

# SINGLE-FAMILY HOME OPERATING COSTS: NATURAL GAS VS. RESIDENTIAL HEATING OIL, PROPANE AND ELECTRIC

Average costs for a three person, 2,300 square foot single-family home in the DC metropolitan region utilizing space heating, water heating, cooking and drying.

Equipment Description	Estimated Annual Operating Costs <sup>1,2,3,4</sup>			Savings if Converted to Natural Gas			Operating Life-Cycle Cost <sup>9</sup>		
	DC	MD	VA	DC	MD	VA	DC	MD	VA
<b>Space Heating</b> <sup>5,6,7</sup>									
Natural Gas - Average Furnace, 80% AFUE	\$522	\$537	\$583	-	-	-	\$7,830	\$8,062	\$8,745
Residential Heating Oil (#2) - Average Furnace, 80% AFUE <sup>5</sup>	\$1,263	\$1,263	\$1,263	\$741	\$726	\$680	\$18,945	\$18,945	\$18,945
Propane - Average Furnace, 80% AFUE	\$2,027	\$2,027	\$2,027	\$1,505	\$1,490	\$1,444	\$30,407	\$30,407	\$30,407
All Electric Furnace/Resistance Heat <sup>14</sup>	\$2,034	\$2,045	\$1,771	\$1,512	\$1,508	\$1,188	\$30,513	\$30,675	\$26,566
Electric - Standard Efficiency Heat Pump, 8.7 HSPF <sup>7,15</sup>	\$867	\$872	\$755	\$345	\$334	\$172	\$13,005	\$13,074	\$11,323
<b>Natural Gas - High Efficiency Furnace, 92% AFUE</b>									
Natural Gas - High Efficiency Furnace, 92% AFUE	\$454	\$467	\$507	-	-	-	\$6,809	\$7,010	\$7,604
Residential Heating Oil (#2) - High Efficiency Furnace, 92% AFUE	\$1,233	\$1,233	\$1,233	\$779	\$766	\$726	\$18,499	\$18,499	\$18,499
Propane - High Efficiency Furnace, 92% AFUE <sup>6</sup>	\$1,763	\$1,763	\$1,763	\$1,309	\$1,295	\$1,256	\$26,441	\$26,441	\$26,441
Electric - High Efficiency Heat Pump, 9.5 HSPF <sup>7,15</sup>	\$785	\$789	\$683	\$331	\$322	\$177	\$11,775	\$11,837	\$10,252
<b>Water Heating</b> <sup>5,8</sup>									
Natural Gas - Standard Water Heater, 0.59 EF	\$149	\$153	\$166	-	-	-	\$1,490	\$1,534	\$1,664
Residential Heating Oil (#2) - Standard Water Heater, 0.59 EF	\$374	\$374	\$374	\$225	\$221	\$208	\$3,739	\$3,739	\$3,739
Propane - Standard Water Heater, 0.59 EF	\$578	\$578	\$578	\$430	\$425	\$412	\$5,785	\$5,785	\$5,785
Electric - Standard Water Heater, 0.9 EF	\$452	\$454	\$393	\$303	\$301	\$227	\$4,519	\$4,543	\$3,934
<b>Natural Gas - Condensing Tankless Water Heater, 0.95 EF</b>									
Natural Gas - Condensing Tankless Water Heater, 0.95 EF	\$93	\$95	\$103	-	-	-	\$925	\$952	\$1,033
Propane - Condensing Tankless Water Heater, 0.95 EF	\$359	\$359	\$359	\$267	\$264	\$256	\$3,593	\$3,593	\$3,593
Electric - High-Performing Water Heater, 0.95 EF	\$428	\$430	\$373	\$336	\$335	\$269	\$4,281	\$4,304	\$3,727
<b>Cooking</b> <sup>12</sup>									
Natural Gas - Standard Cooktop, 40% Efficient	\$42	\$43	\$47	-	-	-	\$502	\$517	\$561
Electric - Standard Cooktop, 74% Efficient	\$105	\$105	\$91	\$63	\$62	\$44	\$1,257	\$1,263	\$1,094
<b>Clothes Drying</b> <sup>13</sup>									
Natural Gas - Standard Dryer, 2.67 EF	\$31	\$32	\$35	-	-	-	\$399	\$407	\$441
Electric - Standard Dryer, 3.01 EF	\$128	\$129	\$111	\$97	\$97	\$77	\$1,663	\$1,671	\$1,448

Notes:

<sup>1</sup> Average gas rate / net therm based on published Washington Gas tariff rate schedules (Residential Heating) and actual net purchased gas charges for the 12 months ending July 2019. Taxes not included. DC - \$0.8372 Net Therm | MD - \$0.8620 Net Therm | VA - \$0.9051 Net Therm.

<sup>2</sup> Electric cost / KWH based DOE-published "Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State," Issued March 2019 (Table 5.6.B). Taxes not included. Source: [https://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_06\\_b](https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_b). DC - 13.22 Cents / KWH | MD - 13.29 Cents / KWH | VA - 11.51 Cents / KWH.

<sup>3</sup> Residential fuel oil rate / Gallon based on most recent data from the DOE's "Central Atlantic (PADD 1B) No. 2 Heating Oil Residential Price (Dollars per Gallon)" data date range from October 2017 through March 2019. Source: [http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M\\_EPD2F\\_PRS\\_R1Y\\_DPG&f=M](http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EPD2F_PRS_R1Y_DPG&f=M). \$2.91 per gallon of fuel oil.

<sup>4</sup> Propane rate / Gallon based on most recent data from the DOE's "Central Atlantic (PADD 1B) Propane Residential Price (Dollars per Gallon)" from October 2017 - March 2019. Source: [http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M\\_EPLLPA\\_PRS\\_R1Y\\_DPG&f=M](http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EPLLPA_PRS_R1Y_DPG&f=M). \$2.97 Per Gallon of Residential Propane.

<sup>5</sup> Conversion factors: 1 MMBtu = 7.2 gallons #2 heating oil; 10.9 gallons liquid propane; 293.1 KWH electricity; 10.0 therms natural gas.

<sup>6</sup> Heating load required based on square footage of home with average insulation and standard ceiling height.

<sup>7</sup> Heat pump efficiency (HSPF) adjusted for Washington, DC region.

<sup>8</sup> Daily water heating equipment efficiencies (EF) and analysis based on DOE usage per person in HH and regional water temperature.

<sup>9</sup> Operating life-cycle cost equal projected annual operating costs X appliance lifespan. (Maintenance is not included.) Furnace life estimated at 15 years per DOE Home Heating Guide. Source: <http://www.energy.gov/sites/prod/files/2014/01/f6/homeHeating.pdf>. Water heater life estimated at 10 years based on AHRI. Source: <http://www.ahrinet.org/Homeowners/Indoor-Comfort-Systems/Water-Heaters>. Cooking life estimated at 12 being based on EIA Building Equipment Cost Analysis. Source: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>. Dryer life estimated at 13 being based on EIA Building Equipment Cost Analysis. Source: <https://www.eia.gov/analysis/studies/buildings/equipcosts/pdf/full.pdf>.

<sup>12</sup> Cooking equipment efficiencies (% efficient) and energy consumption based on 2 MMBTU / Yr (20 Therms / Year) usage provided by ESC Carbon Footprint Spreadsheet.

<sup>13</sup> Drying equipment efficiencies (EF) and energy consumption based on DOE National Single Family Average of 8 Drying Loads / Week and 7 Lbs / Load provided by ESC Carbon Footprint Spreadsheet.

<sup>14</sup> Electric resistance heat (e.g., electric baseboard) is heat generated by converting electricity to heat. 3,412 Btu = 1 KWH (COP = 1).

<sup>15</sup> The coefficient of performance or COP of a heat pump is a ratio of heating or cooling provided to work required and is calculated: (Heat Energy Transported)/(Energy Input). COP decreases at colder outdoor temperatures. Where natural gas block rates in place (MD, VA), average net cost/therm estimated by applying block rates to evenly distributed annual total gas use of 900 therms.

AFUE = Annual Fuel Utilization Efficiency

Updated: 7/8/2019