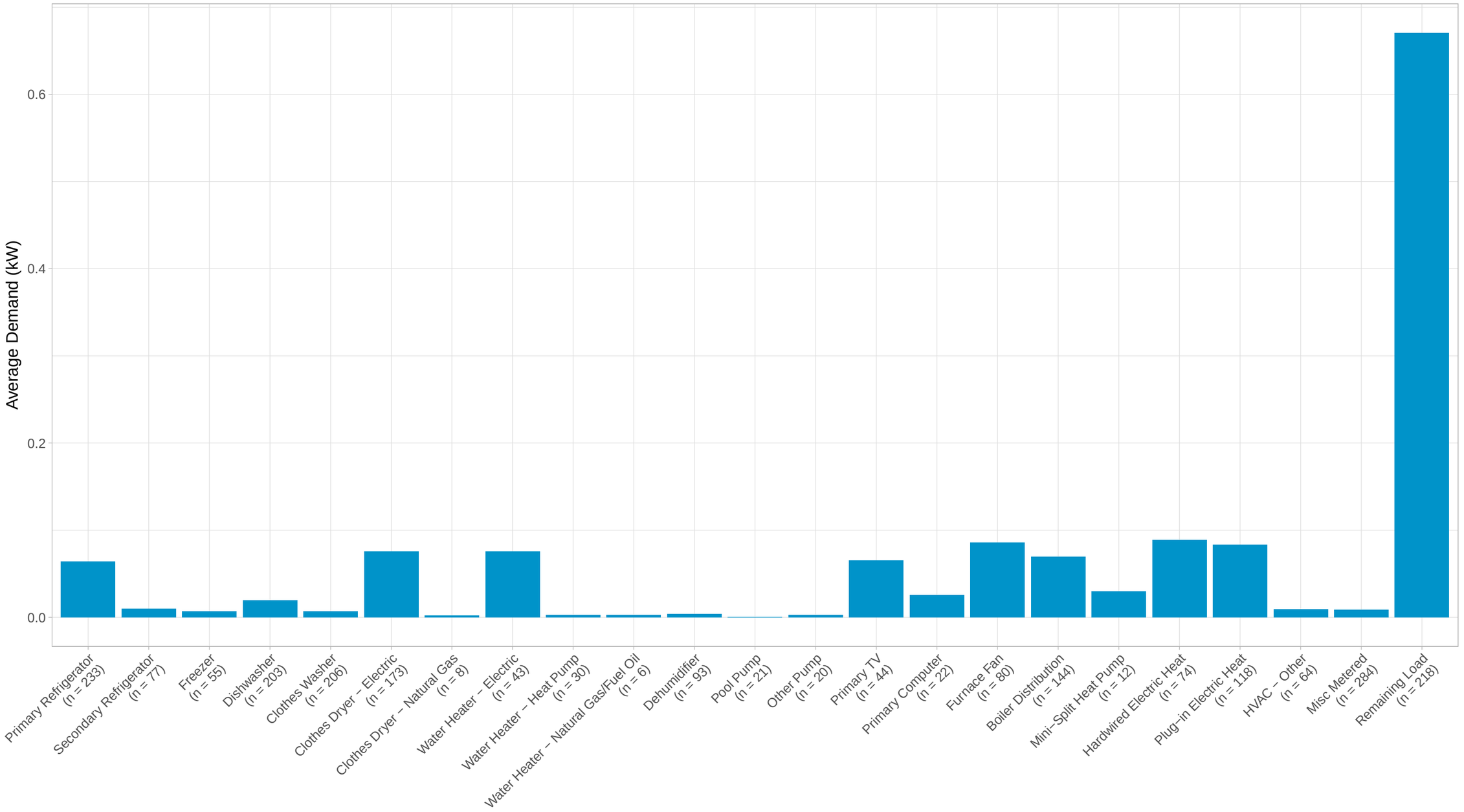
3.2 Population Average Residential Winter Peak Demand by End Use Category



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

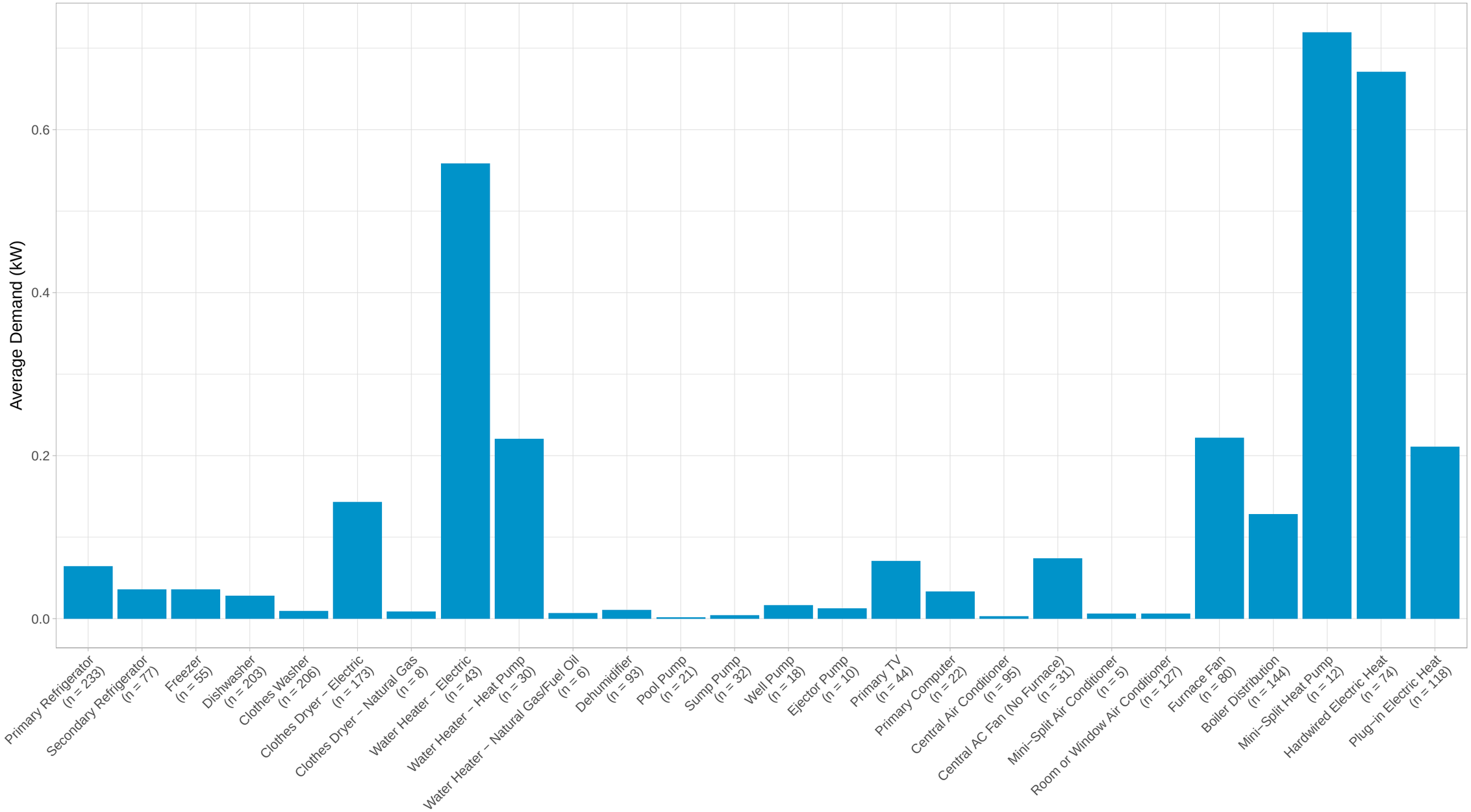
3.3 Population Average Residential Winter Peak Demand by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

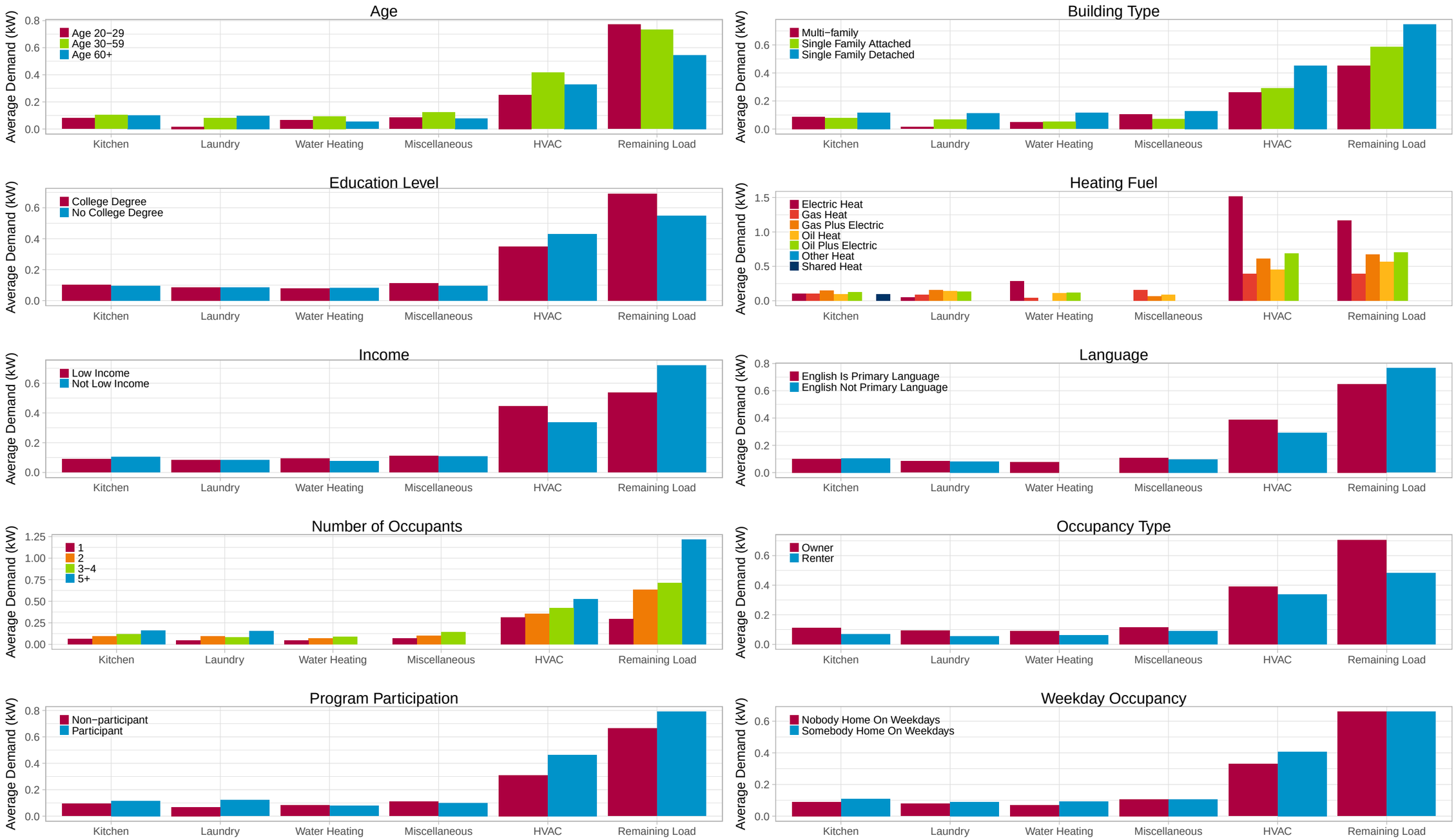
3.4 Average Residential Winter Peak Demand by End Use for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

3.5 Population Average Residential Winter Peak Demand by End Use Category and Demographic

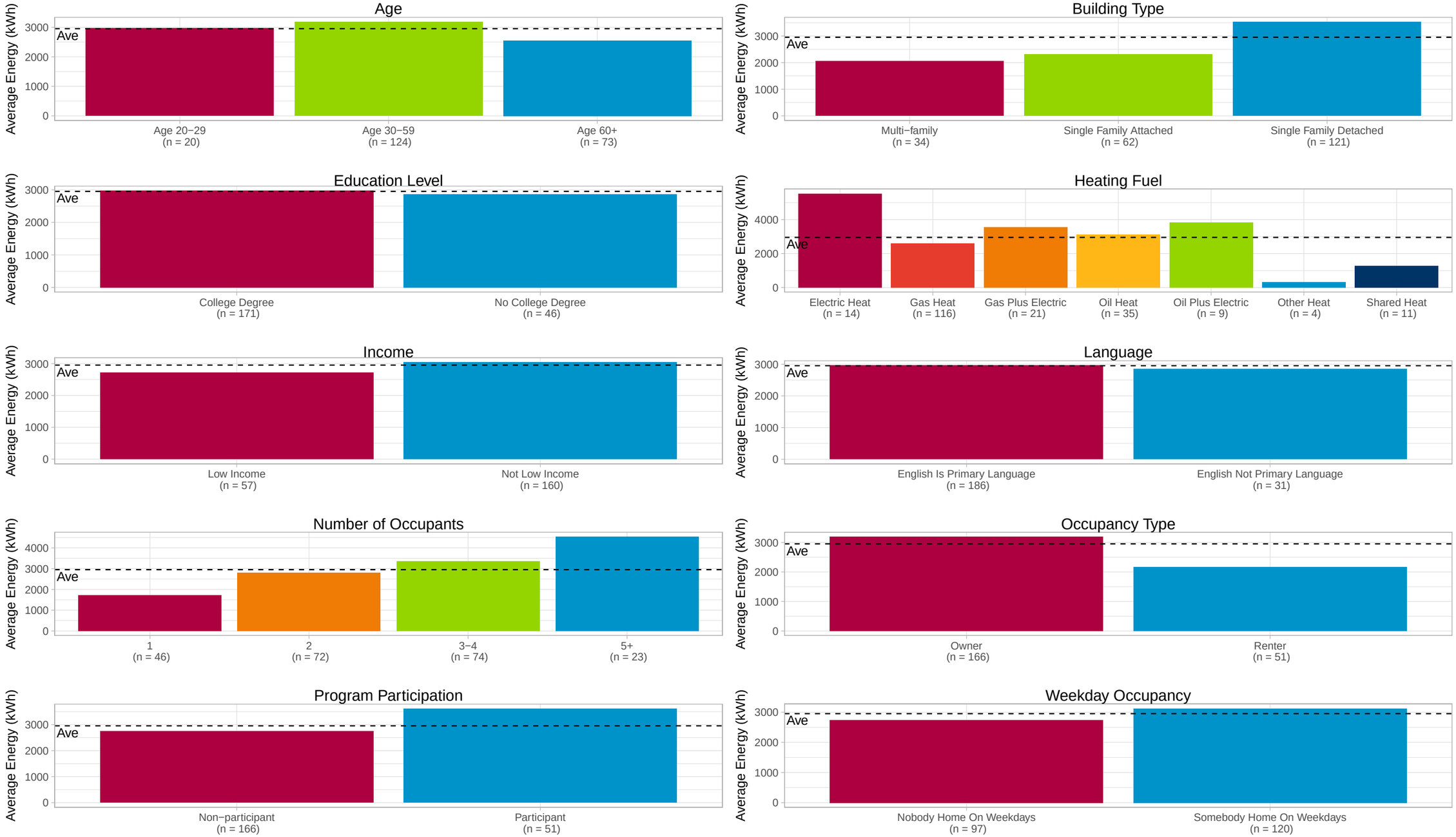


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

4 Winter Energy Consumption

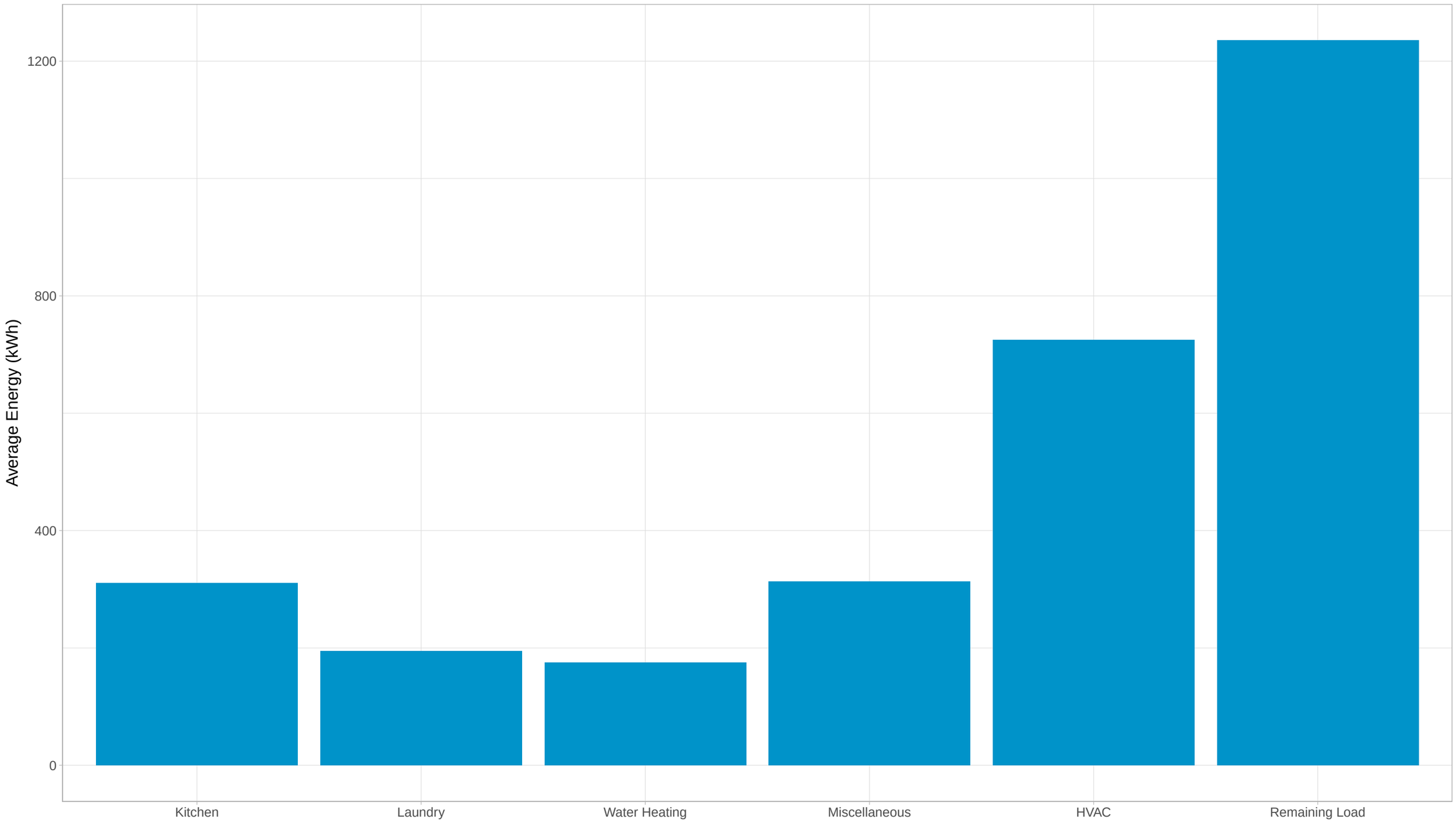
4.1 Average Whole Home Winter Energy Consumption by Demographic



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

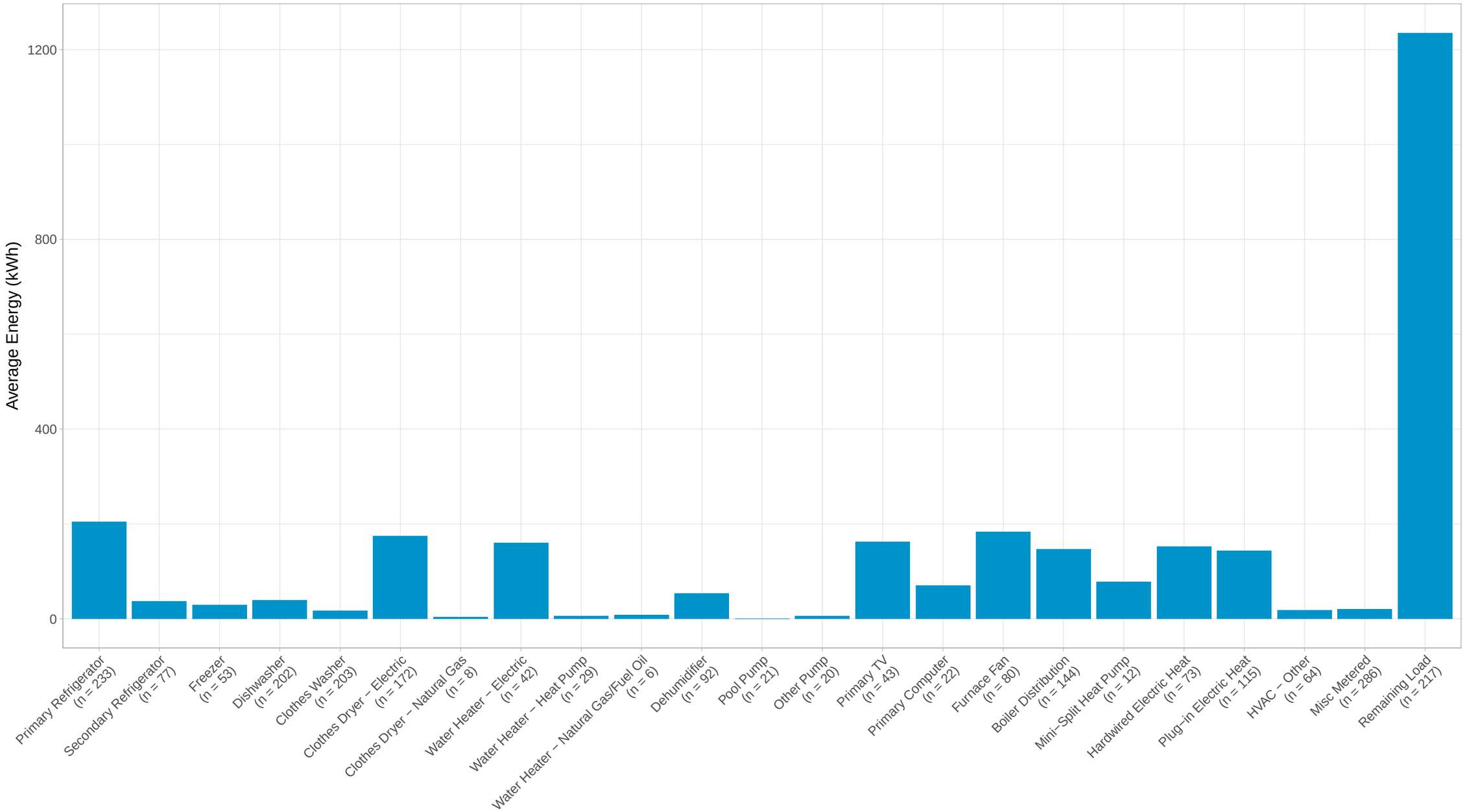
4.2 Population Average Winter Energy Consumption by End Use Category



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

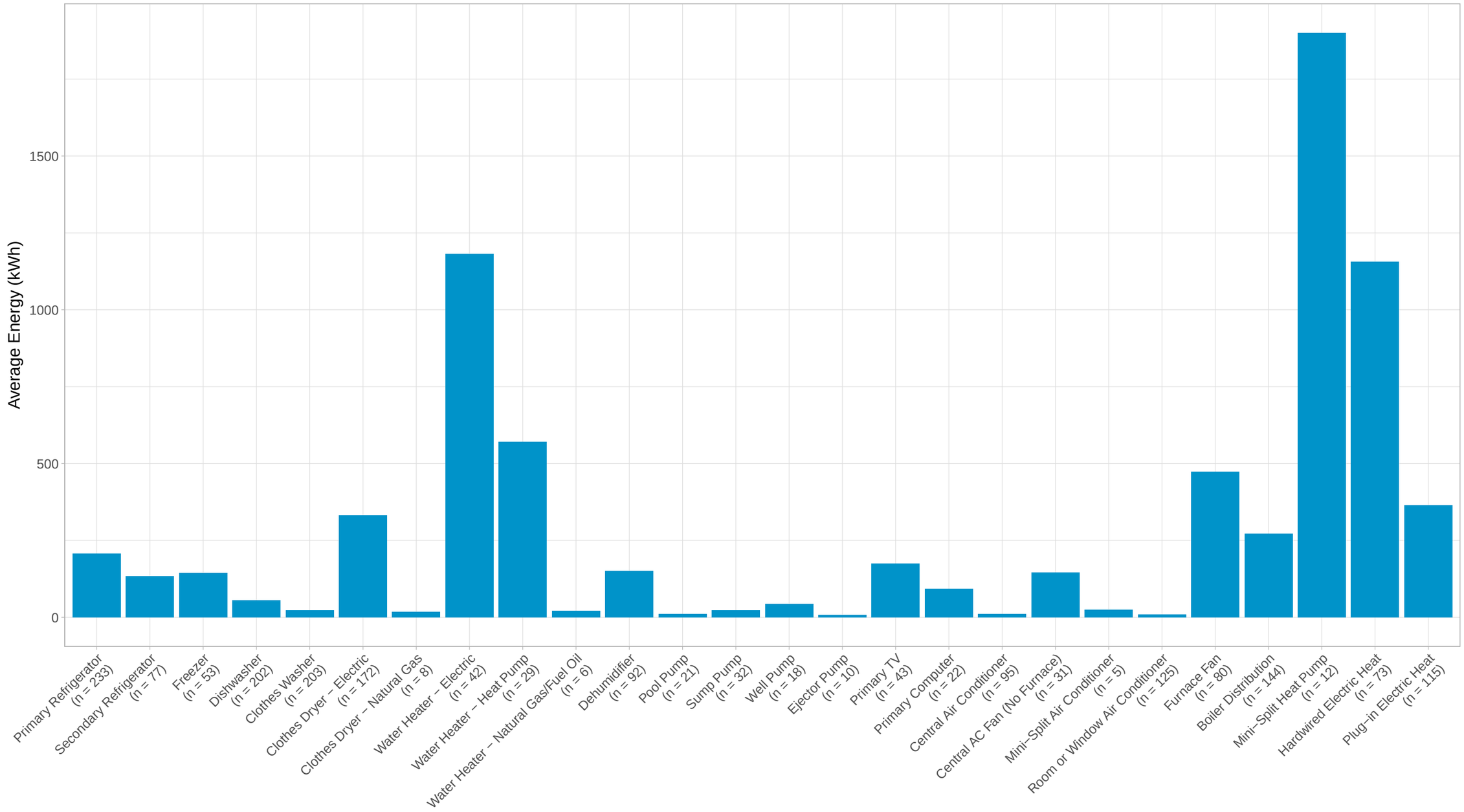
4.3 Population Average Winter Energy Consumption by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

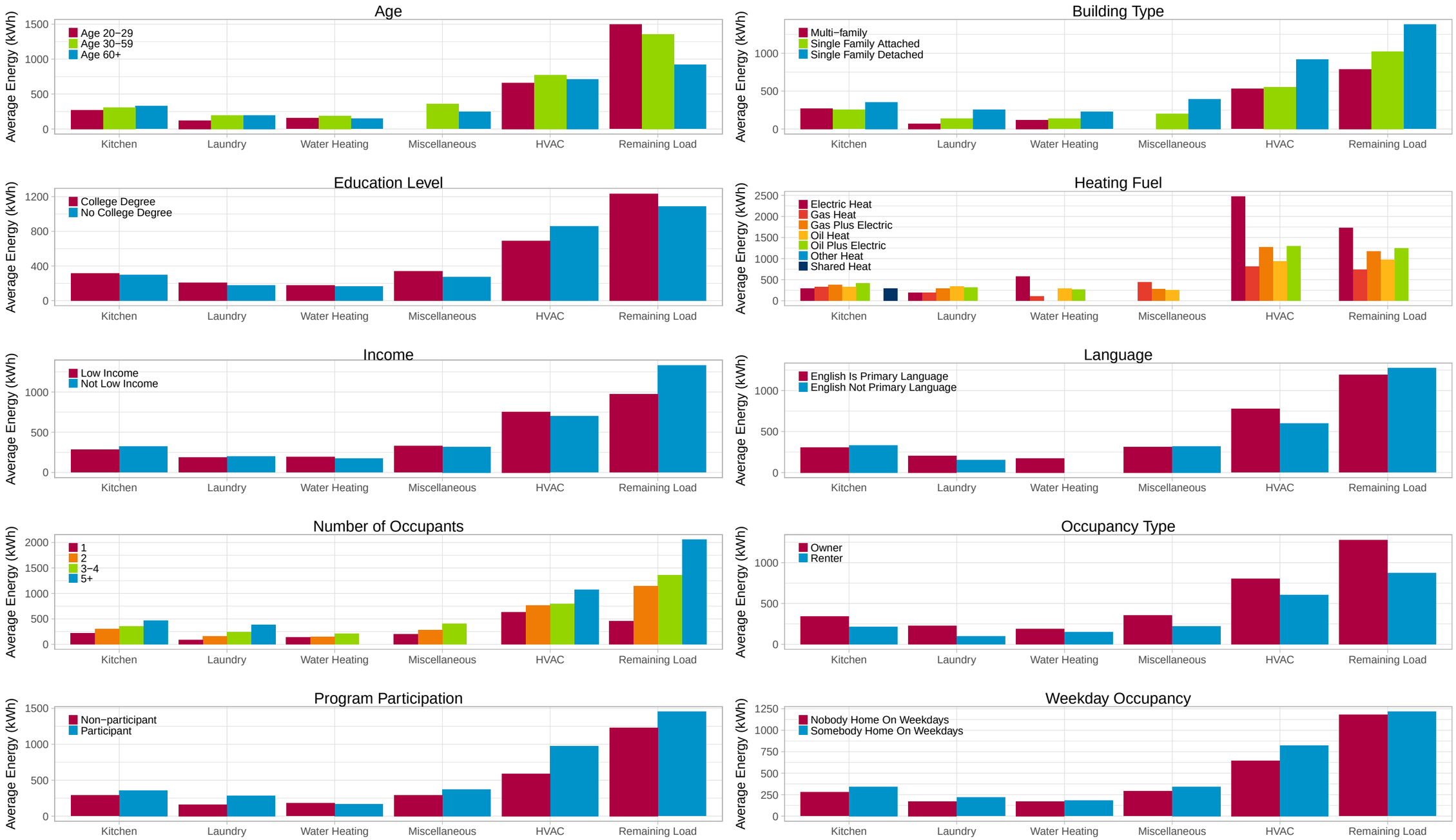
4.4 Average Winter Energy Consumption by End Use for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

4.5 Population Average Winter Energy Consumption by End Use Category and Demographic

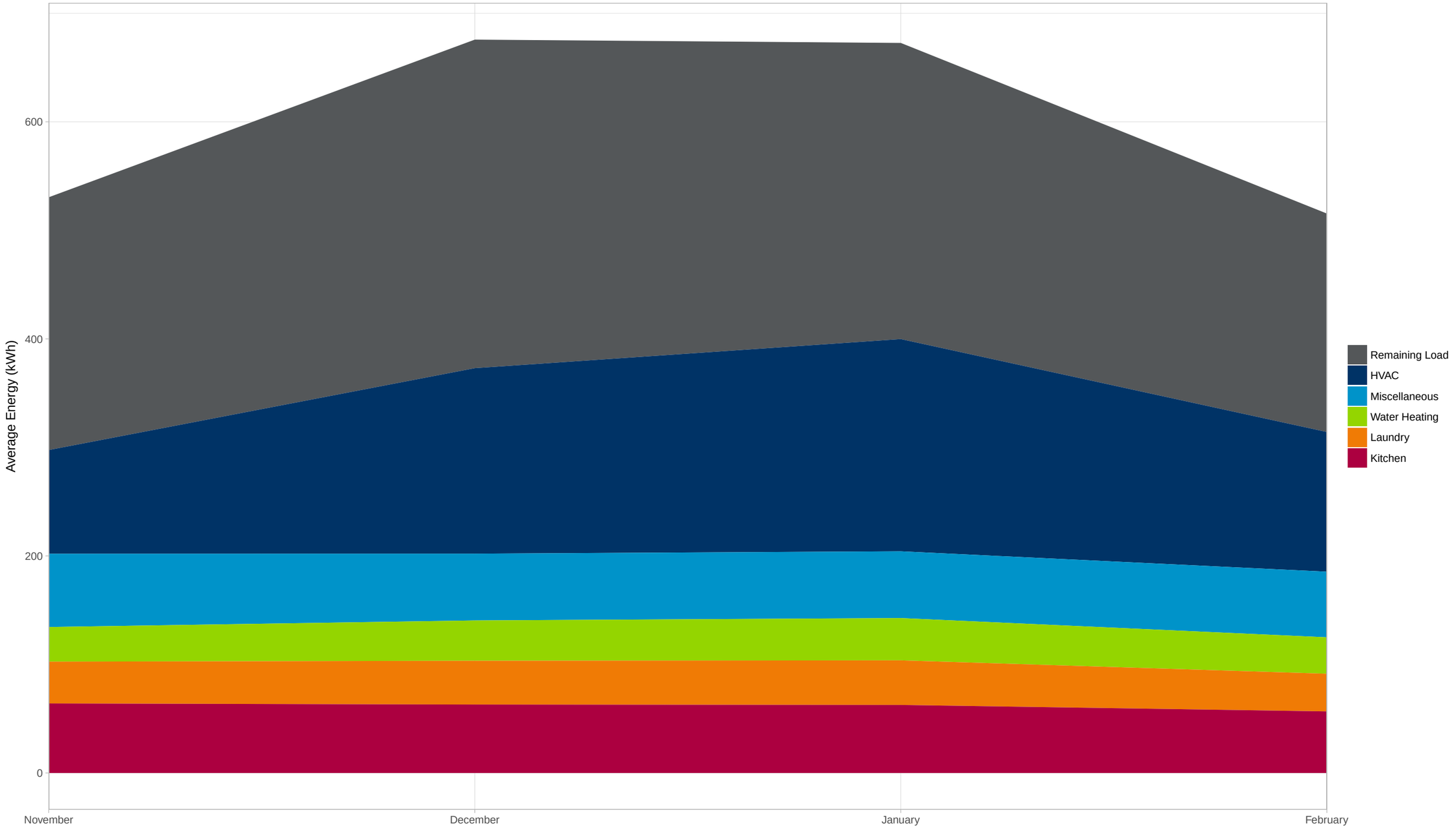


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

5 Monthly Energy Consumption

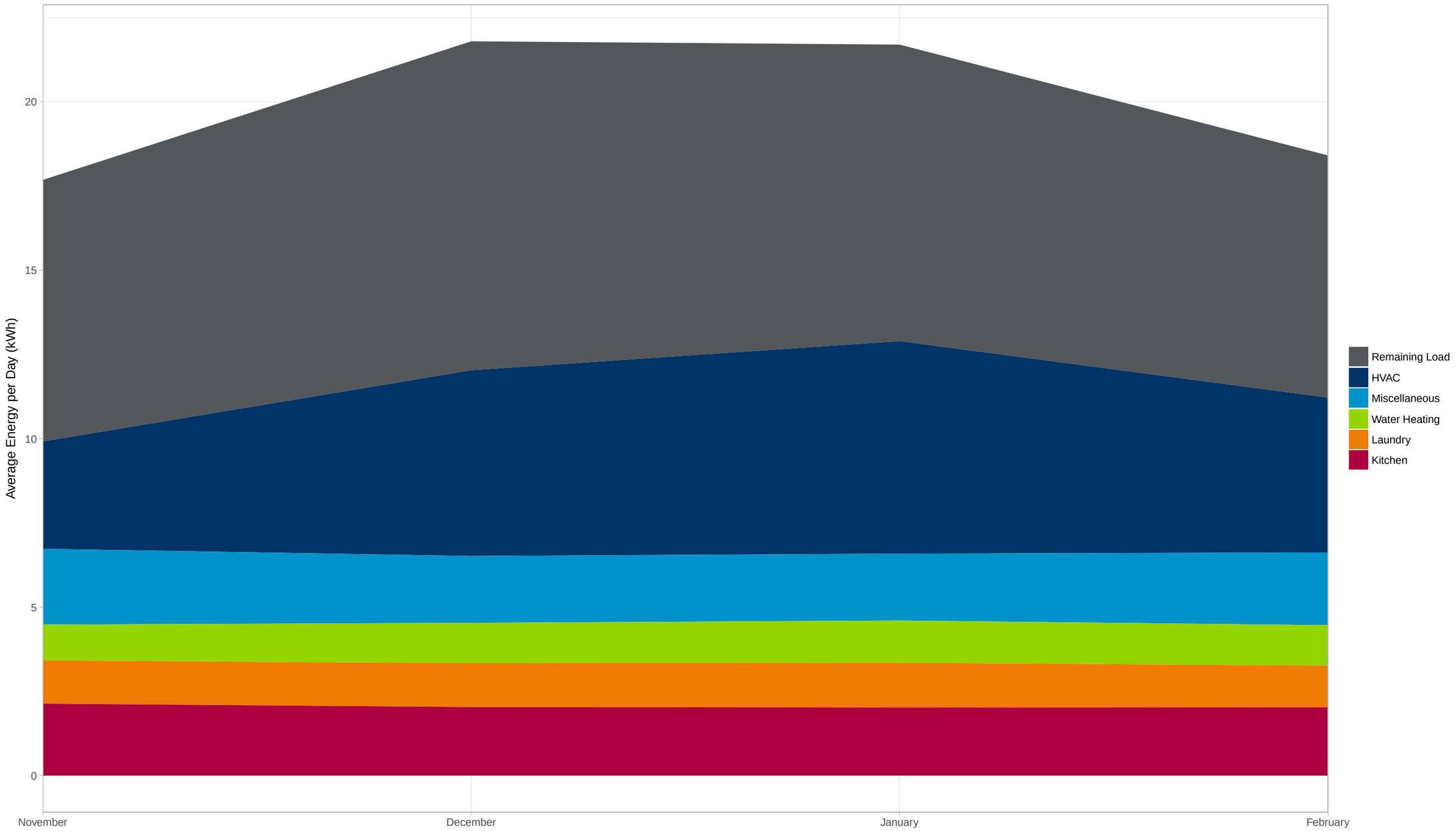
5.1 Population Total Monthly Energy Consumption by End Use Category



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

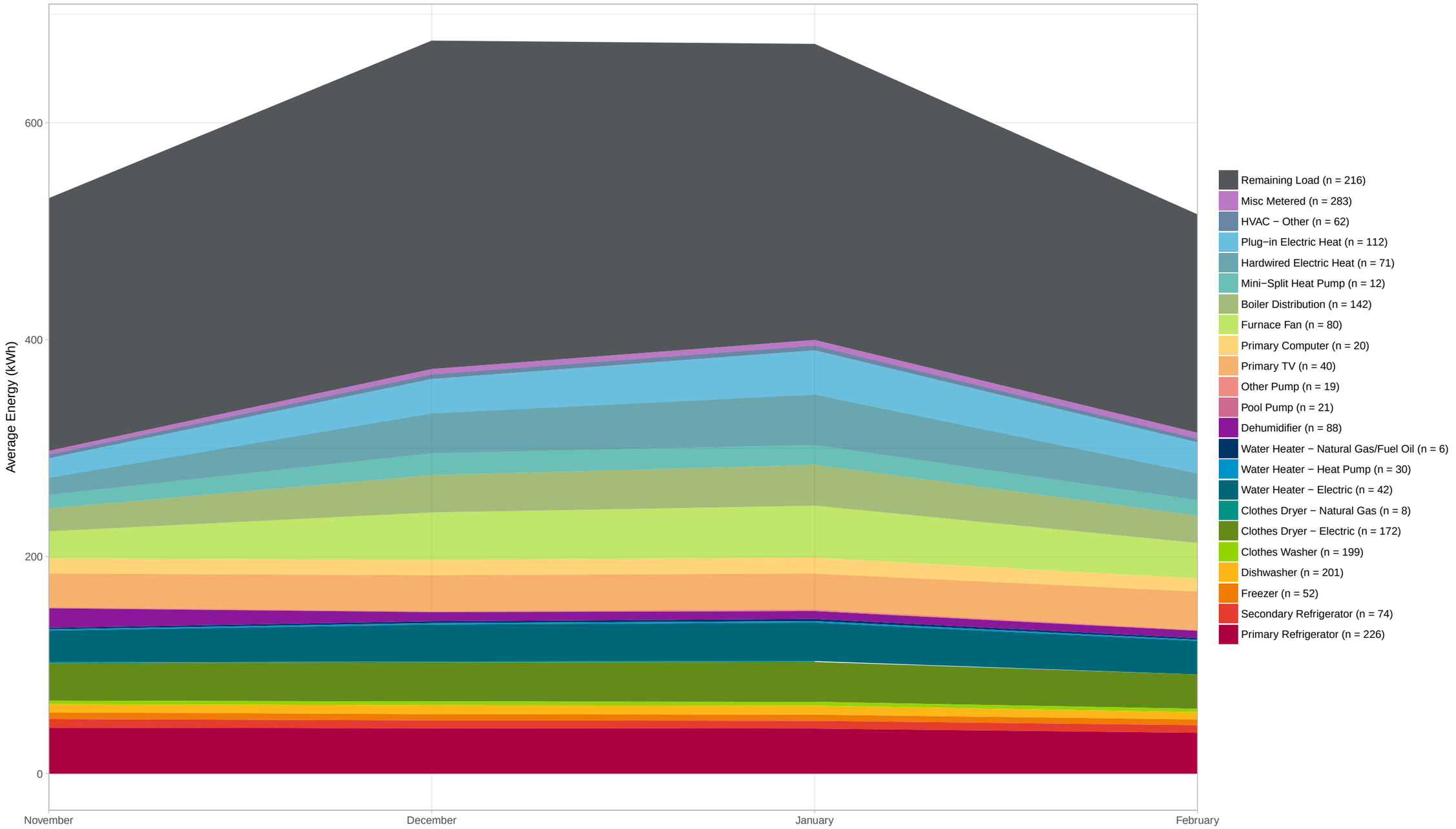
5.2 Population Monthly Energy Consumption Per Day by End Use Category



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

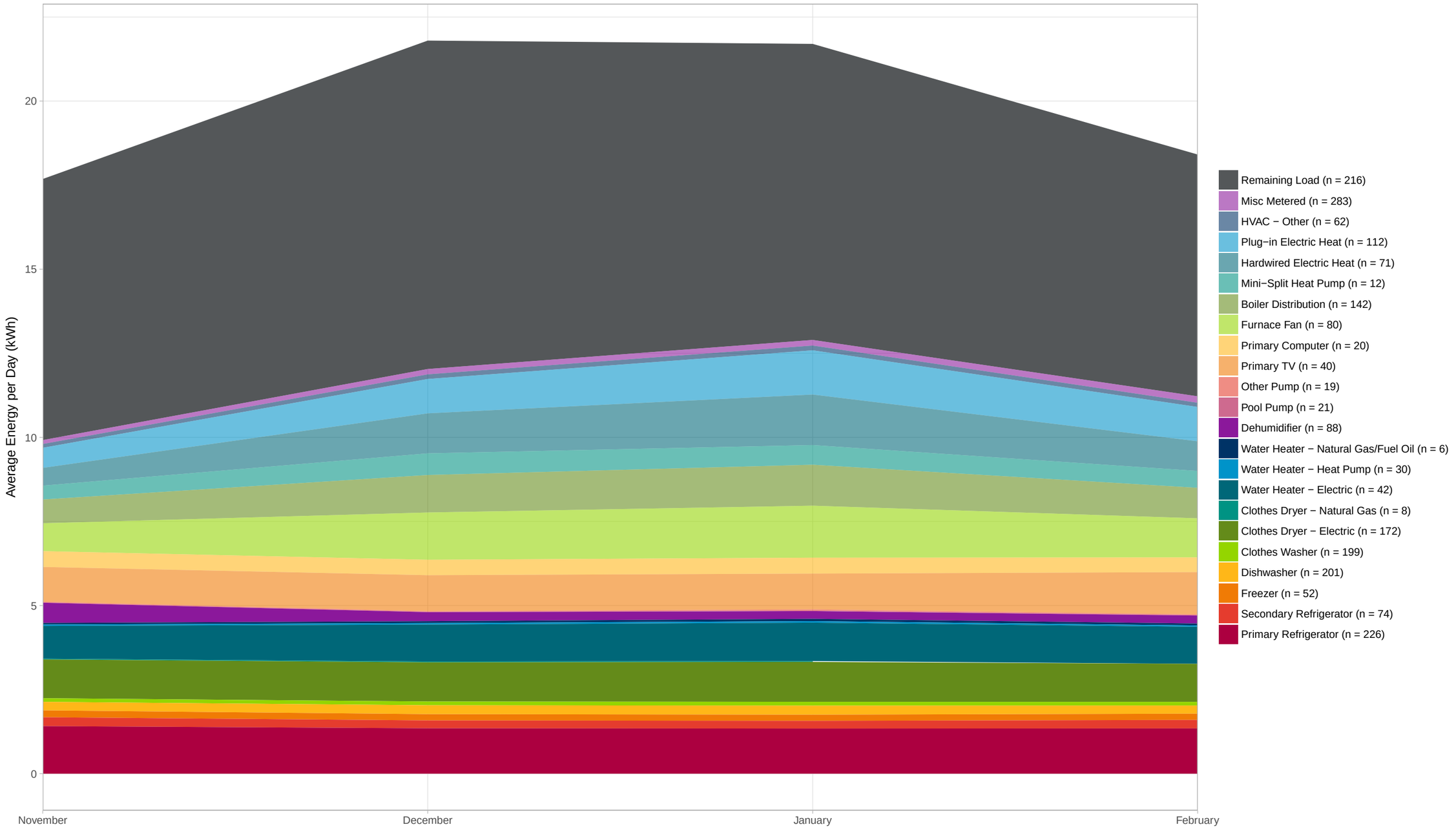
5.3 Population Total Monthly Energy Consumption by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

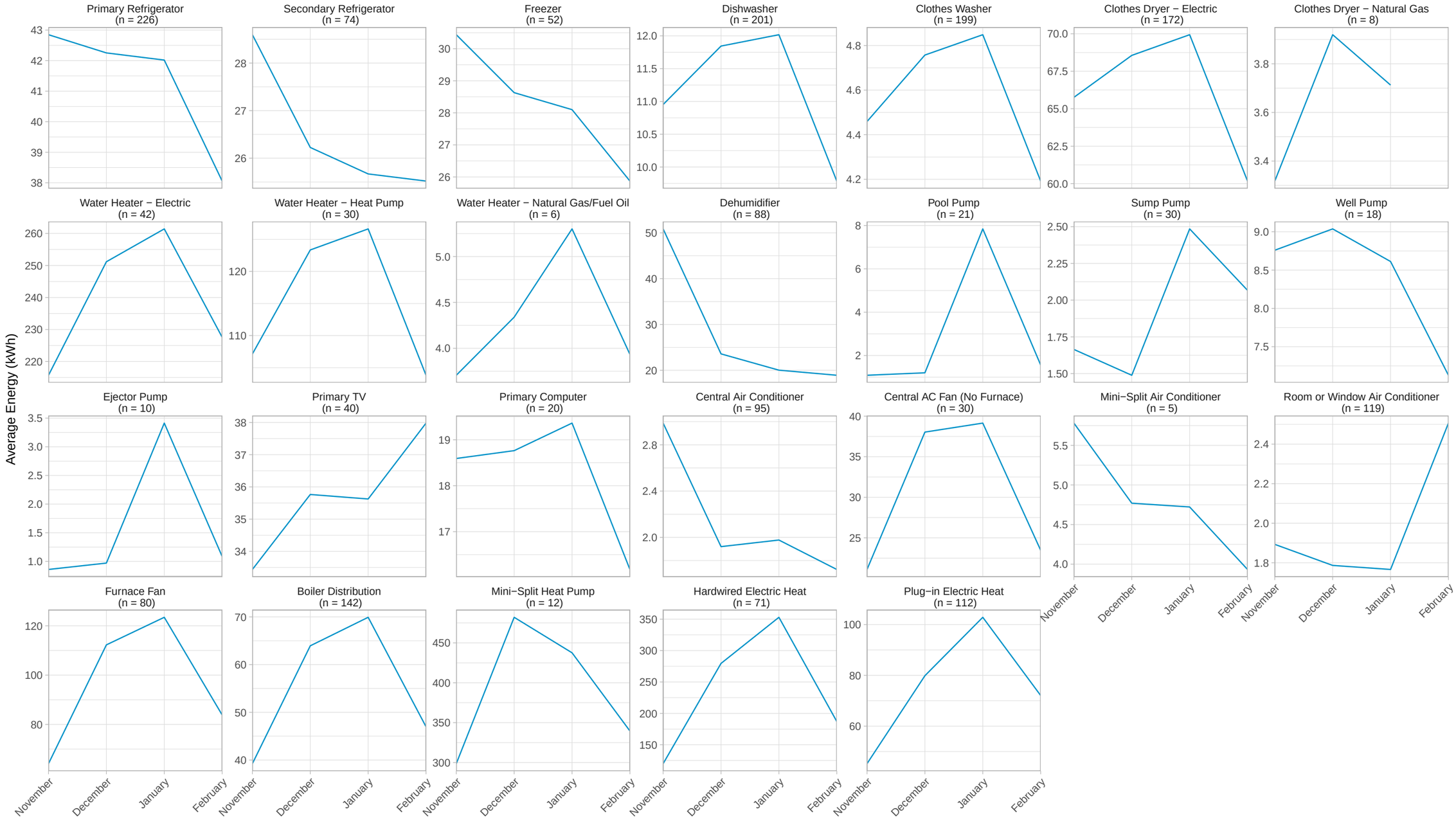
5.4 Population Monthly Energy Consumption Per Day by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

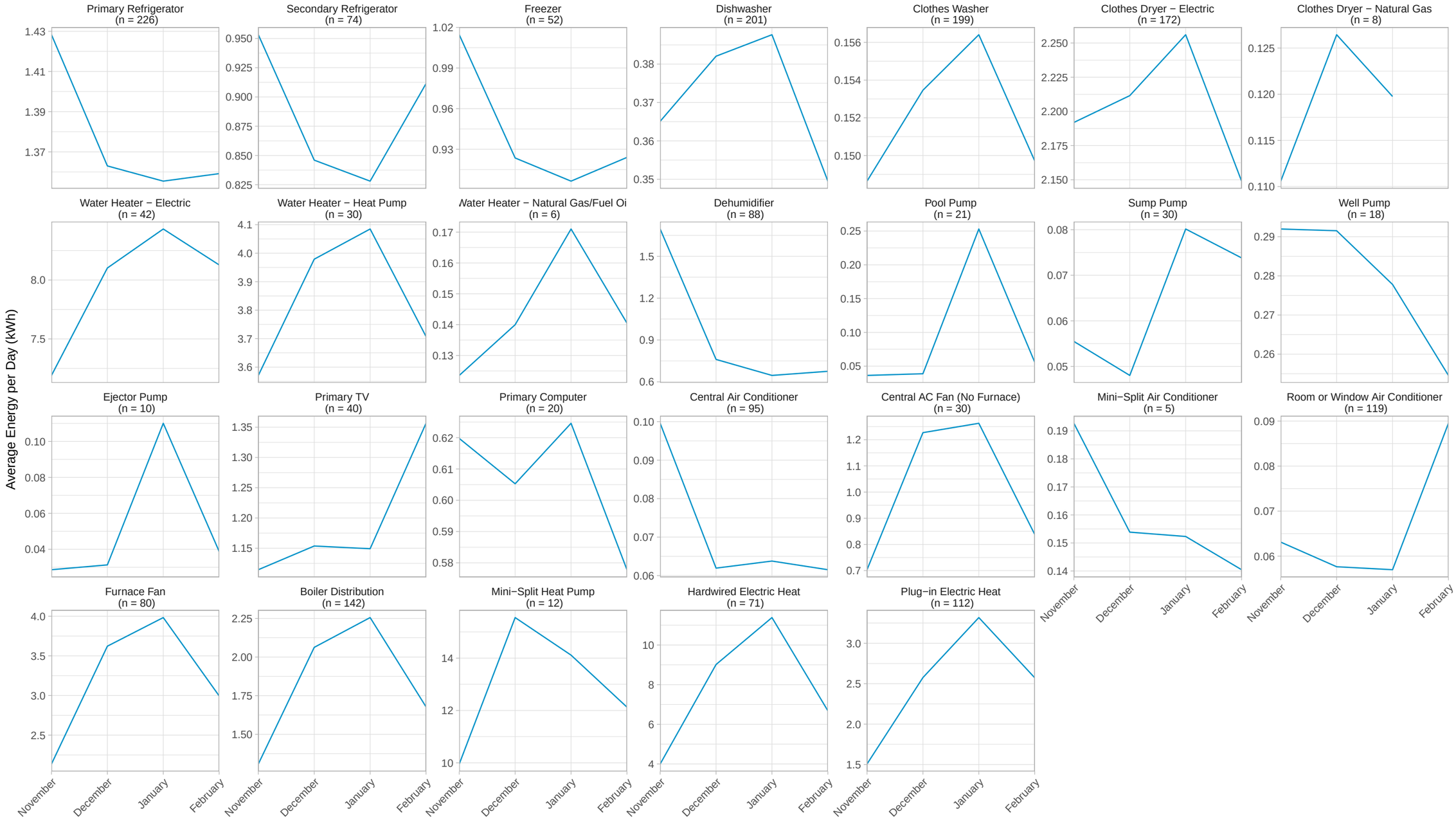
5.5 Total Monthly Energy Consumption by End Use for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

5.6 Monthly Energy Consumption Per Day by End Use for Homes With End Use

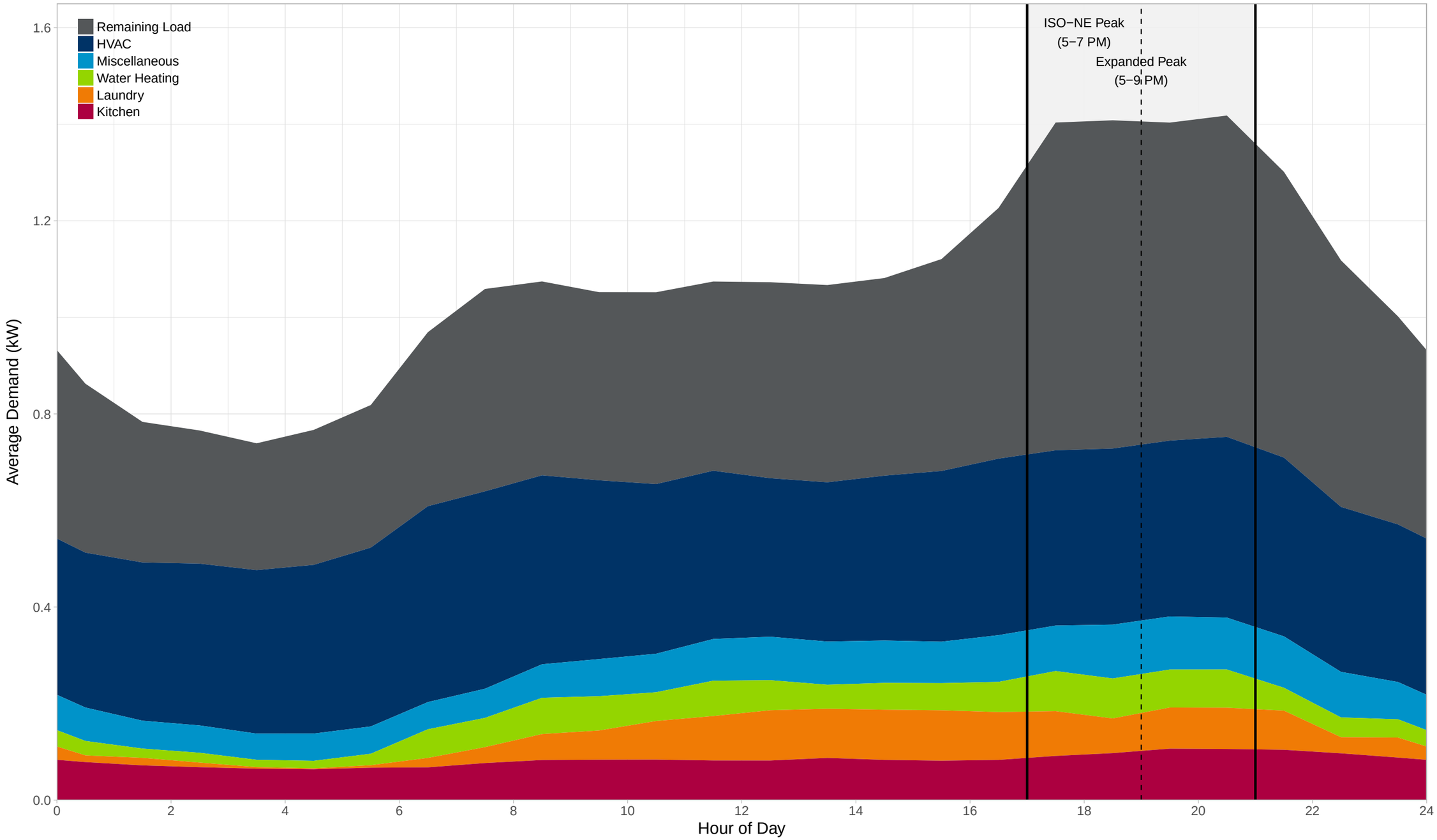


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

6 Winter Peak Day Load Shapes

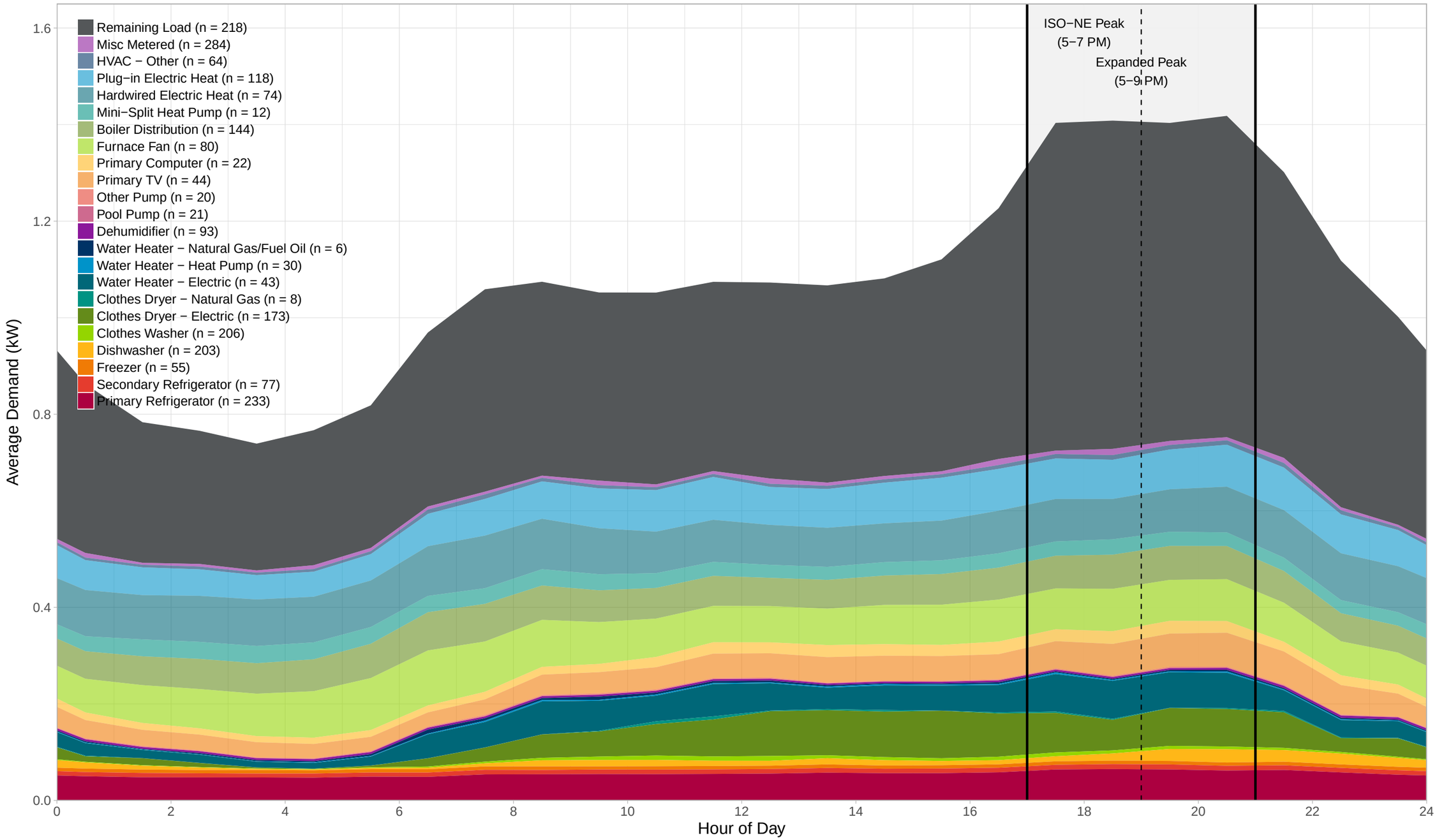
6.1 Population Winter Peak Day Load Shape by End Use Category



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

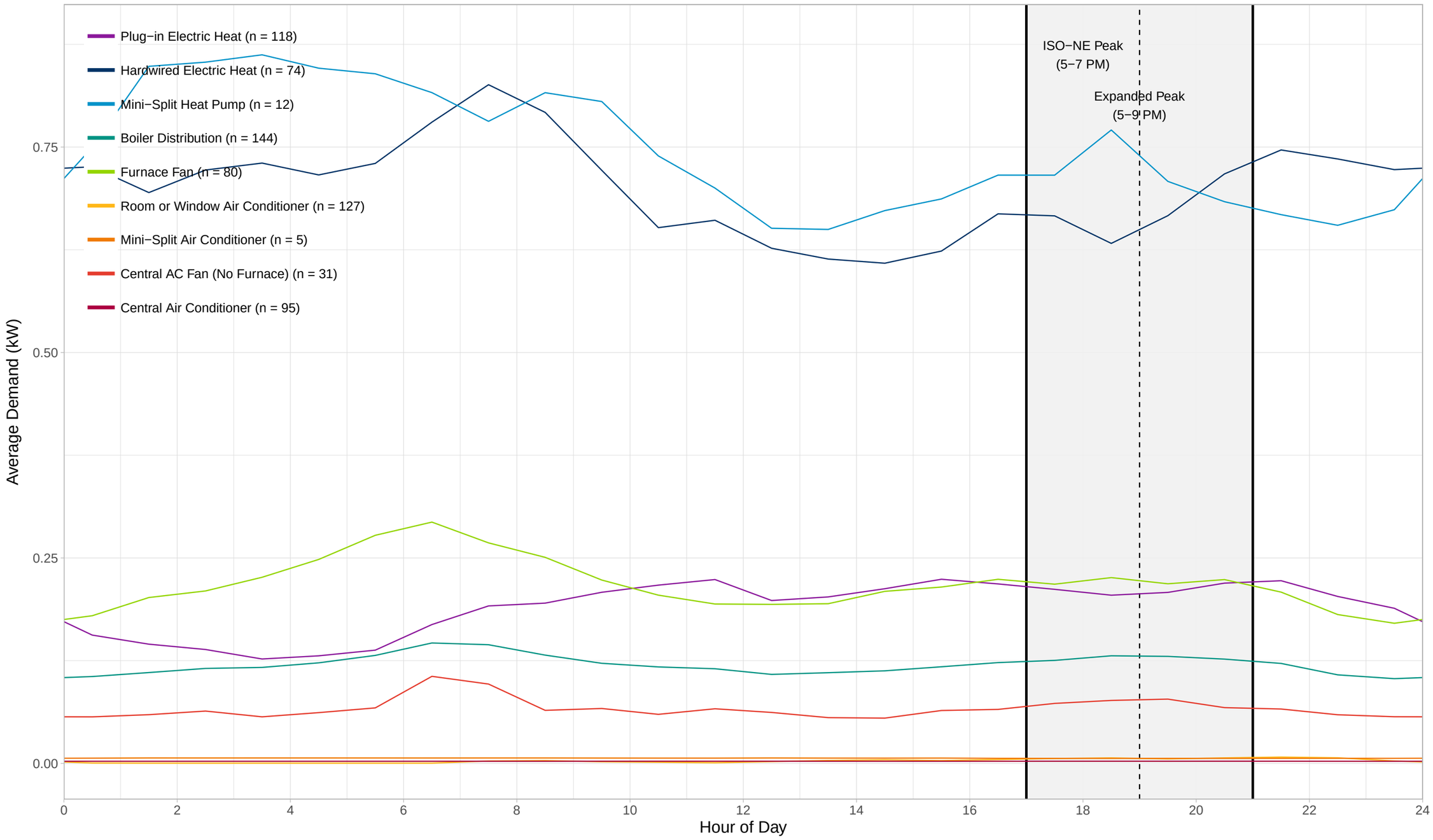
6.2 Population Winter Peak Day Load Shape by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

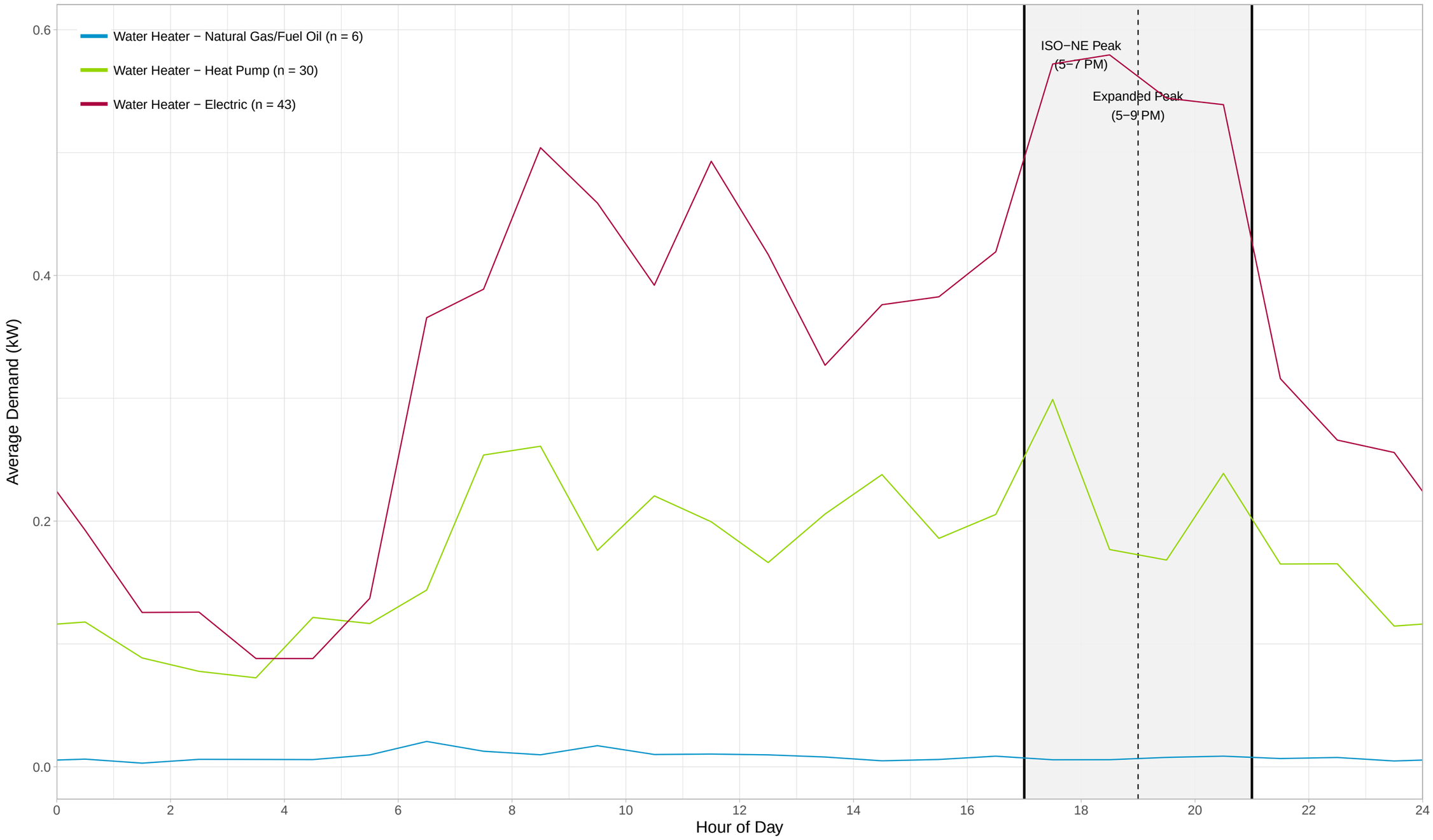
6.3 Winter Peak Day HVAC Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

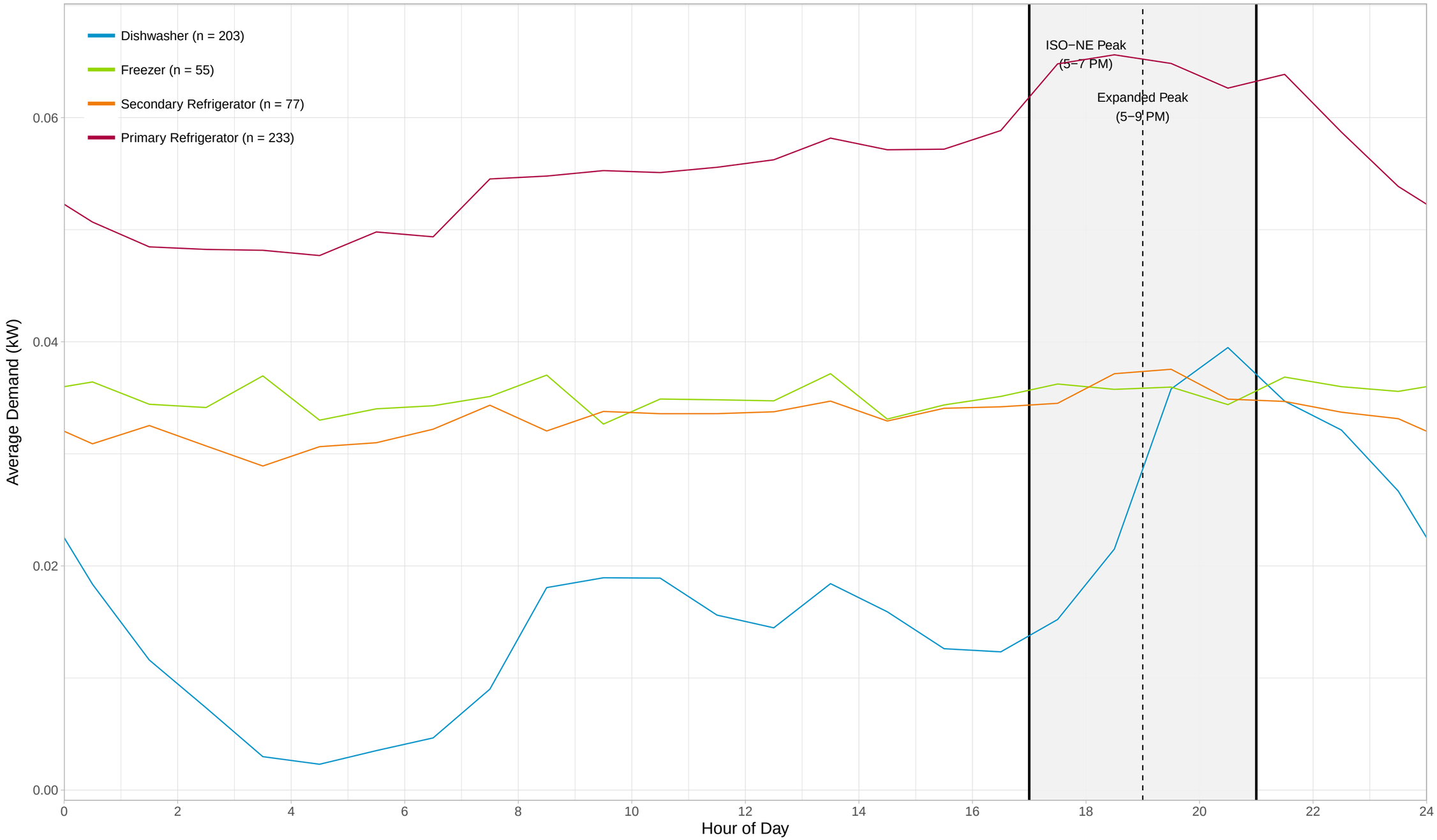
6.4 Winter Peak Day Water Heating Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

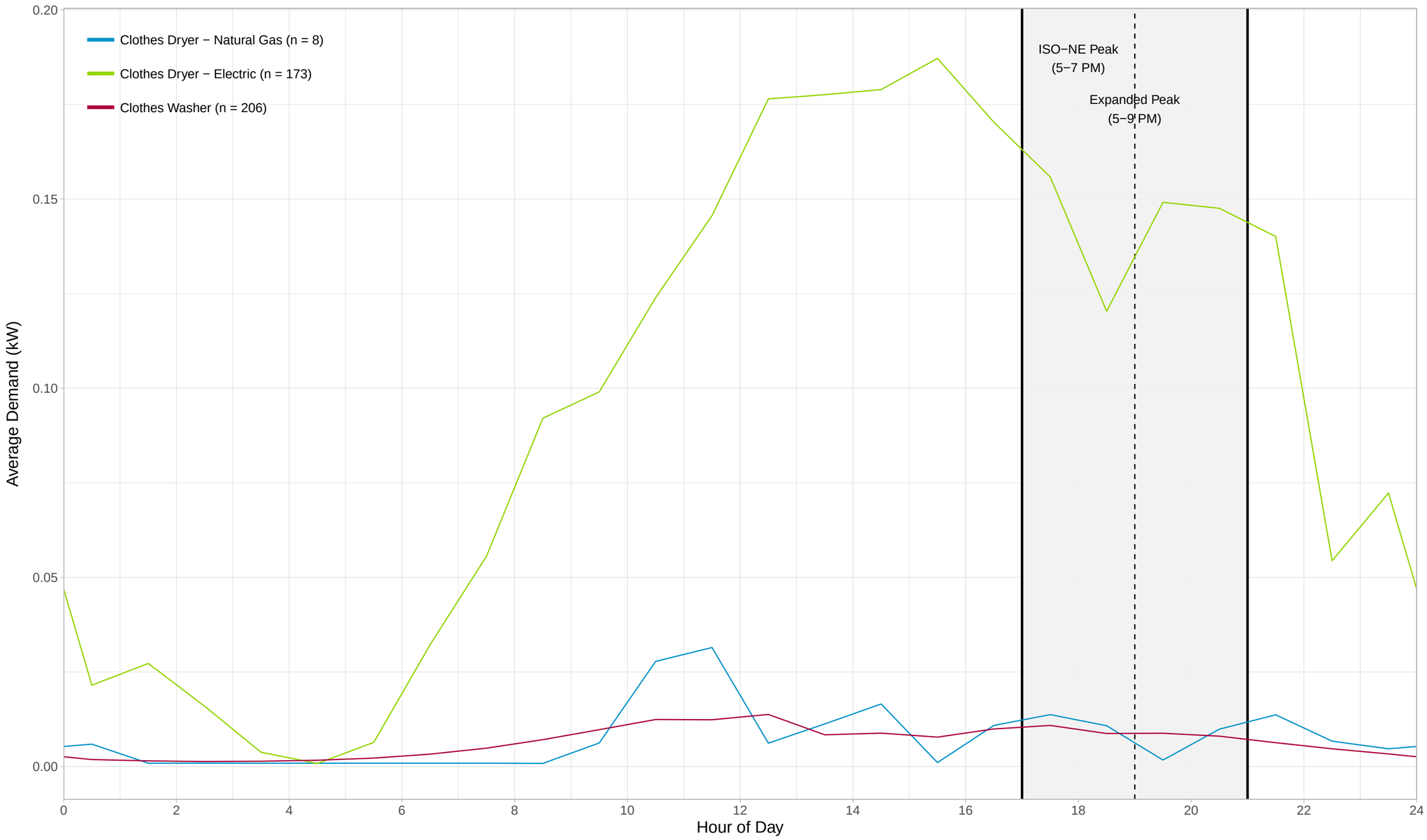
6.5 Winter Peak Day Kitchen Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

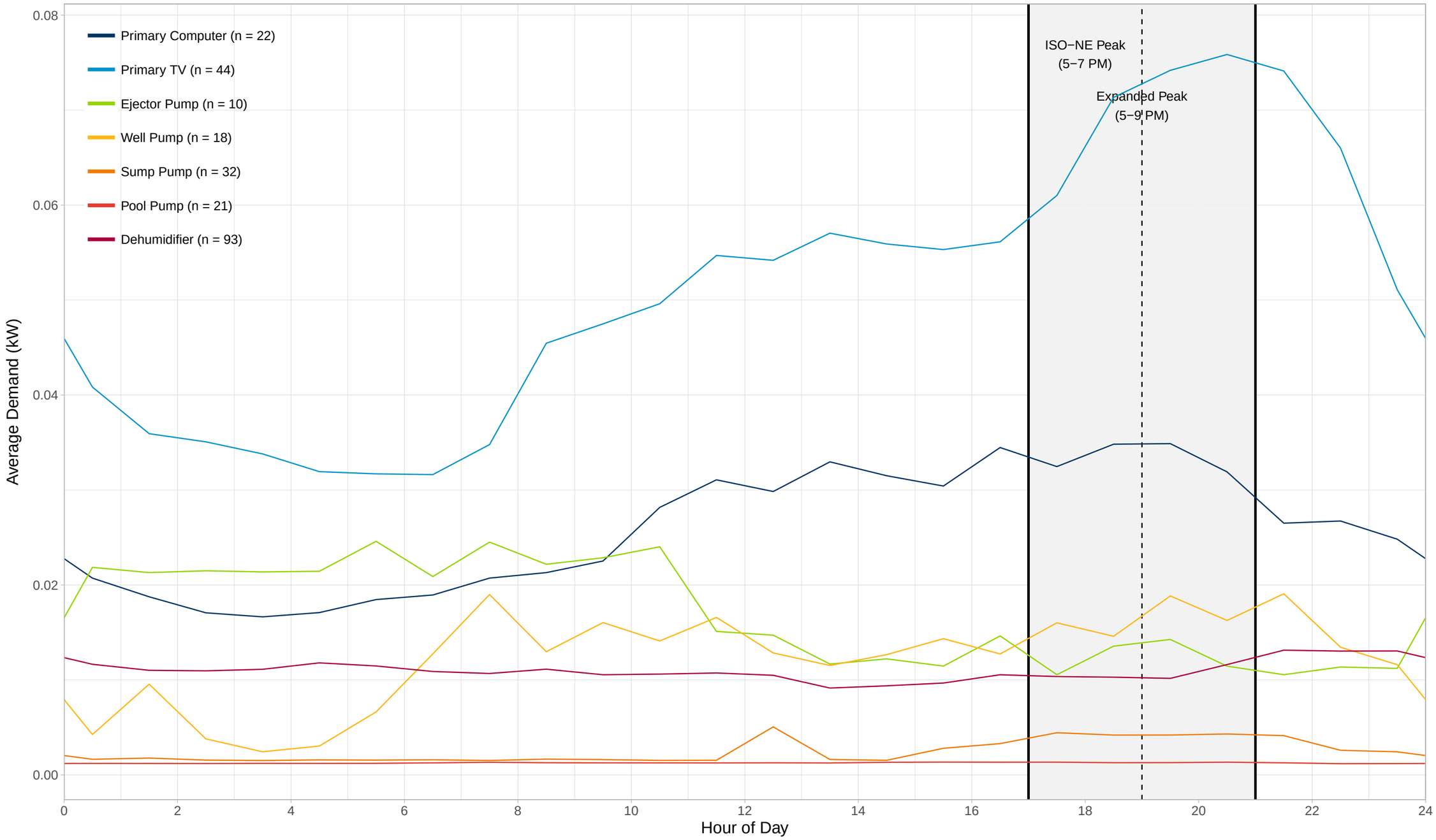
6.6 Winter Peak Day Laundry Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

6.7 Winter Peak Day Miscellaneous Load Shapes for Homes With End Use

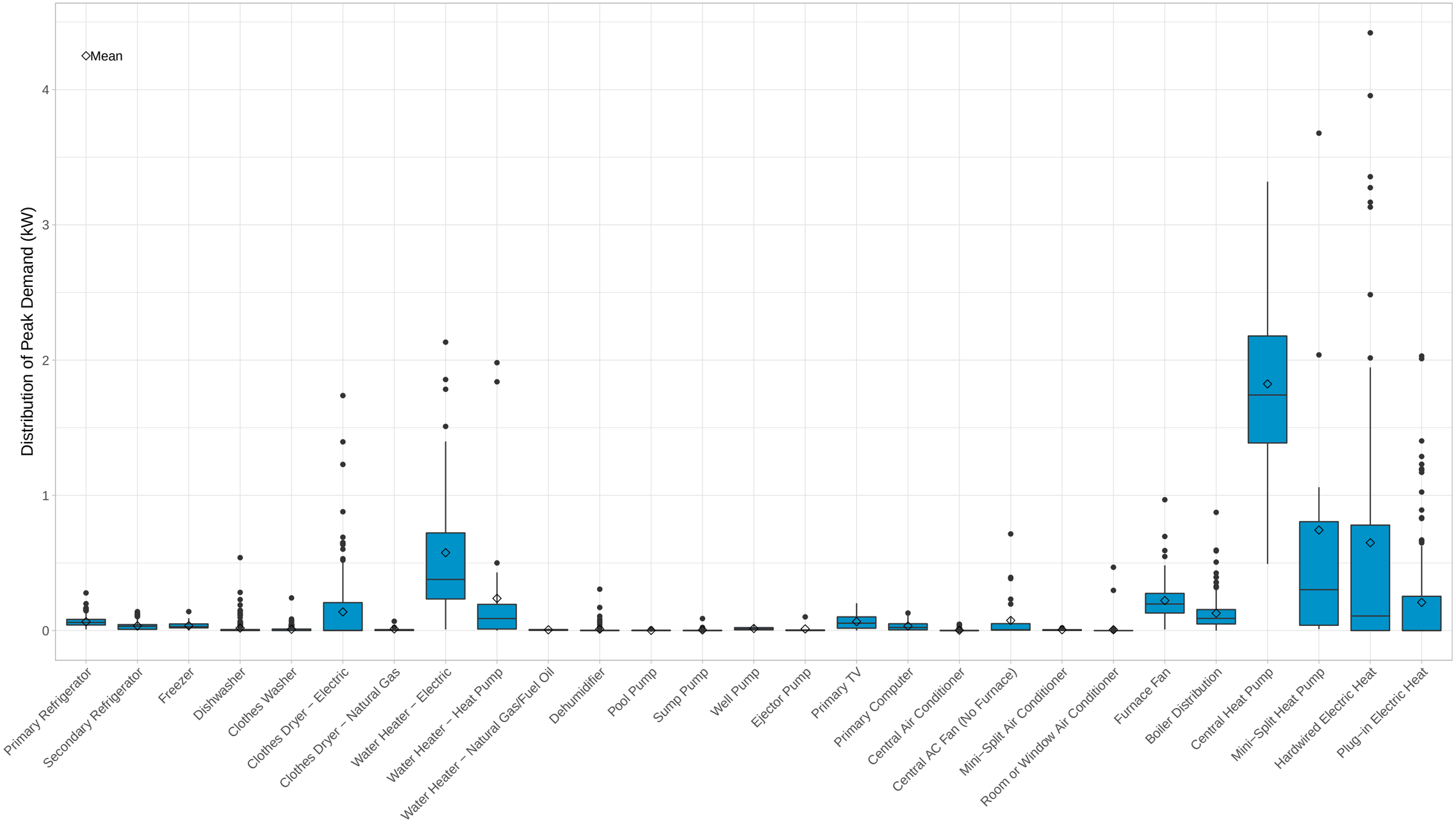


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

7 Distributions and High Users

7.1 Distribution of ISO-NE Winter Peak Demand by End Use for Homes With End Use

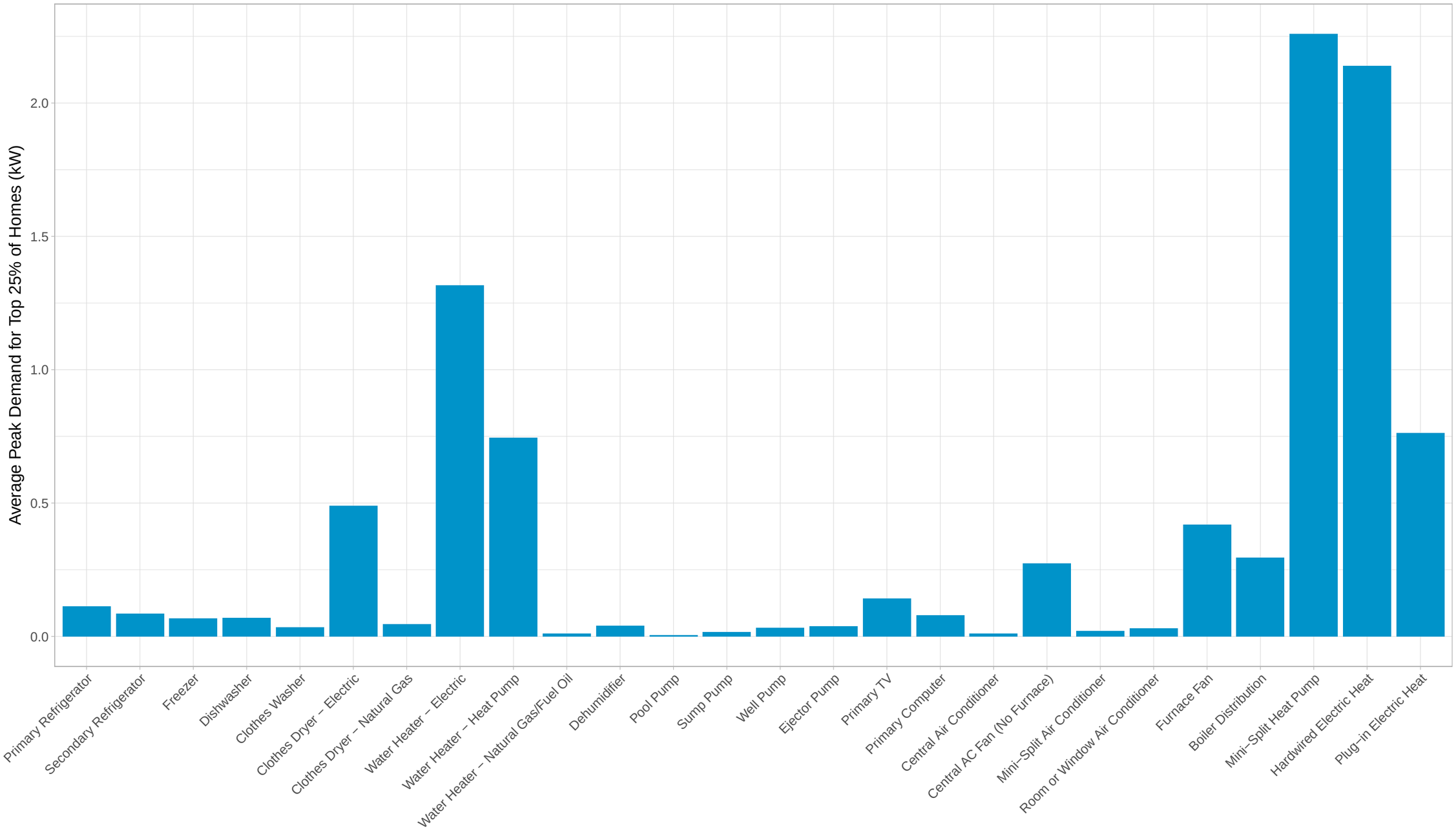


Source: Navigant Analysis

Note: data displayed as a Tukey boxplot - whiskers represent the highest/lowest datum within 1.5 * IQR

©2018 Navigant Consulting, Inc. All Rights Reserved

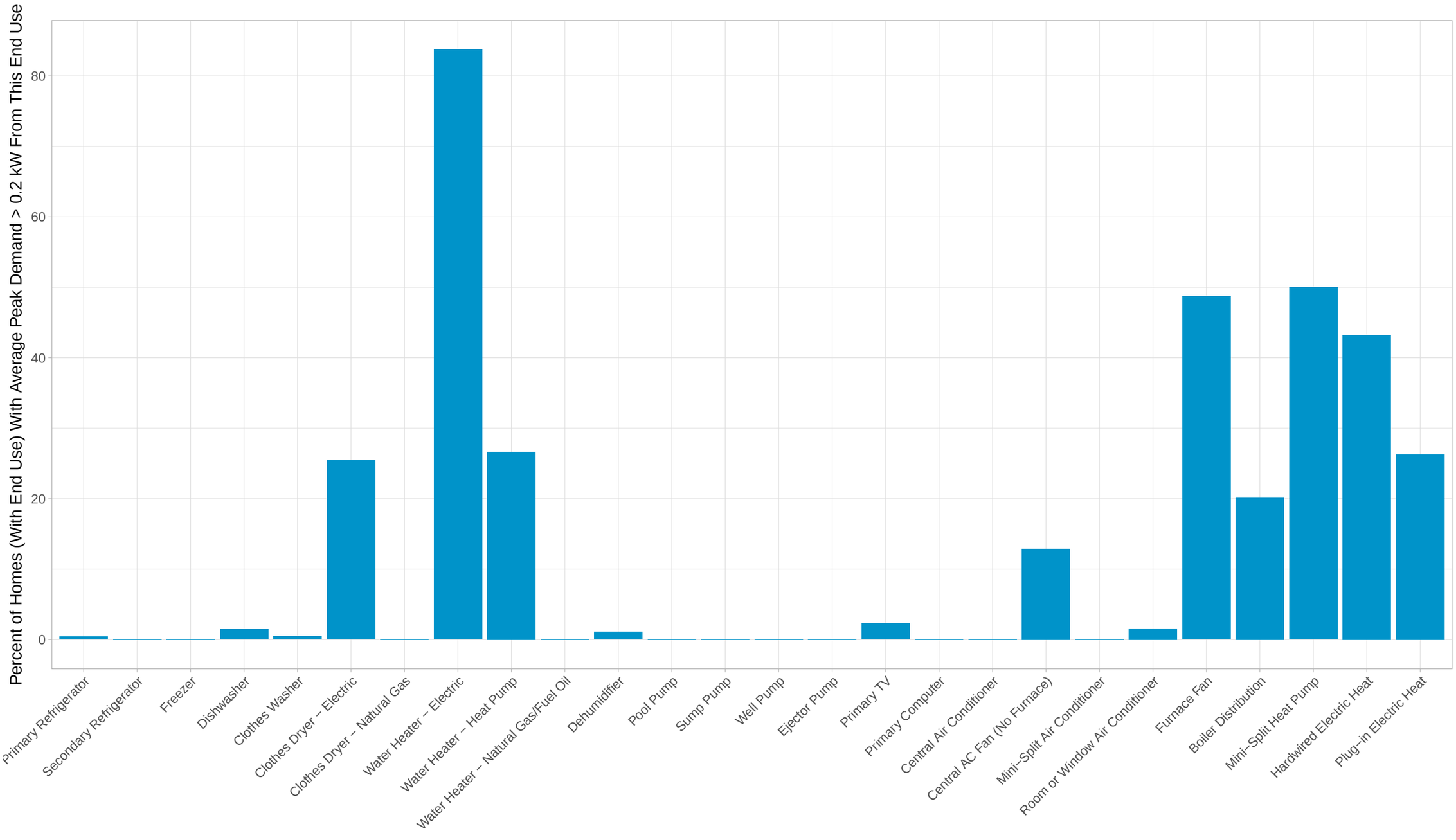
7.2 Average ISO-NE Winter Peak Demand by End Use for Top 25% of Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

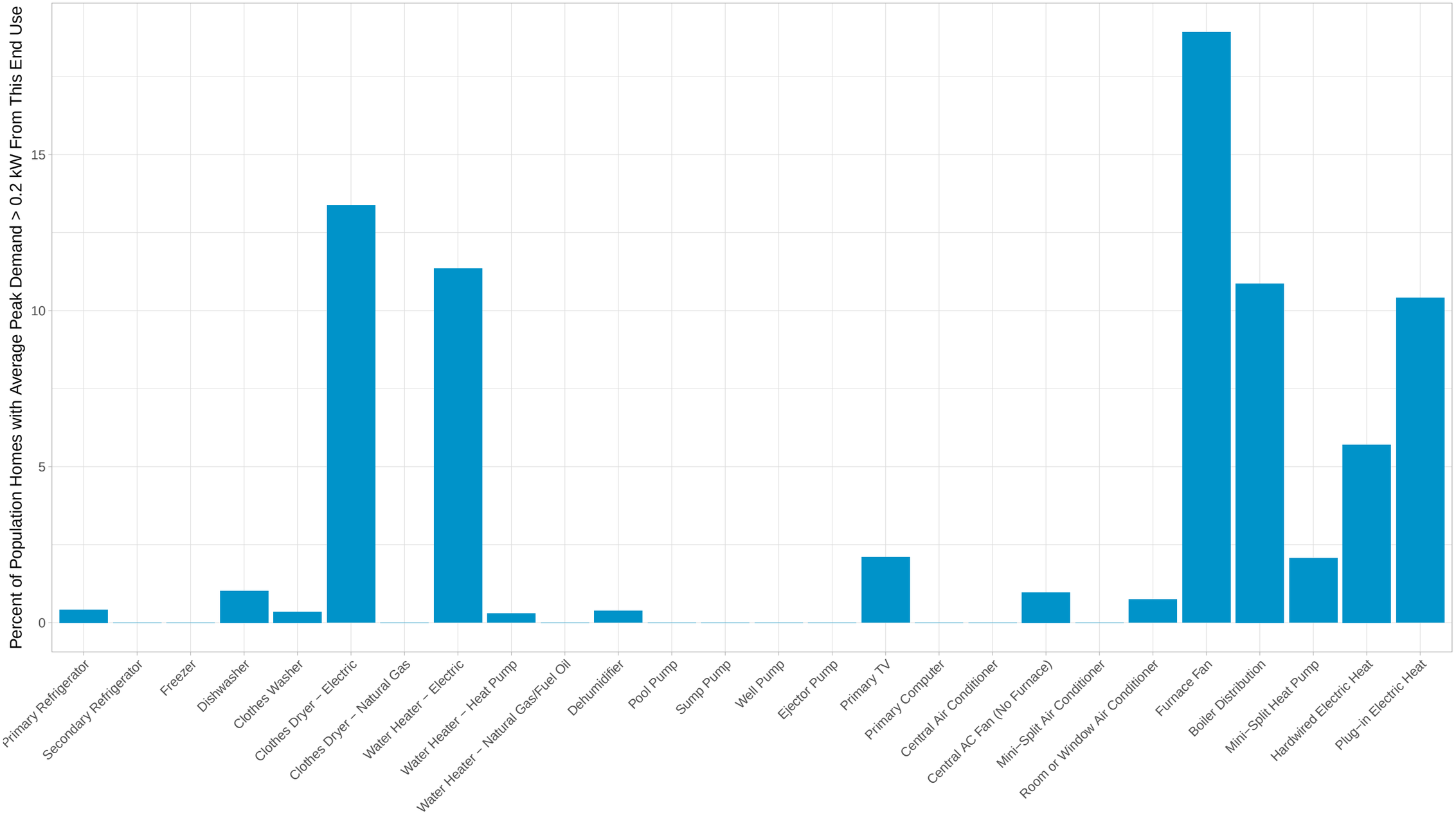
7.3 Percent of Homes (With End Use) with Average ISO-NE Winter Peak Demand > 0.2 kW by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

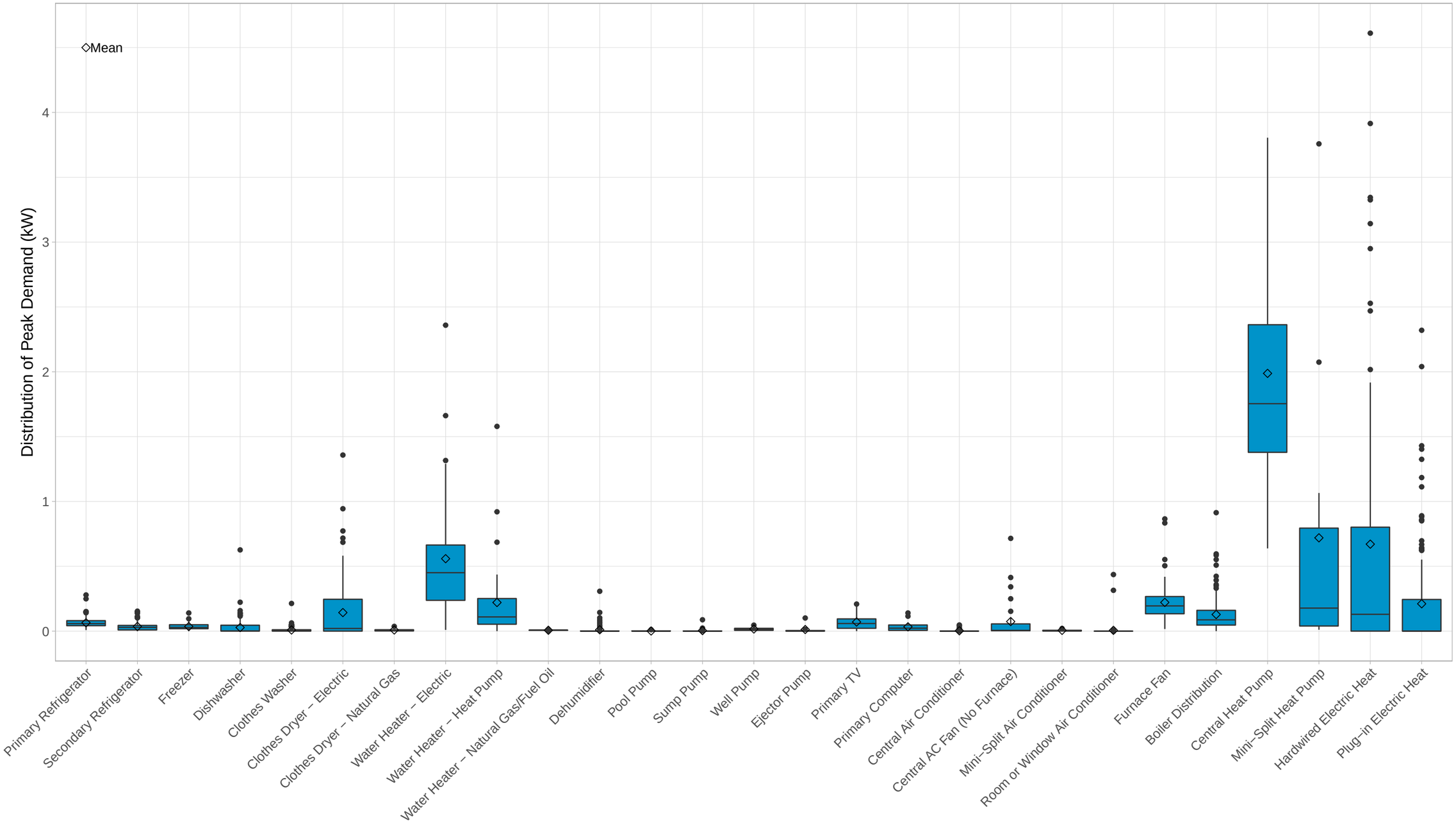
7.4 Percent of Population Homes with Average ISO-NE Winter Peak Demand > 0.2 kW by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

7.5 Distribution of Residential Winter Peak Demand by End Use for Homes With End Use

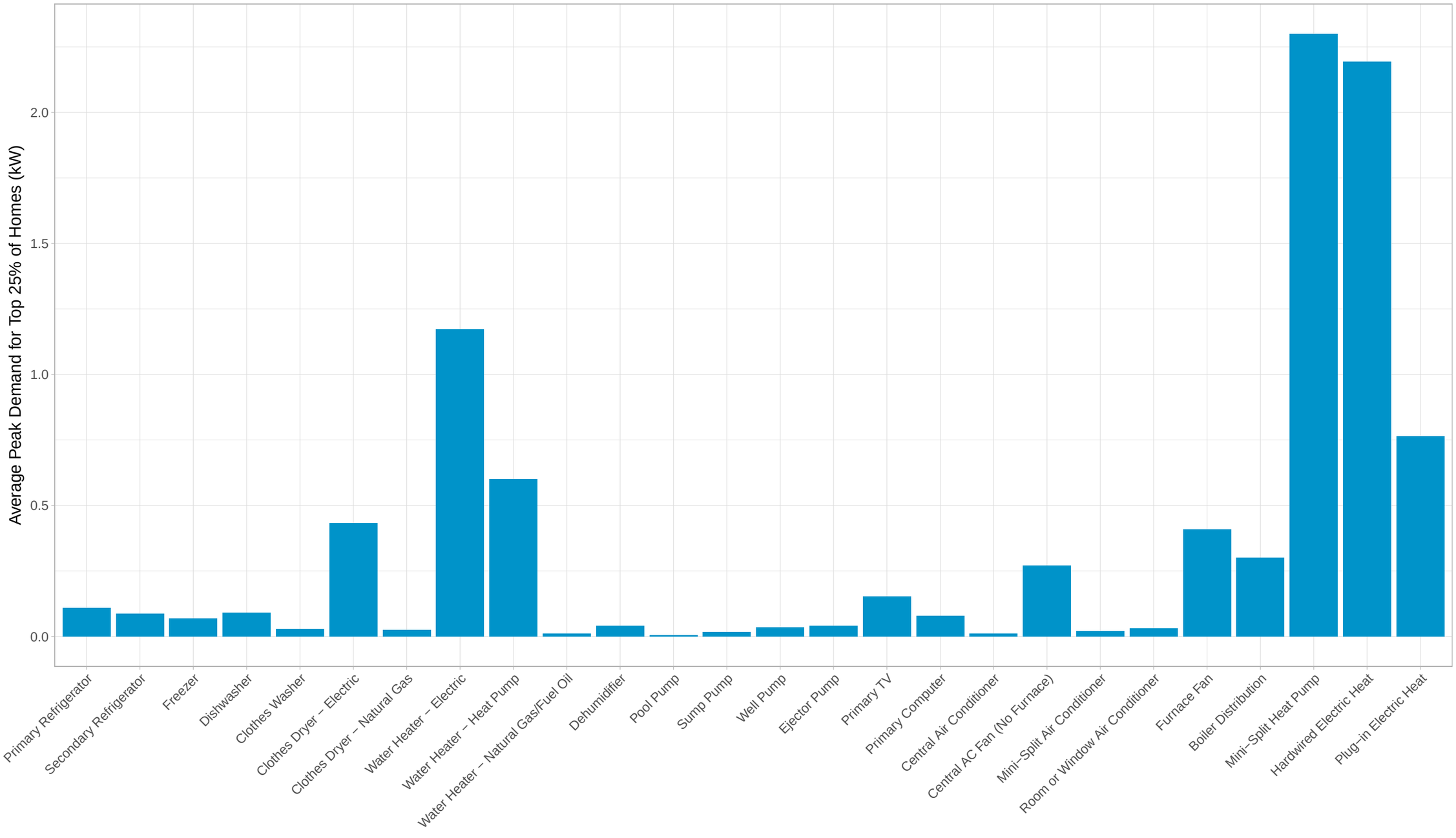


Source: Navigant Analysis

Note: data displayed as a Tukey boxplot - whiskers represent the highest/lowest datum within 1.5 * IQR

©2018 Navigant Consulting, Inc. All Rights Reserved

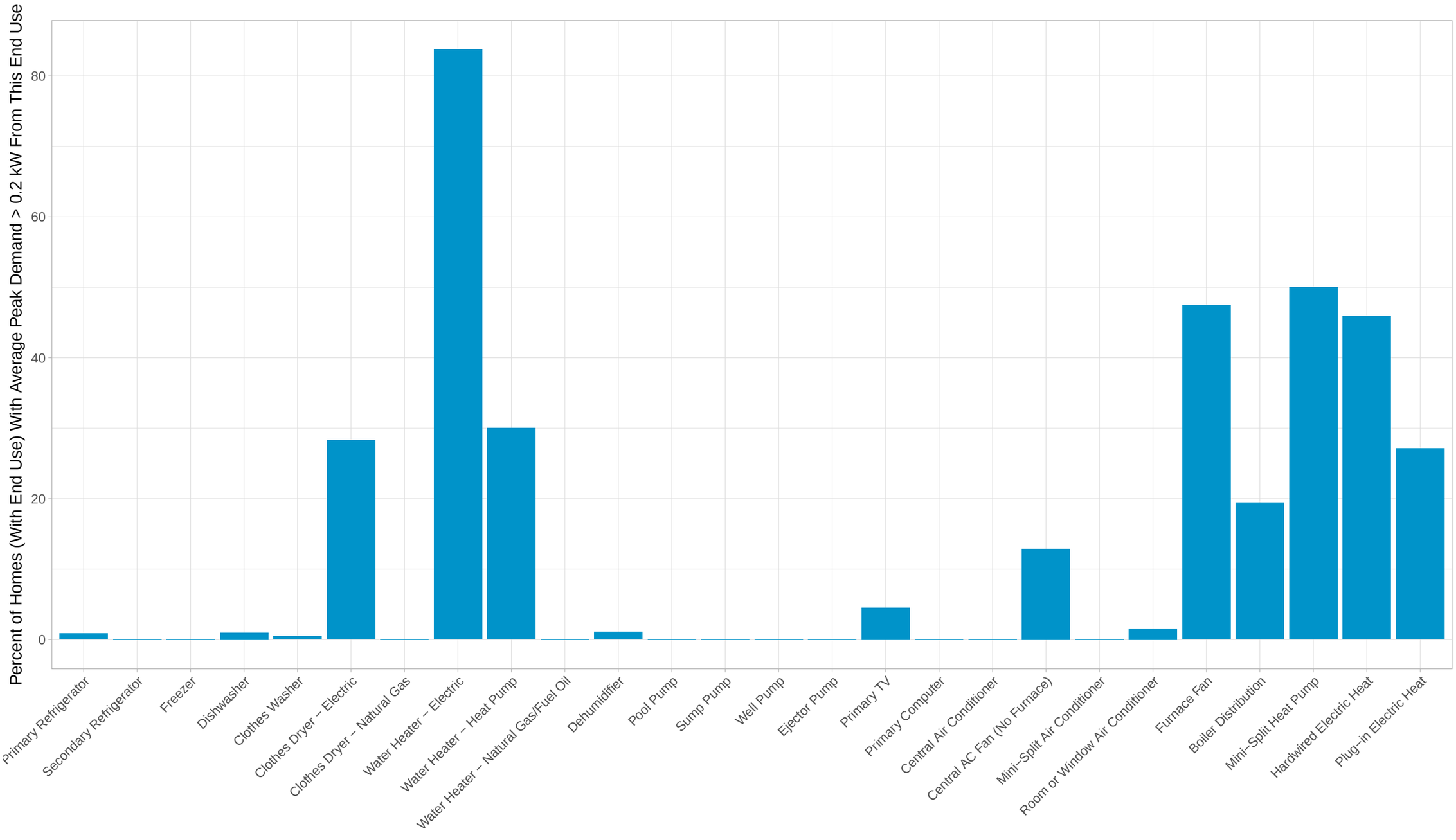
7.6 Average Residential Winter Peak Demand by End Use for Top 25% of Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

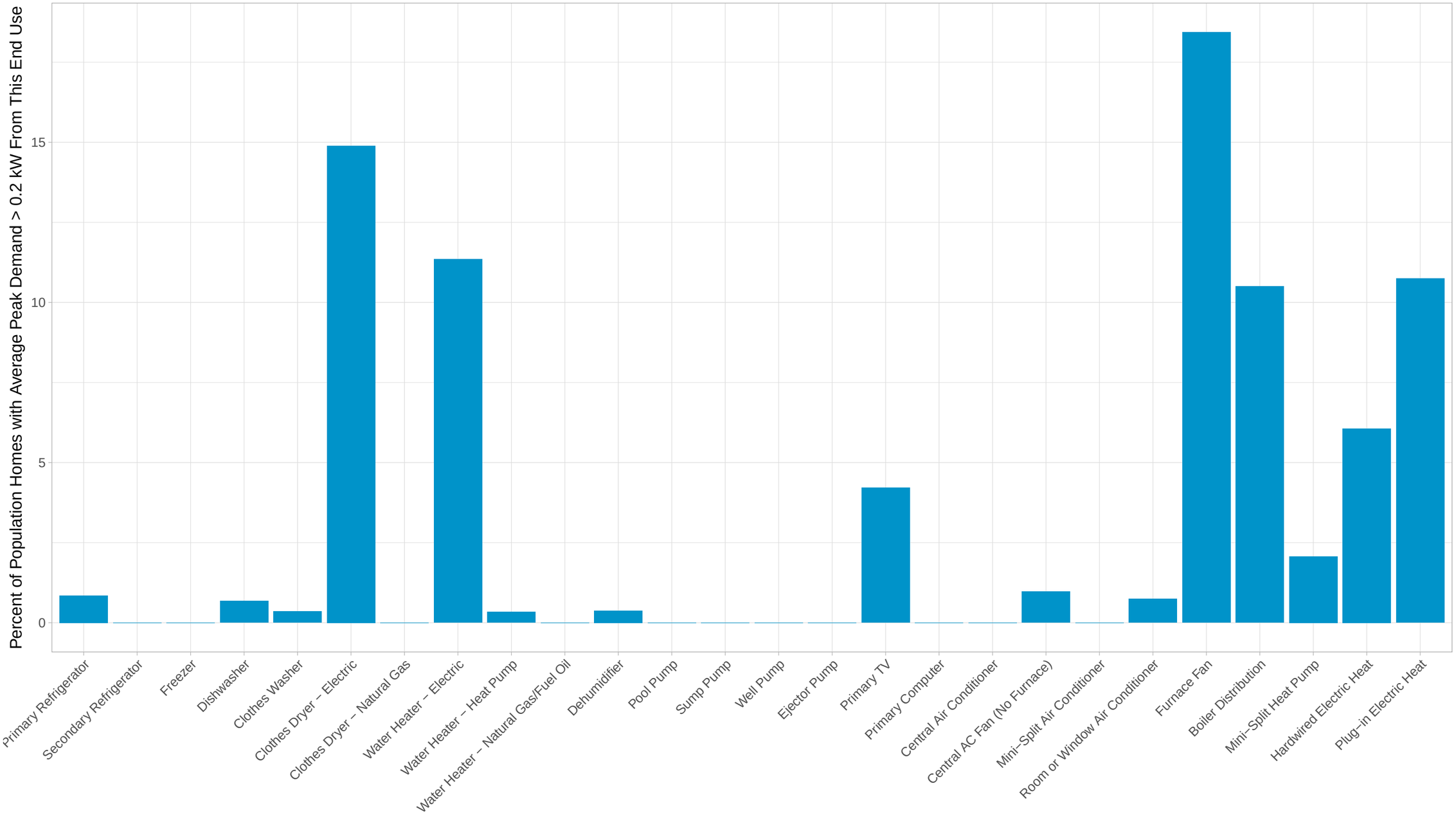
7.7 Percent of Homes (With End Use) with Average Residential Winter Peak Demand > 0.2 kW by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

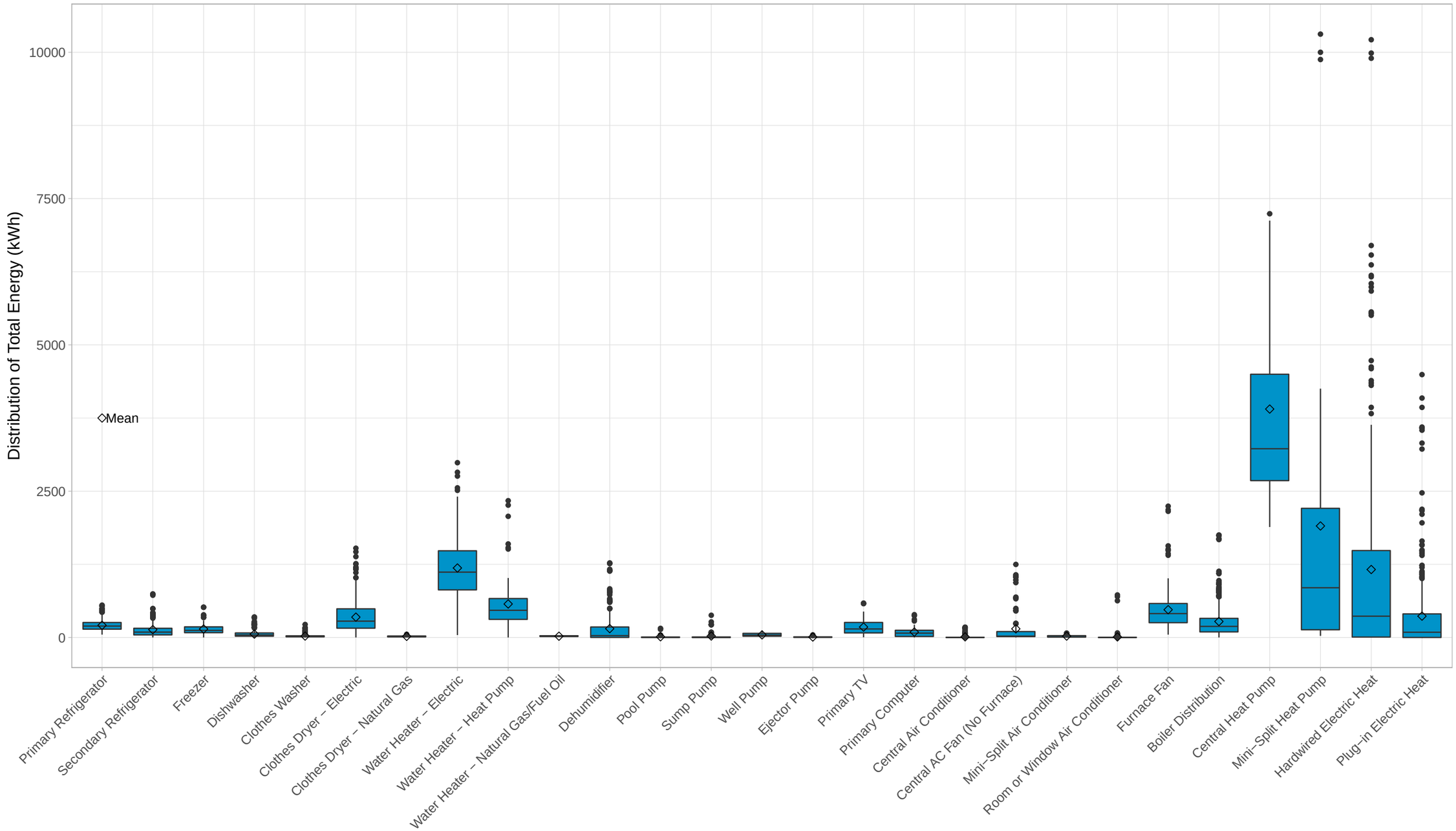
7.8 Percent of Population Homes with Average Residential Winter Peak Demand > 0.2 kW by End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

7.9 Distribution of Winter Energy Consumption by End Use for Homes With End Use

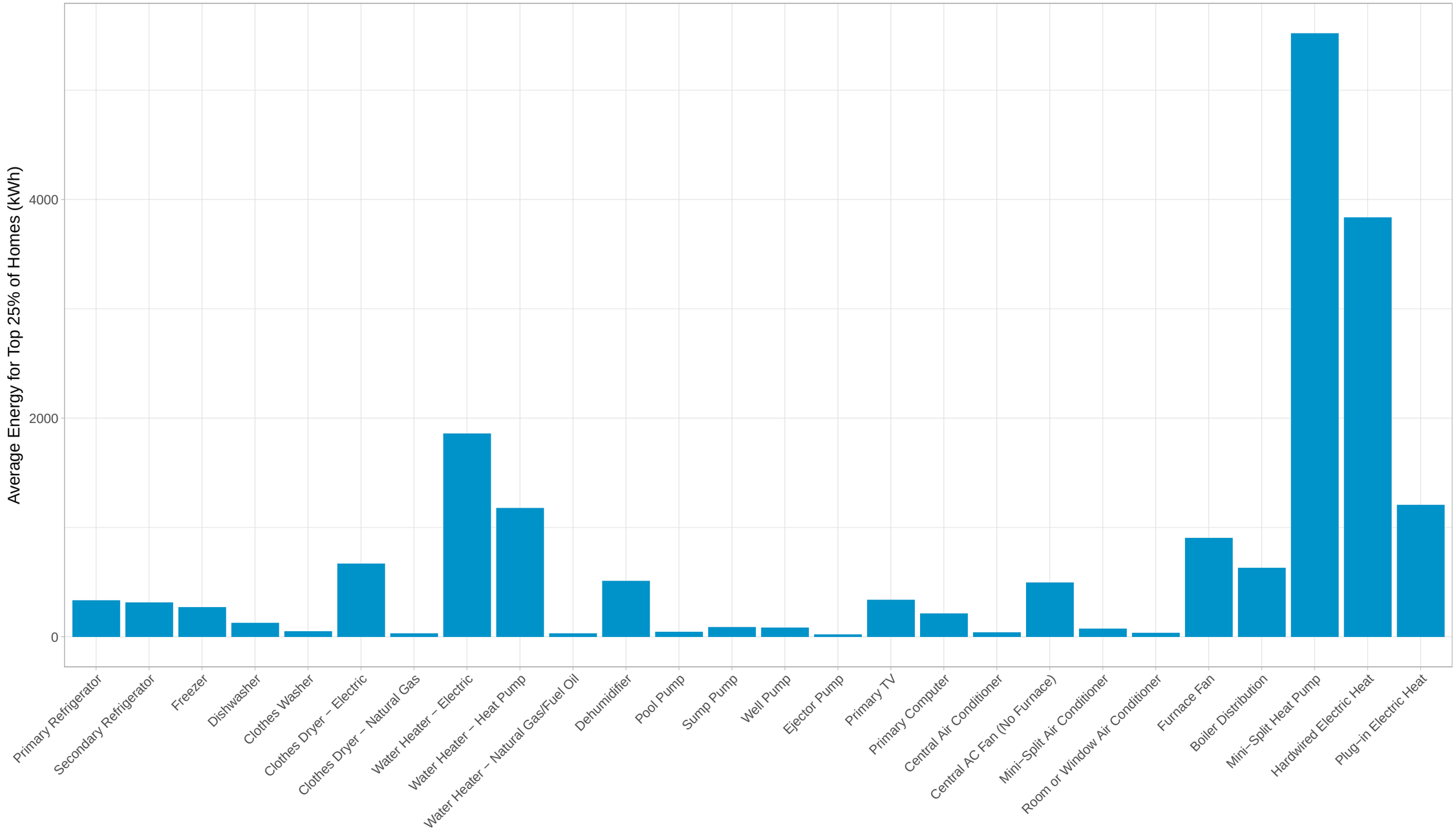


Source: Navigant Analysis

Note: data displayed as a Tukey boxplot - whiskers represent the highest/lowest datum within 1.5 * IQR

©2018 Navigant Consulting, Inc. All Rights Reserved

7.10 Average Winter Energy Consumption by End Use for Top 25% of Homes With End Use

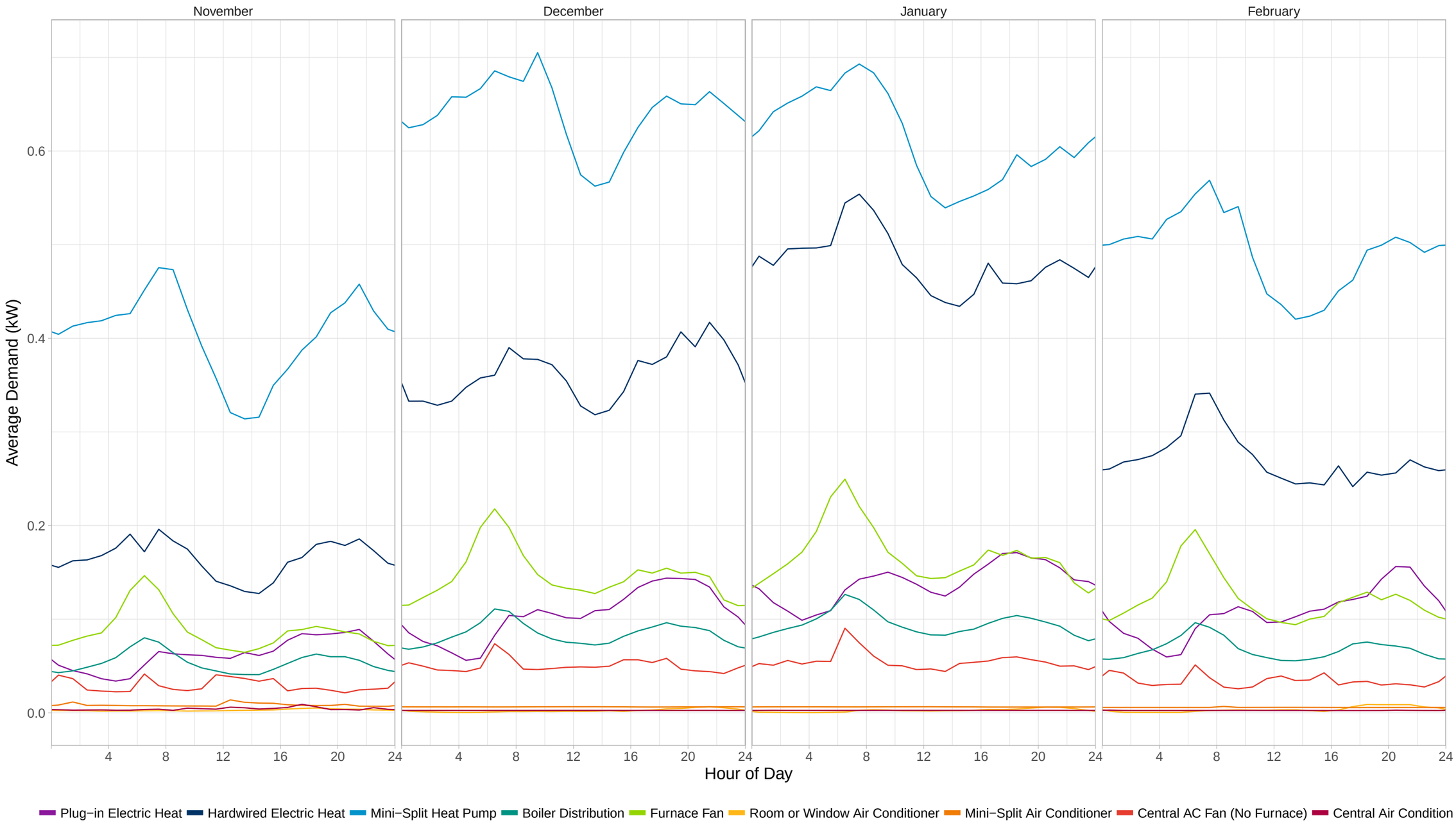


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

8 Monthly Load Shapes by End Use Category

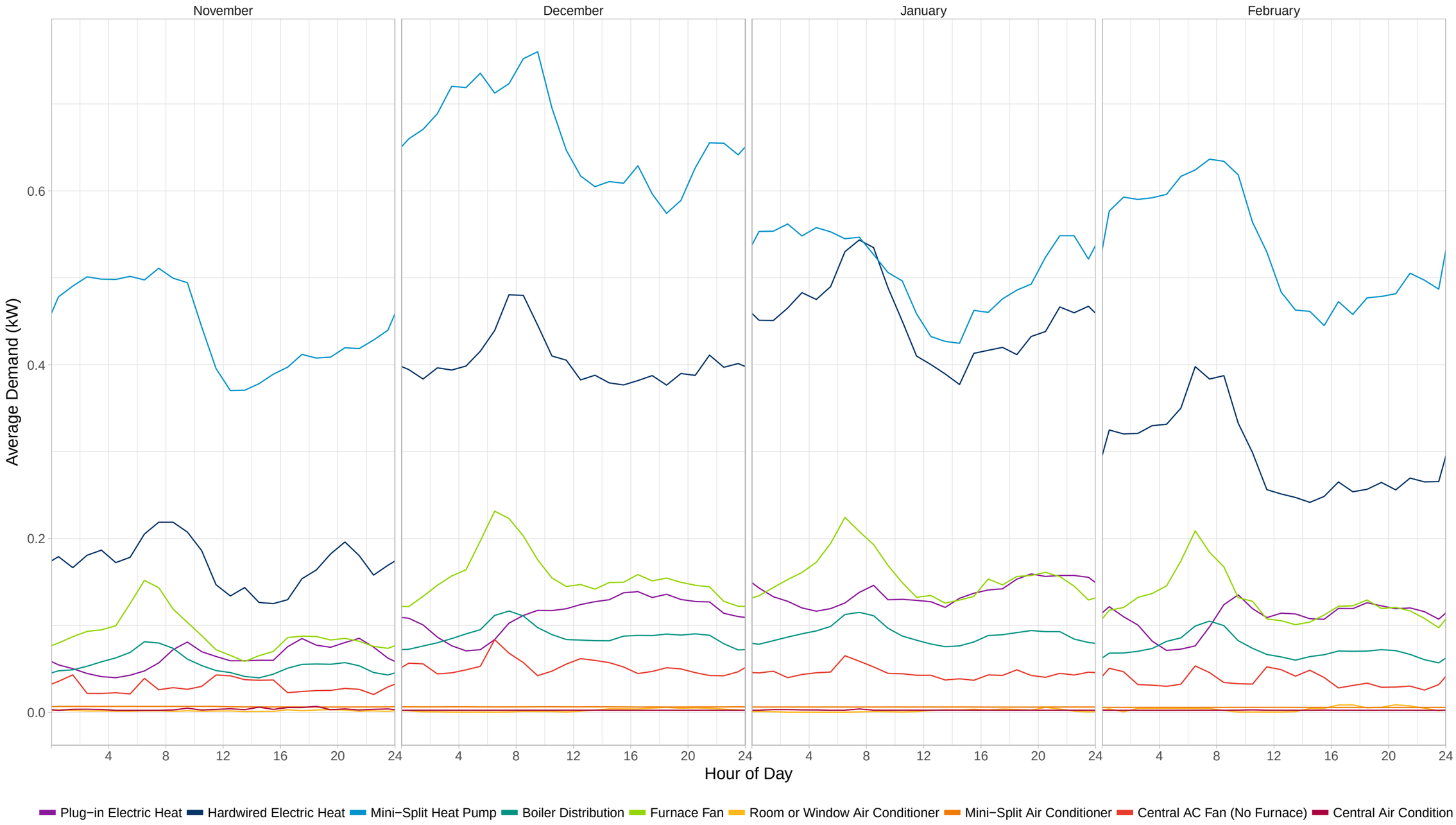
8.1 Monthly Weekday HVAC Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

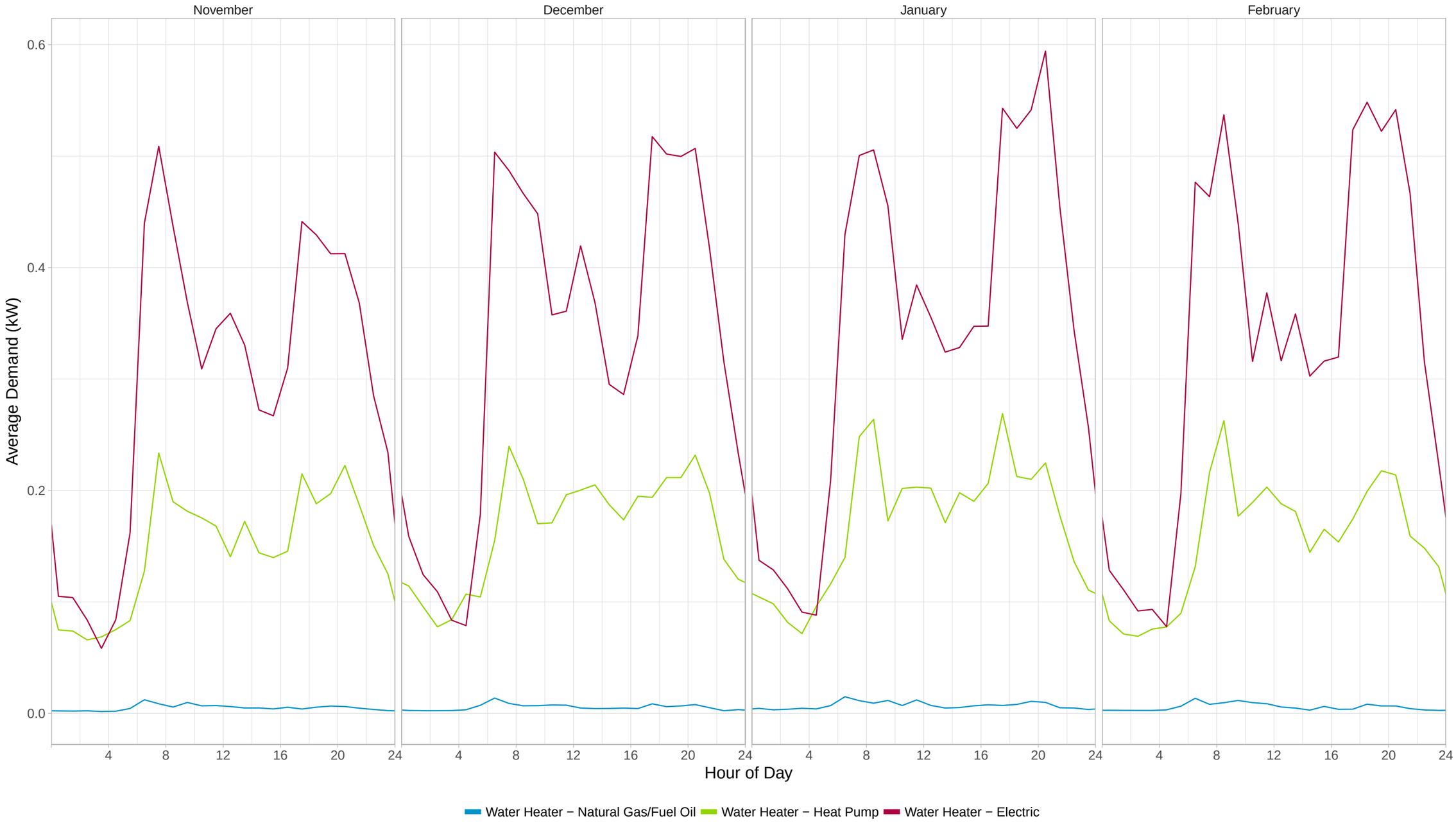
8.2 Monthly Weekend HVAC Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

8.3 Monthly Weekday Water Heating Load Shapes for Homes With End Use



Source: Navigant Analysis

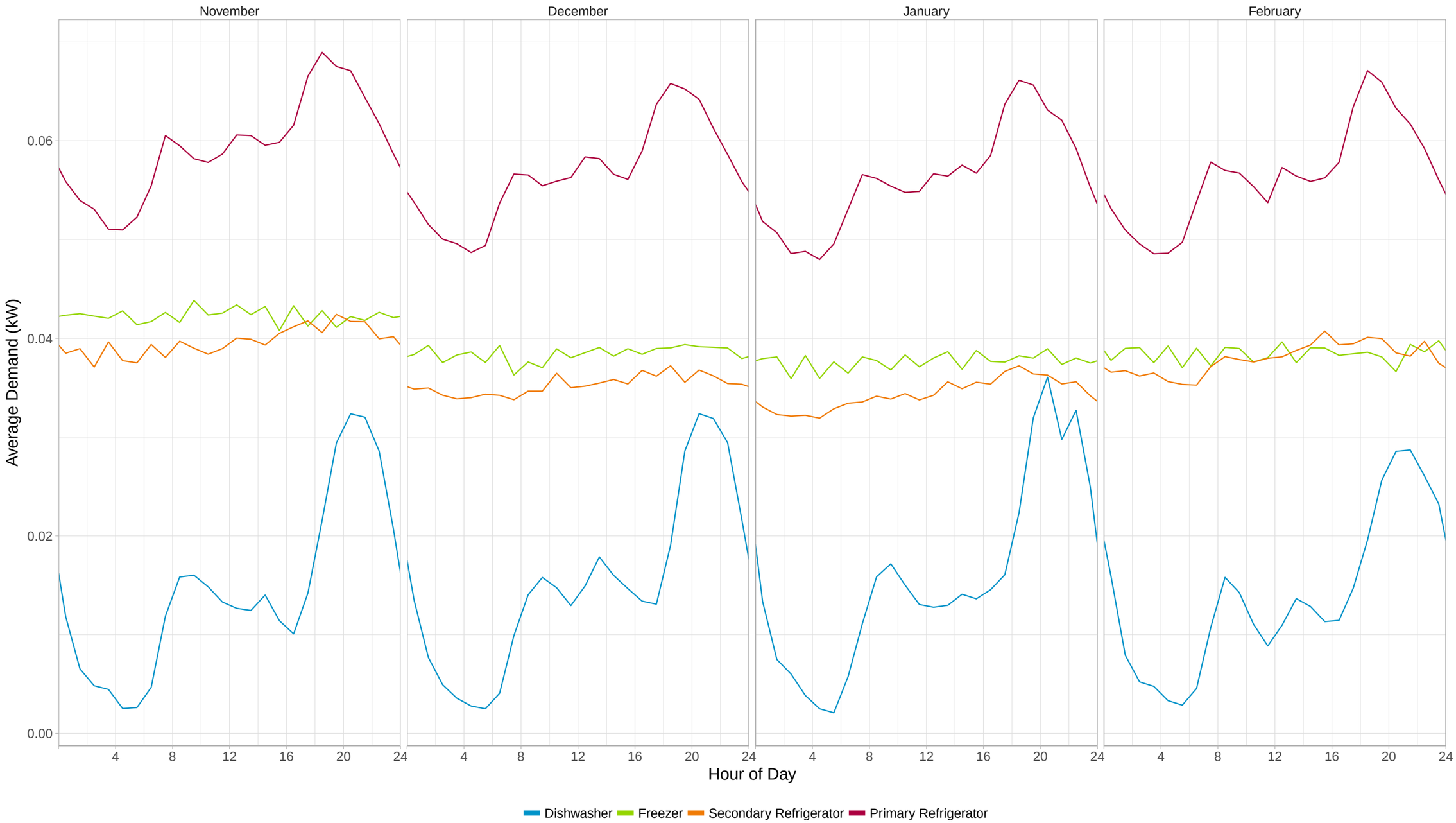
©2018 Navigant Consulting, Inc. All Rights Reserved

8.4 Monthly Weekend Water Heating Load Shapes for Homes With End Use

Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

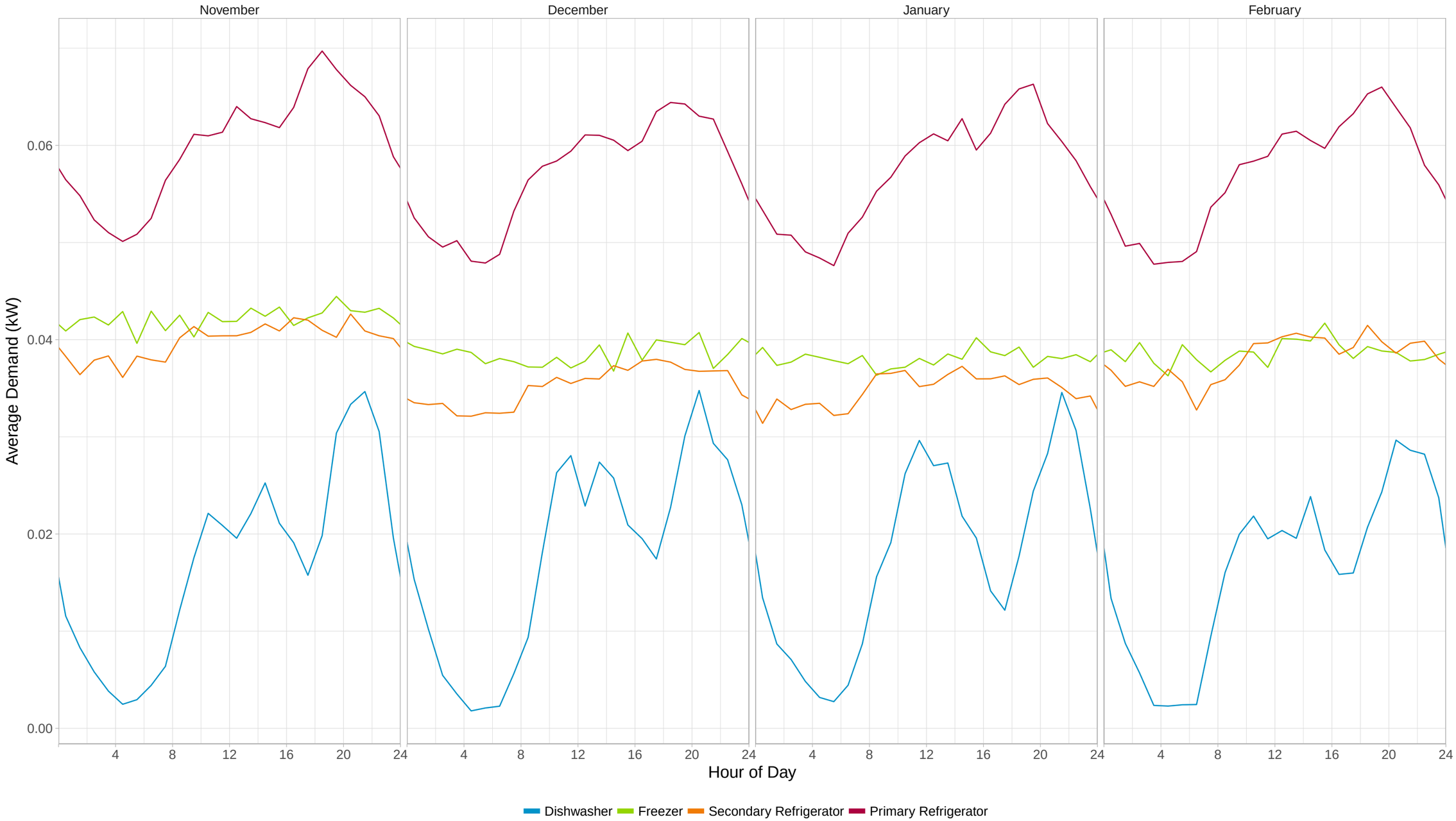
8.5 Monthly Weekday Kitchen Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

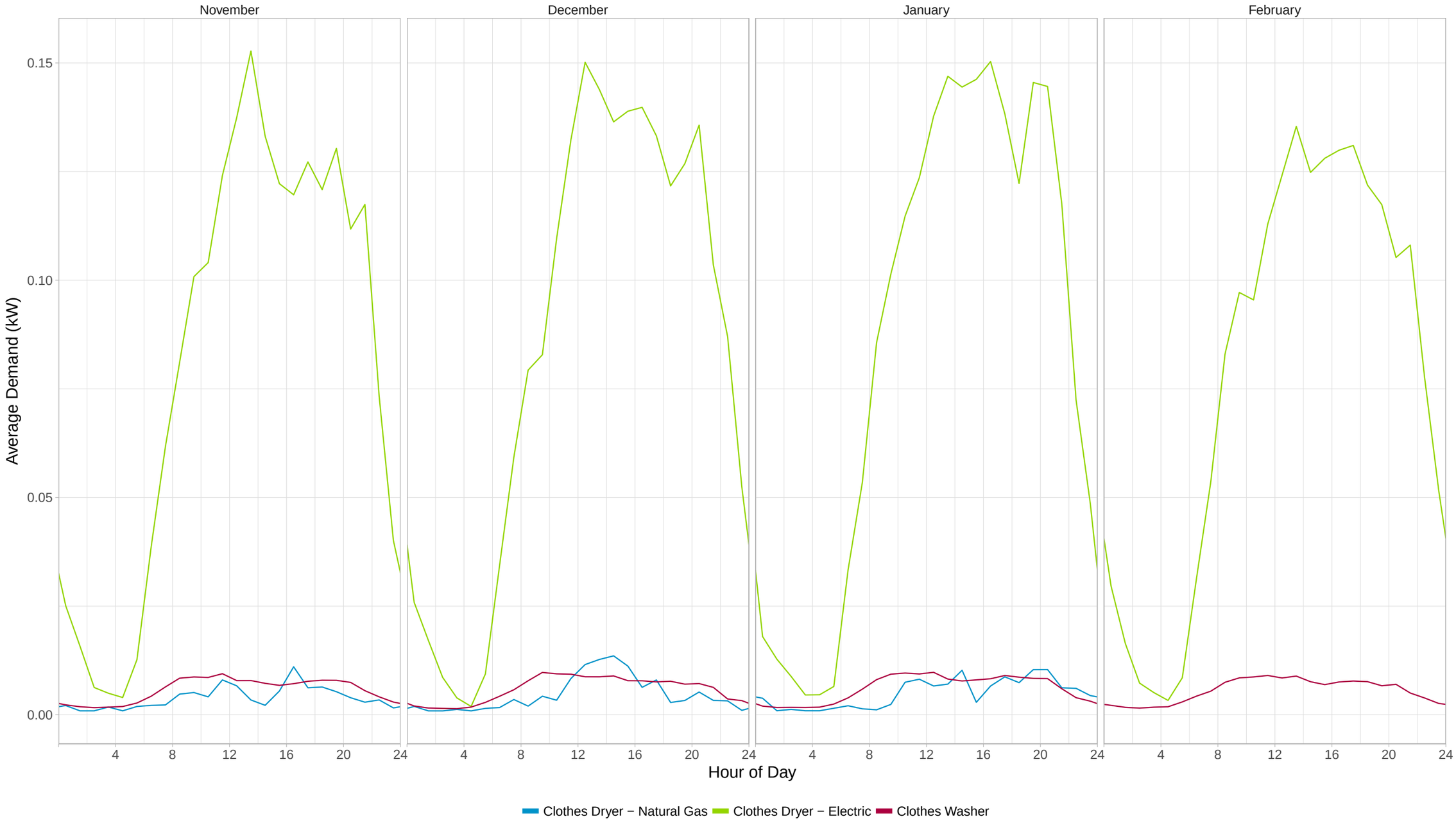
8.6 Monthly Weekend Kitchen Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

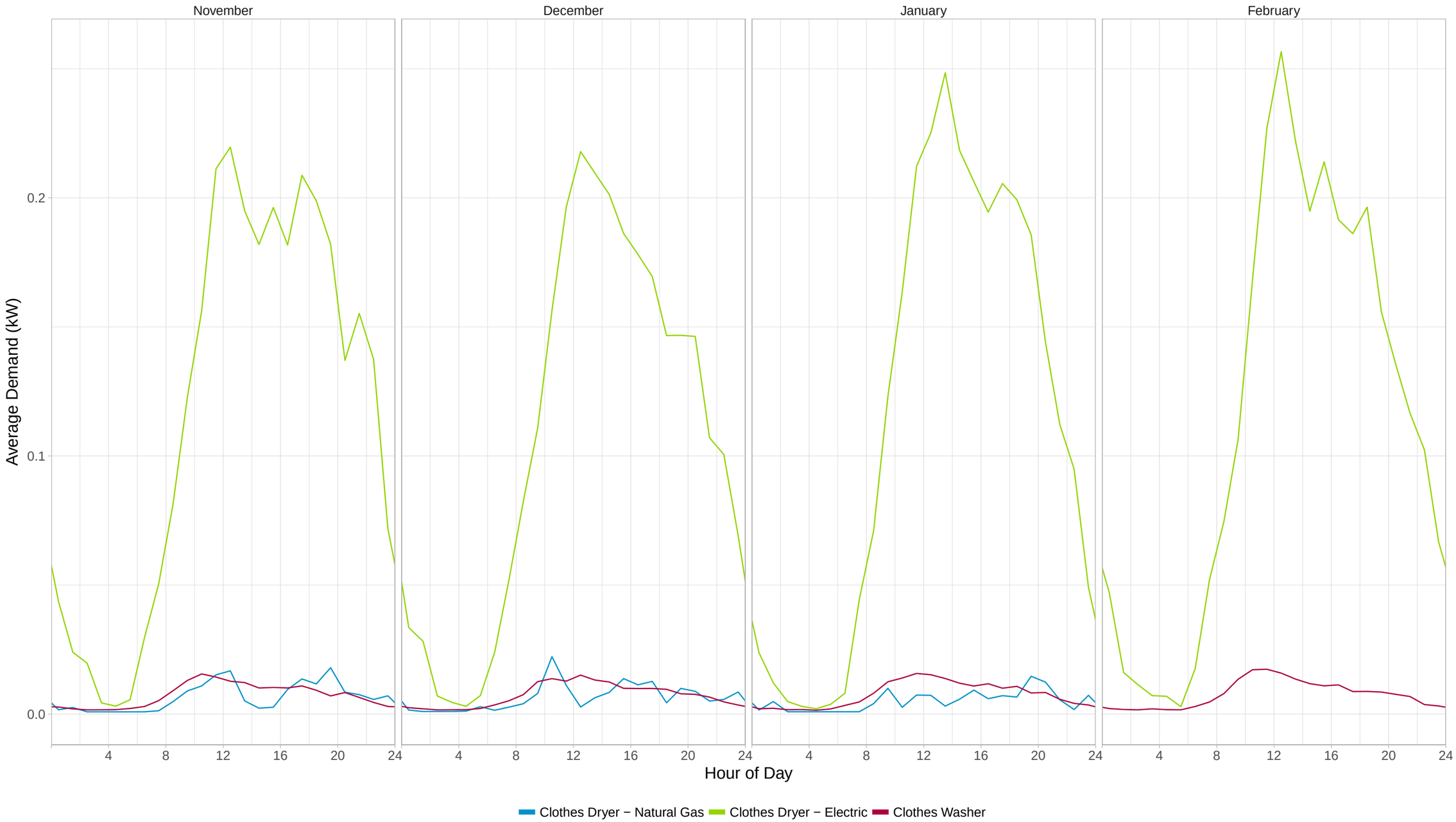
8.7 Monthly Weekday Laundry Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

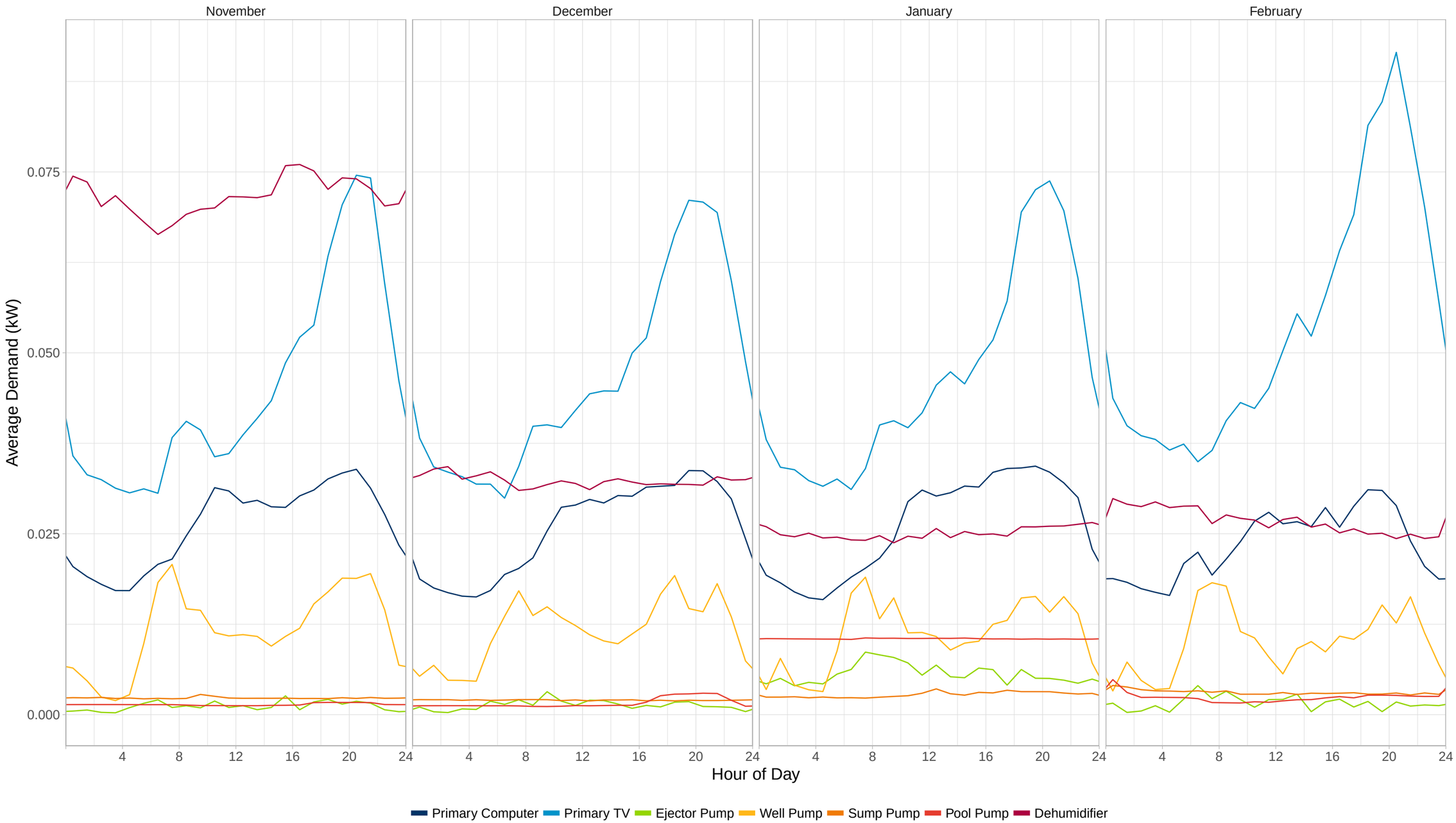
8.8 Monthly Weekend Laundry Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

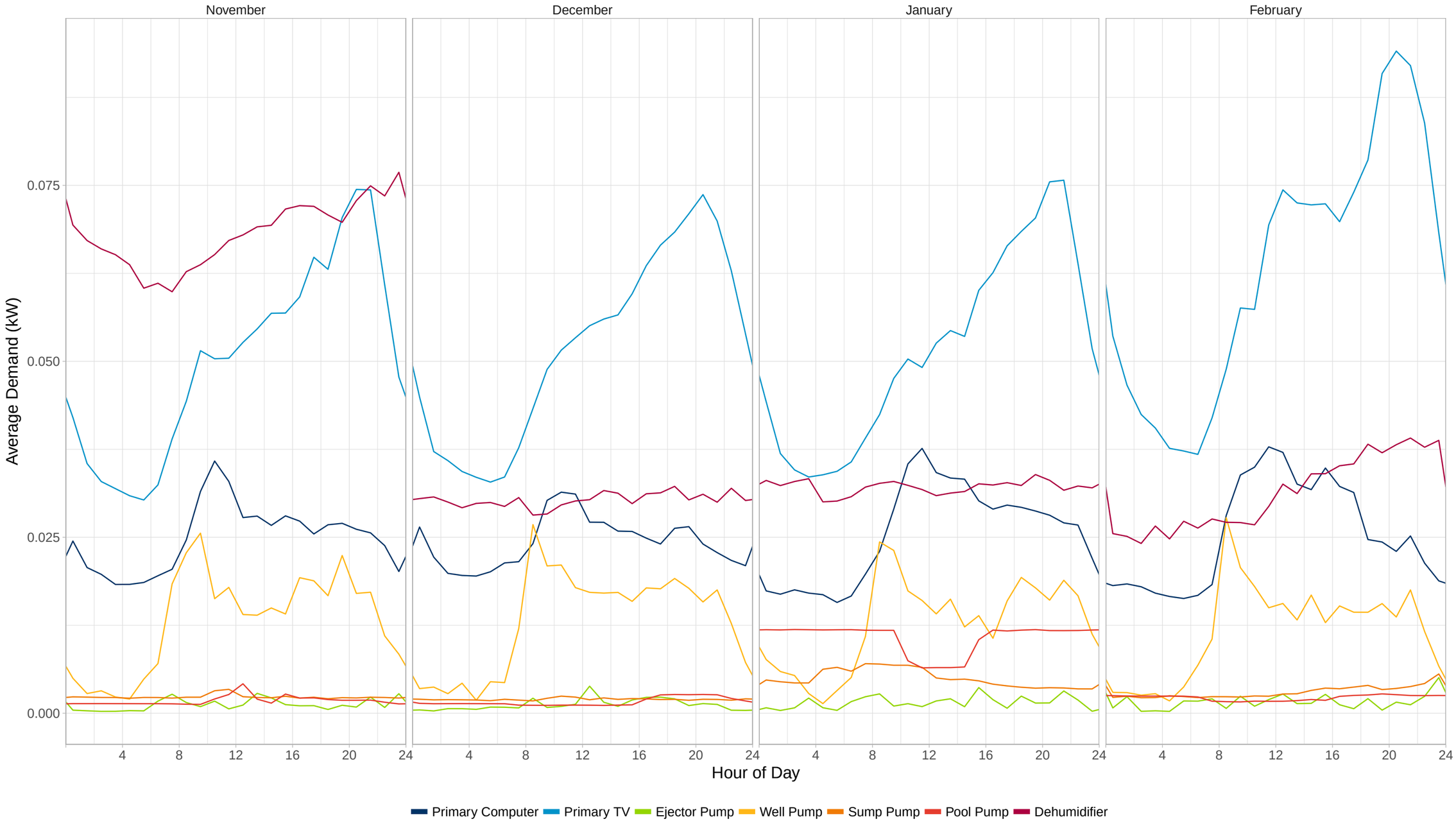
8.9 Monthly Weekday Miscellaneous Load Shapes for Homes With End Use



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

8.10 Monthly Weekend Miscellaneous Load Shapes for Homes With End Use



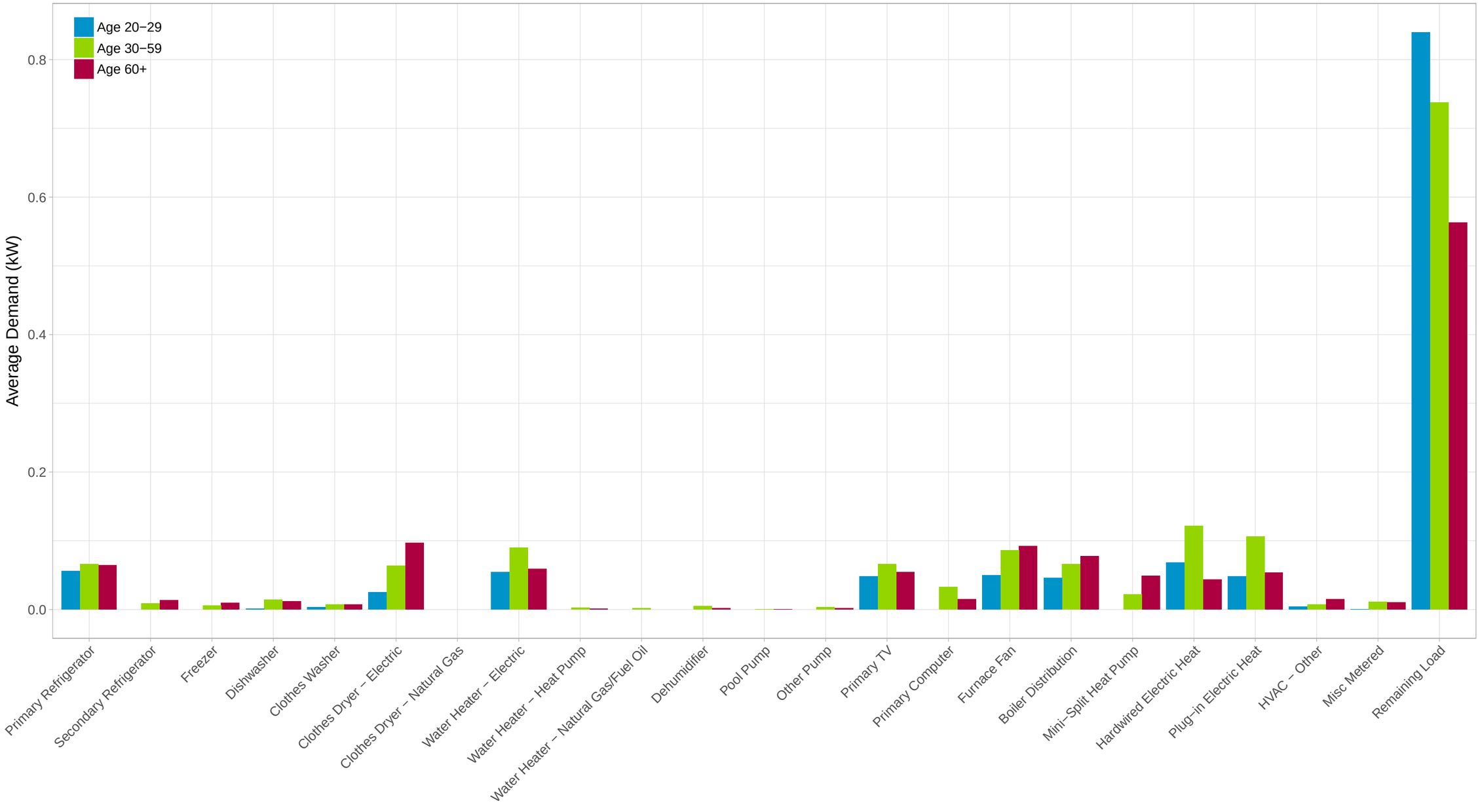
Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9 End Use Data Split by Demographic

9.1 Population ISO-NE Winter Peak Demand

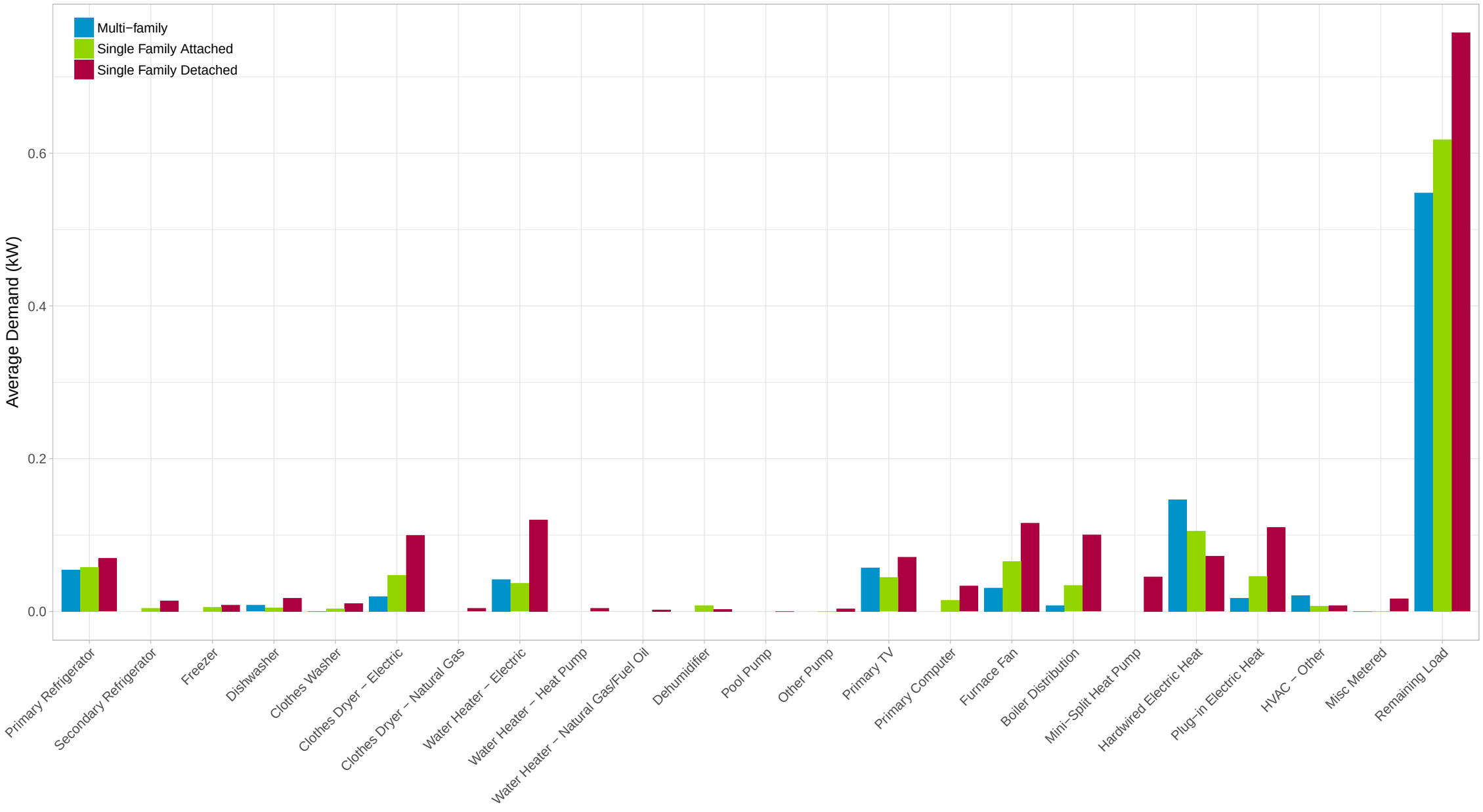
9.1.1 Population Average ISO-NE Winter Peak Demand by End Use and Age



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

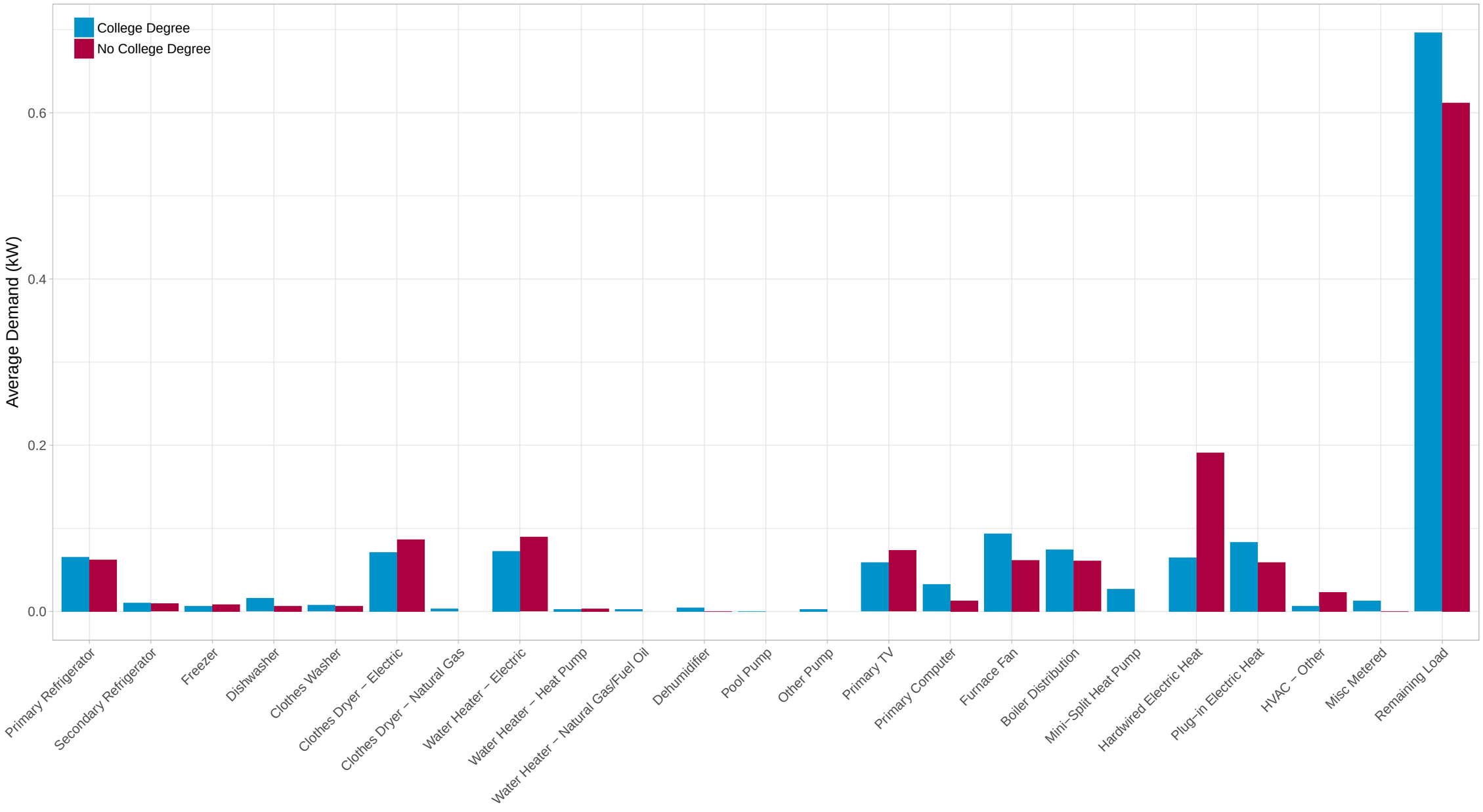
9.1.2 Population Average ISO-NE Winter Peak Demand by End Use and Building Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

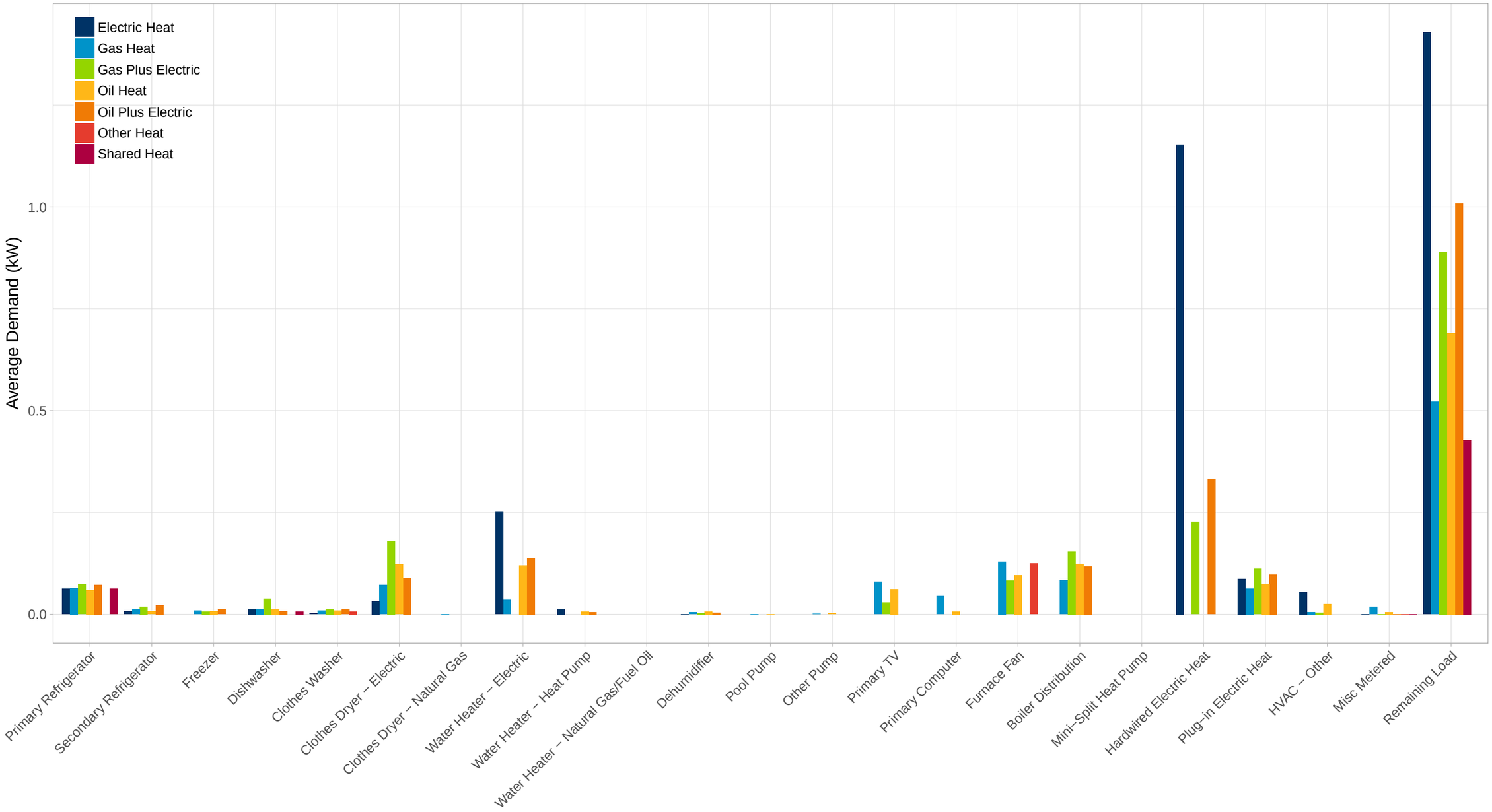
9.1.3 Population Average ISO-NE Winter Peak Demand by End Use and Education Level



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

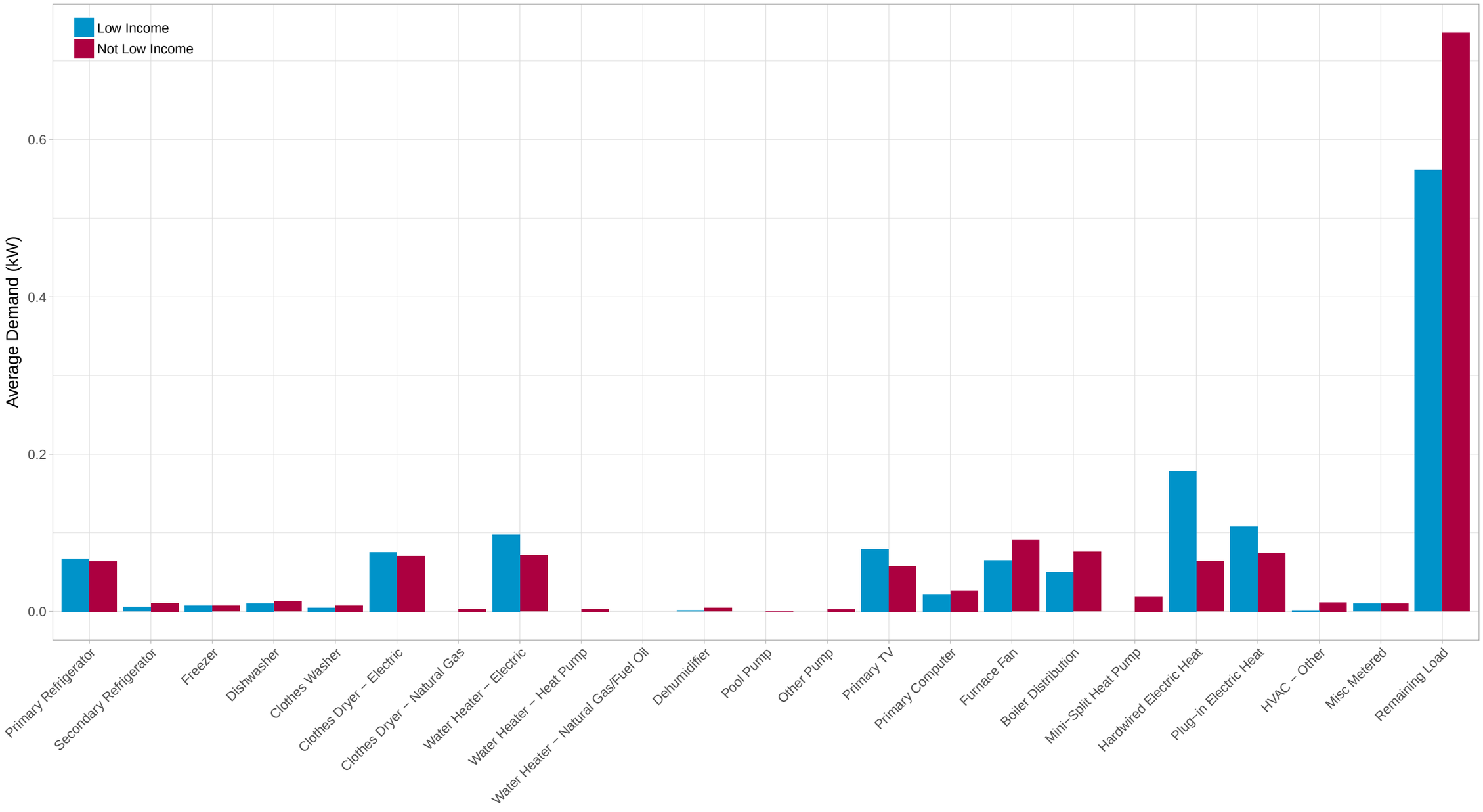
9.1.4 Population Average ISO-NE Winter Peak Demand by End Use and Heating Fuel



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

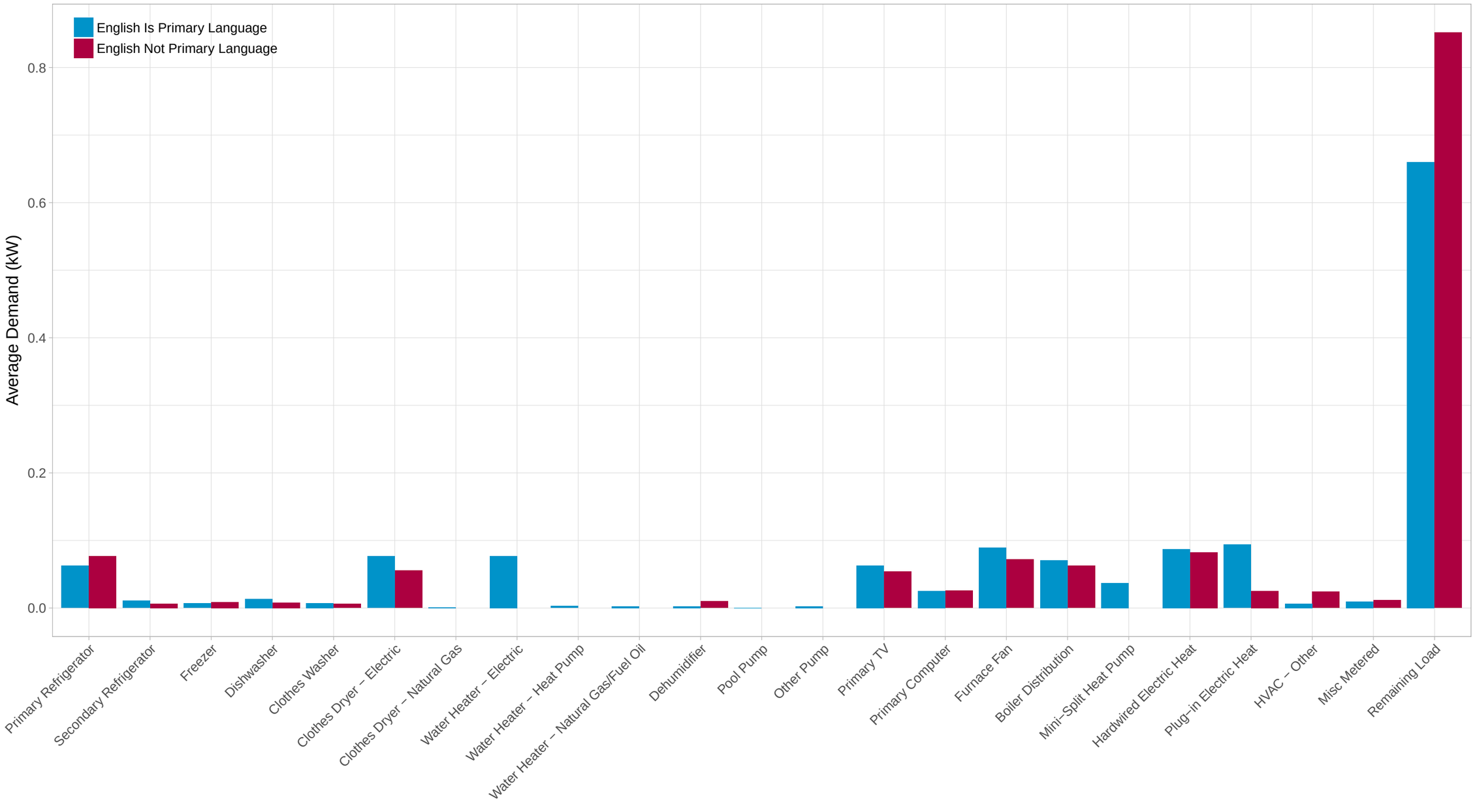
9.1.5 Population Average ISO-NE Winter Peak Demand by End Use and Income



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

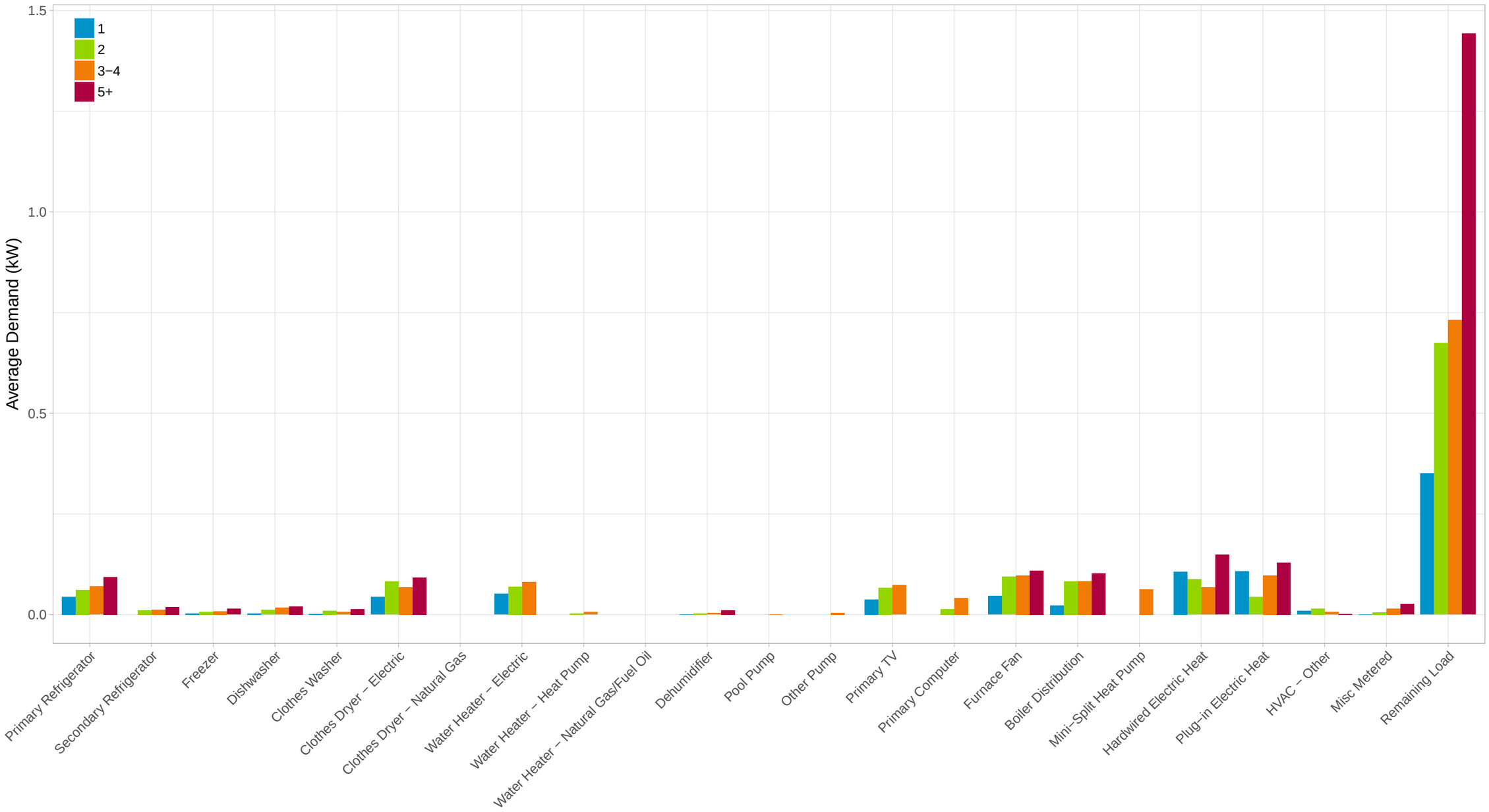
9.1.6 Population Average ISO-NE Winter Peak Demand by End Use and Language



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

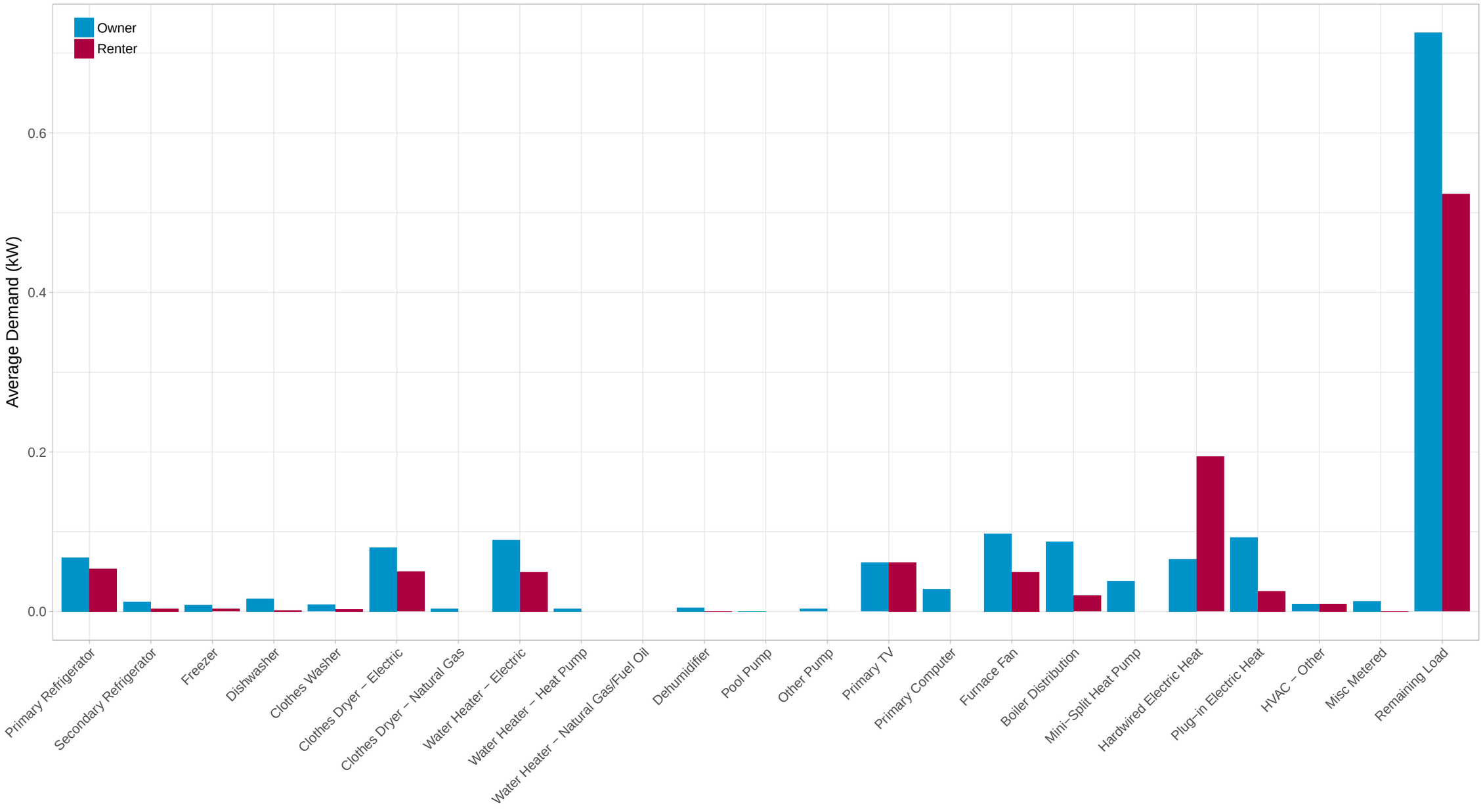
9.1.7 Population Average ISO-NE Winter Peak Demand by End Use and Number of Occupants



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

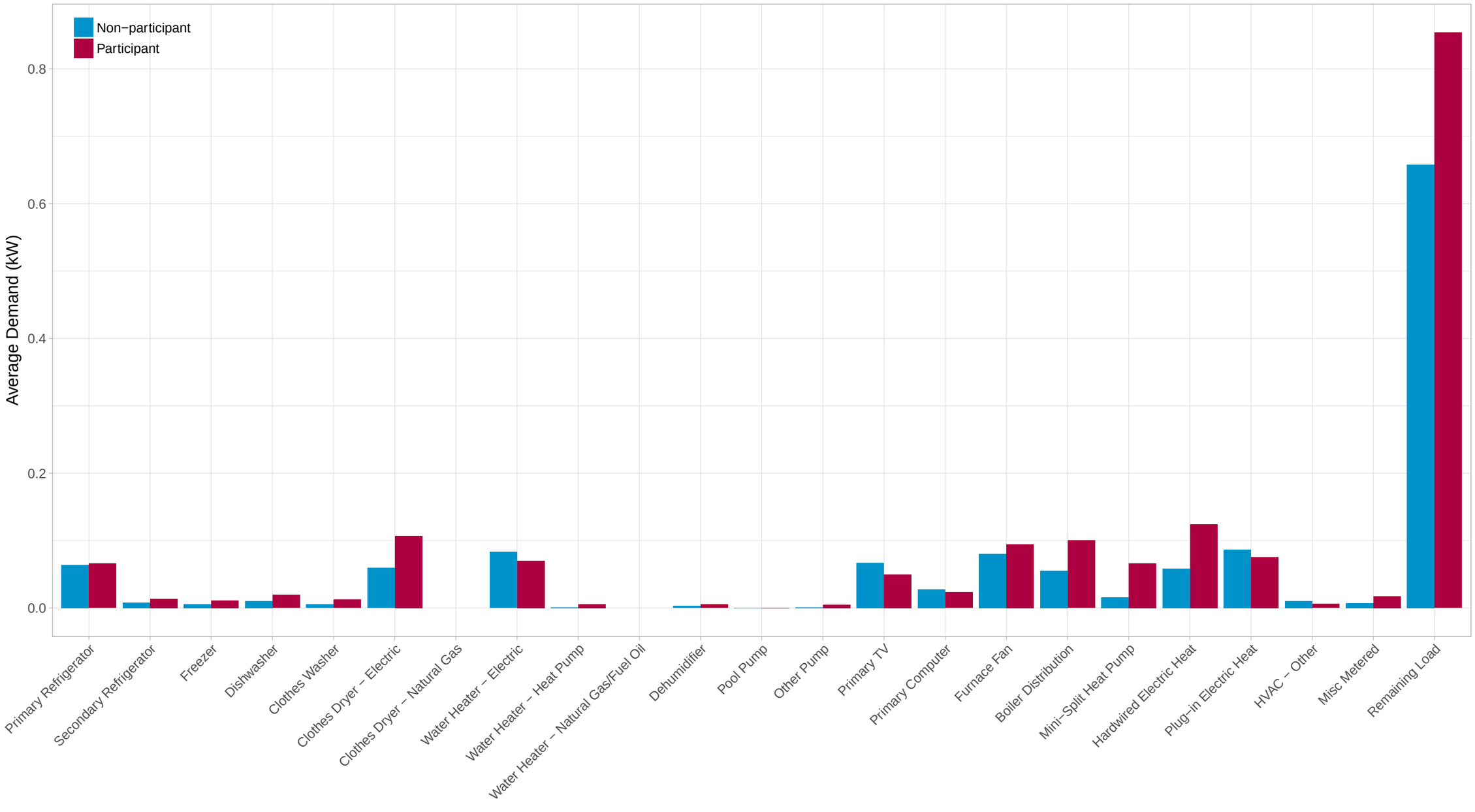
9.1.8 Population Average ISO-NE Winter Peak Demand by End Use and Occupancy Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

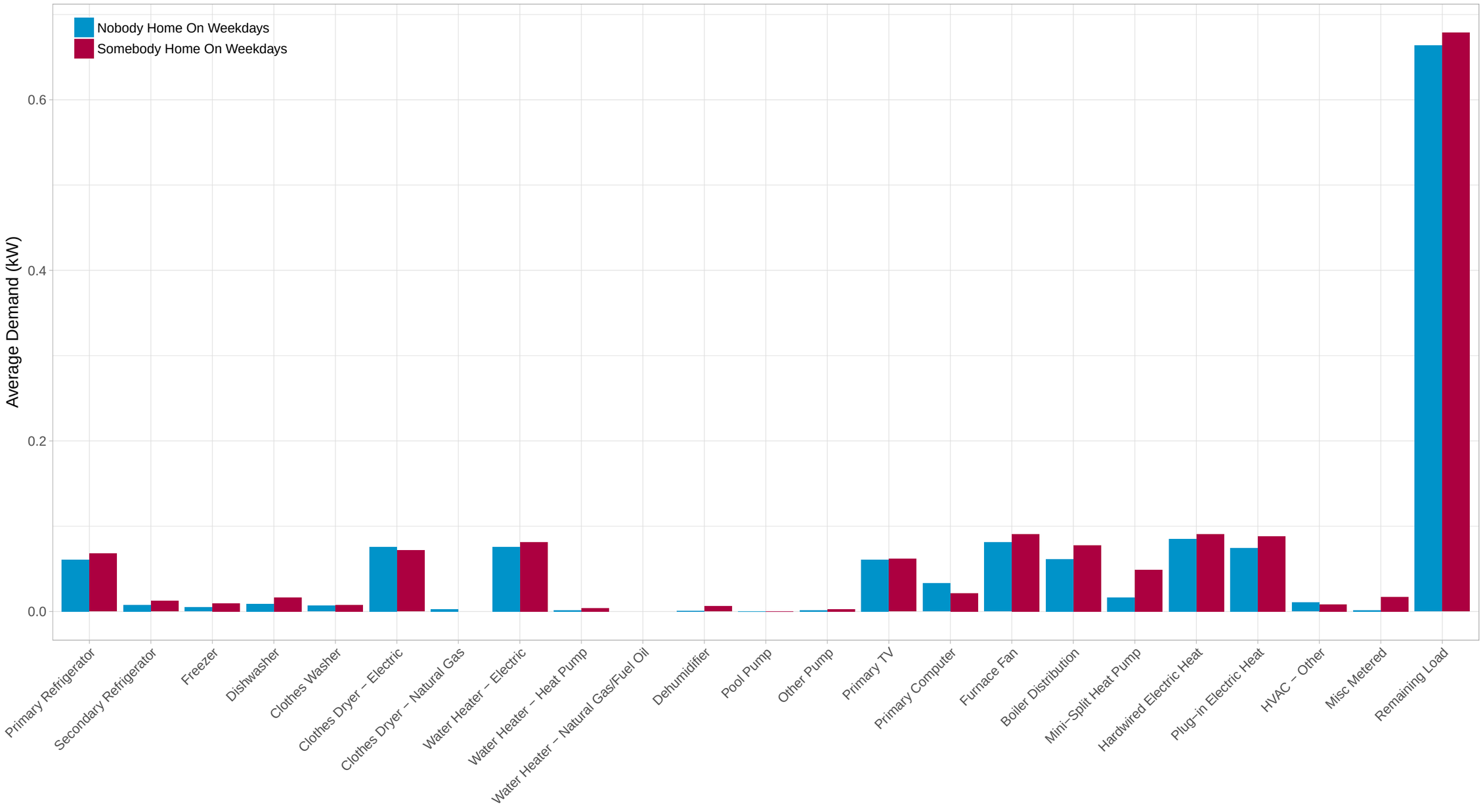
9.1.9 Population Average ISO-NE Winter Peak Demand by End Use and Program Participation



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.1.10 Population Average ISO-NE Winter Peak Demand by End Use and Weekday Occupancy

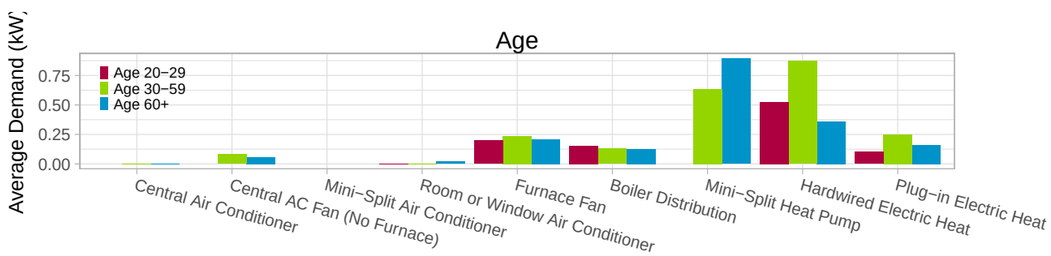


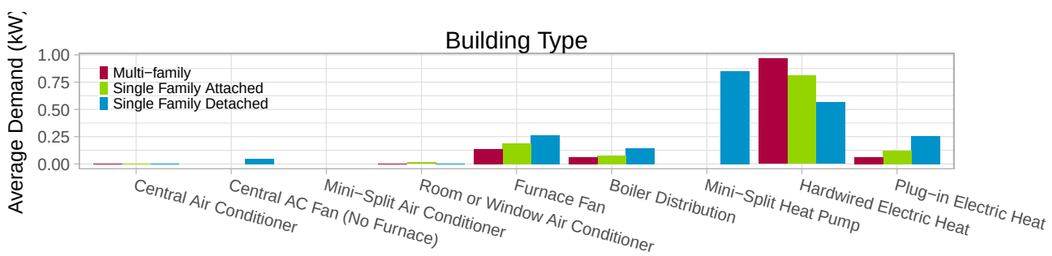
Source: Navigant Analysis

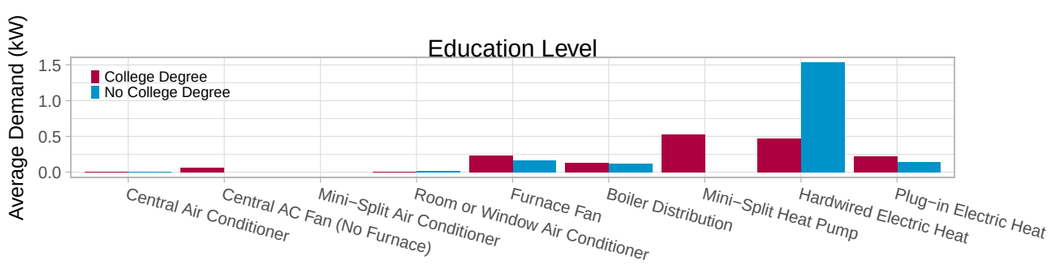
©2018 Navigant Consulting, Inc. All Rights Reserved

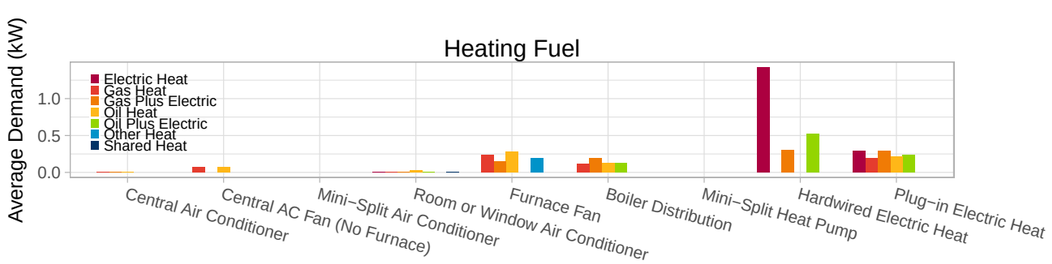
9.2 ISO-NE Winter Peak Demand for Homes With End Use

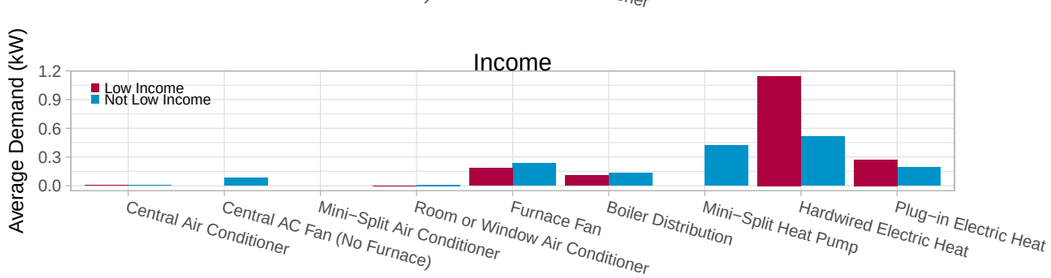
9.2.1 Average ISO-NE Winter Peak HVAC Demand by End Use and Demographic for Homes With End Use

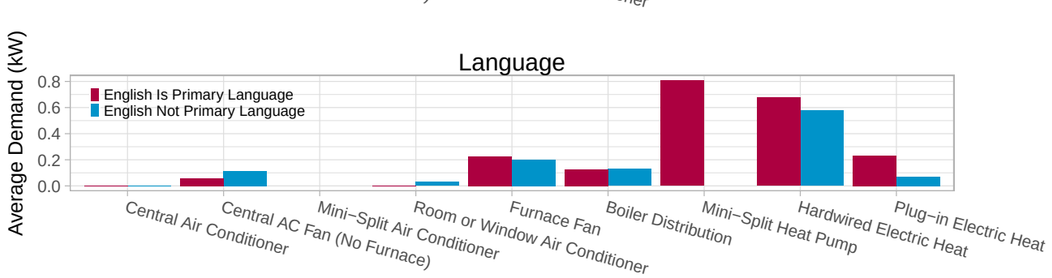


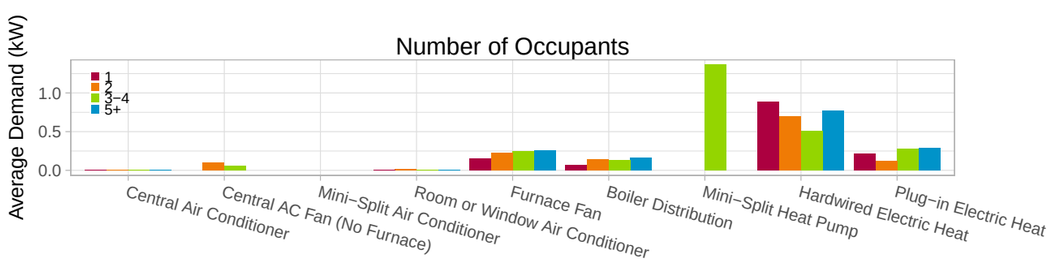


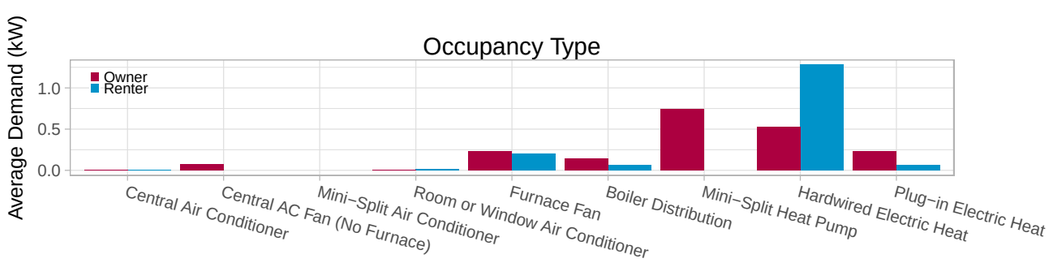


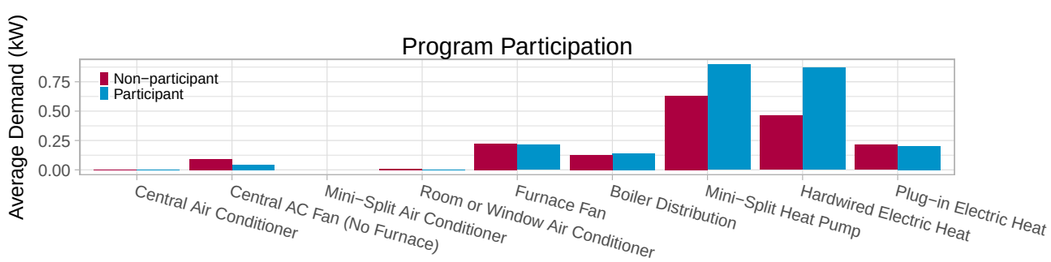


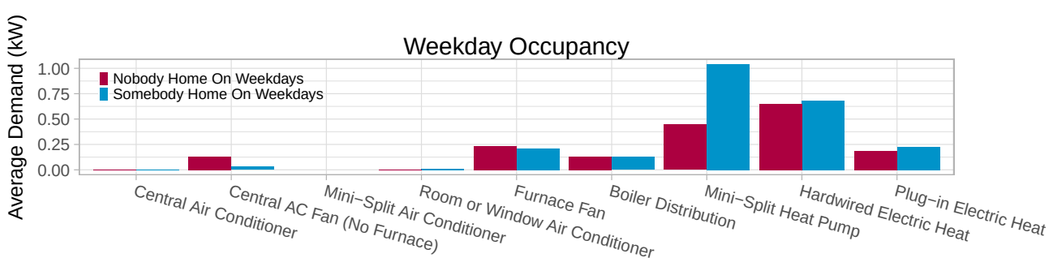








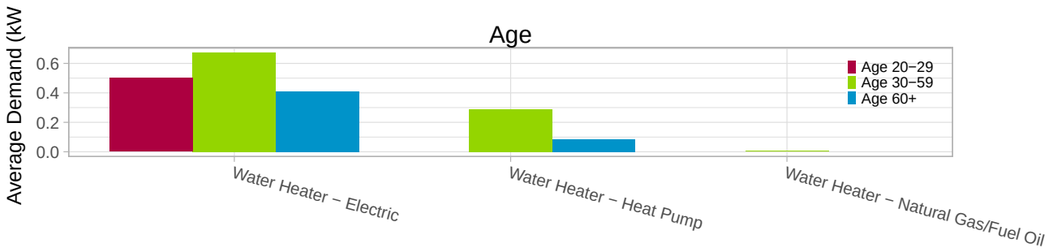


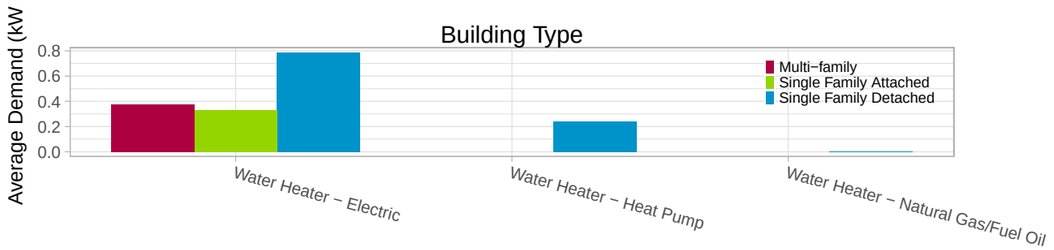


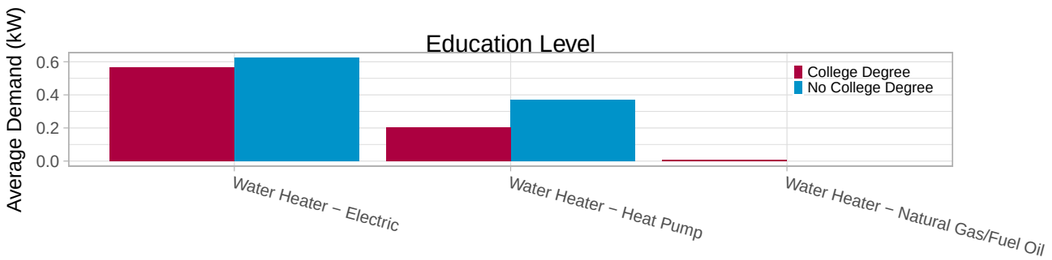
Source: Navigant Analysis

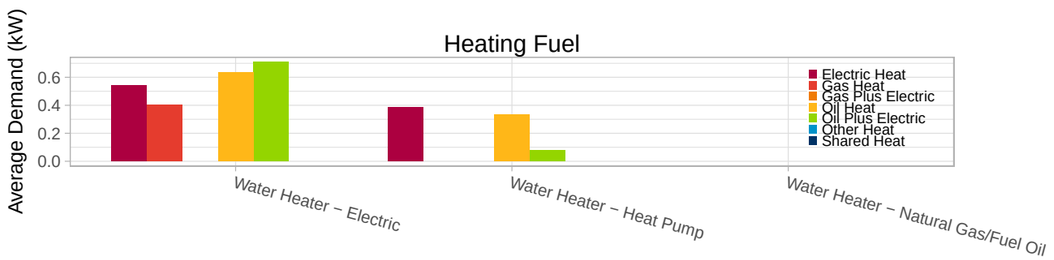
©2018 Navigant Consulting, Inc. All Rights Reserved

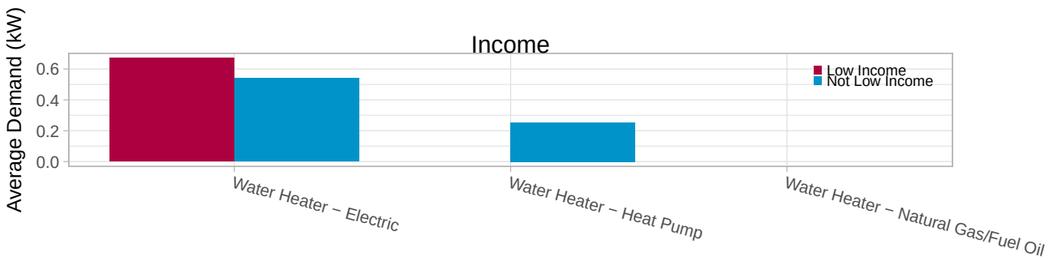
9.2.2 Average ISO-NE Winter Peak Water Heating Demand by End Use and Demographic for Homes With End Use

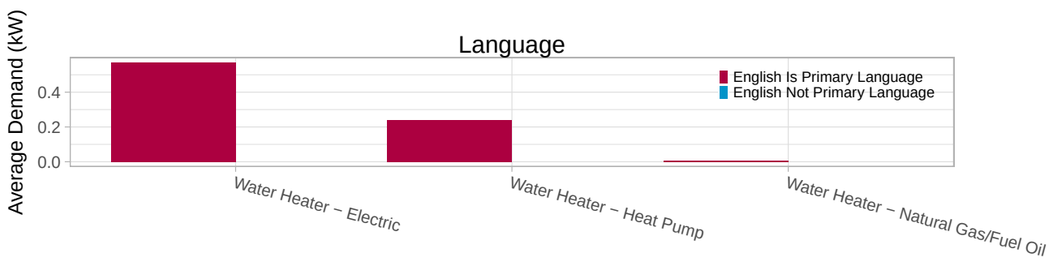


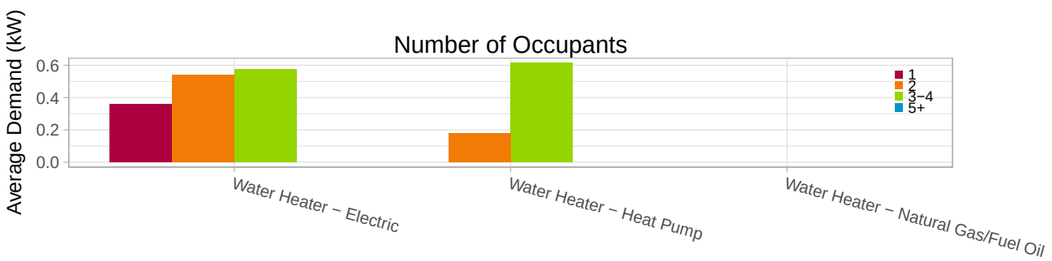


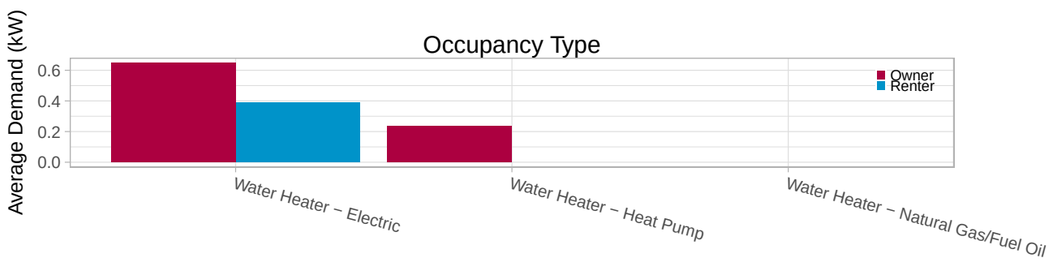


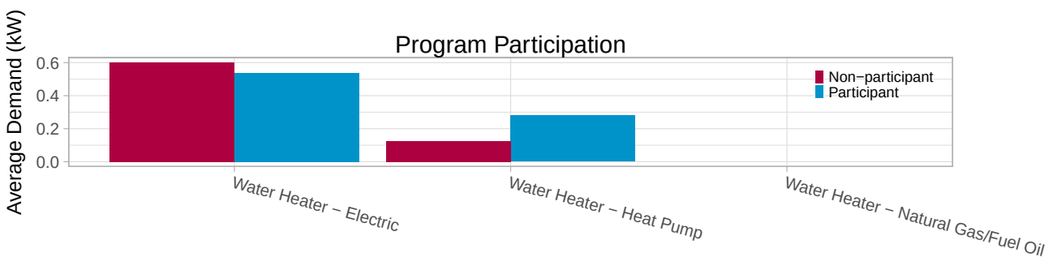


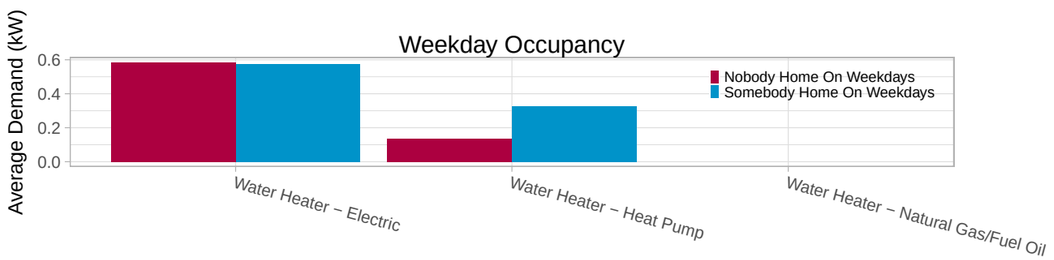








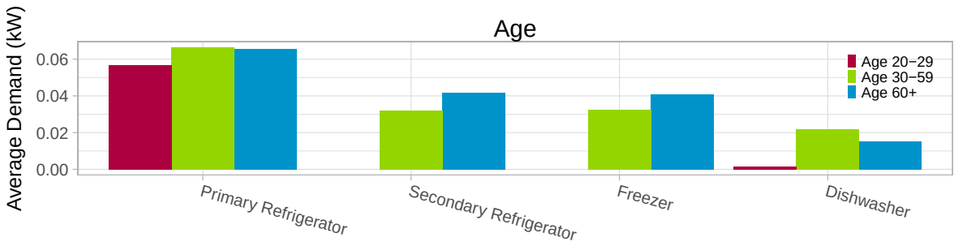


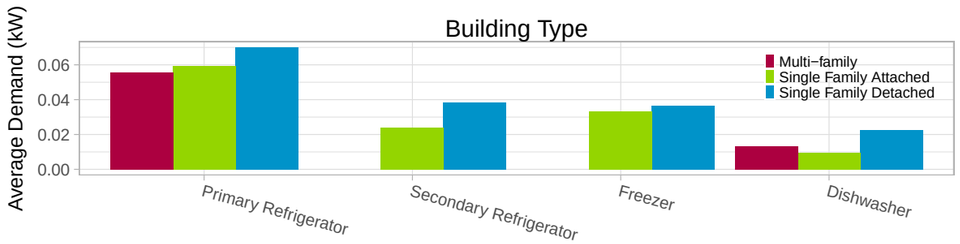


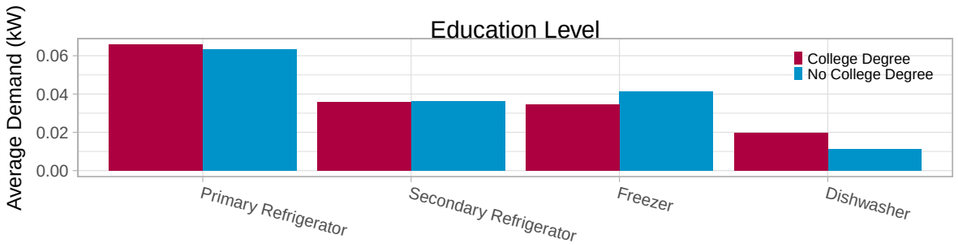
Source: Navigant Analysis

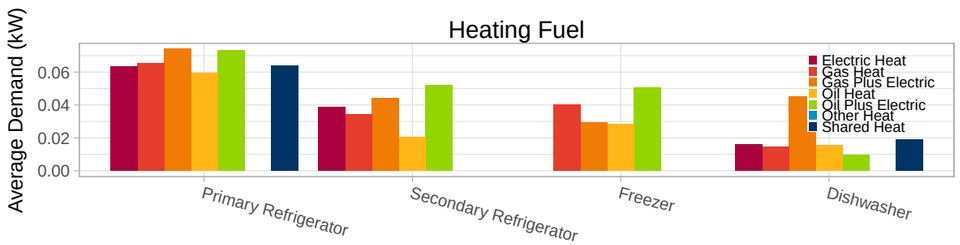
©2018 Navigant Consulting, Inc. All Rights Reserved

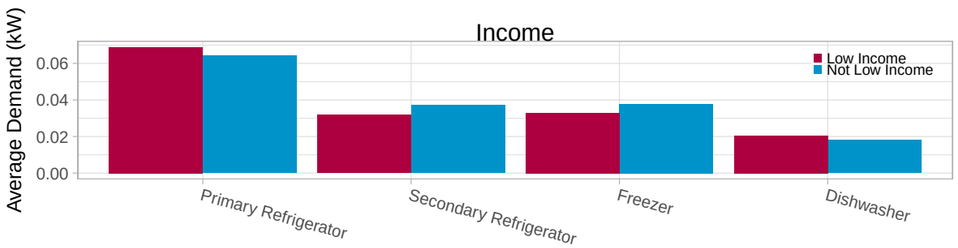
9.2.3 Average ISO-NE Winter Peak Kitchen Demand by End Use and Demographic for Homes With End Use

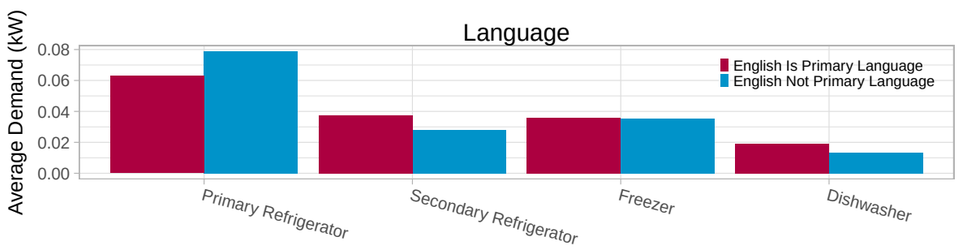


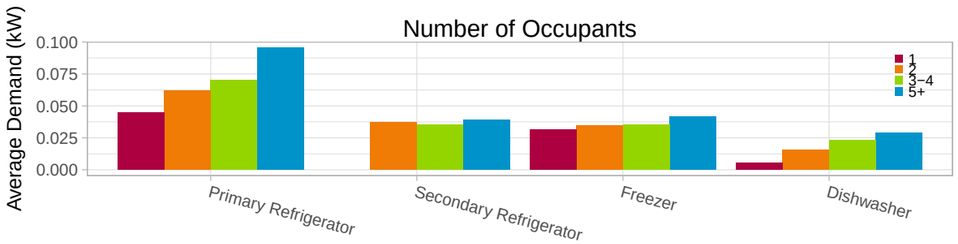


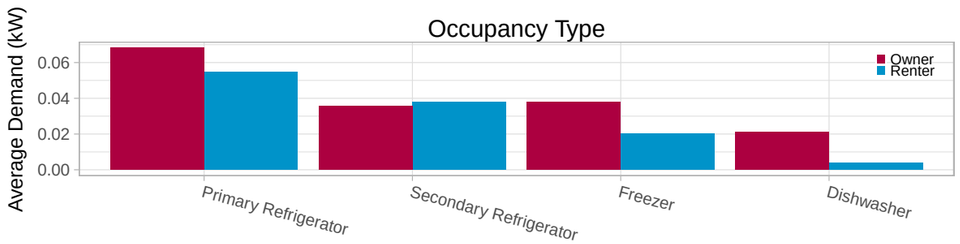


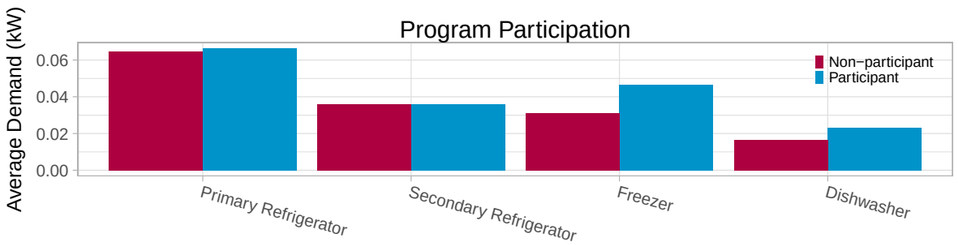


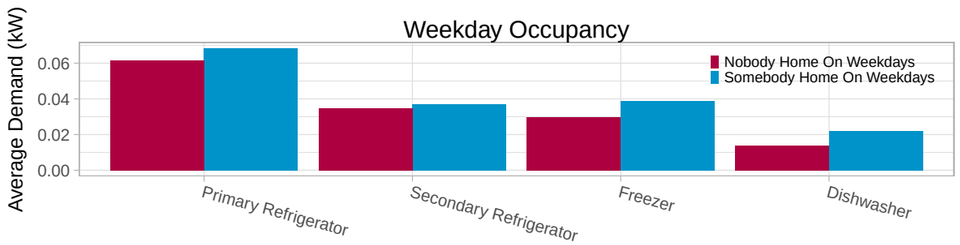








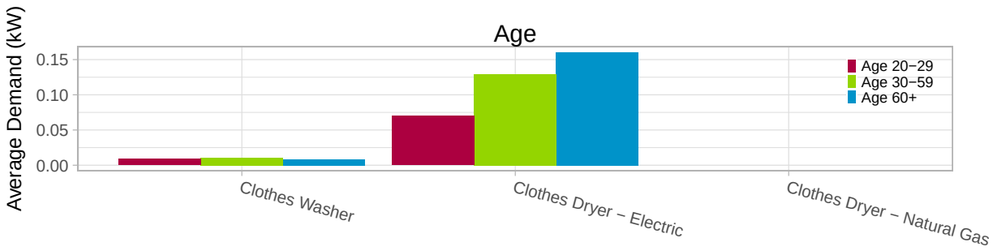


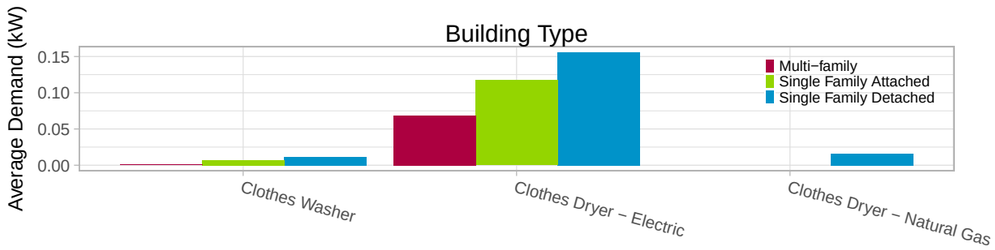


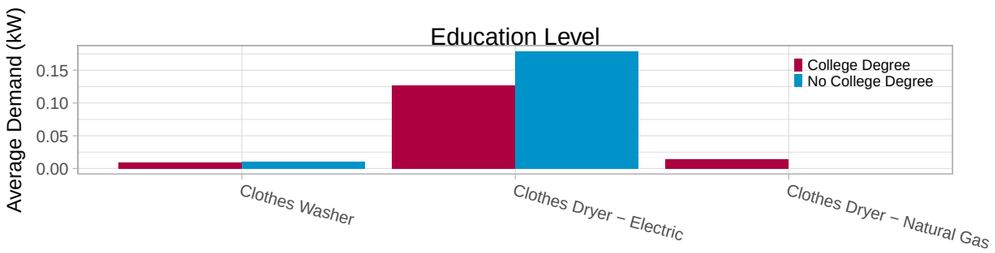
Source: Navigant Analysis

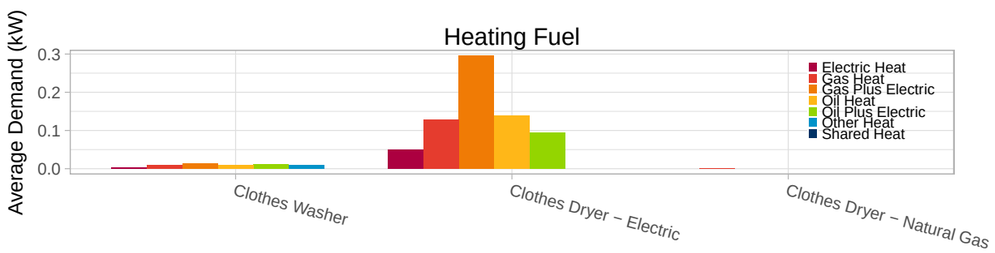
©2018 Navigant Consulting, Inc. All Rights Reserved

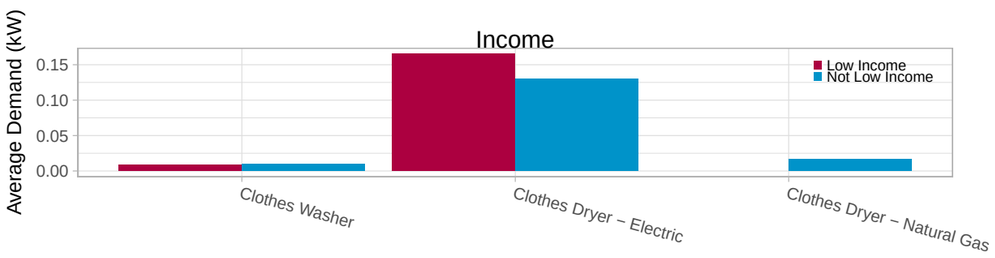
9.2.4 Average ISO-NE Winter Peak Laundry Demand by End Use and Demographic for Homes With End Use

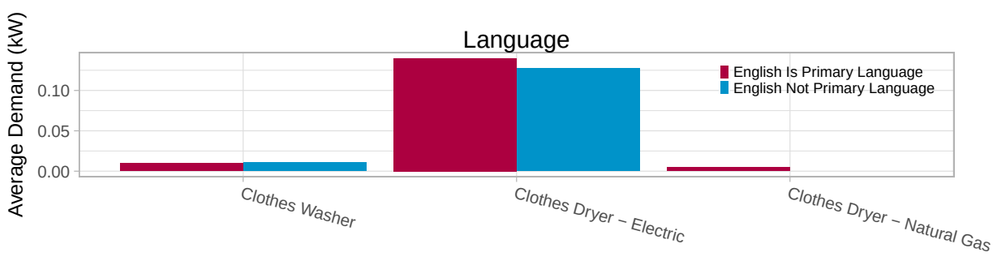


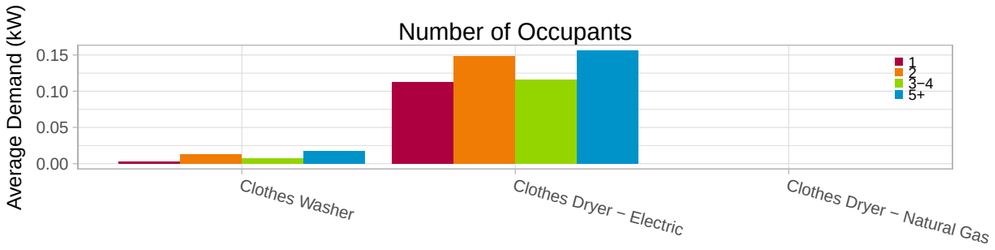


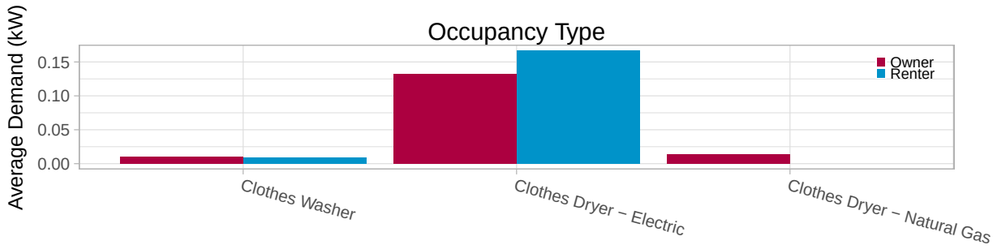


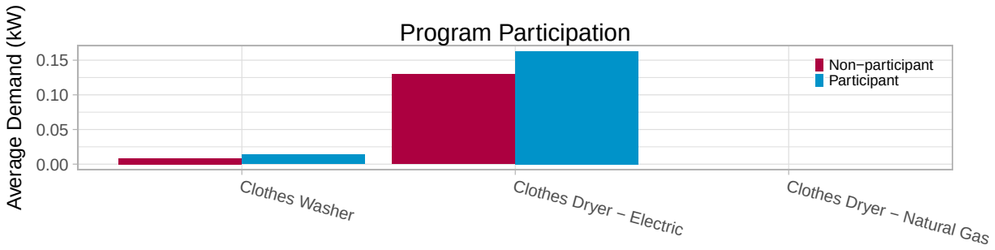


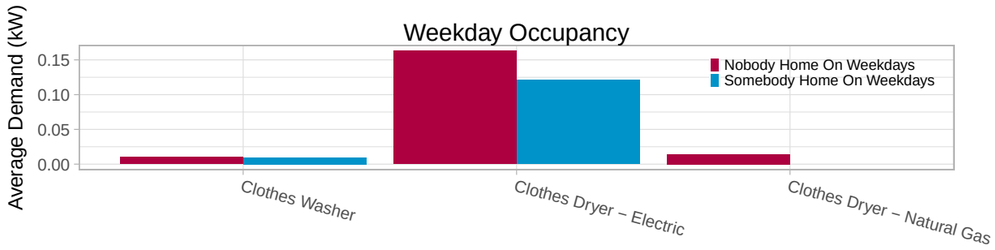








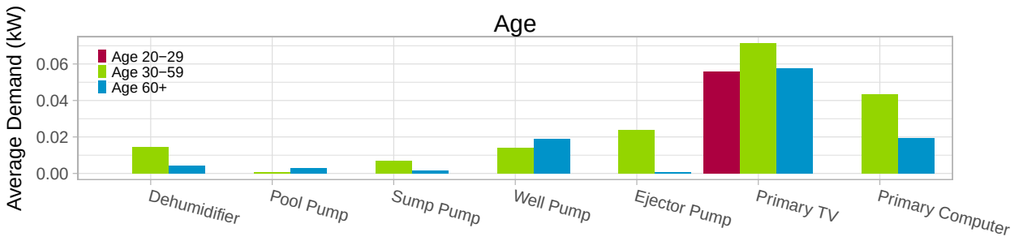


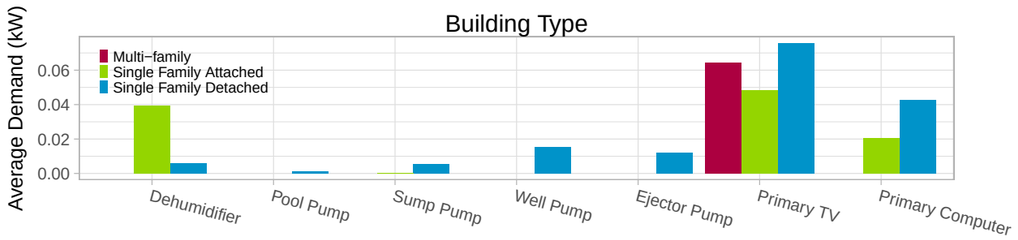


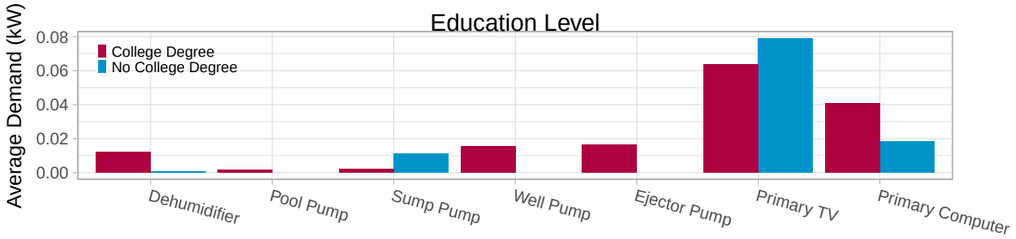
Source: Navigant Analysis

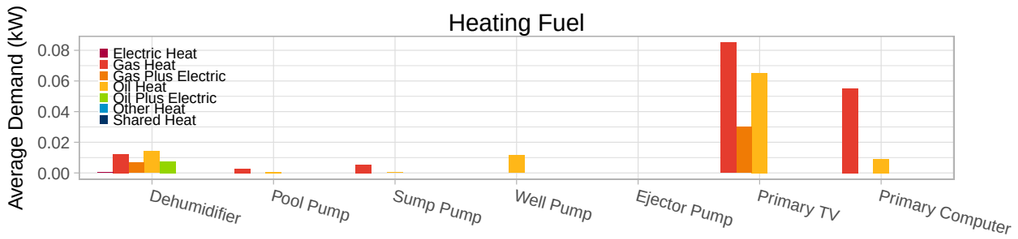
©2018 Navigant Consulting, Inc. All Rights Reserved

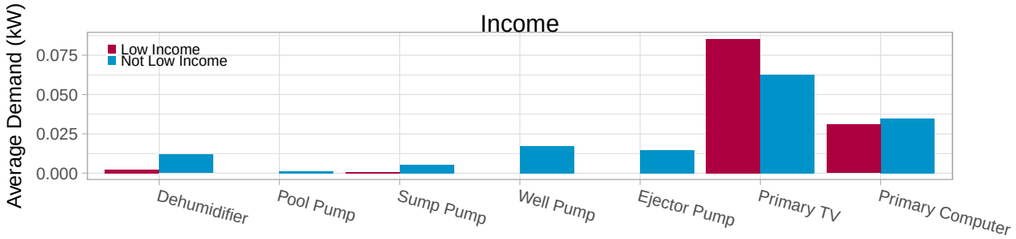
9.2.5 Average ISO-NE Winter Peak Miscellaneous Demand by End Use and Demographic for Homes With End Use

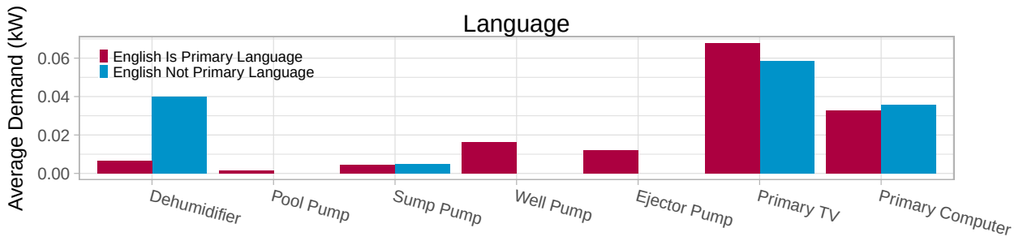


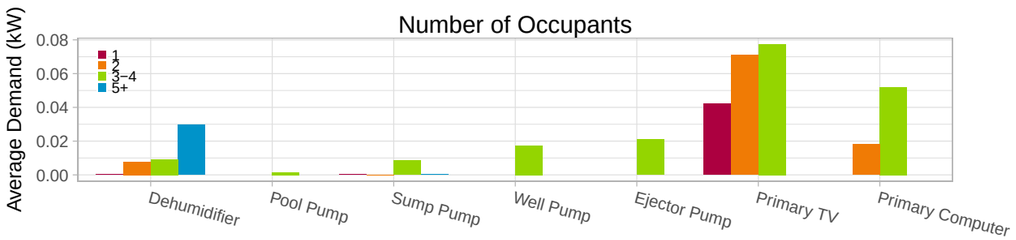


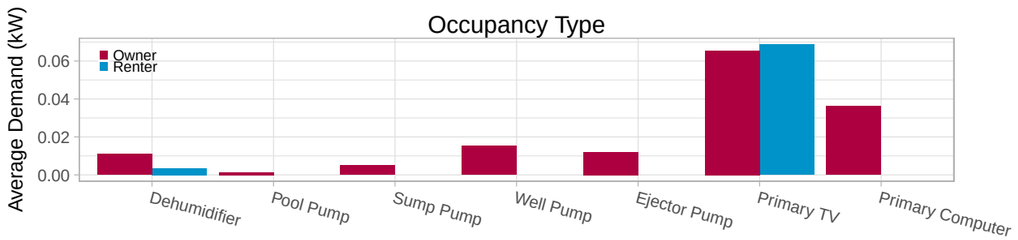


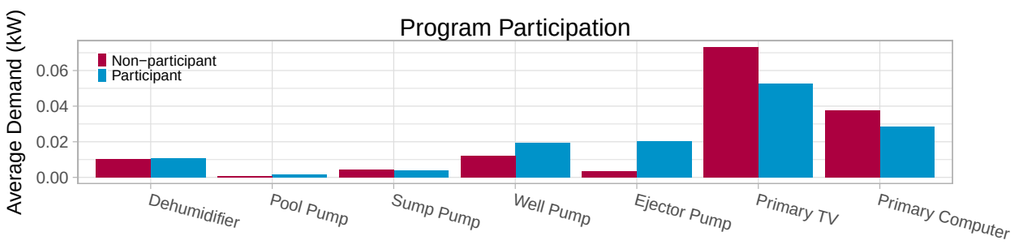


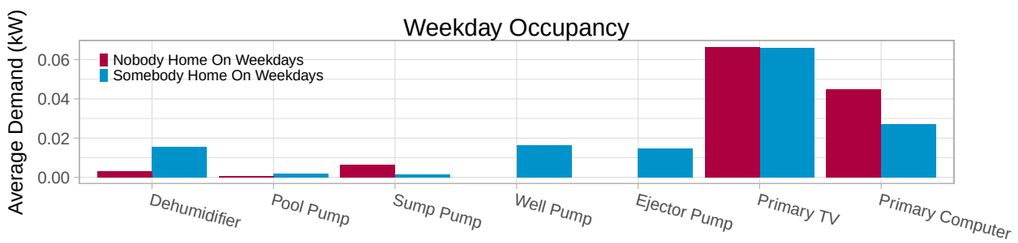










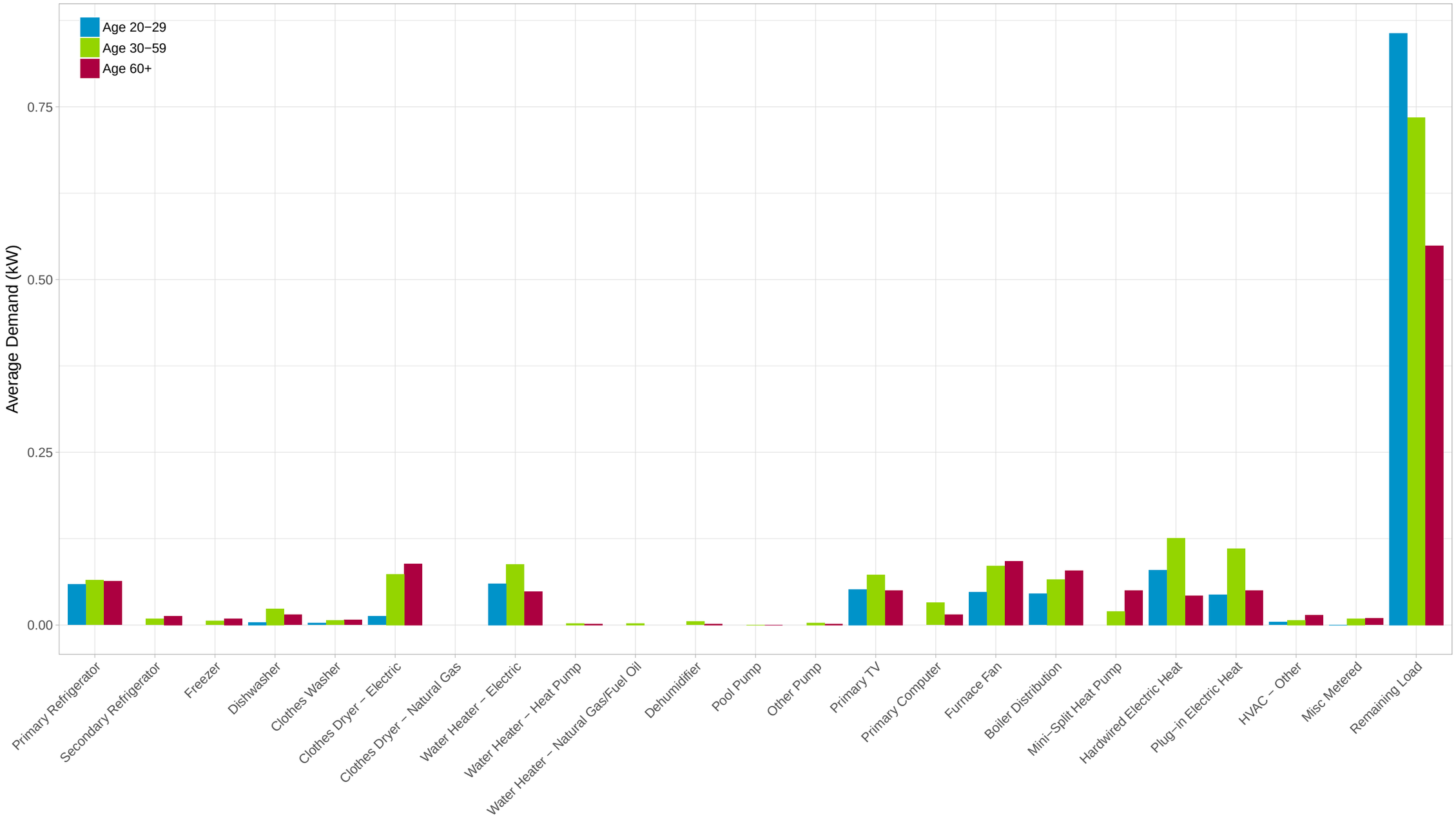


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.3 Population Residential Winter Peak Demand

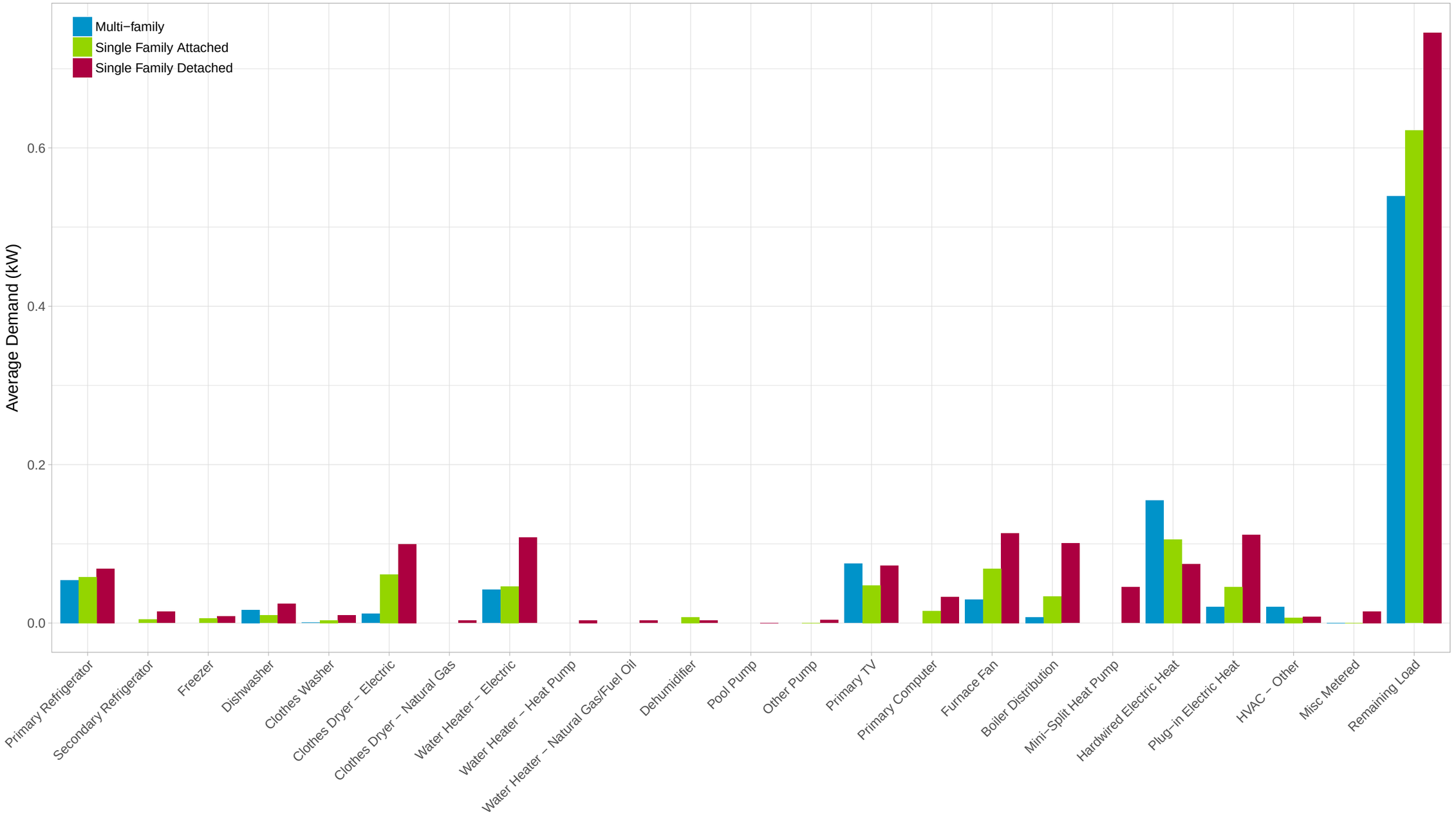
9.3.1 Population Average Residential Winter Peak Demand by End Use and Age



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

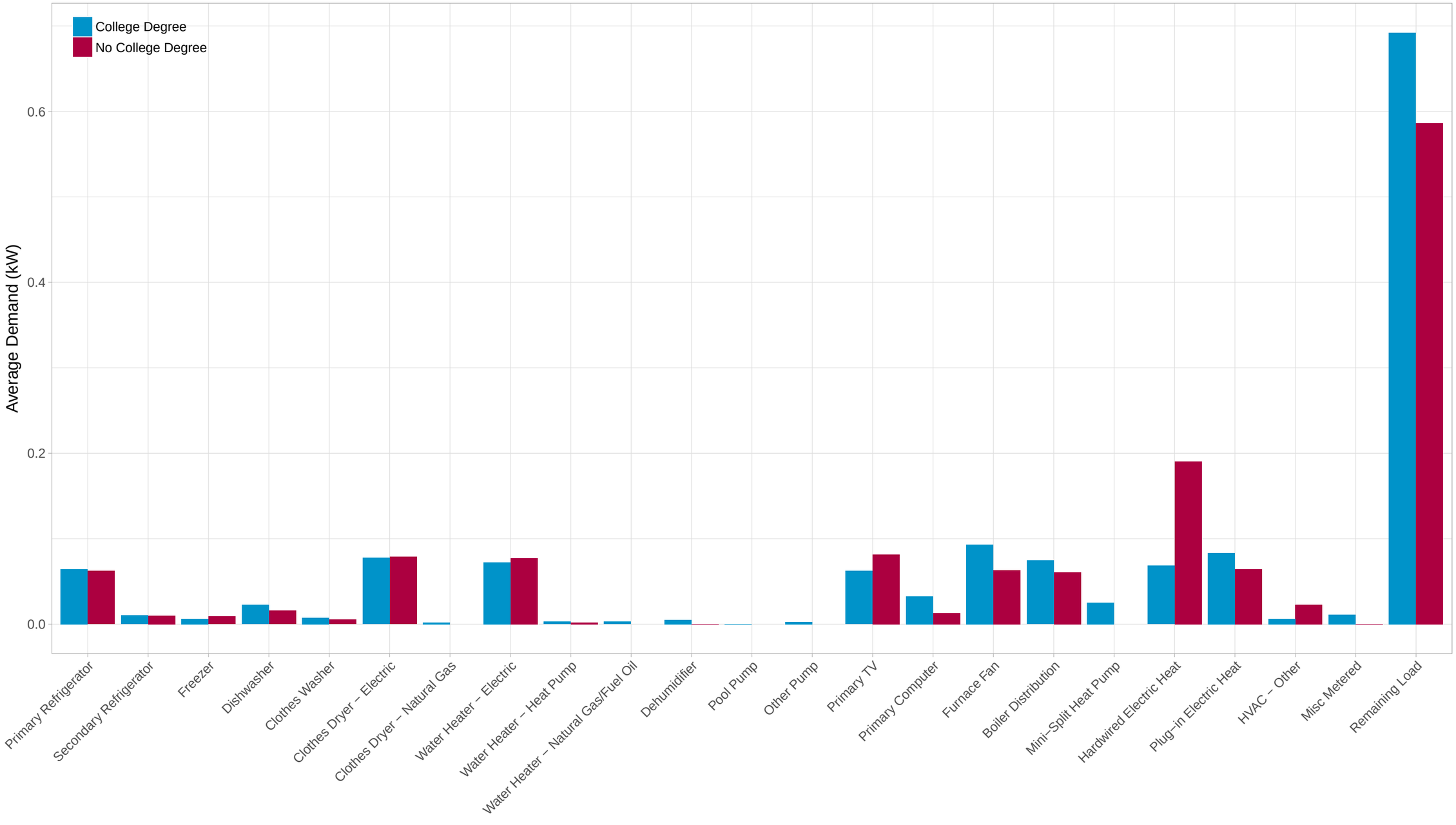
9.3.2 Population Average Residential Winter Peak Demand by End Use and Building Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

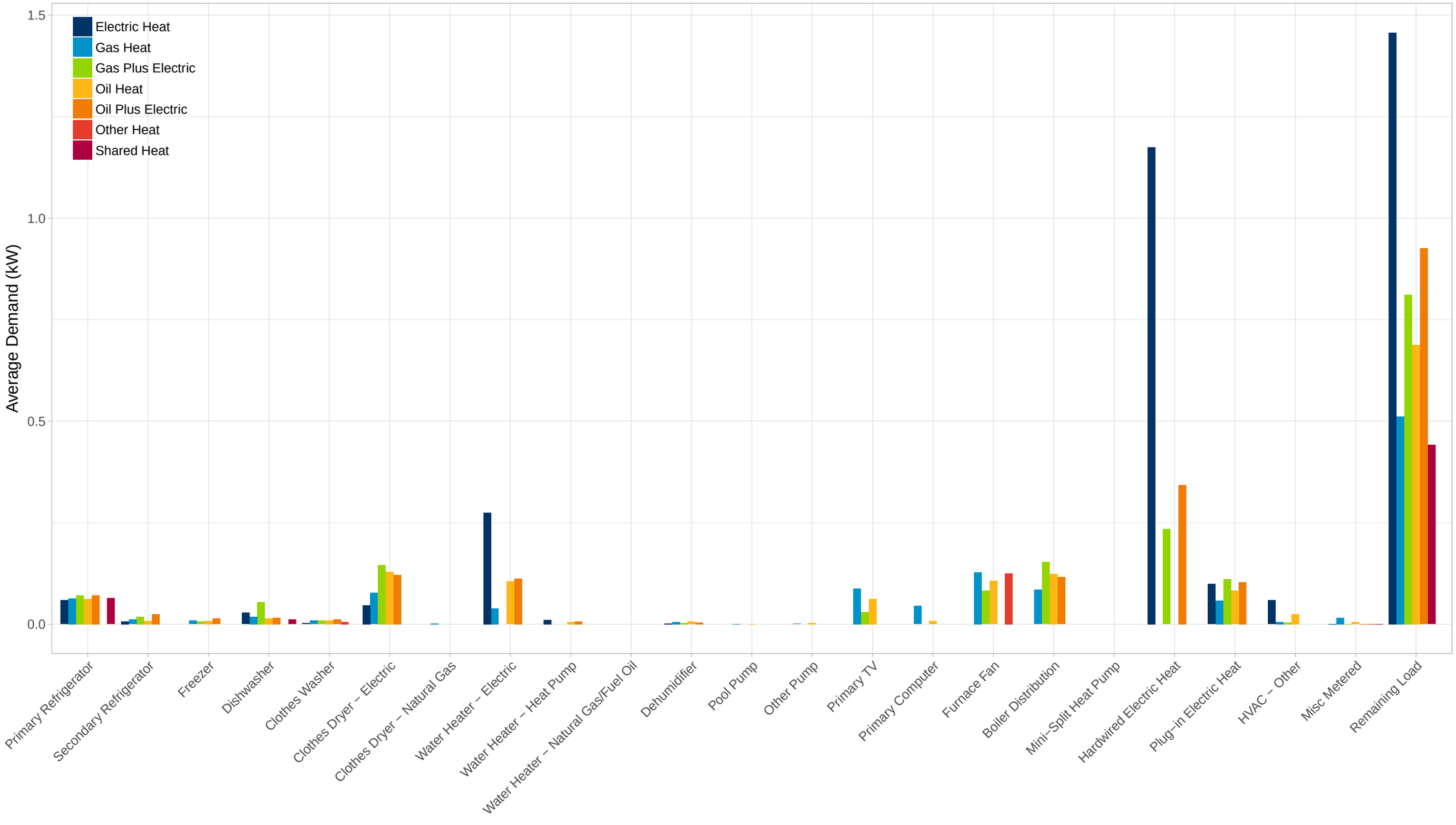
9.3.3 Population Average Residential Winter Peak Demand by End Use and Education Level



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

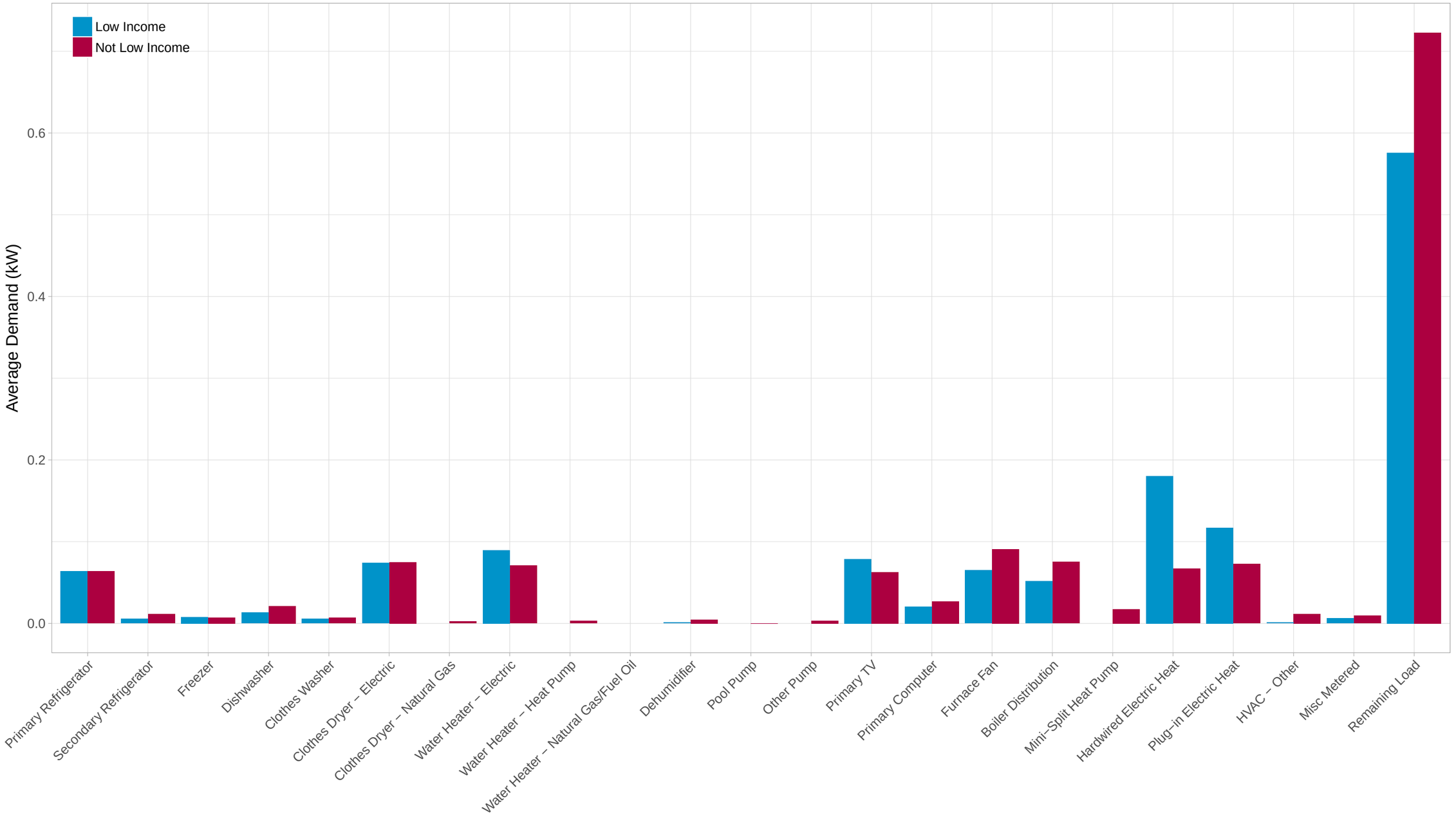
9.3.4 Population Average Residential Winter Peak Demand by End Use and Heating Fuel



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

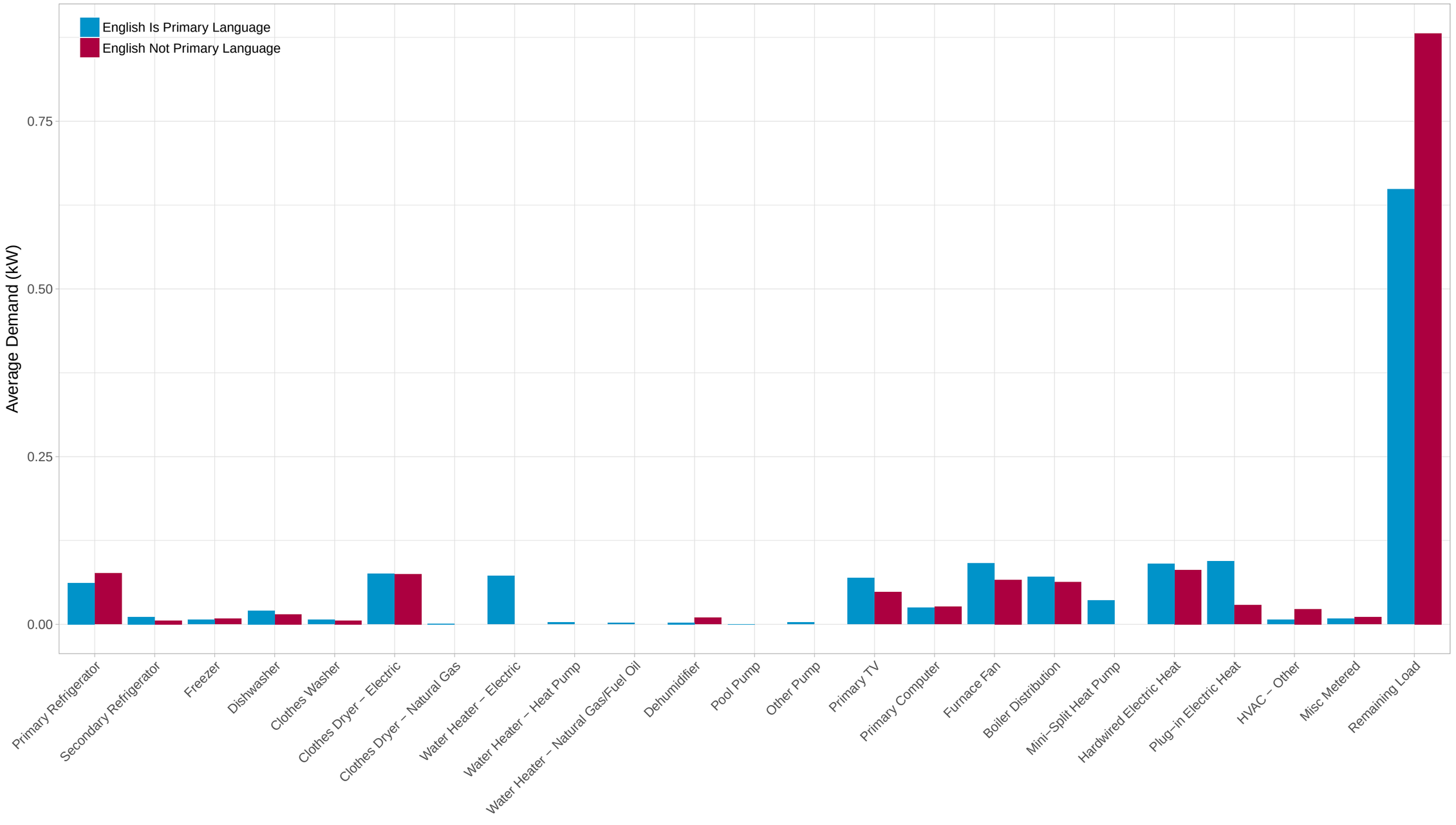
9.3.5 Population Average Residential Winter Peak Demand by End Use and Income



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

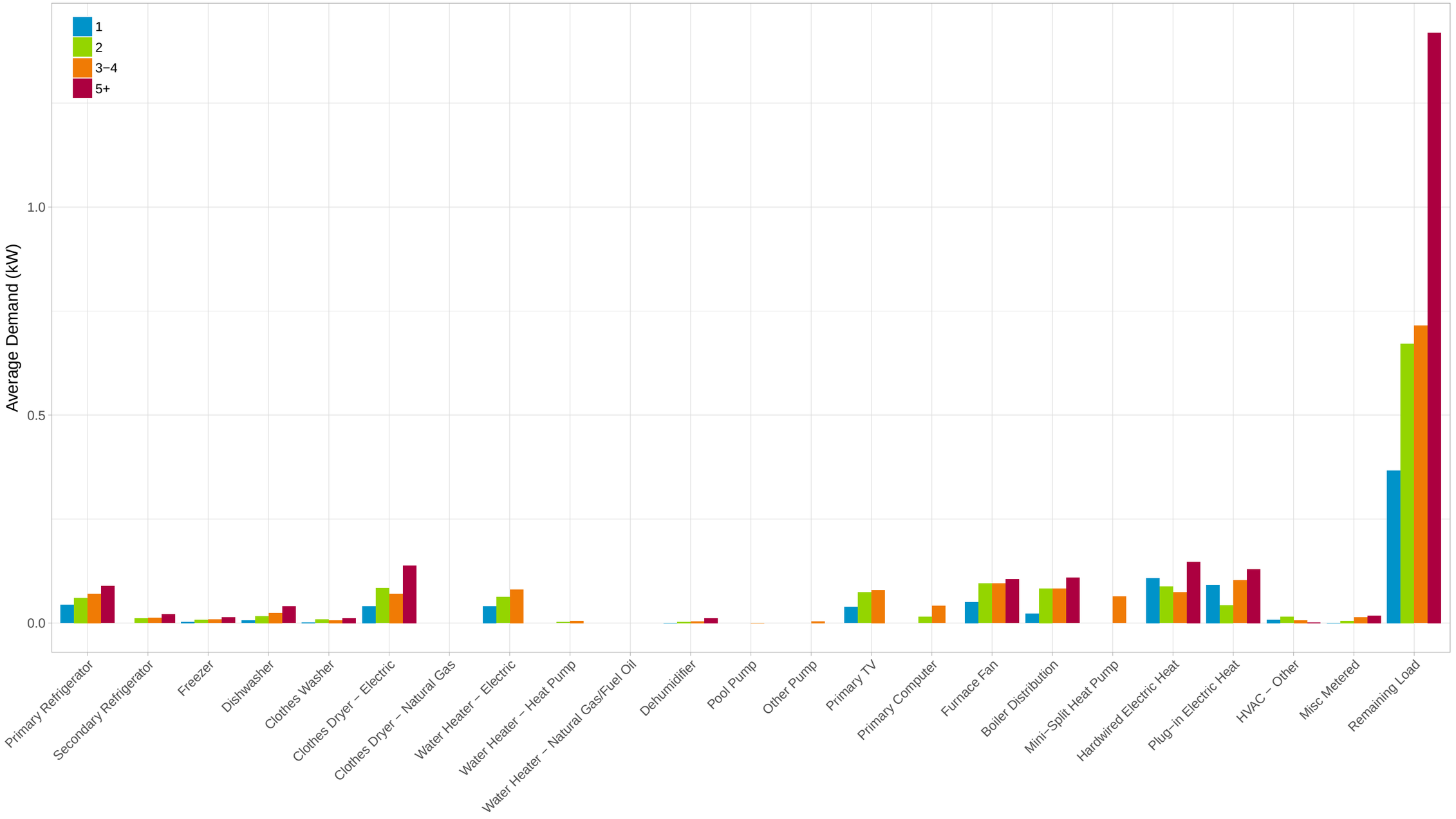
9.3.6 Population Average Residential Winter Peak Demand by End Use and Language



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

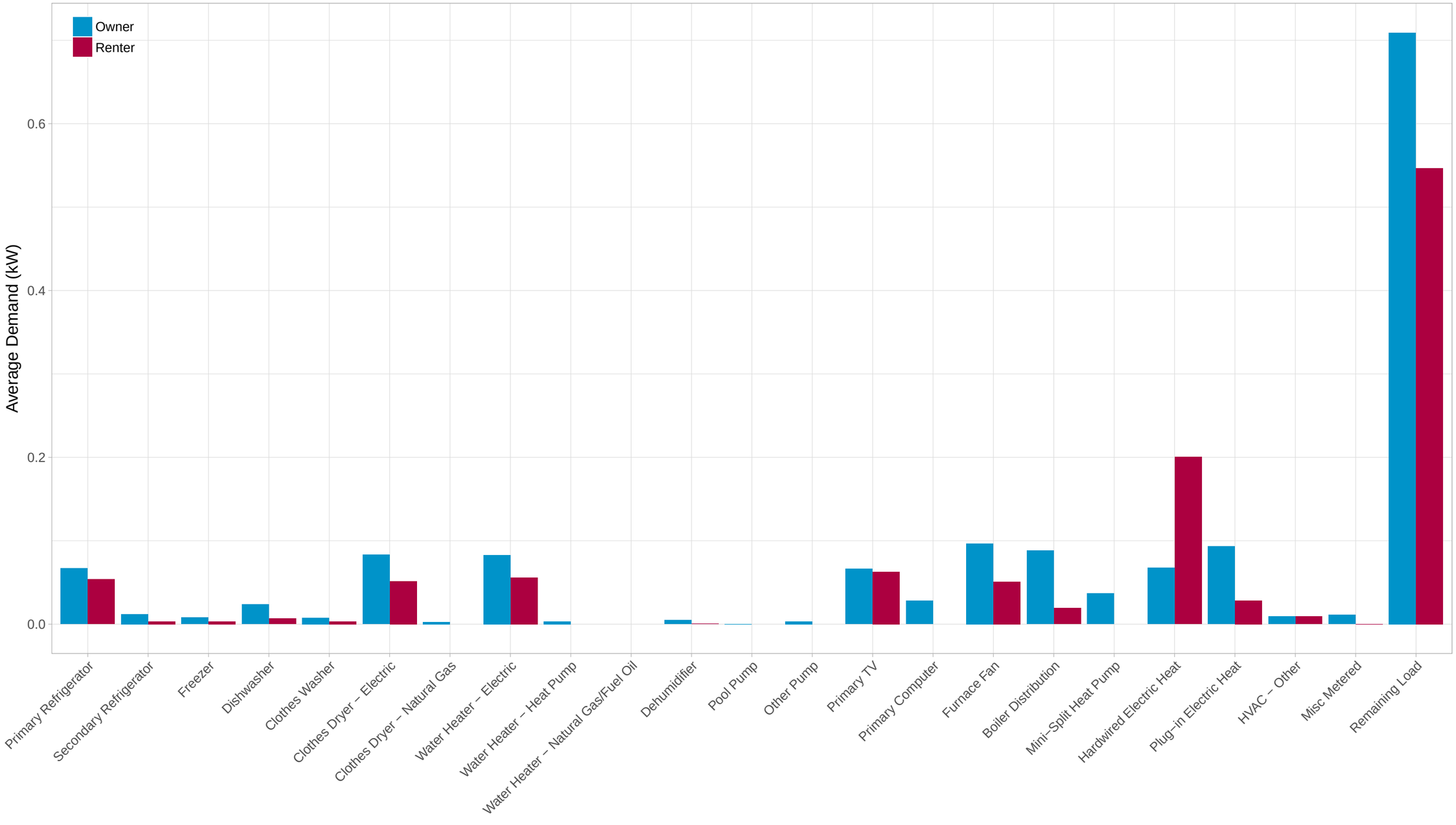
9.3.7 Population Average Residential Winter Peak Demand by End Use and Number of Occupants



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

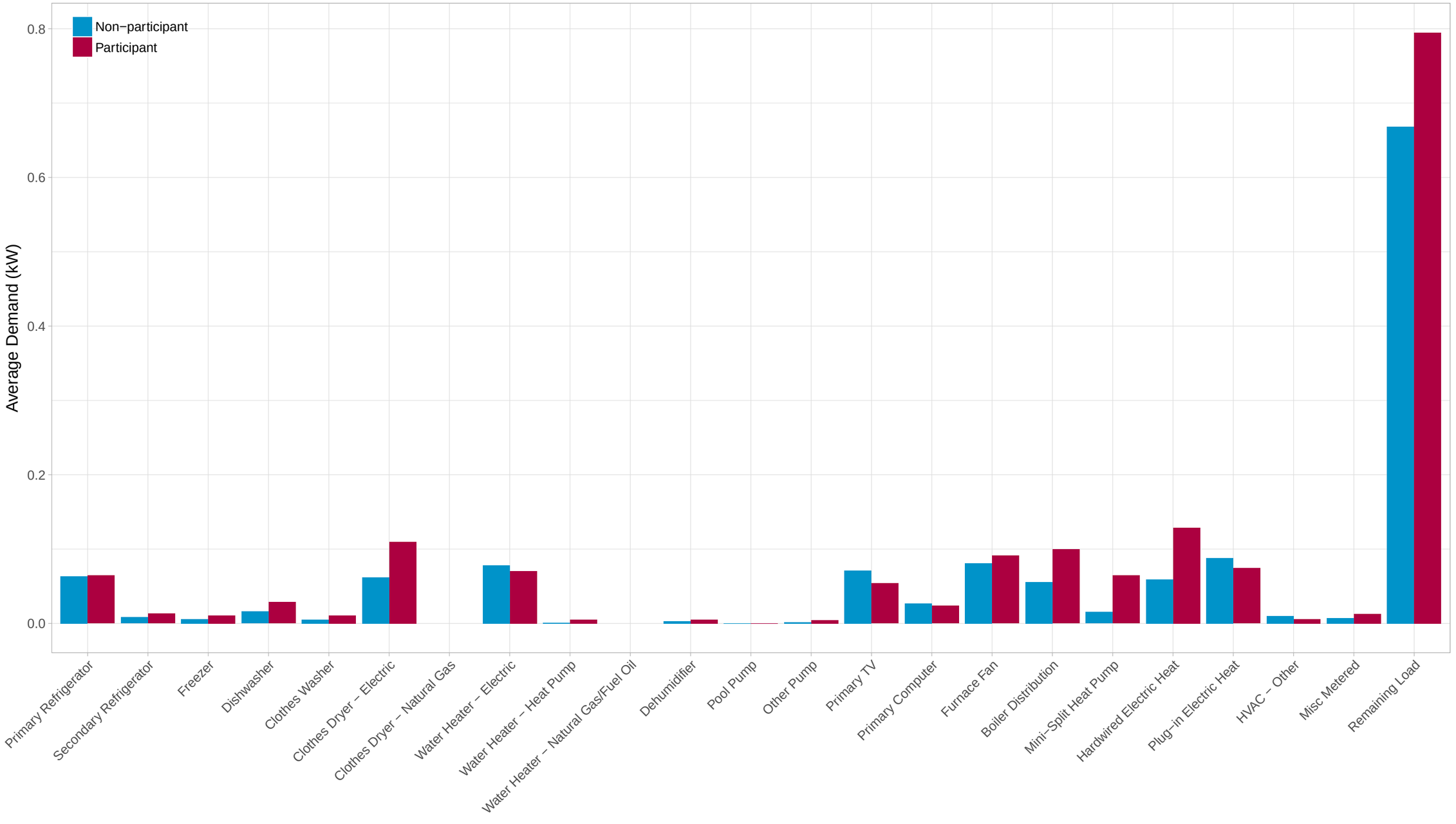
9.3.8 Population Average Residential Winter Peak Demand by End Use and Occupancy Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

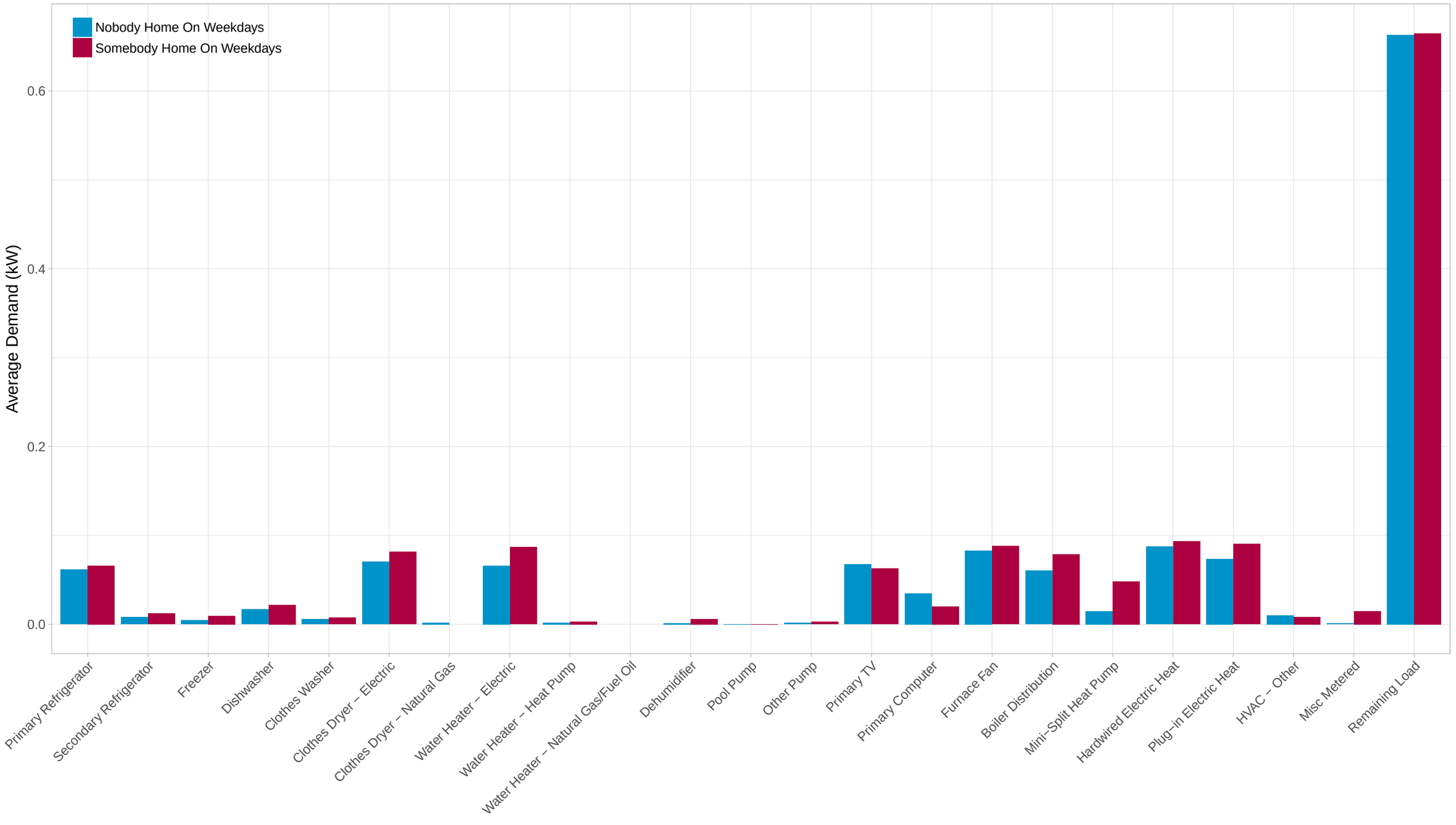
9.3.9 Population Average Residential Winter Peak Demand by End Use and Program Participation



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.3.10 Population Average Residential Winter Peak Demand by End Use and Weekday Occupancy

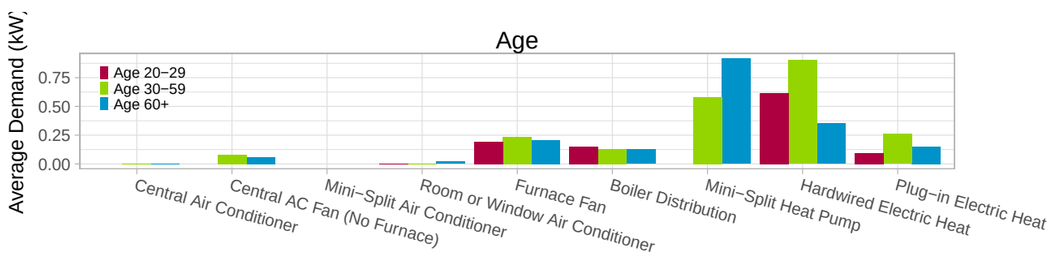


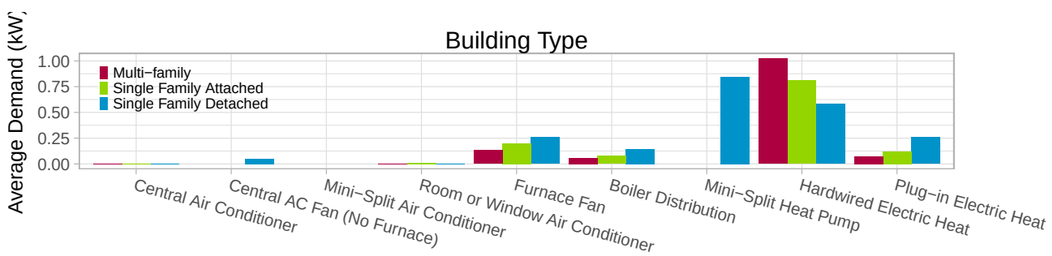
Source: Navigant Analysis

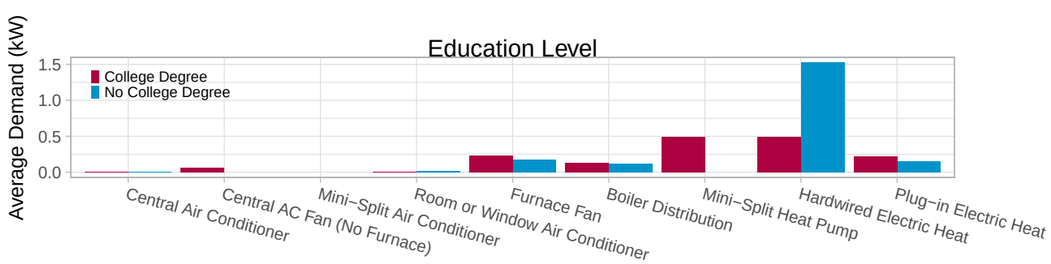
©2018 Navigant Consulting, Inc. All Rights Reserved

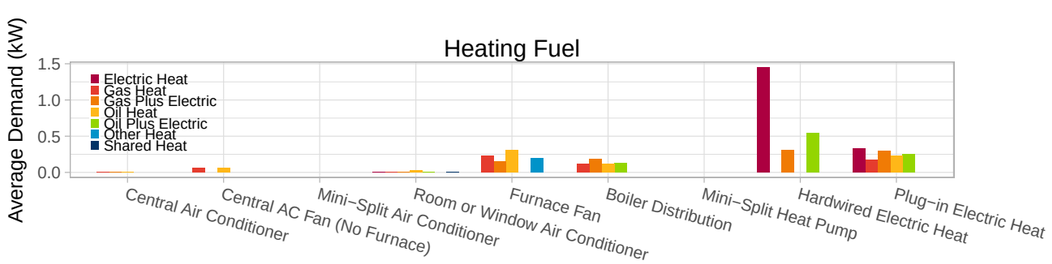
9.4 Residential Winter Peak Demand for Homes With End Use

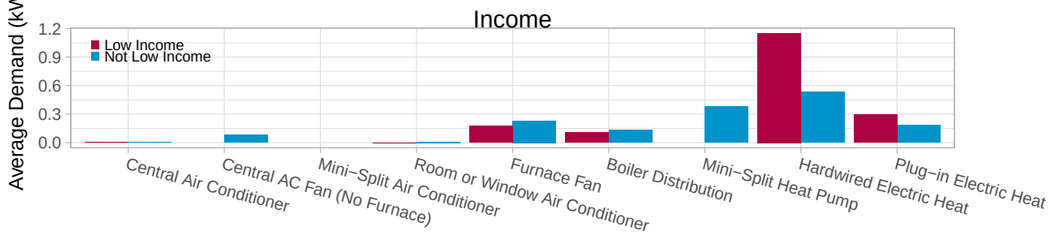
9.4.1 Average Residential Winter Peak HVAC Demand by End Use and Demographic for Homes With End Use

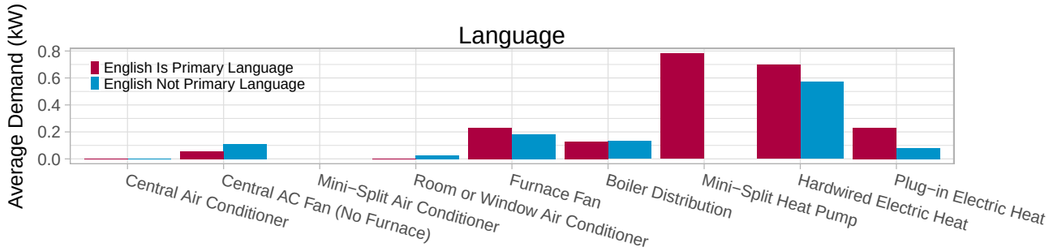


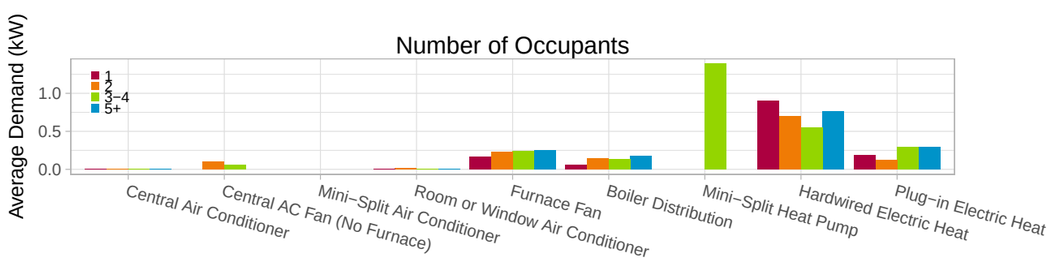


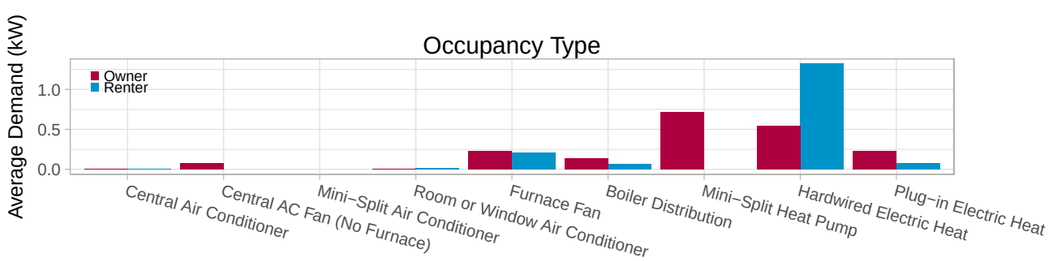


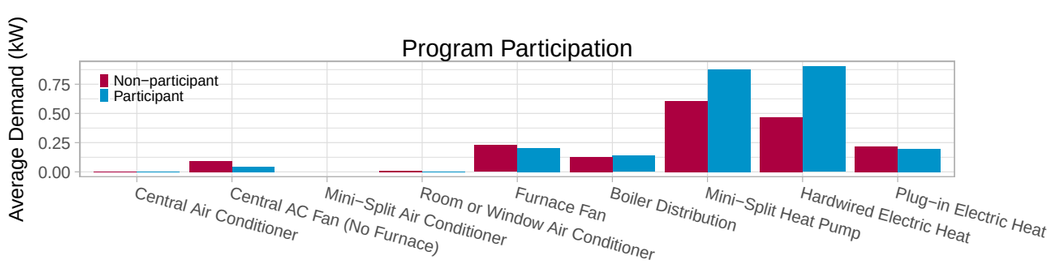


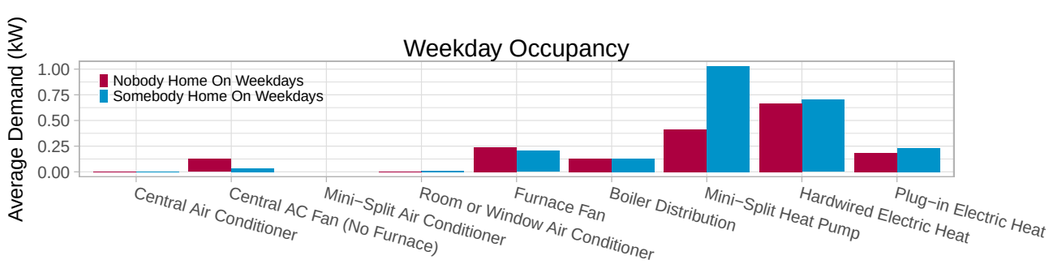








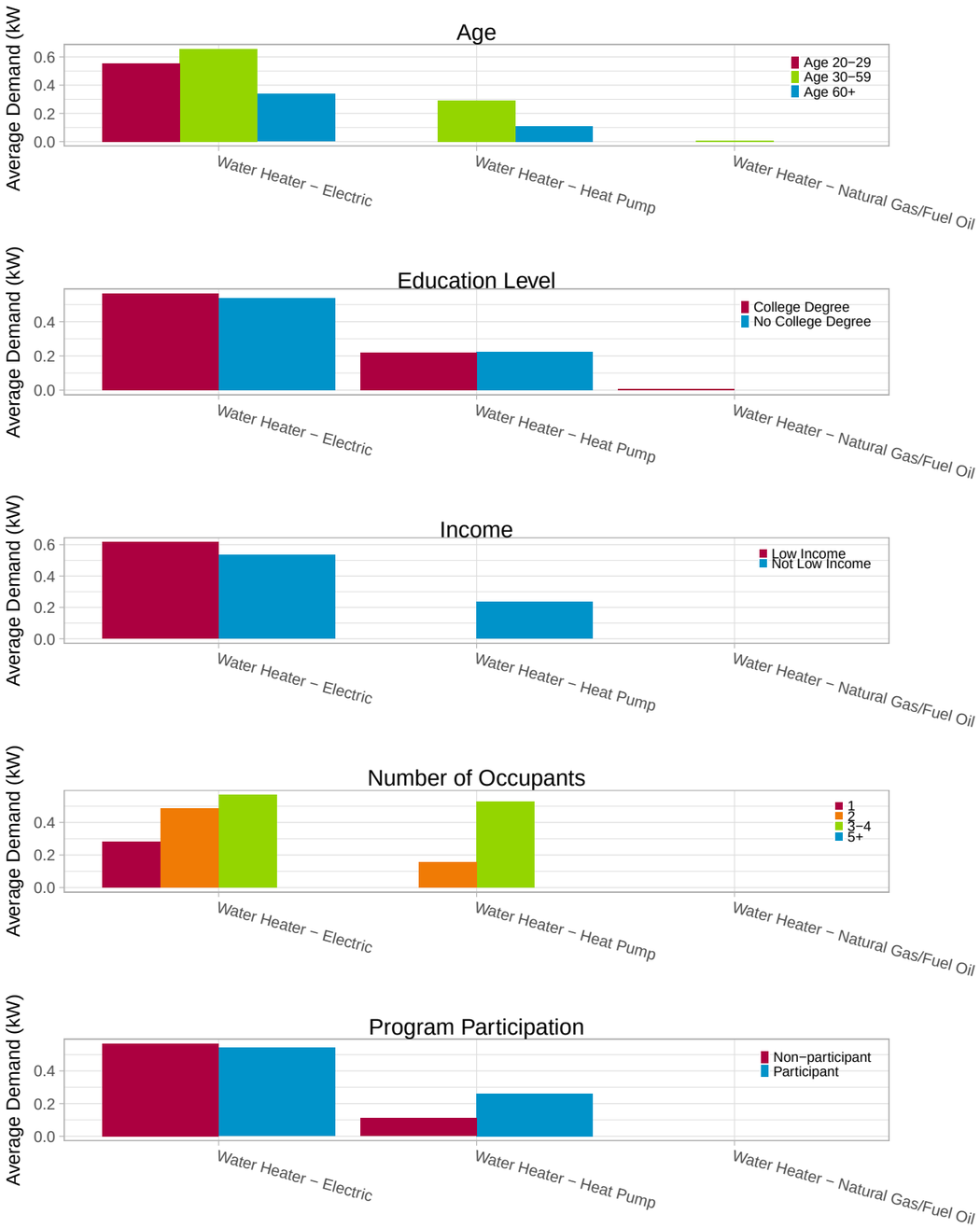


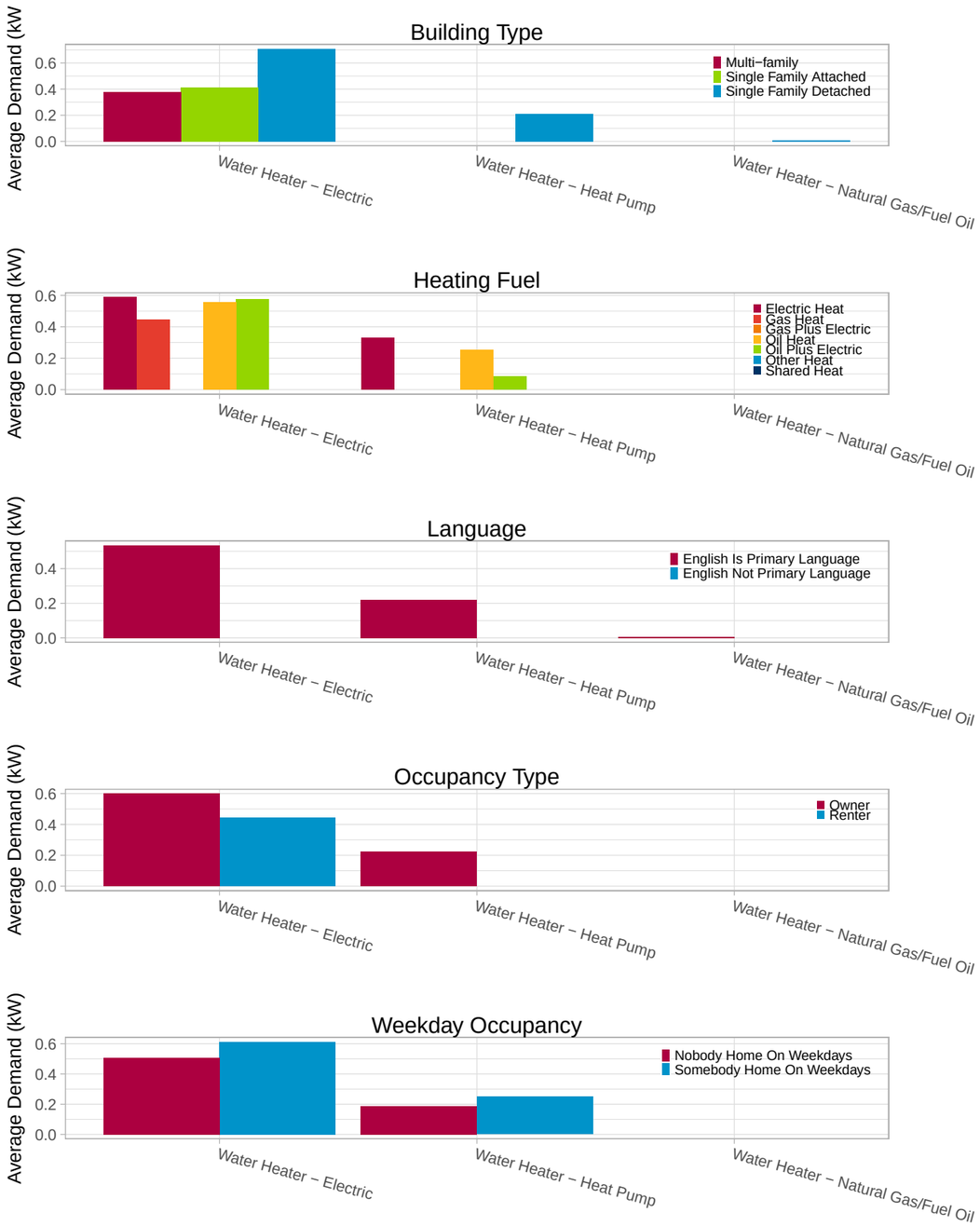


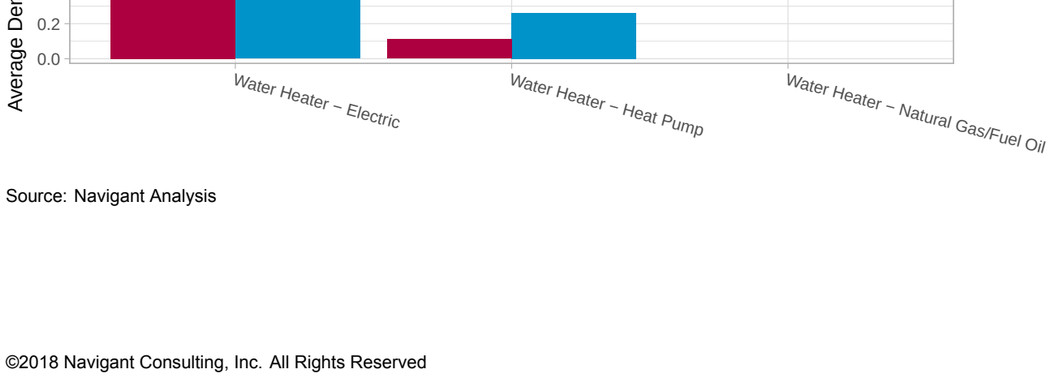
Source: Navigant Analysis

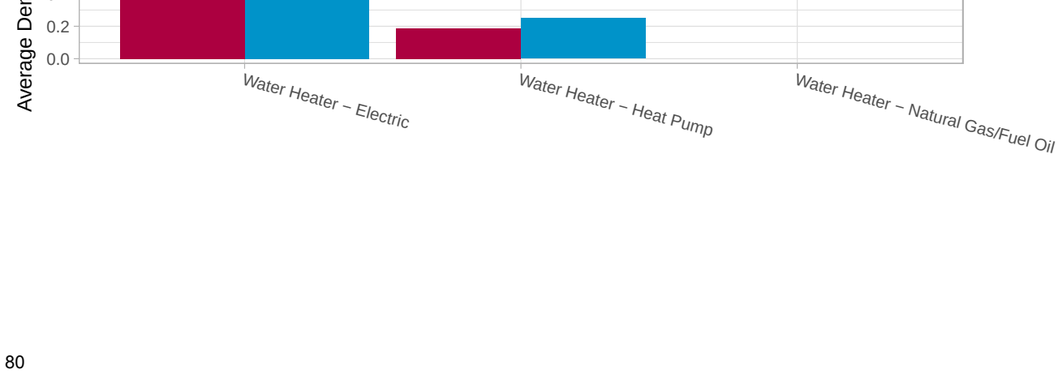
©2018 Navigant Consulting, Inc. All Rights Reserved

9.4.2 Average Residential Winter Peak Water Heating Demand by End Use and Demographic for Homes With End Use





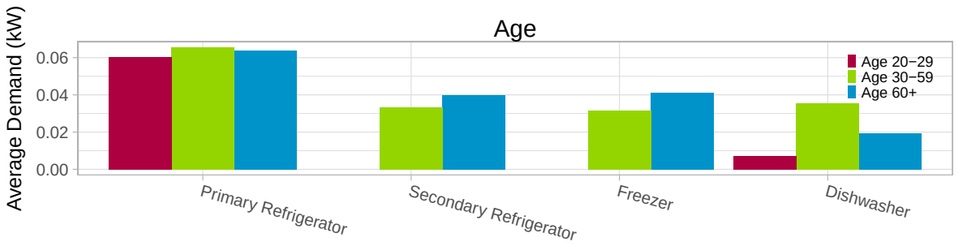


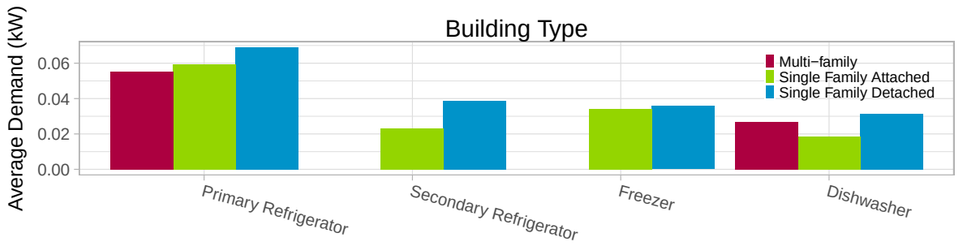


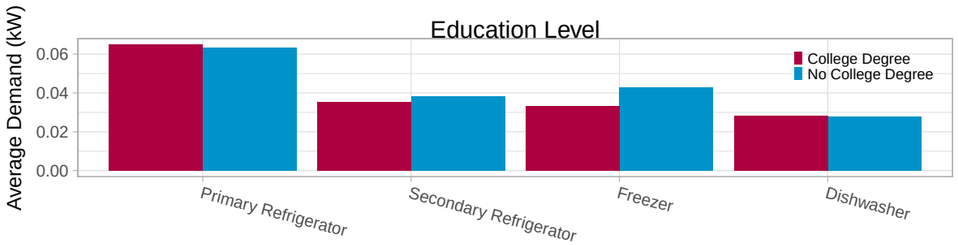
Source: Navigant Analysis

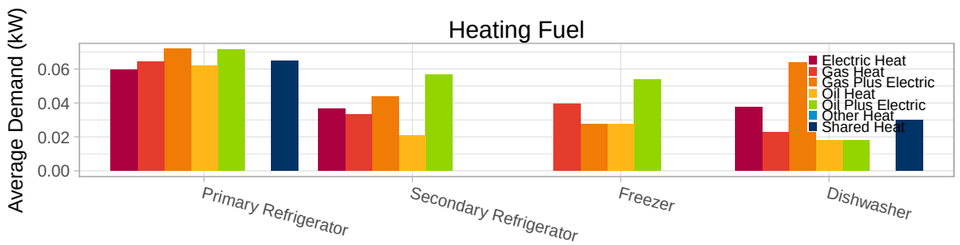
©2018 Navigant Consulting, Inc. All Rights Reserved

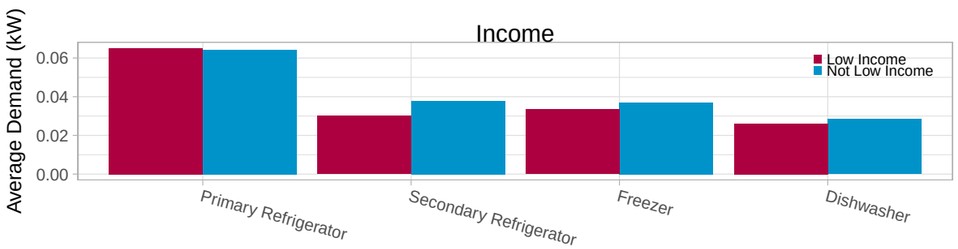
9.4.3 Average Residential Winter Peak Kitchen Demand by End Use and Demographic for Homes With End Use

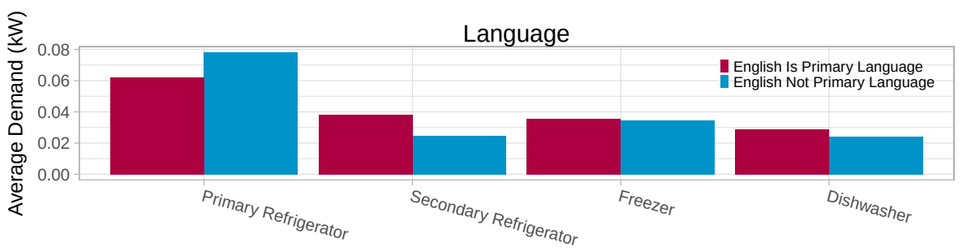


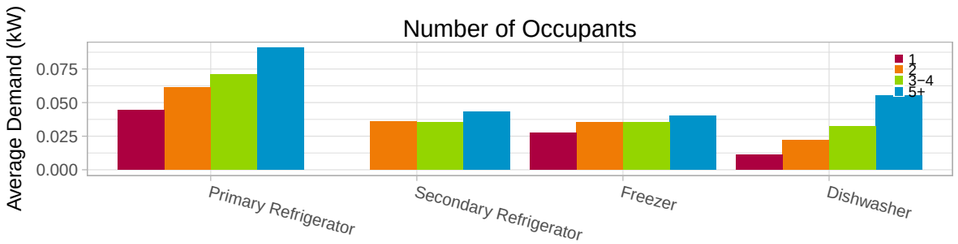


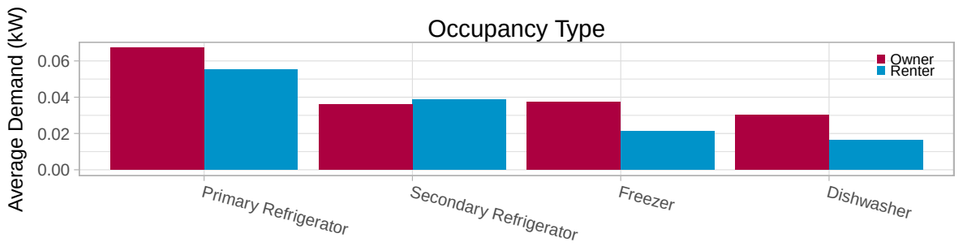


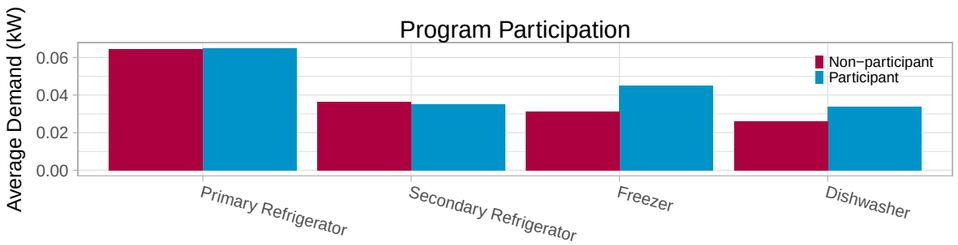


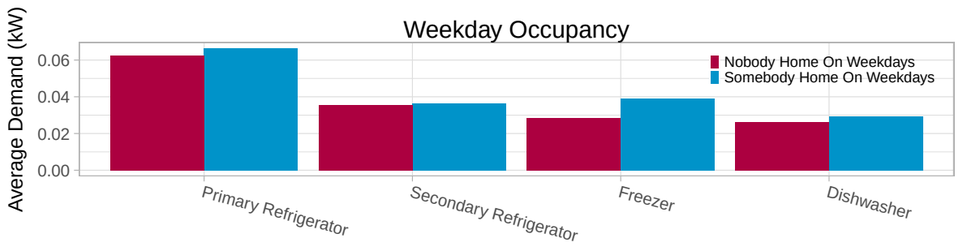








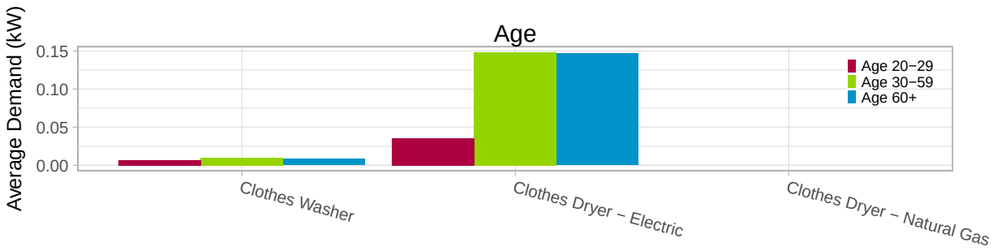


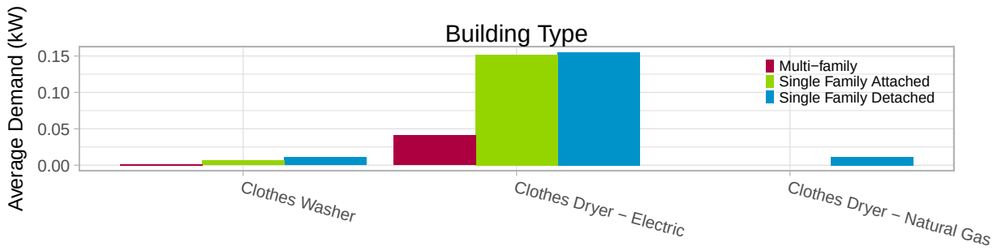


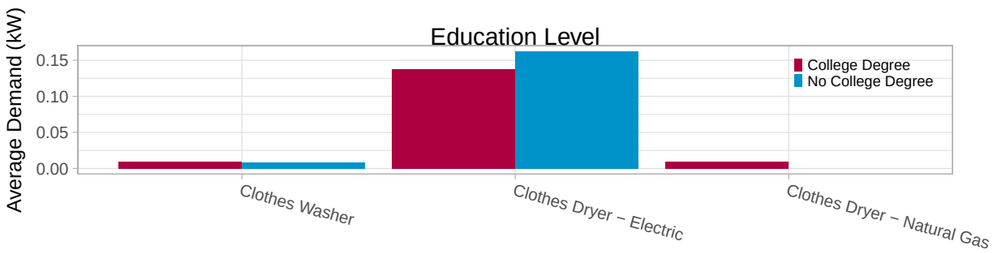
Source: Navigant Analysis

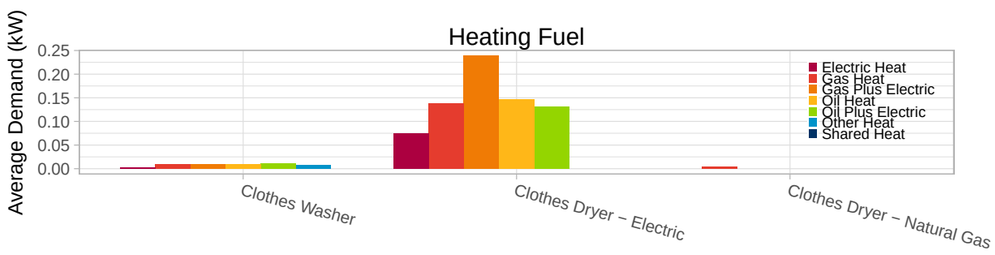
©2018 Navigant Consulting, Inc. All Rights Reserved

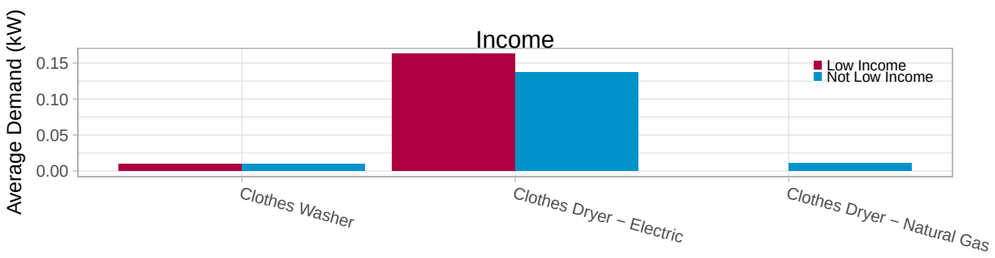
9.4.4 Average Residential Winter Peak Laundry Demand by End Use and Demographic for Homes With End Use

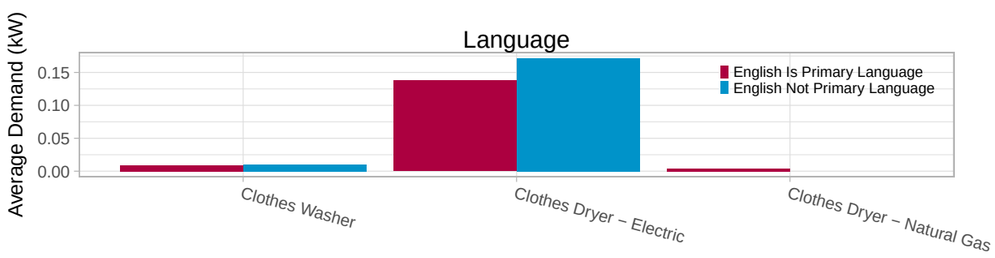


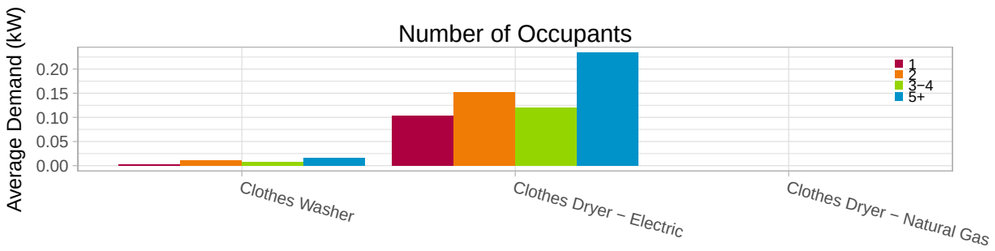


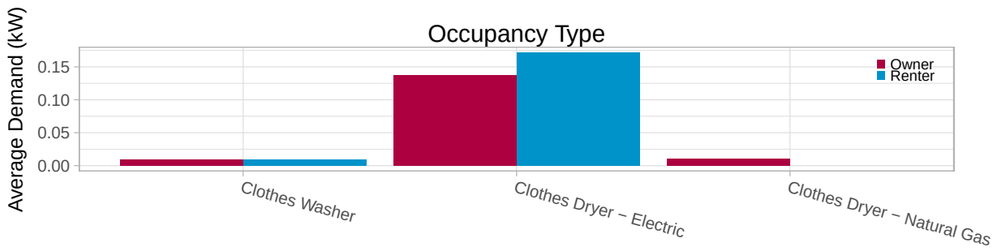


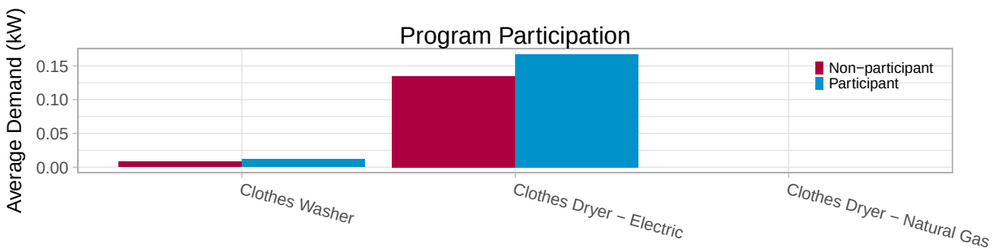


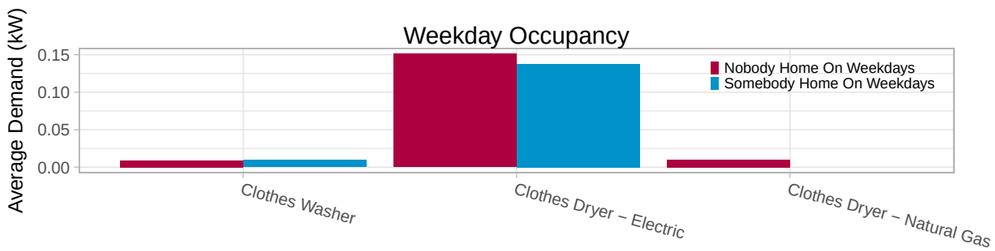








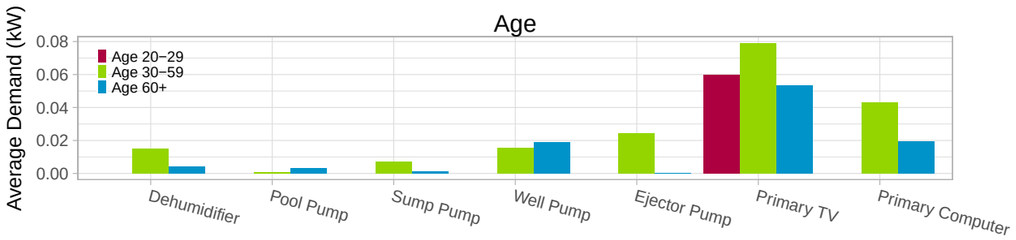


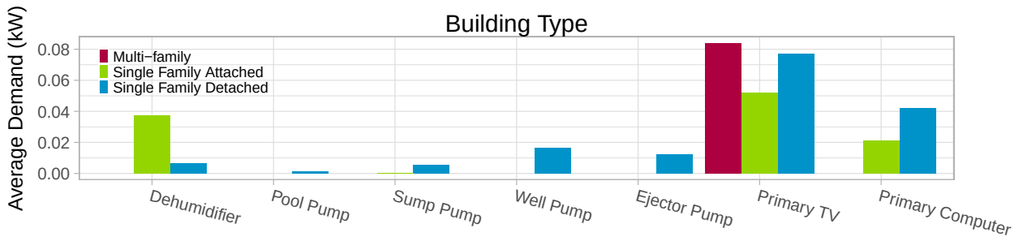


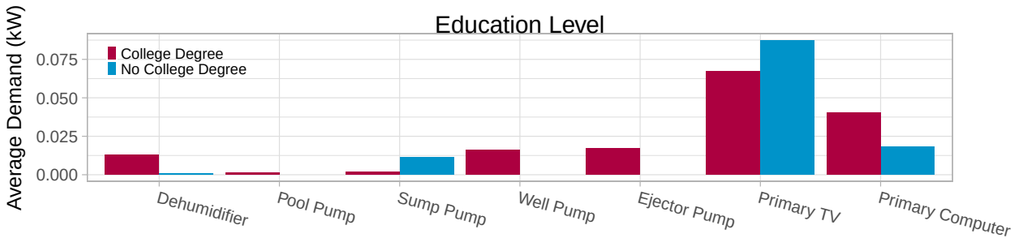
Source: Navigant Analysis

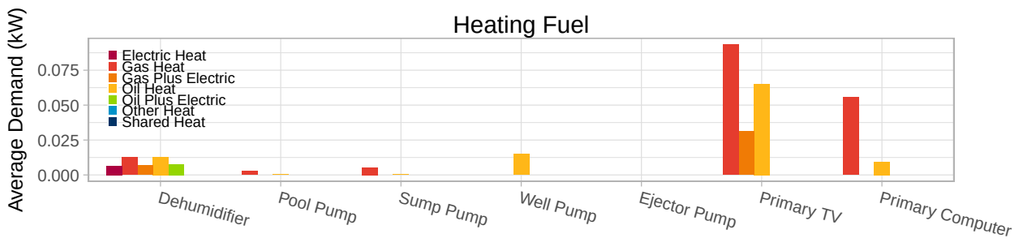
©2018 Navigant Consulting, Inc. All Rights Reserved

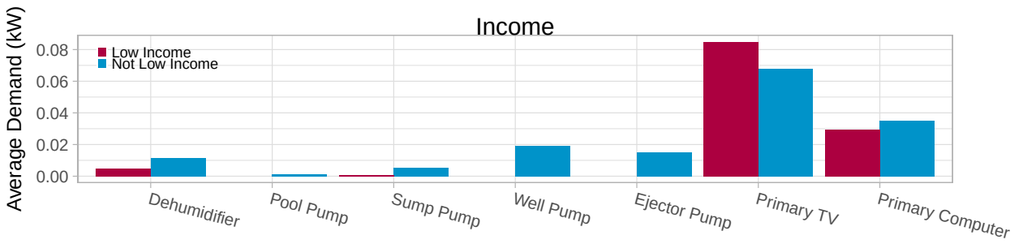
9.4.5 Average Residential Winter Peak Miscellaneous Demand by End Use and Demographic for Homes With End Use

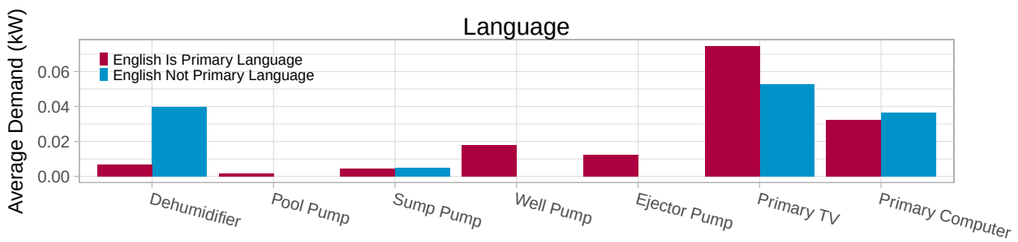


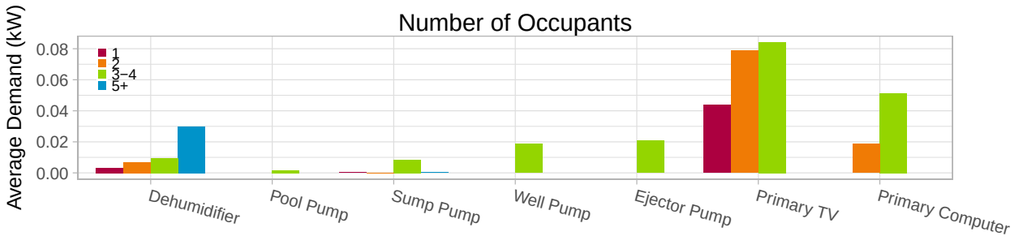


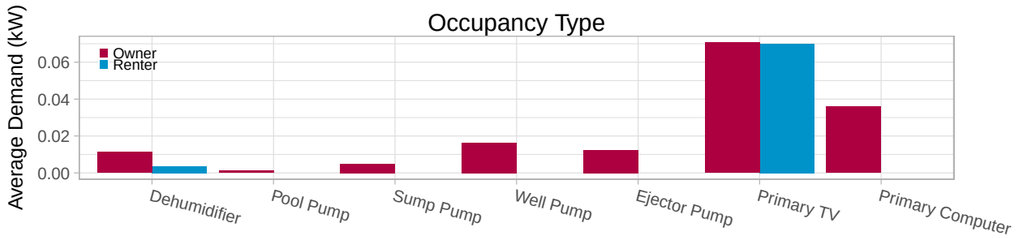


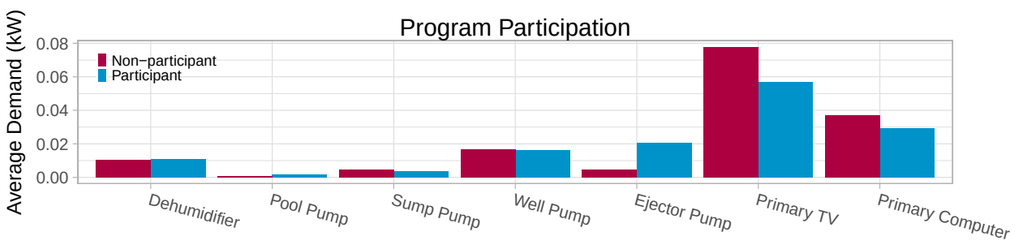


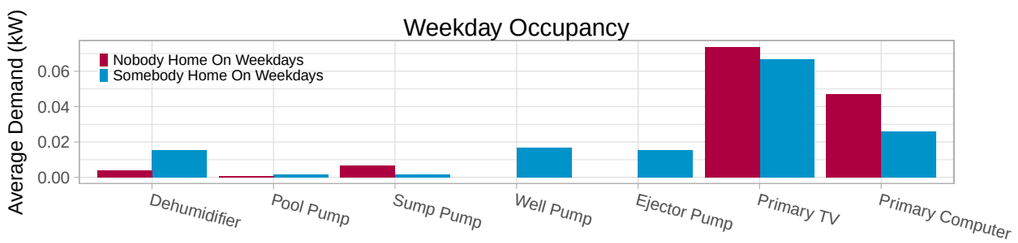










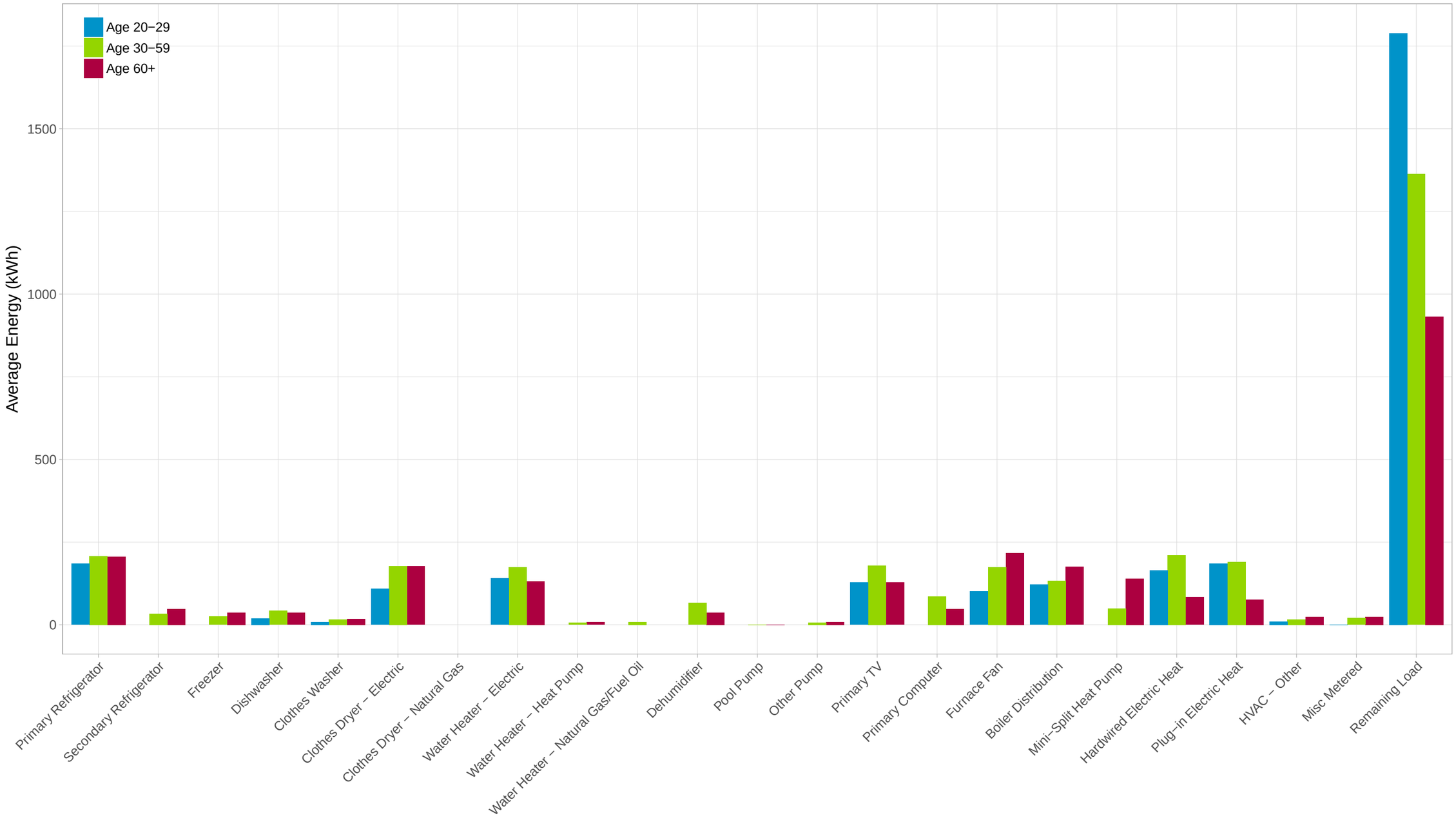


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.5 Population Winter Energy Consumption

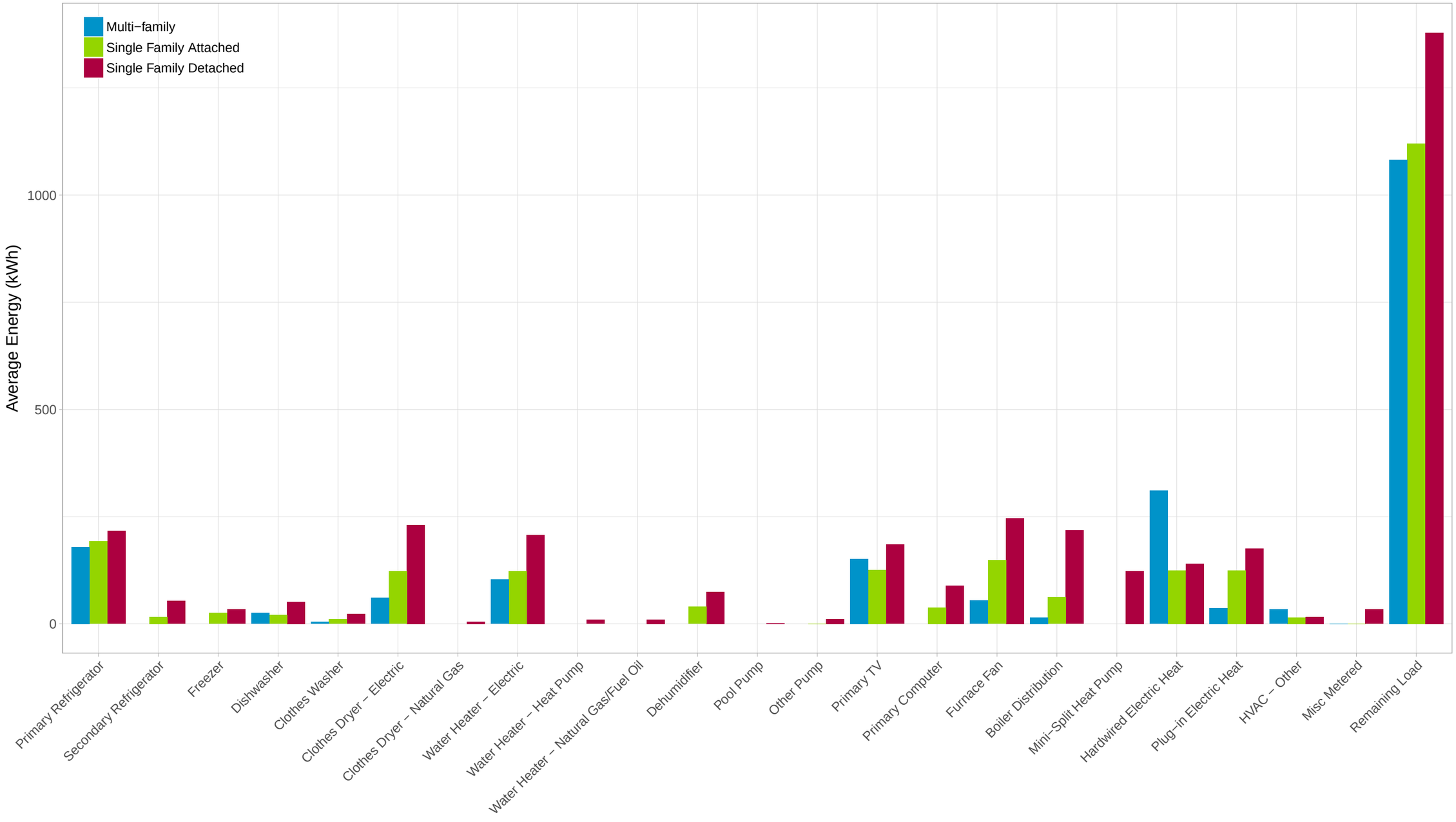
9.5.1 Population Average Winter Energy Consumption by End Use and Age



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

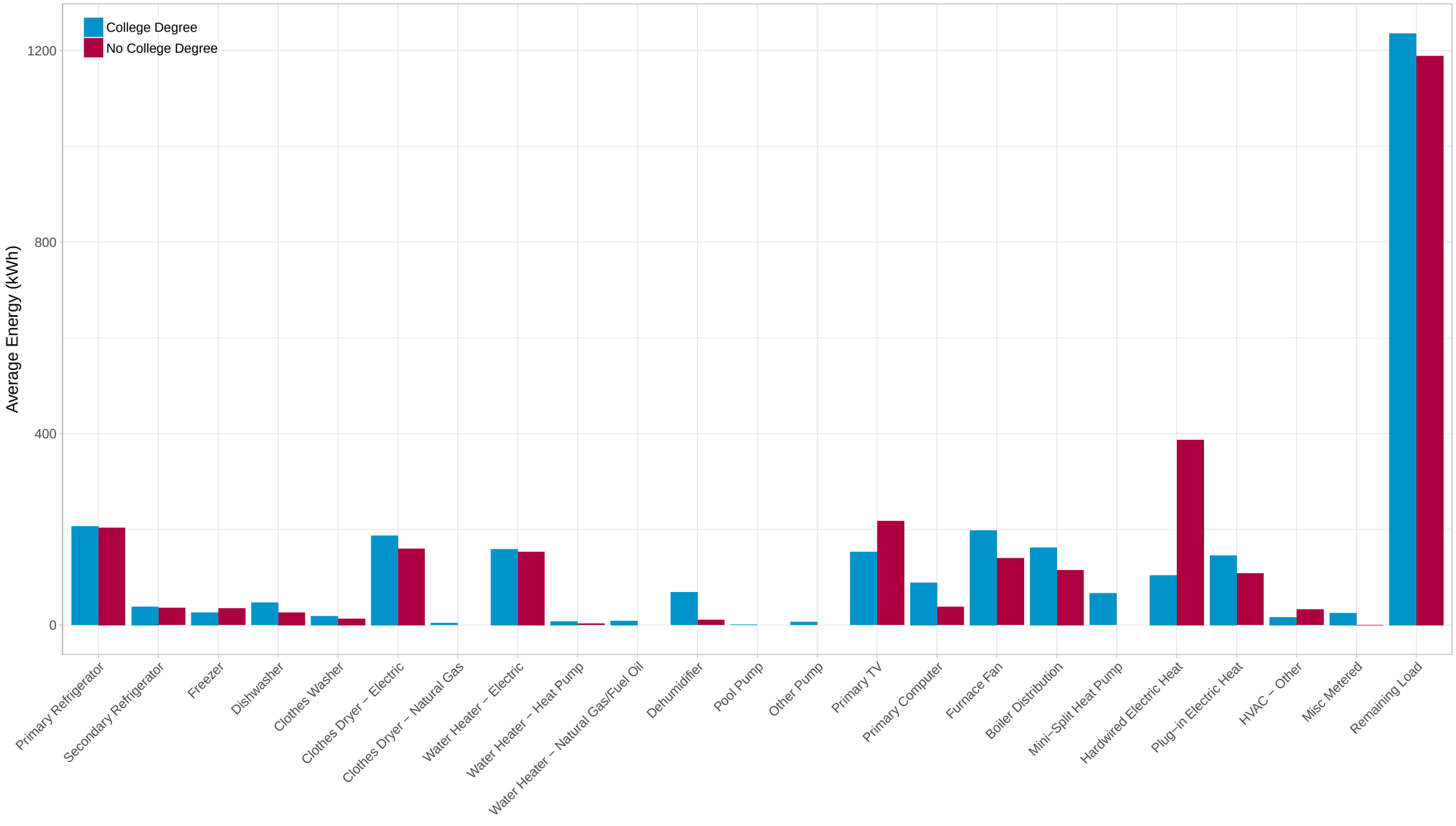
9.5.2 Population Average Winter Energy Consumption by End Use and Building Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

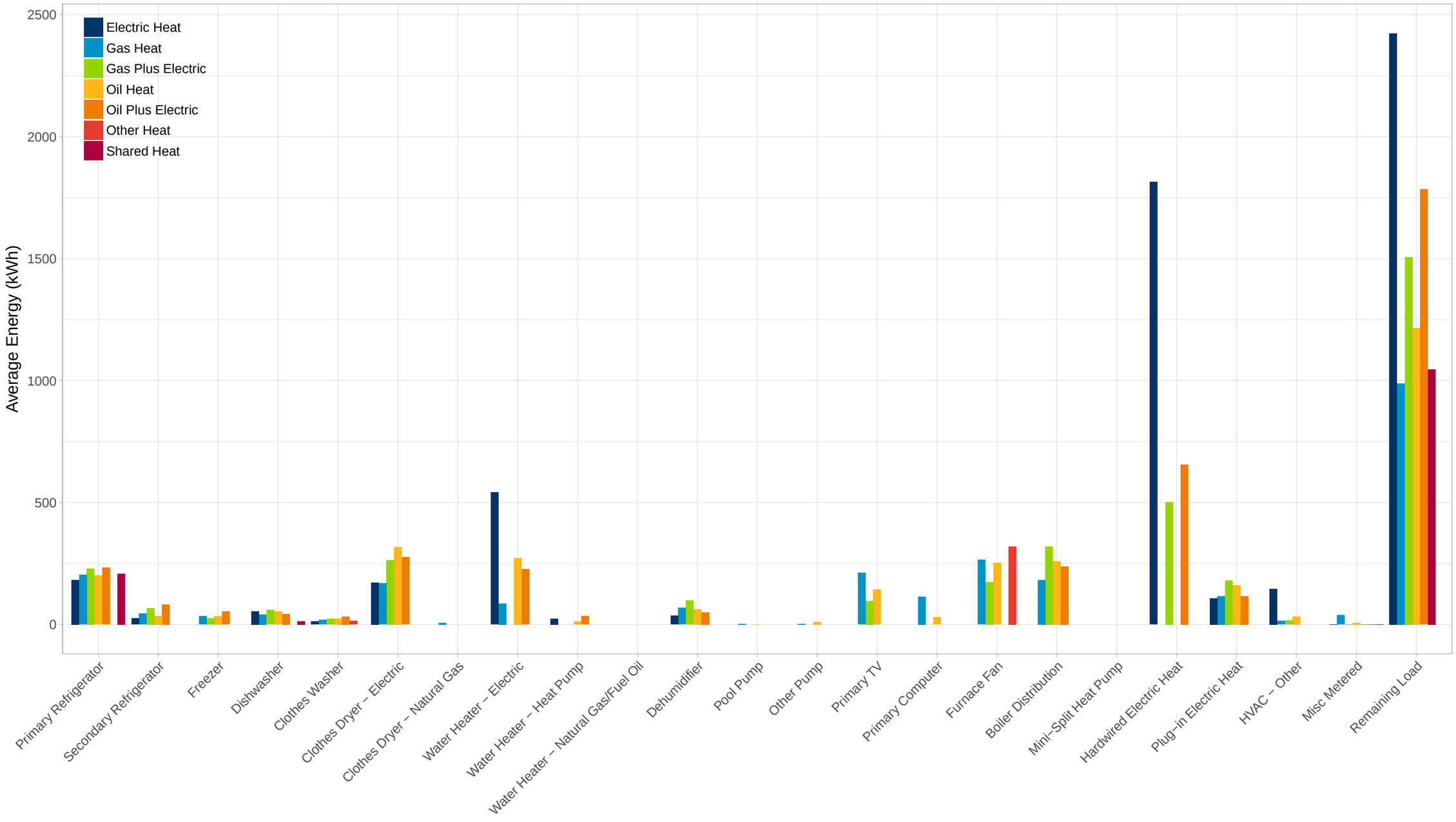
9.5.3 Population Average Winter Energy Consumption by End Use and Education Level



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

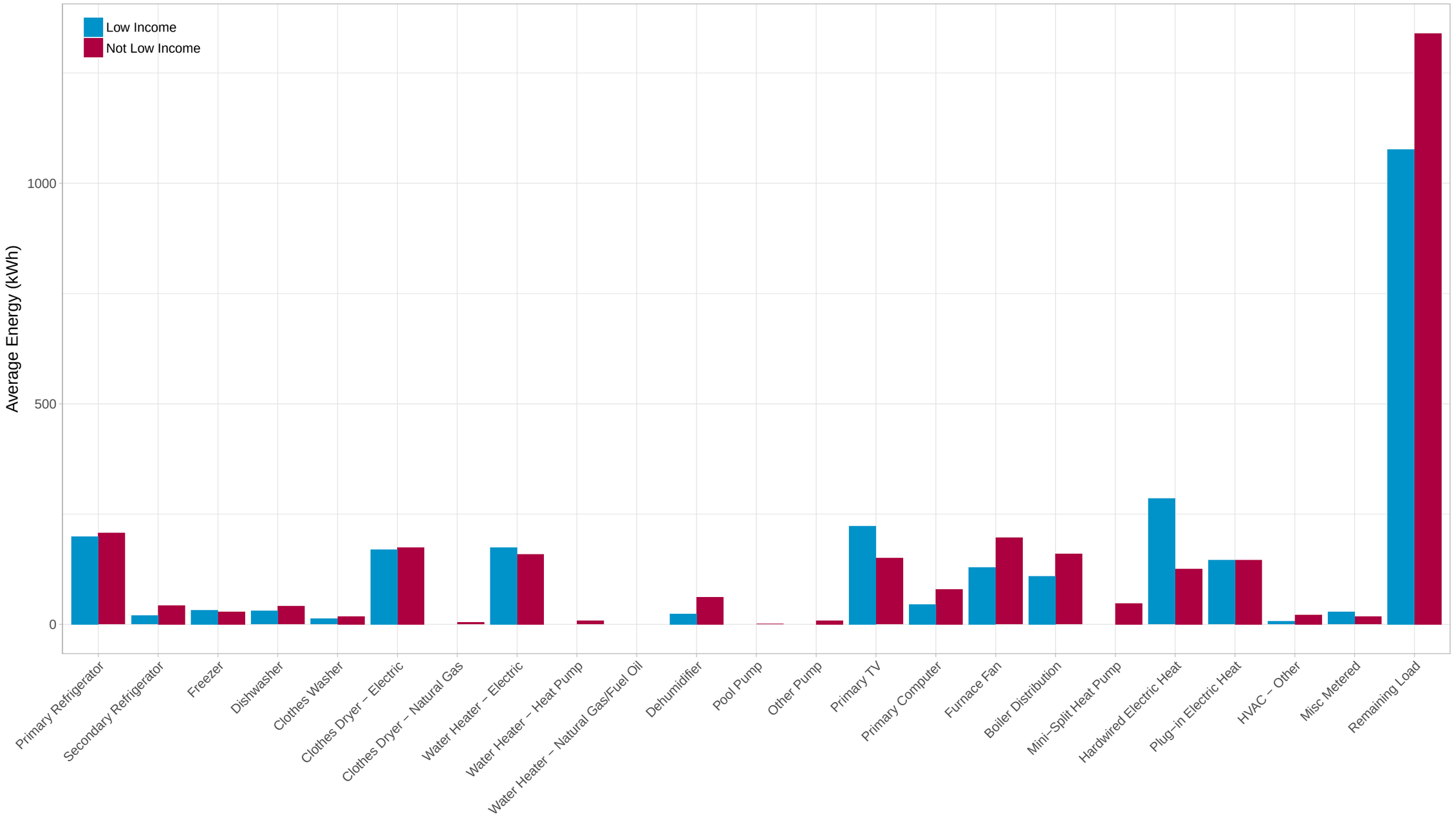
9.5.4 Population Average Winter Energy Consumption by End Use and Heating Fuel



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

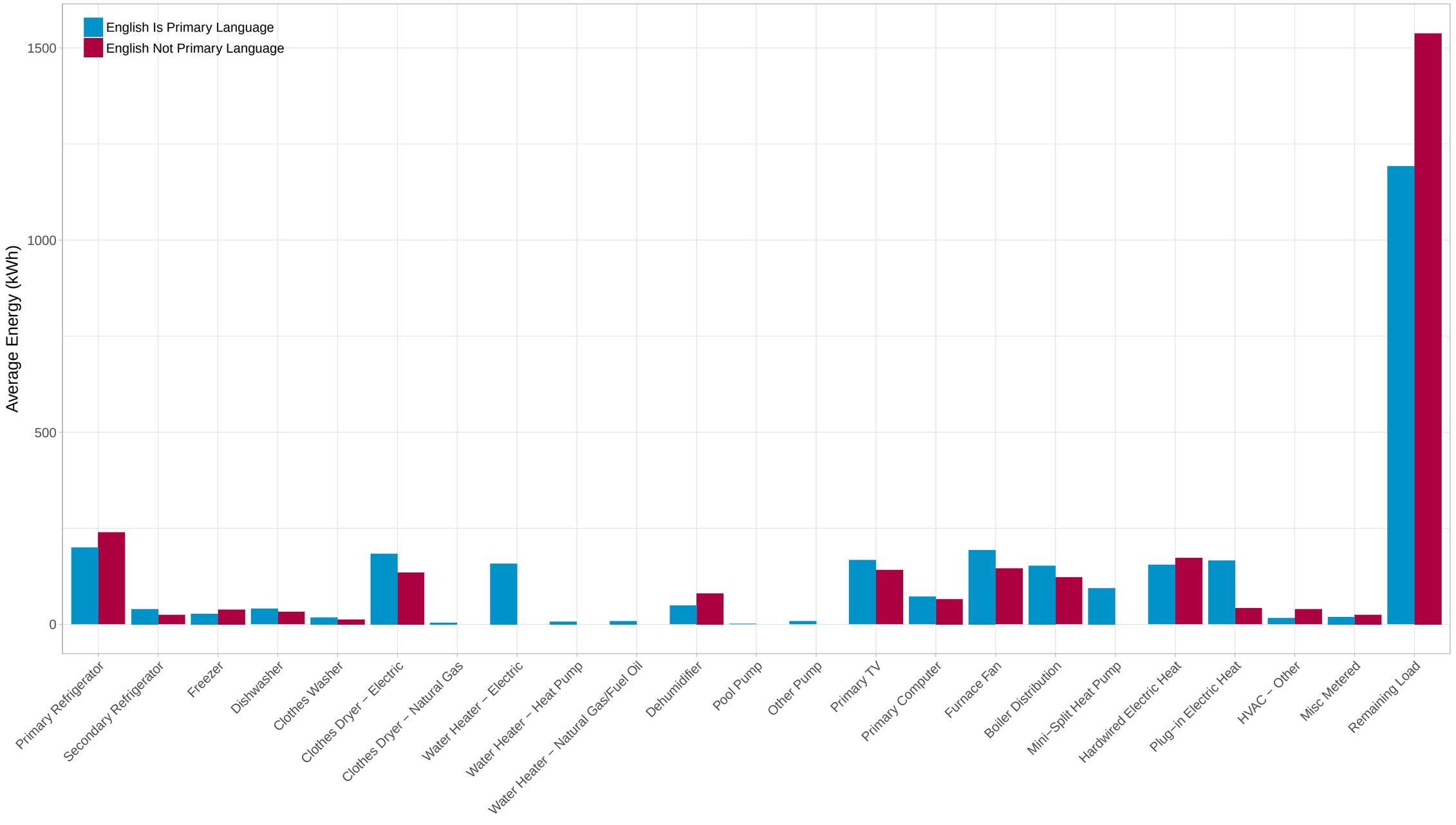
9.5.5 Population Average Winter Energy Consumption by End Use and Income



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

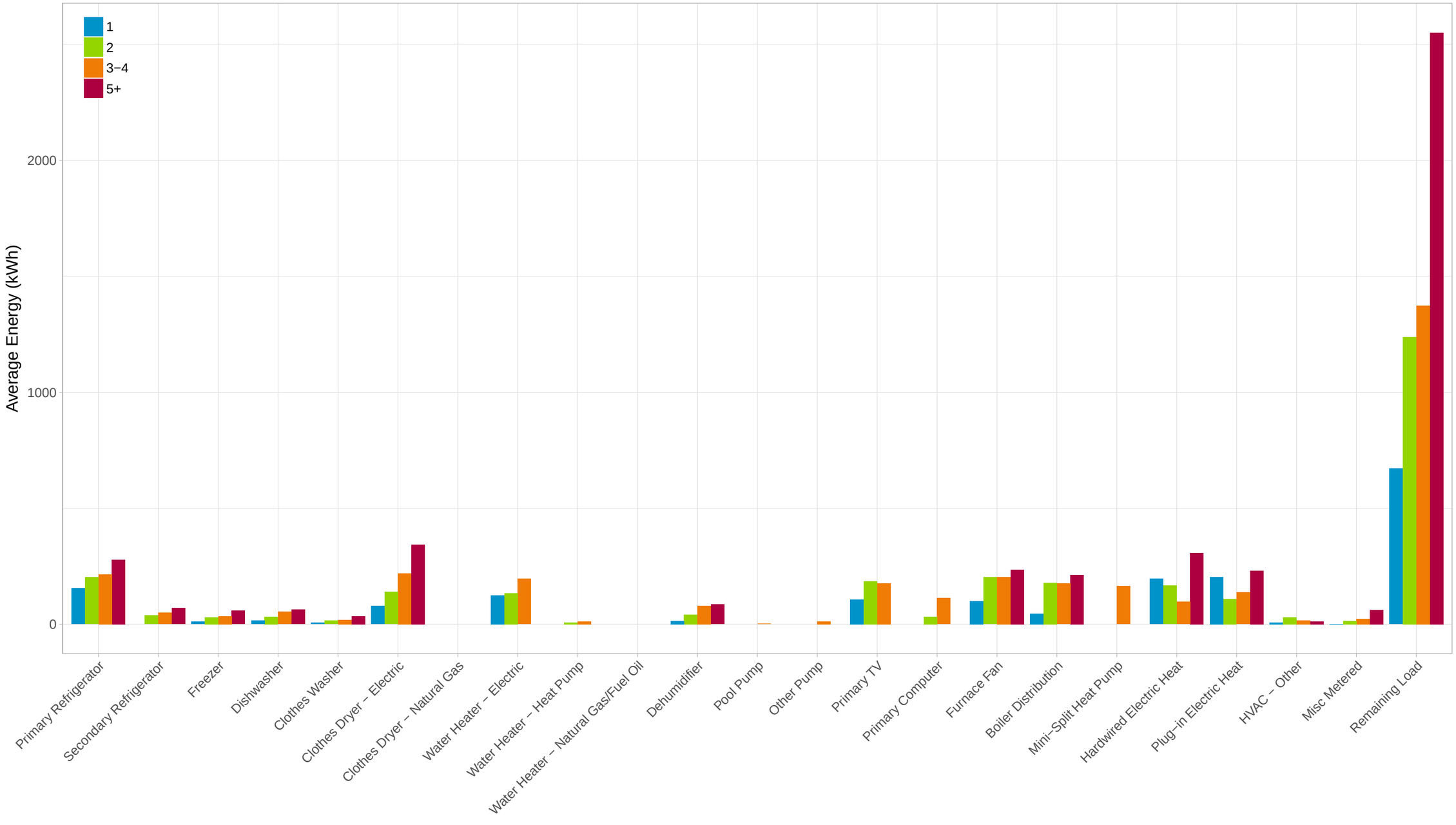
9.5.6 Population Average Winter Energy Consumption by End Use and Language



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

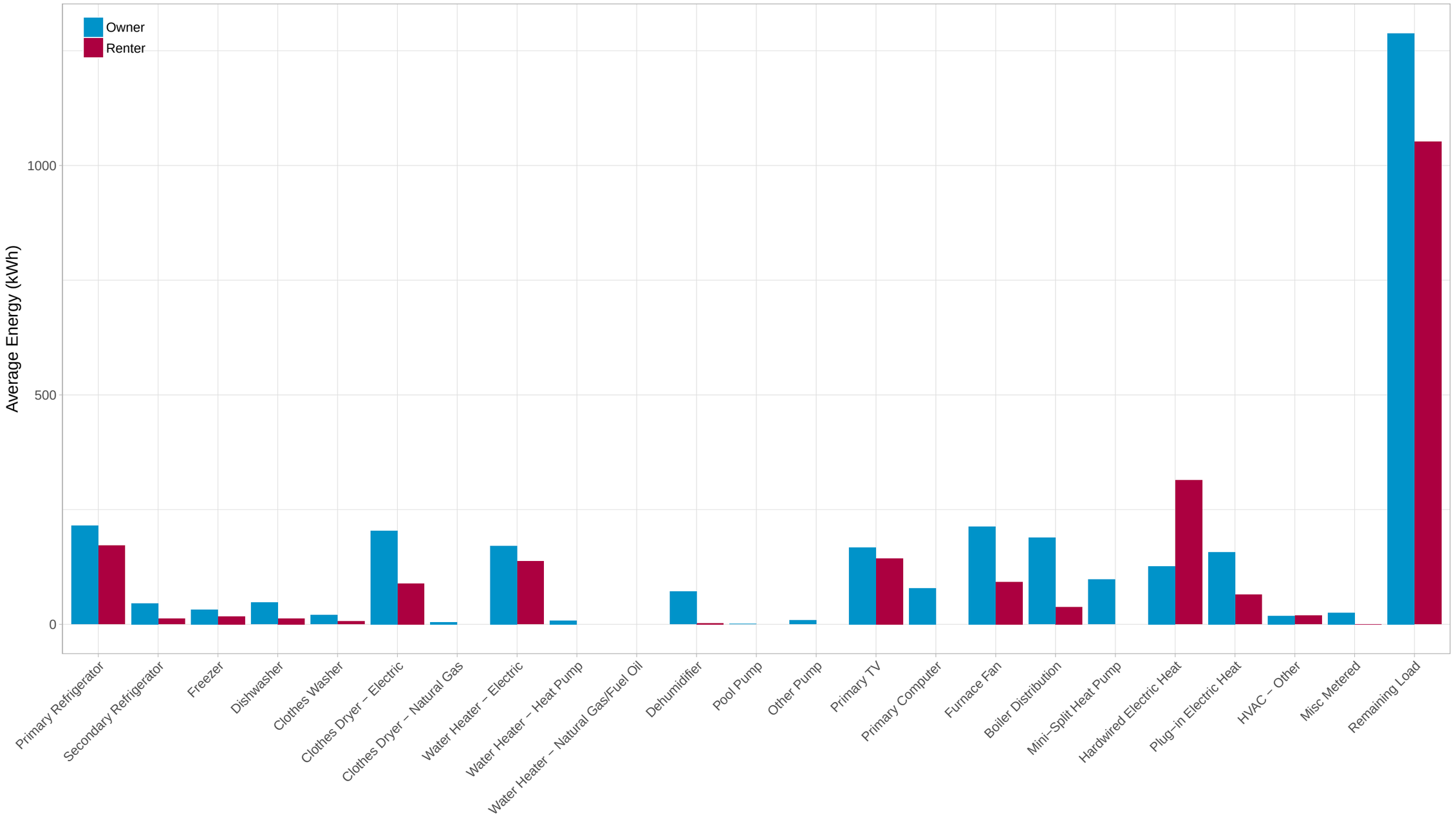
9.5.7 Population Average Winter Energy Consumption by End Use and Number of Occupants



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

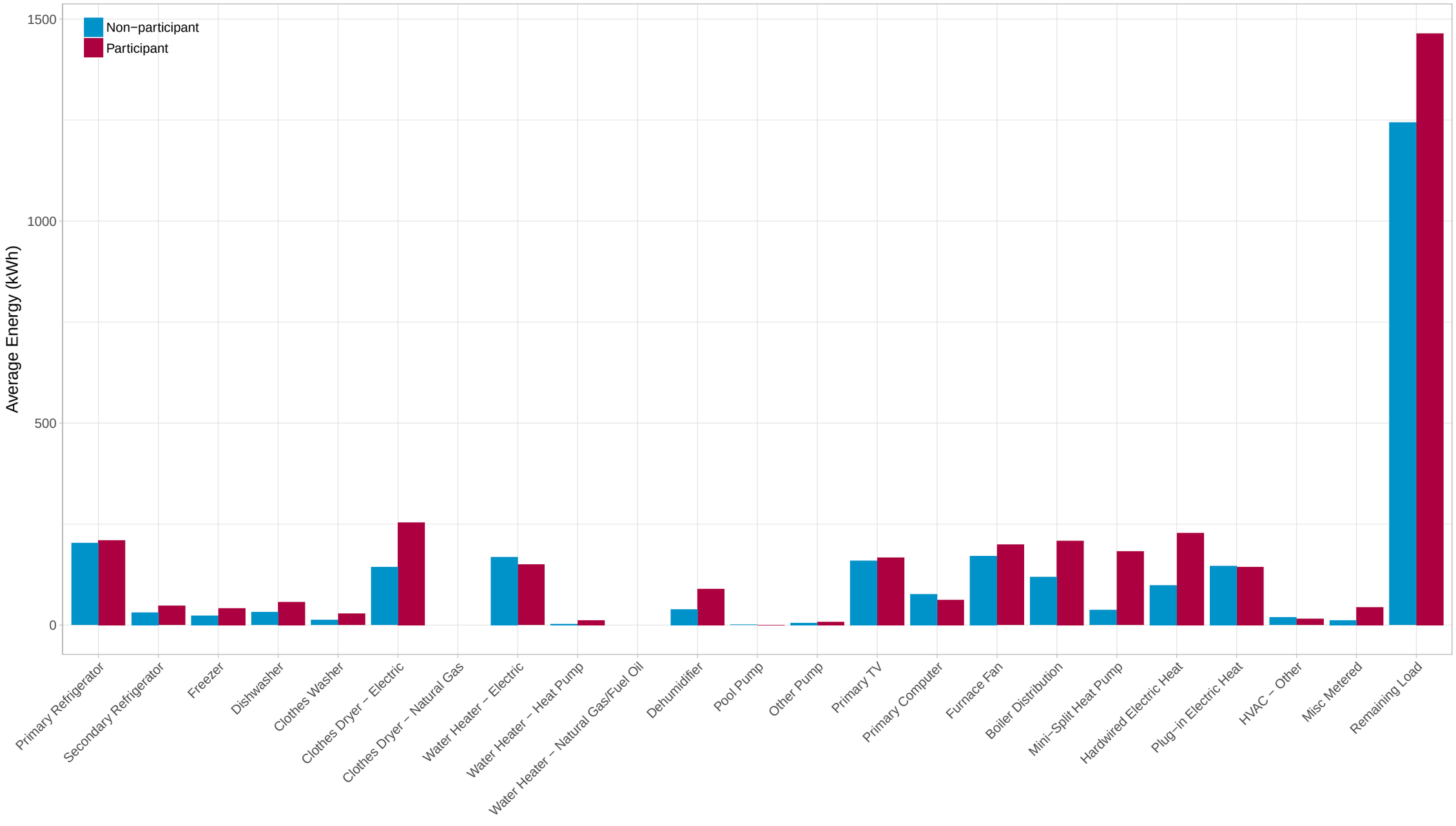
9.5.8 Population Average Winter Energy Consumption by End Use and Occupancy Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

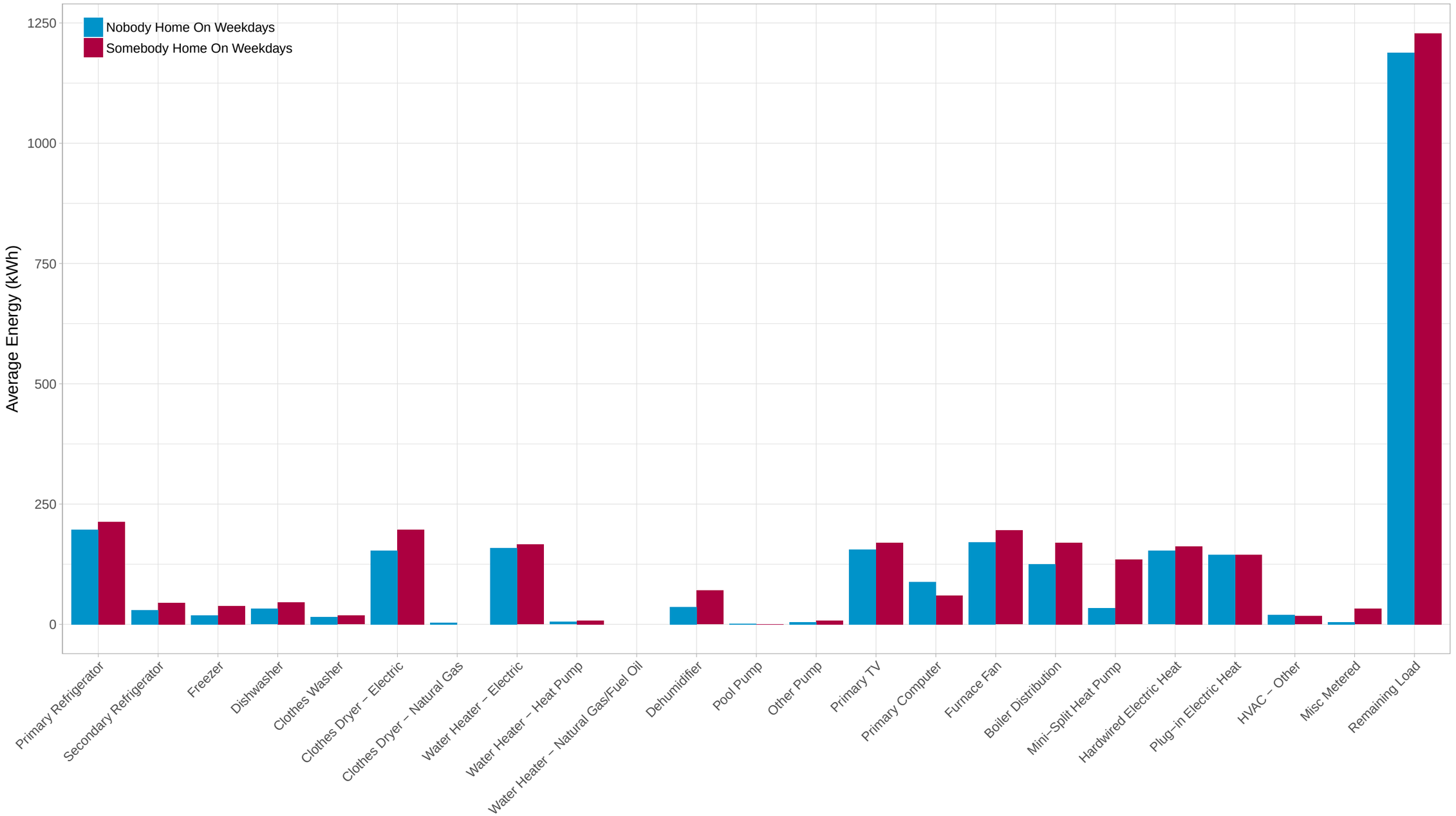
9.5.9 Population Average Winter Energy Consumption by End Use and Program Participation



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.5.10 Population Average Winter Energy Consumption by End Use and Weekday Occupancy

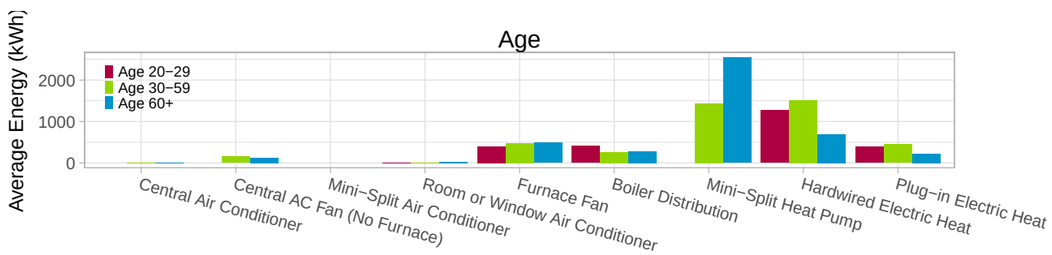


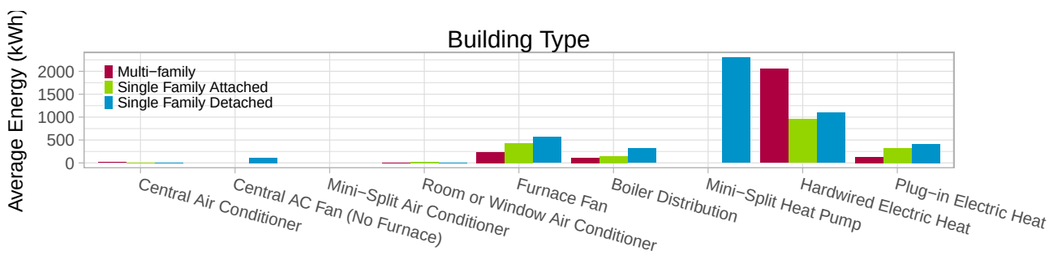
Source: Navigant Analysis

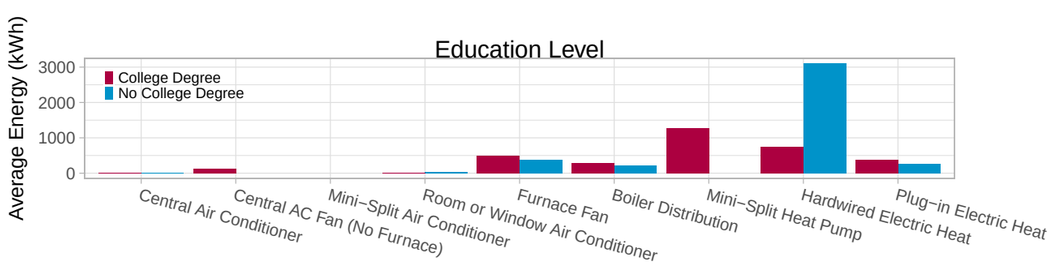
©2018 Navigant Consulting, Inc. All Rights Reserved

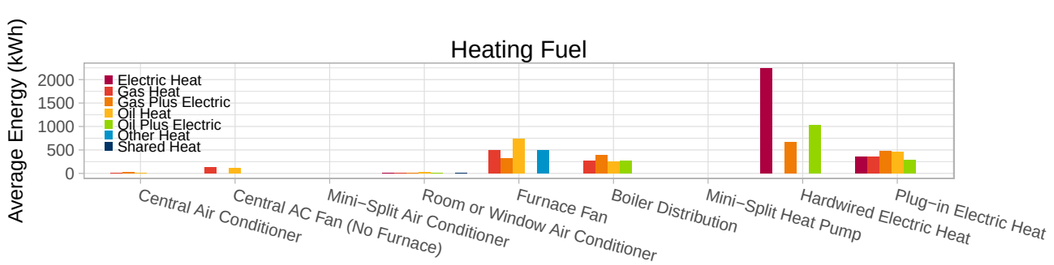
9.6 Winter Energy Consumption for Homes With End Use

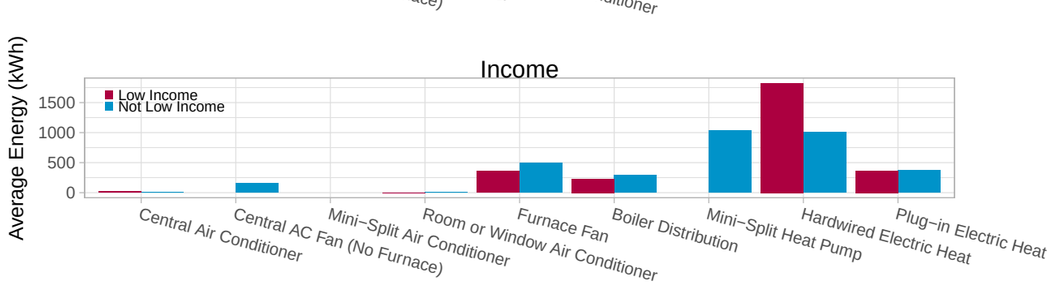
9.6.1 Average Winter HVAC Energy Consumption by End Use and Demographic for Homes With End Use

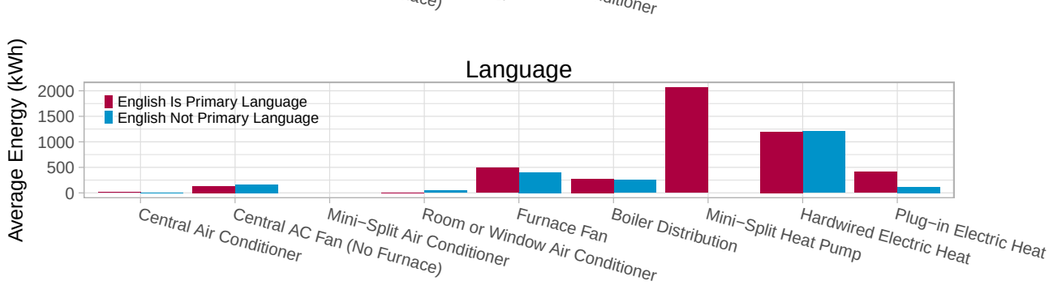


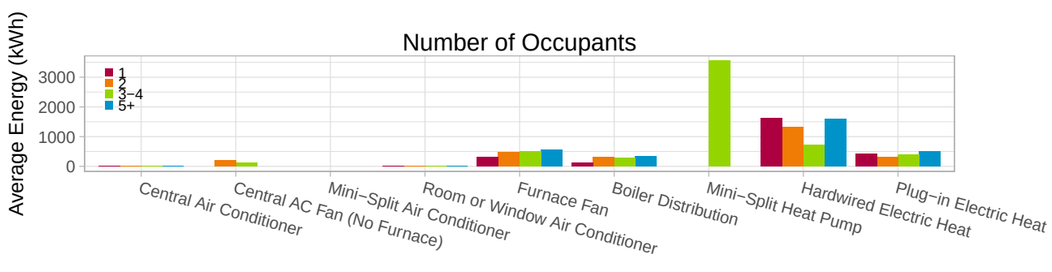


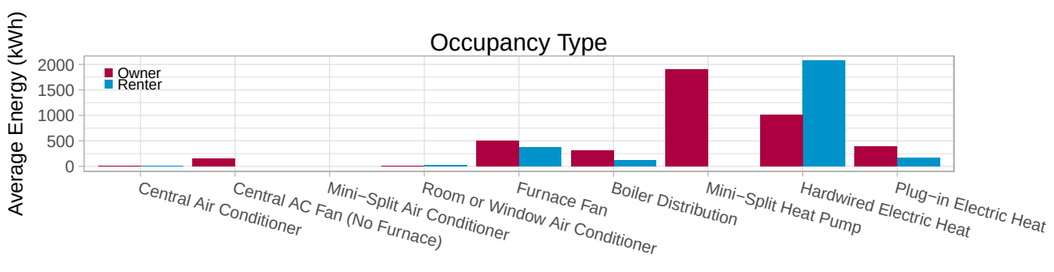


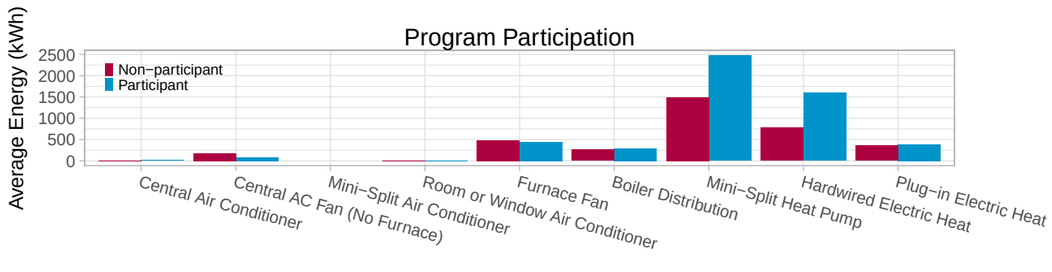


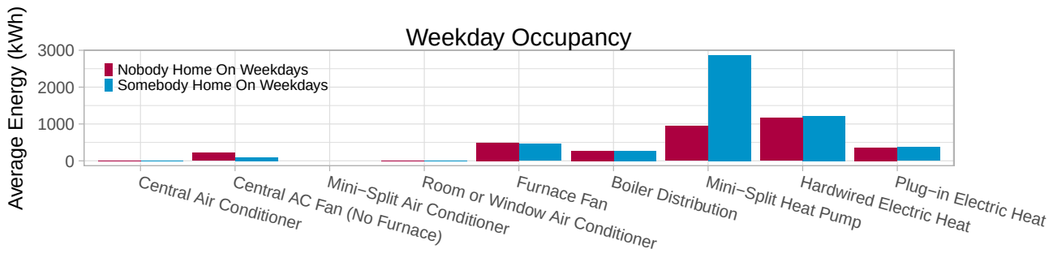








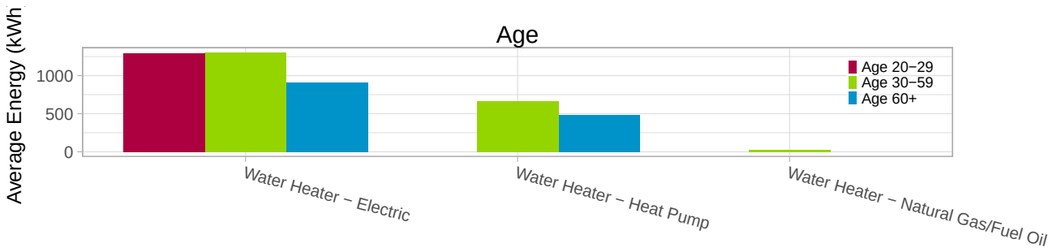


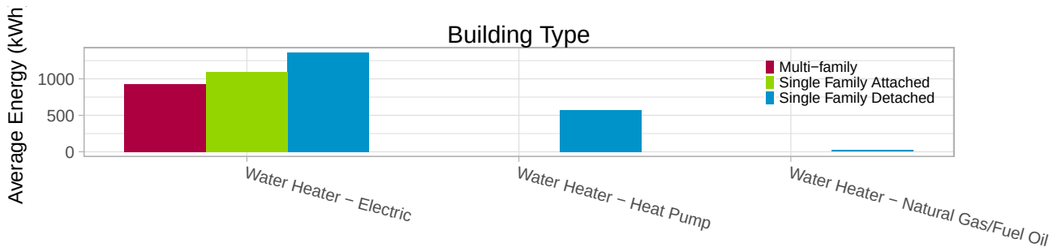


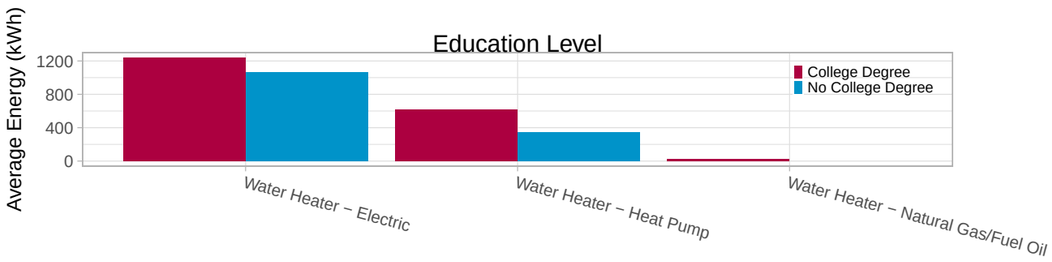
Source: Navigant Analysis

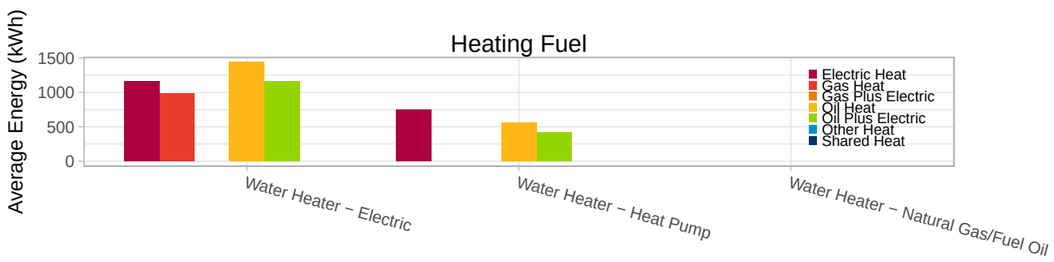
©2018 Navigant Consulting, Inc. All Rights Reserved

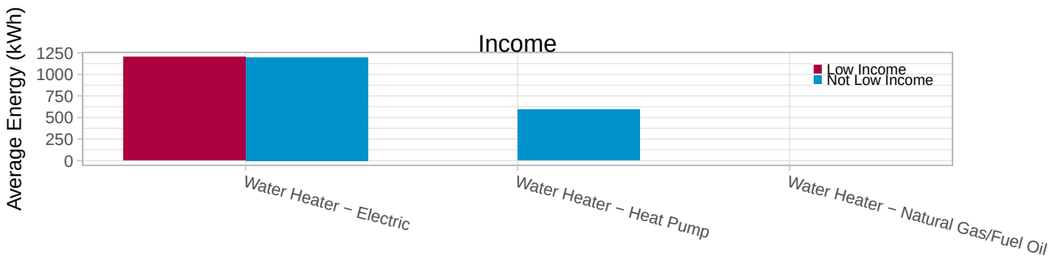
9.6.2 Average Winter Water Heating Energy Consumption by End Use and Demographic for Homes With End Use

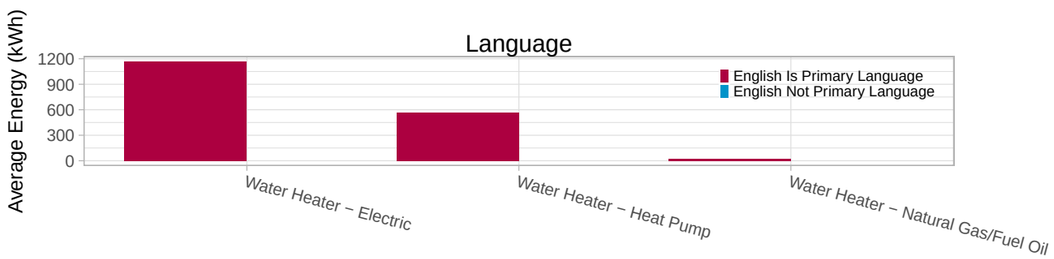


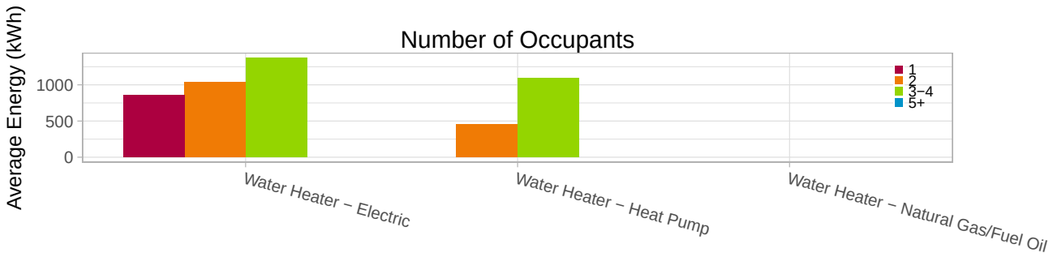


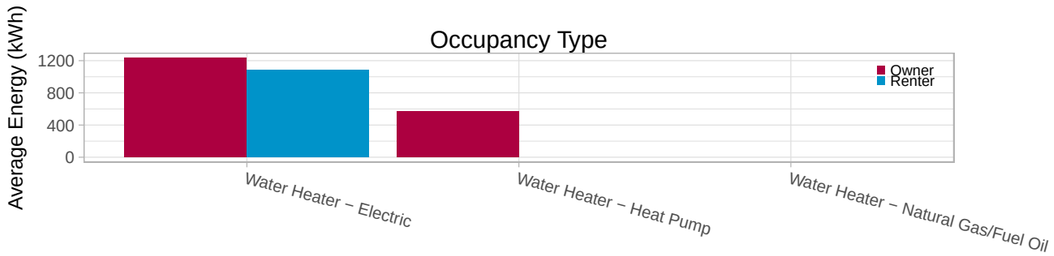


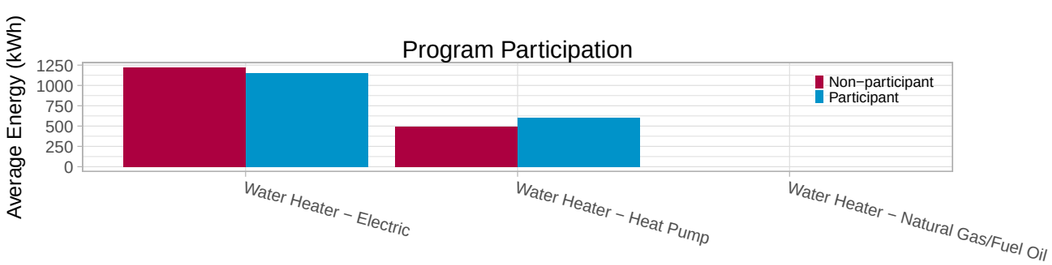


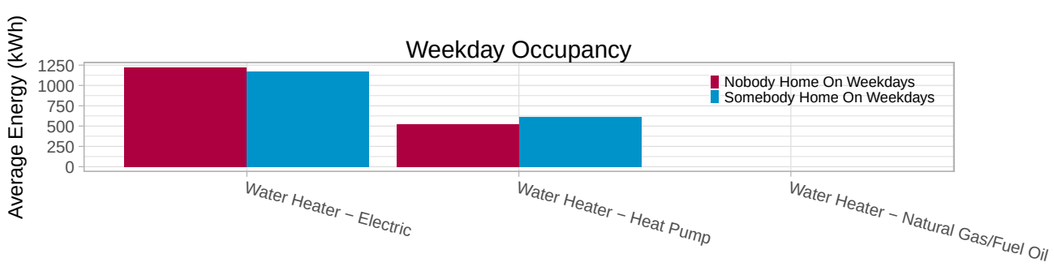








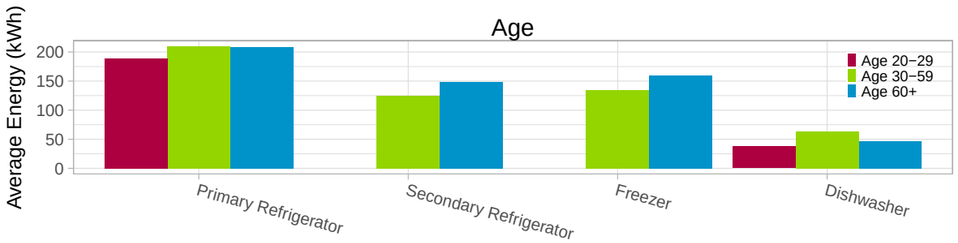


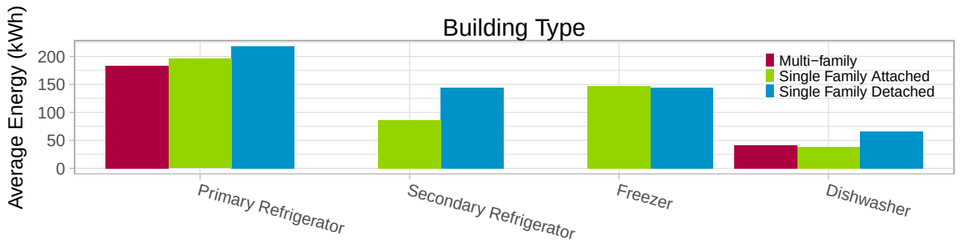


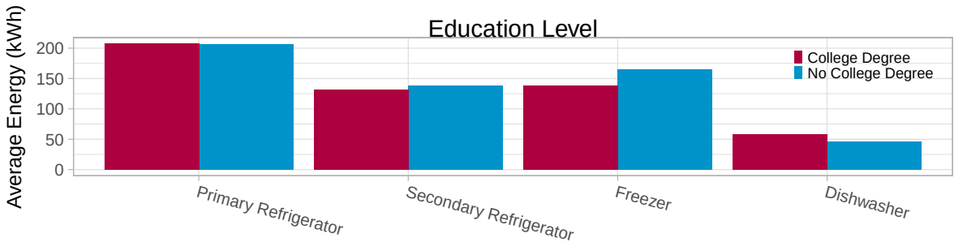
Source: Navigant Analysis

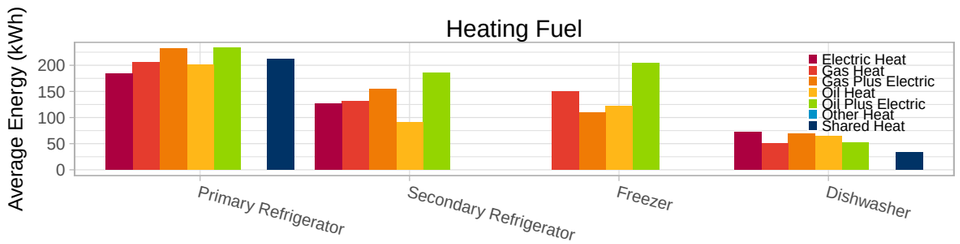
©2018 Navigant Consulting, Inc. All Rights Reserved

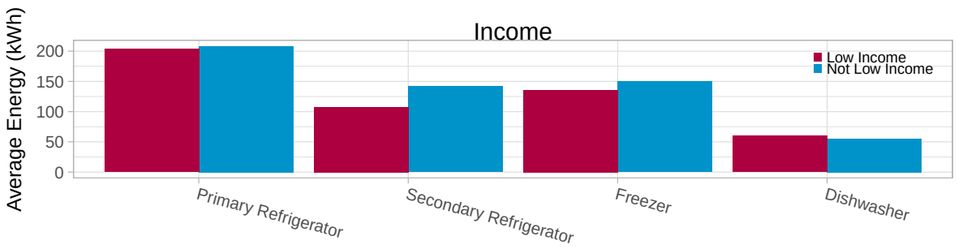
9.6.3 Average Winter Kitchen Energy Consumption by End Use and Demographic for Homes With End Use

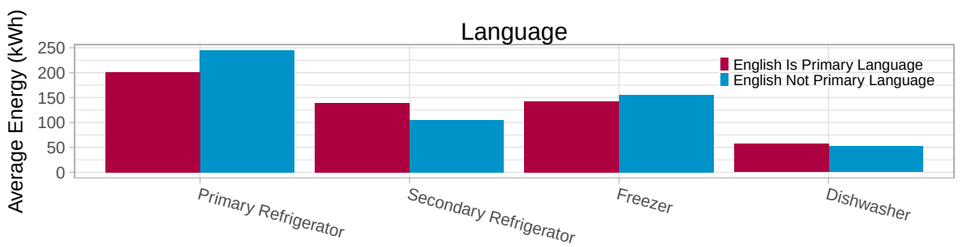


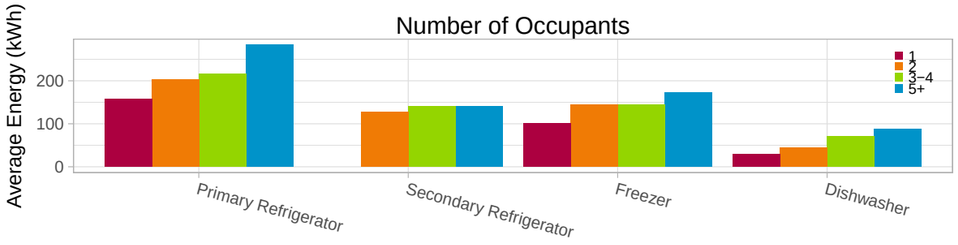


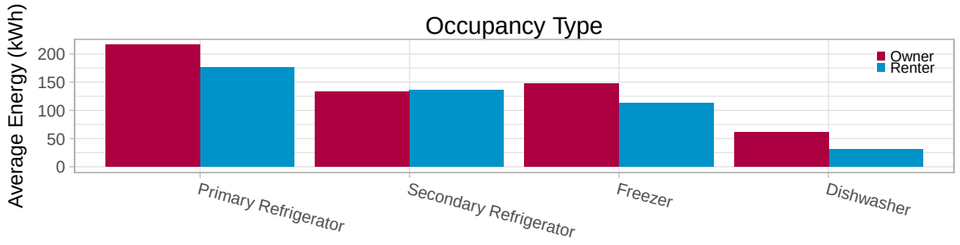


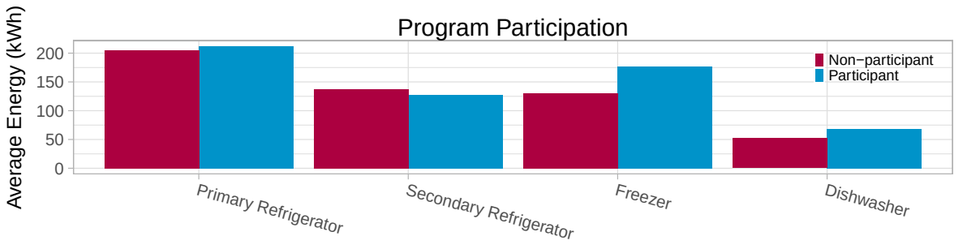


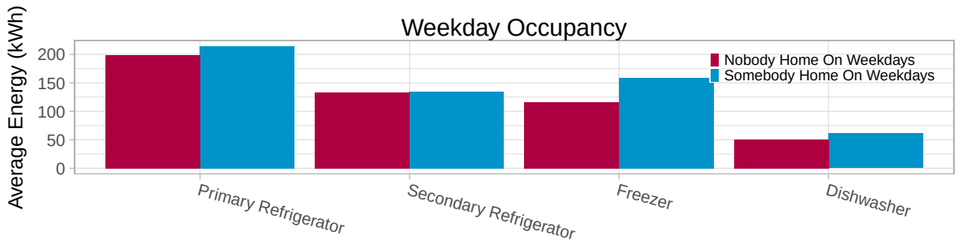








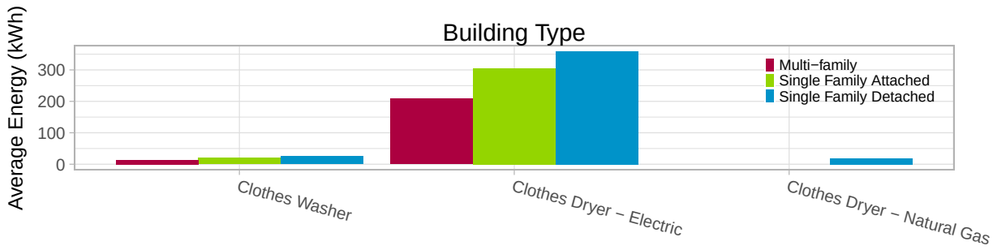


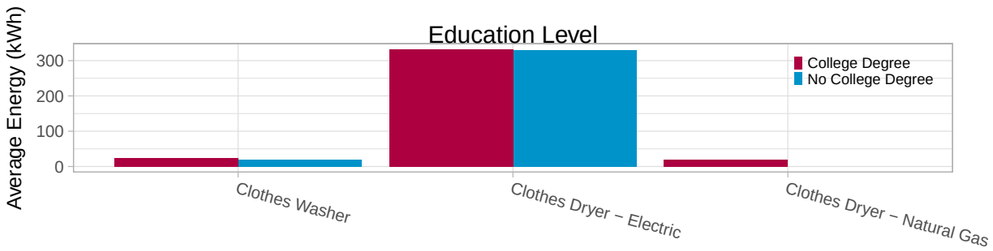


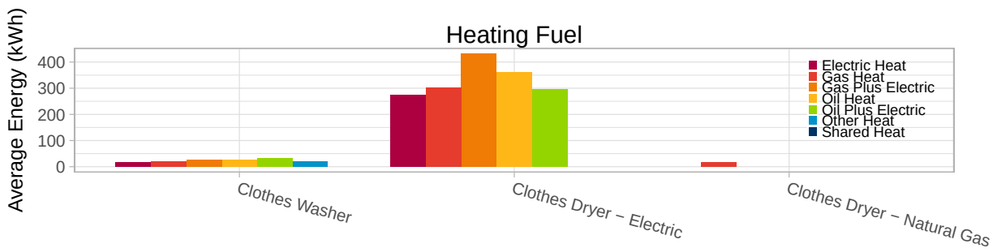
Source: Navigant Analysis

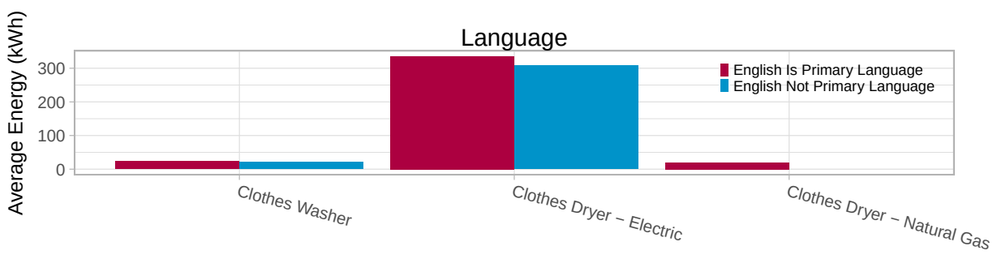
©2018 Navigant Consulting, Inc. All Rights Reserved

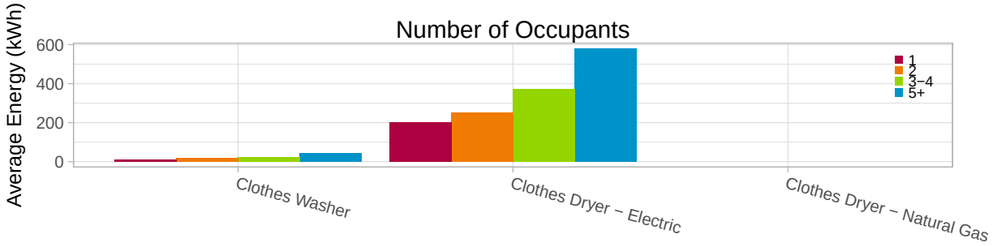
9.6.4 Average Winter Laundry Energy Consumption by End Use and Demographic for Homes With End Use

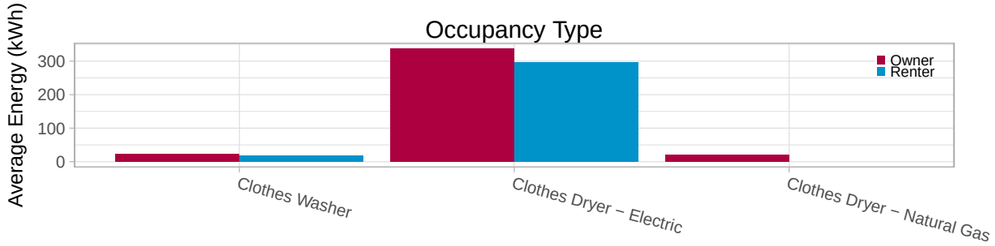


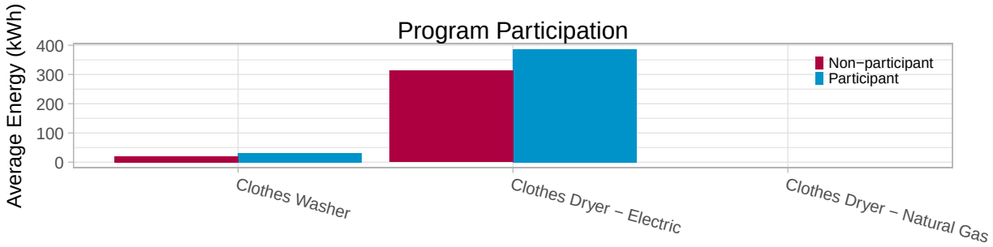


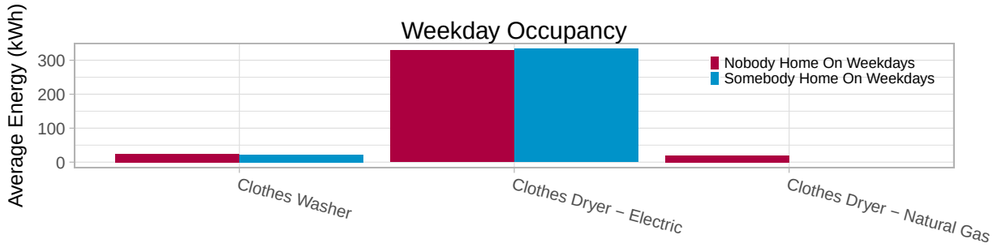








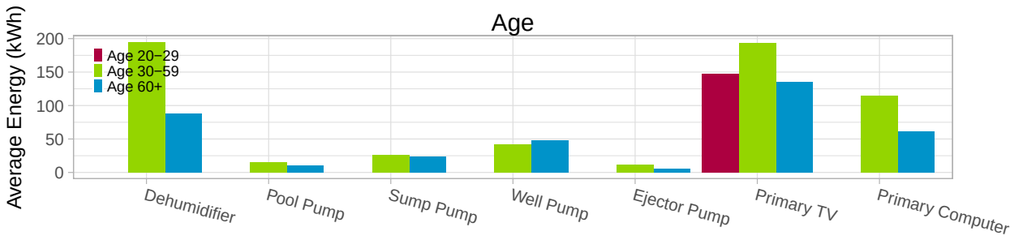


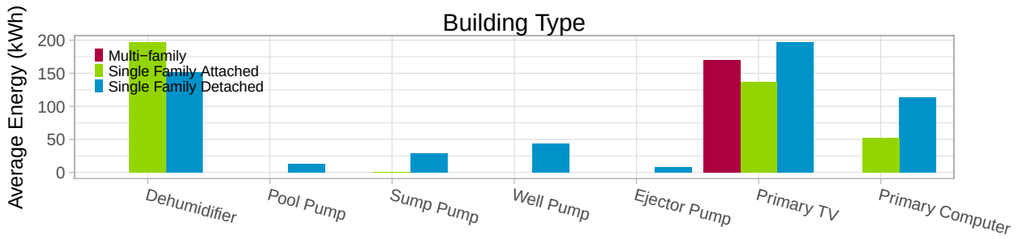


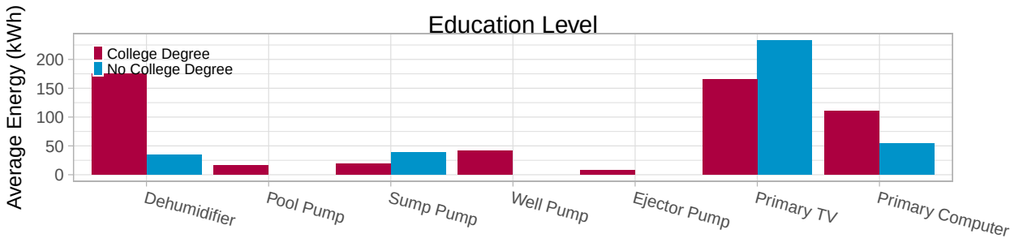
Source: Navigant Analysis

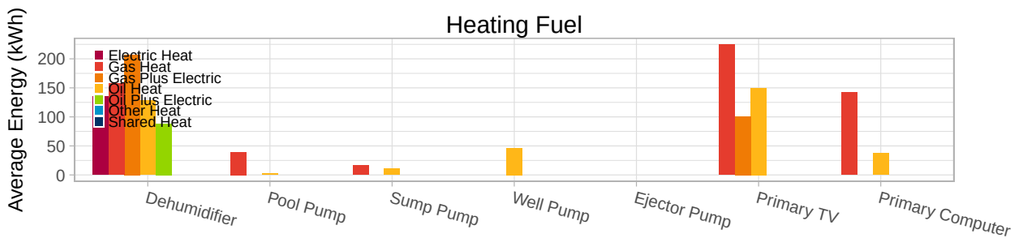
©2018 Navigant Consulting, Inc. All Rights Reserved

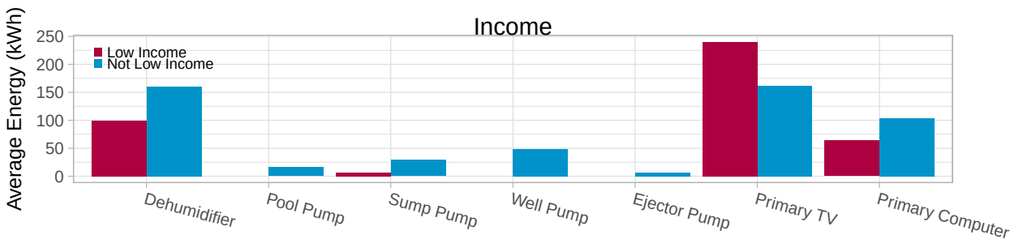
9.6.5 Average Winter Miscellaneous Energy Consumption by End Use and Demographic for Homes With End Use

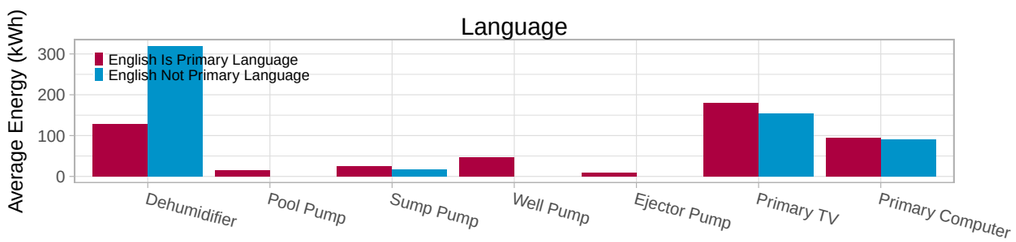


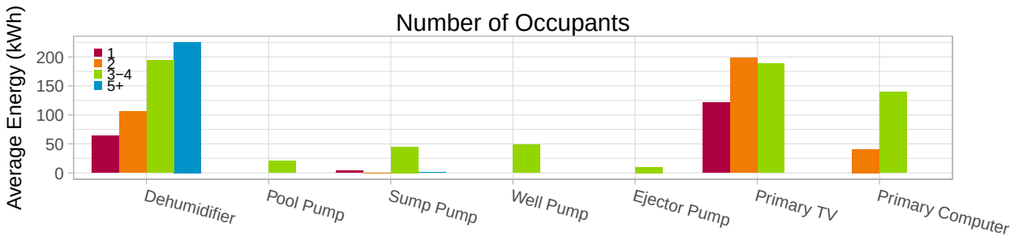


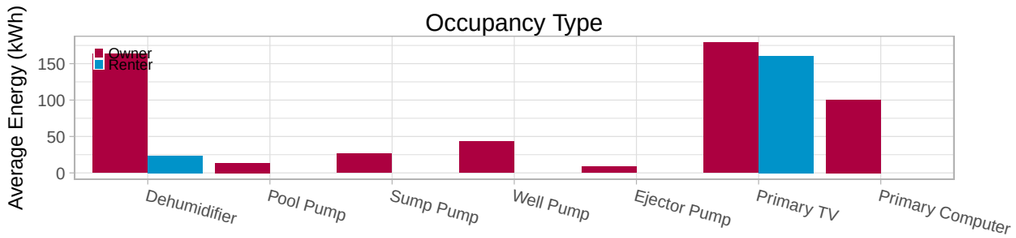


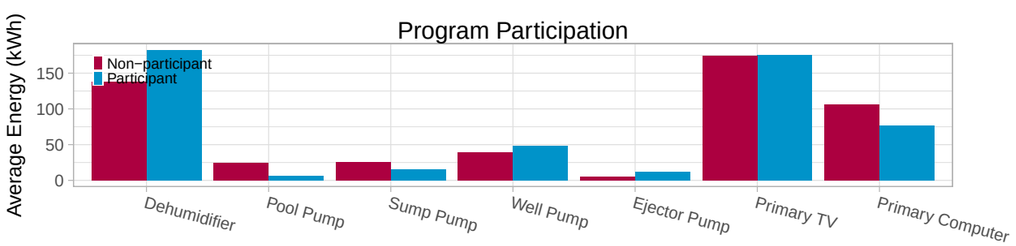


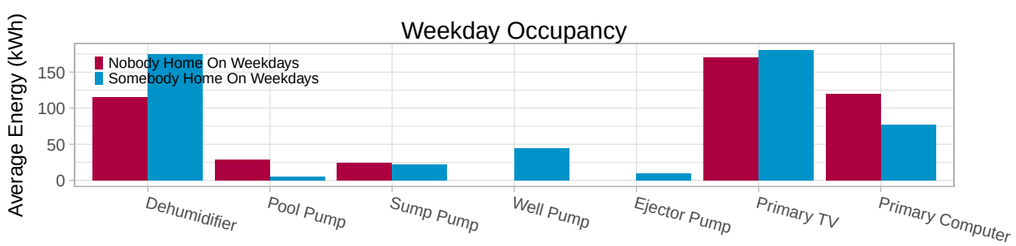










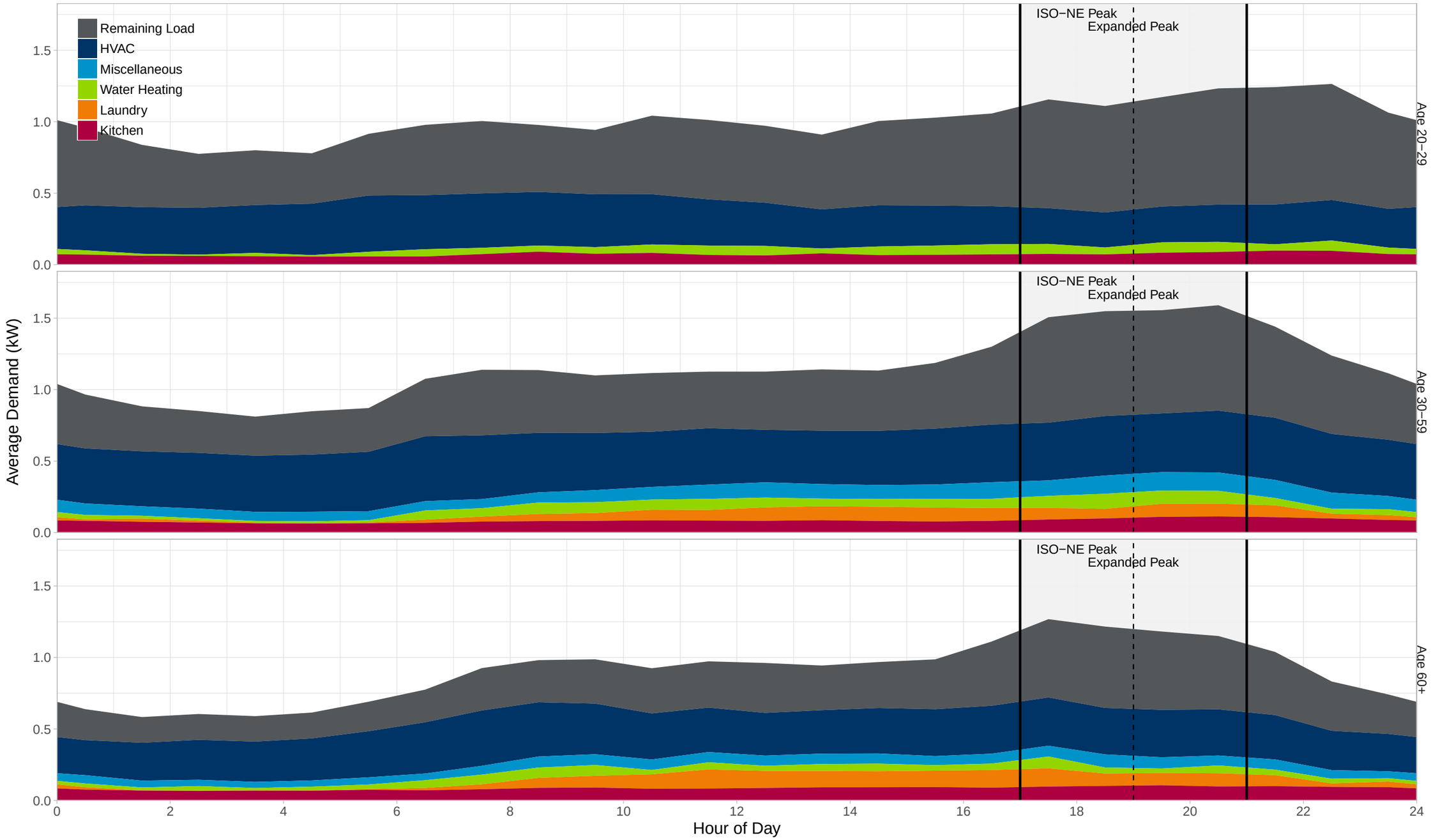


Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.7 Winter Peak Day Load Shapes

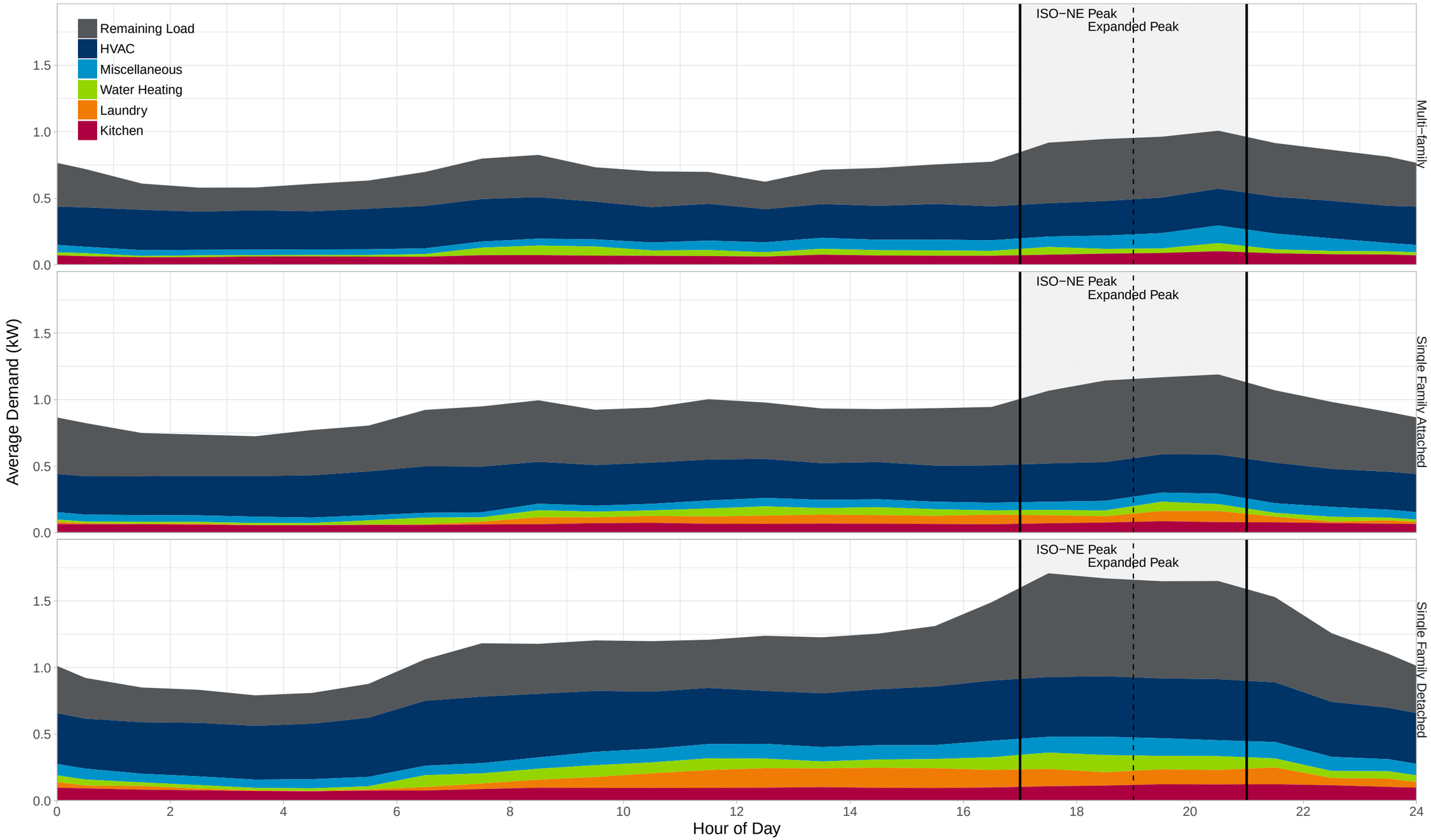
9.7.1 Population Winter Peak Day Load Shape by End Use Category and Age



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

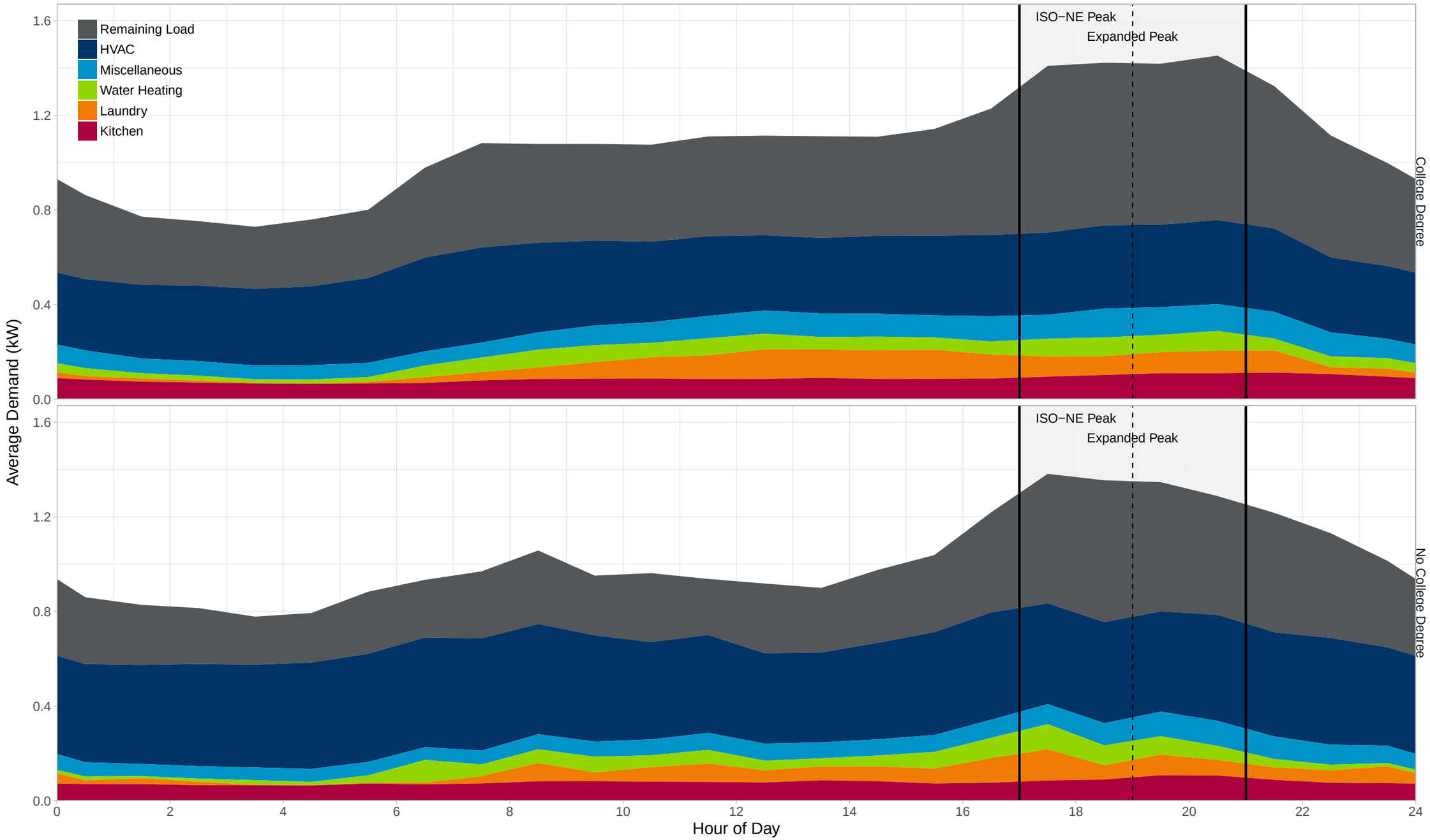
9.7.2 Population Winter Peak Day Load Shape by End Use Category and Building Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

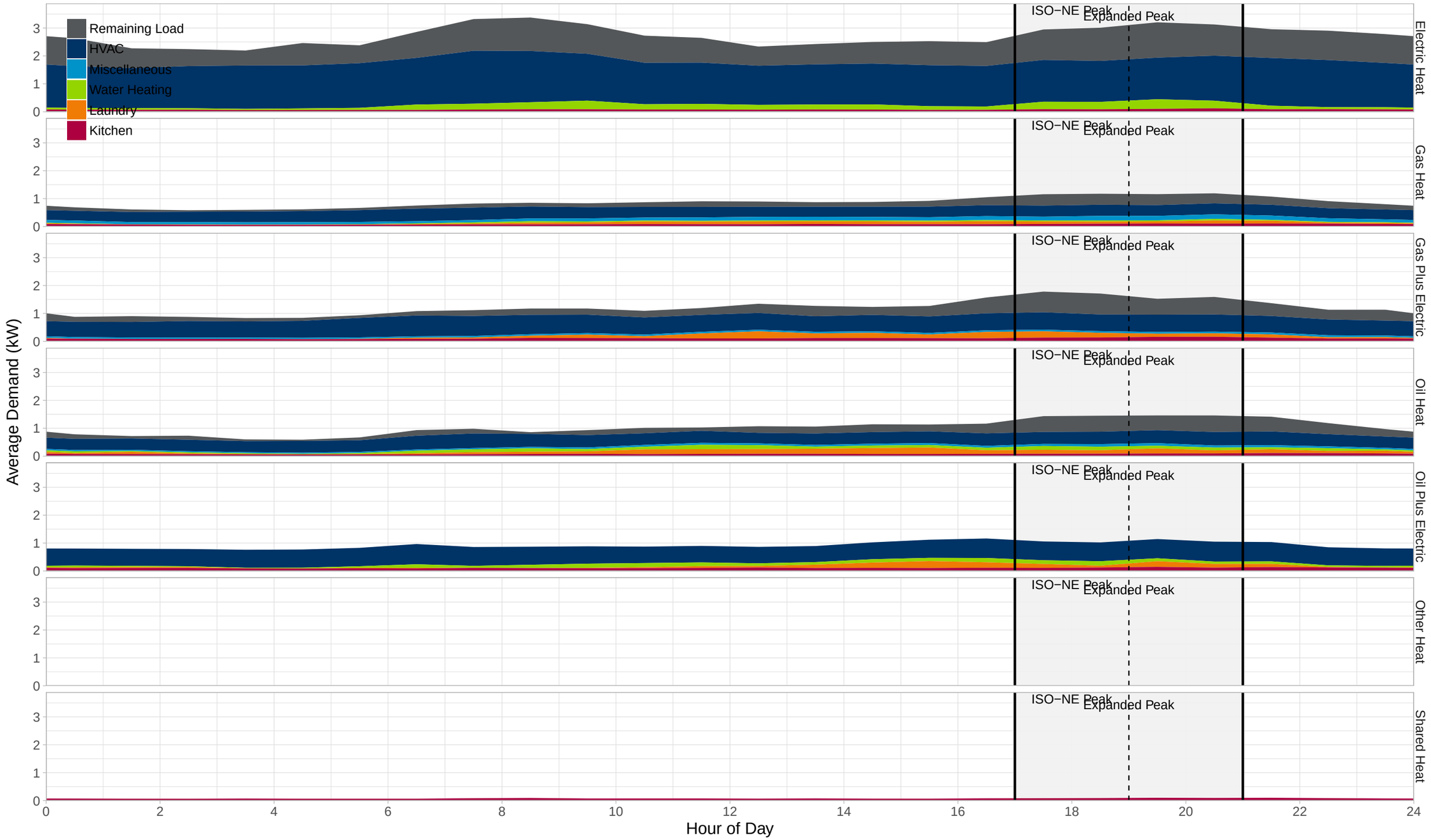
9.7.3 Population Winter Peak Day Load Shape by End Use Category and Education Level



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

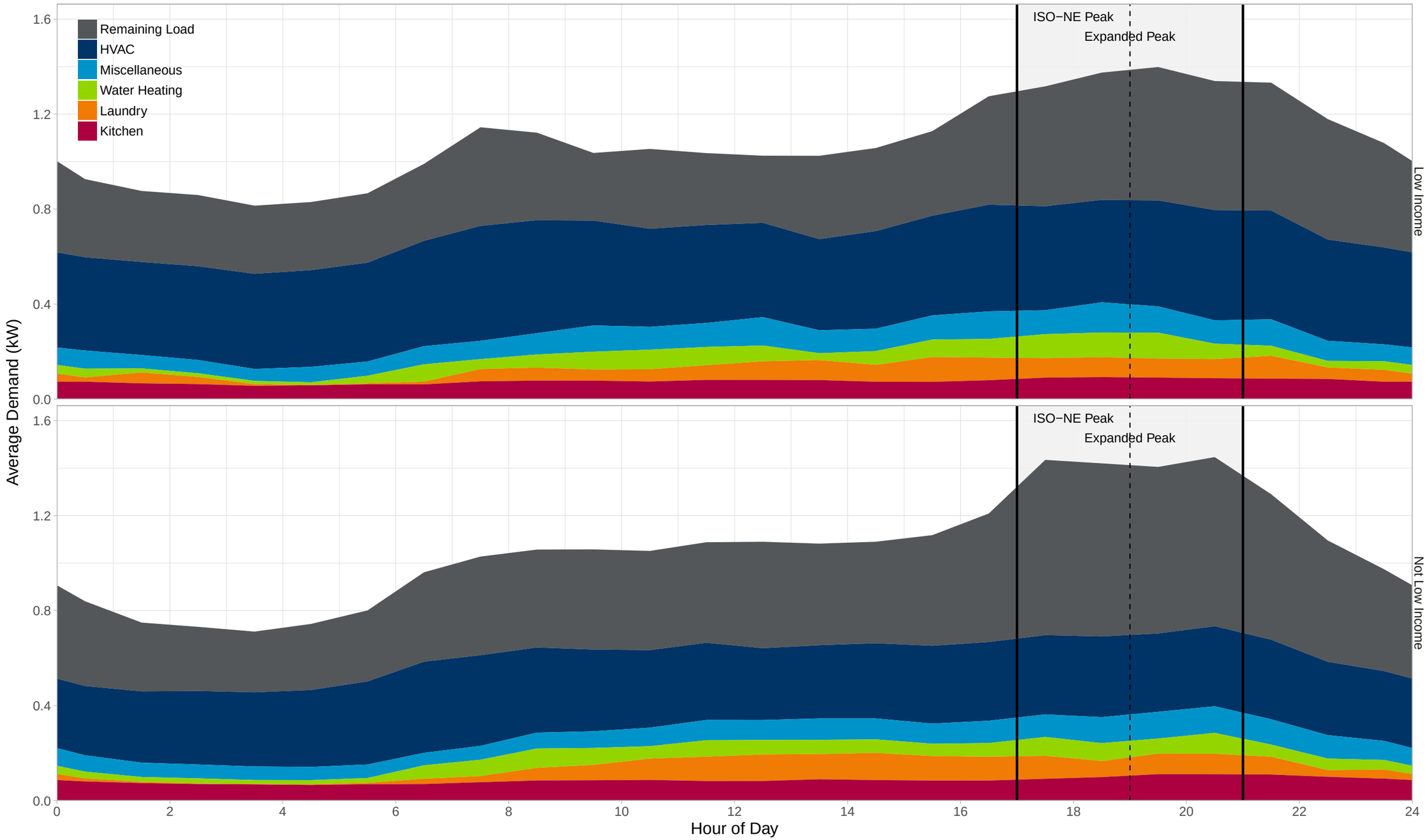
9.7.4 Population Winter Peak Day Load Shape by End Use Category and Heating Fuel



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

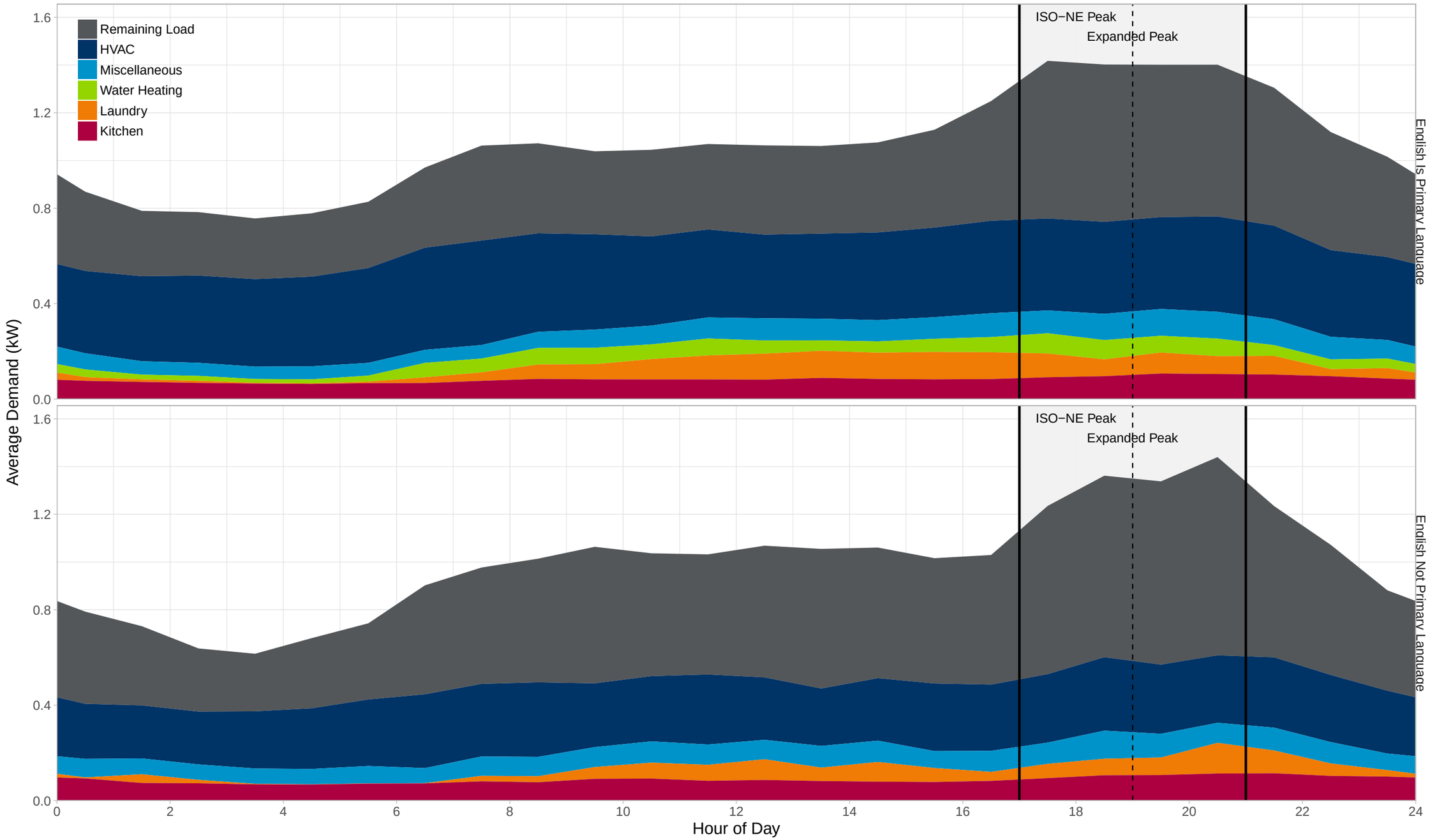
9.7.5 Population Winter Peak Day Load Shape by End Use Category and Income



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

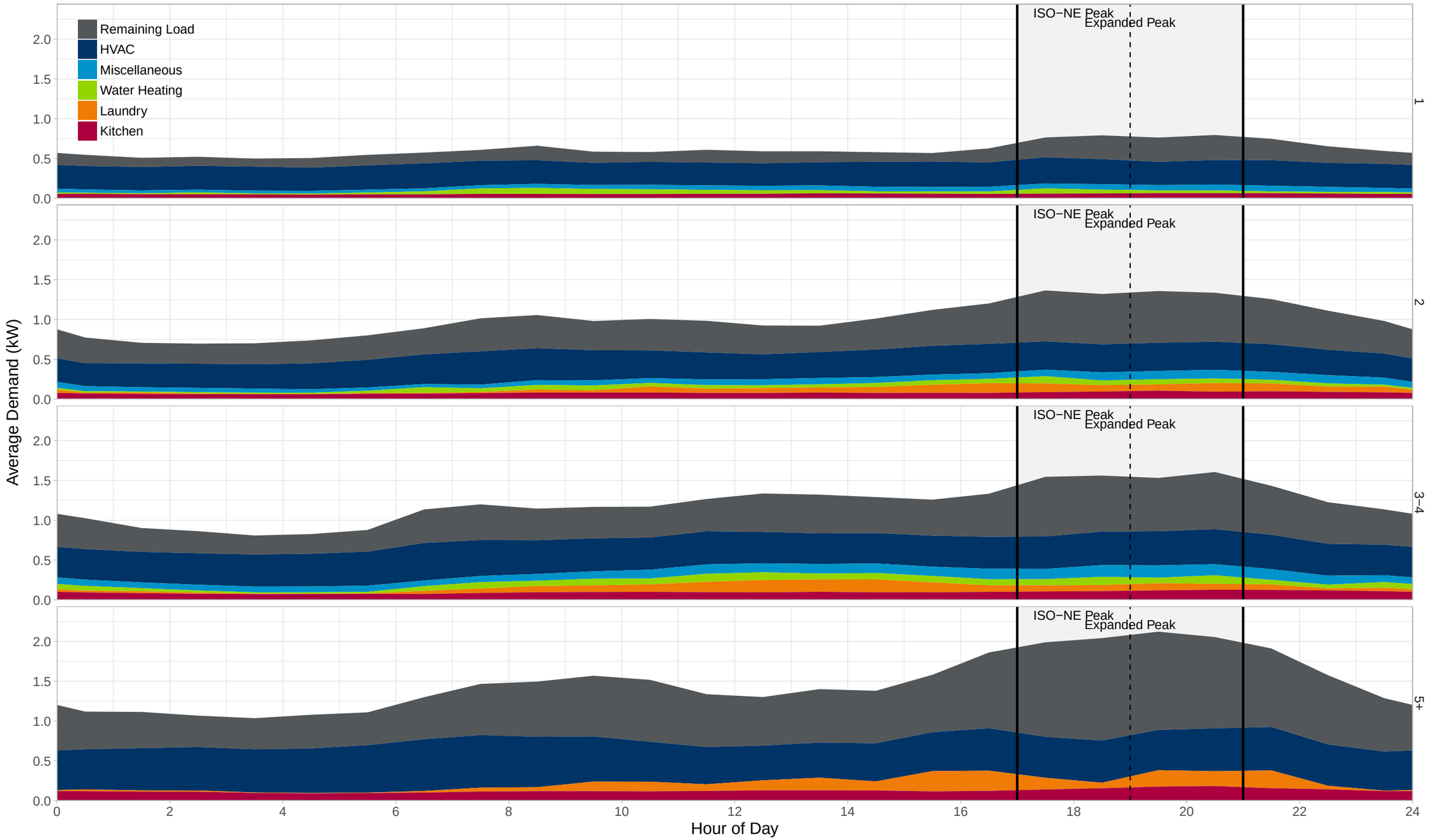
9.7.6 Population Winter Peak Day Load Shape by End Use Category and Language



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

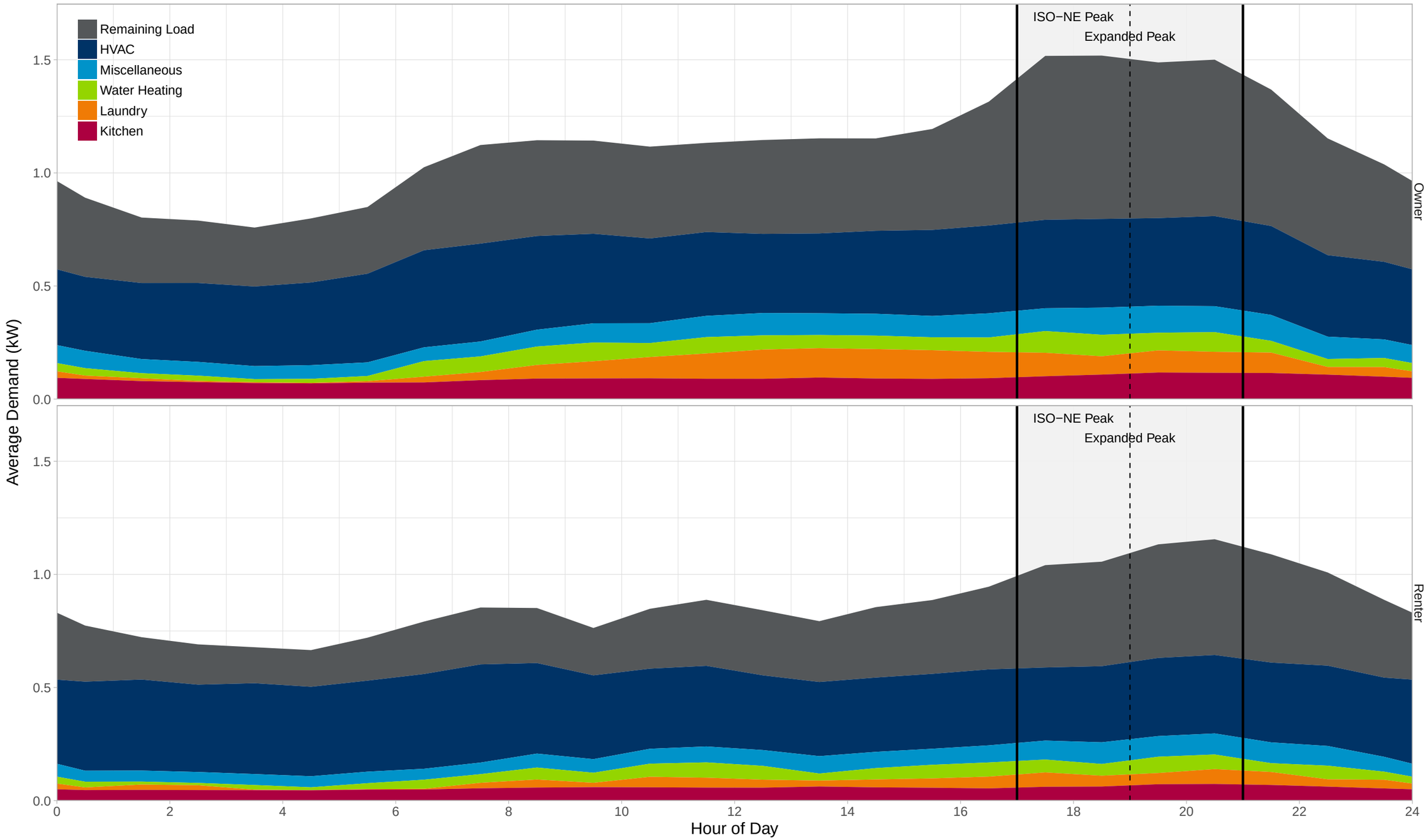
9.7.7 Population Winter Peak Day Load Shape by End Use Category and Number of Occupants



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

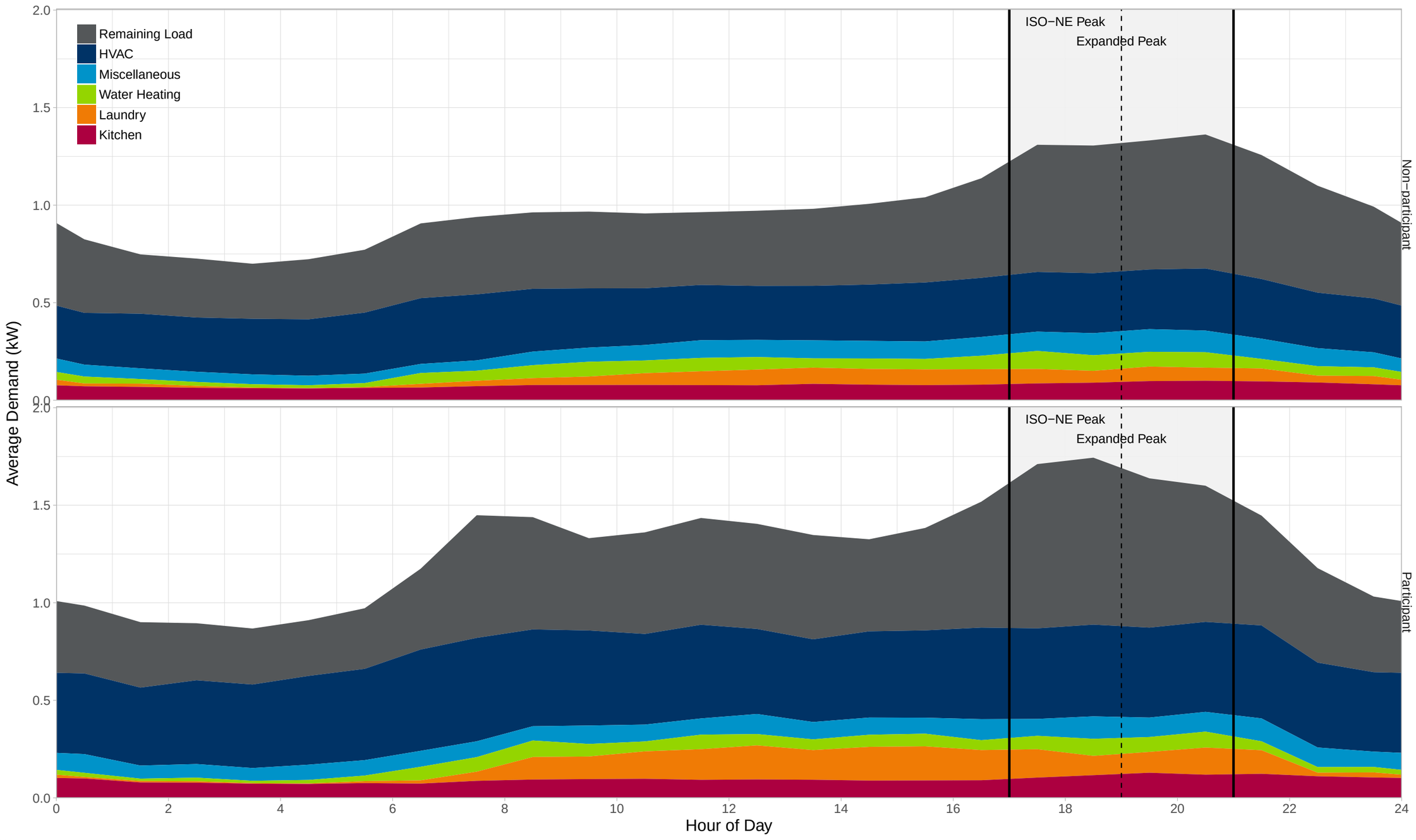
9.7.8 Population Winter Peak Day Load Shape by End Use Category and Occupancy Type



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

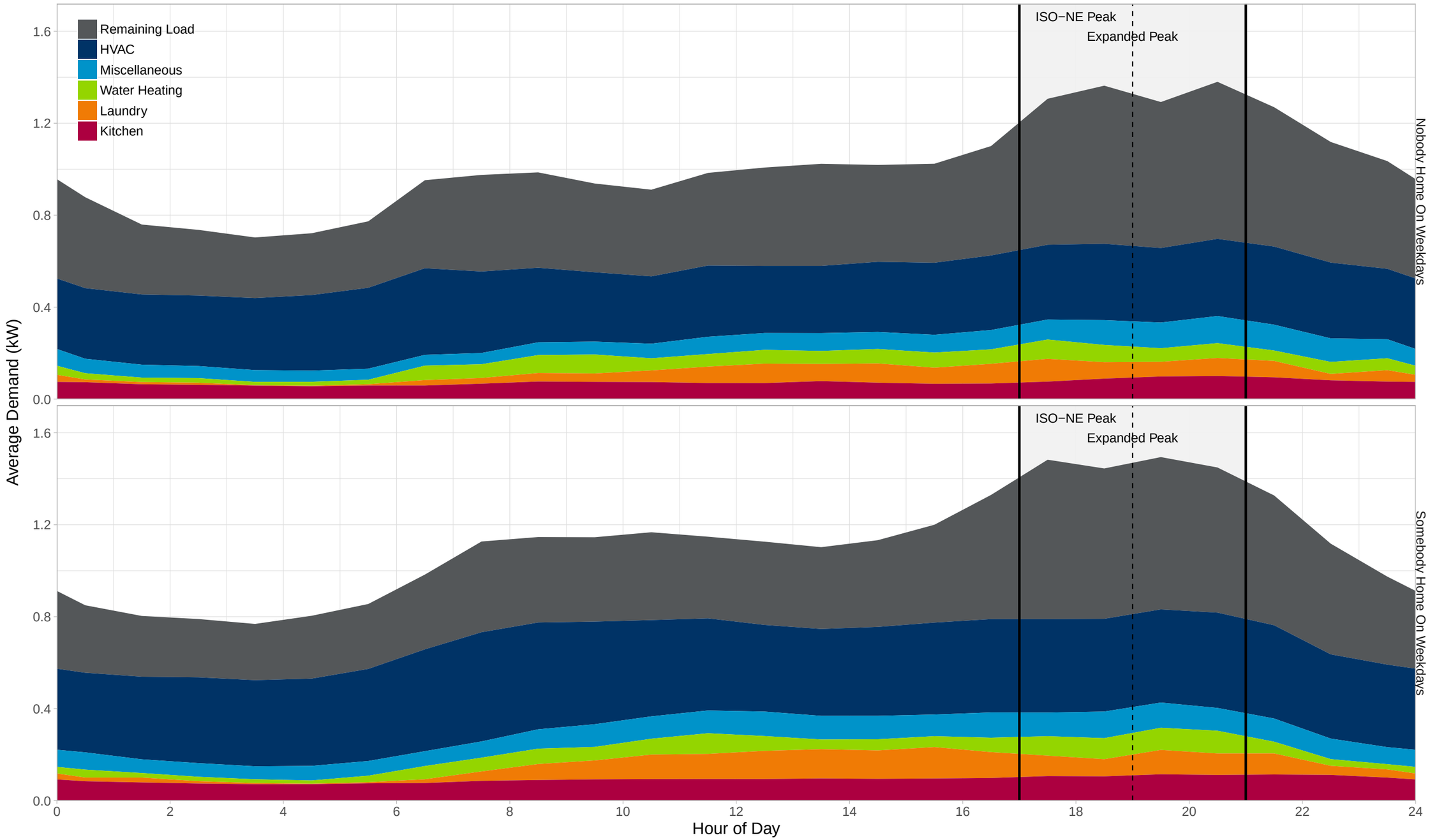
9.7.9 Population Winter Peak Day Load Shape by End Use Category and Program Participation



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved

9.7.10 Population Winter Peak Day Load Shape by End Use Category and Weekday Occupancy



Source: Navigant Analysis

©2018 Navigant Consulting, Inc. All Rights Reserved