



# Winter Fuels Outlook 2011-2012

**Robert Pirog**

Specialist in Energy Economics

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## Summary

The Energy Information Administration (EIA), in its *Short-Term Energy and Winter Fuels Outlook* (STEWFO) for the 2011-2012 winter heating season, projects that American consumers should expect to see heating expenditures that on average will be somewhat higher than last winter. Average expenditures for those heating with natural gas are projected to increase by 2.6%, while those heating with electricity are projected to see a decline in expenditures of about 0.6%. These two fuels serve as the heating source for about 88% of all U.S. household heating. Propane and home heating oil consumers are also projected to see increased expenditures.

Within the U.S. average projections, differences exist with respect to region of the country and type of fuel.

Economic conditions of slow growth and relatively high unemployment suggest that lower consumption of all fuels may occur, especially in the context of milder winter weather conditions as forecast by the National Oceanic and Atmospheric Administration (NOAA). While the price of natural gas has been relatively low, the price of oil has been relatively high over the past year. If the price of oil spikes for an extended amount of time, or if the price of natural gas increases, heating costs might be expected to rise above projected levels for many consumers. Lower prices could reduce seasonal heating expenditures.

Uncertainty exists with respect to the status of funding for the Low Income Energy Assistance Program (LIHEAP), the key federal program assisting low-income households with heating expenditures. Funding for the Department of Labor and the Department of Health and Human Services has to be resolved by Congress (S. 1599, H.R. 3070).

It has not been announced whether the CITGO program to assist some U.S. heating oil consumers will be continued.

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## Introduction

Each year, in October, the Energy Information Administration (EIA) publishes the *Short-Term Energy and Winter Fuels Outlook* (STEWFO).<sup>1</sup> The purpose of the STEWFO is to provide estimates of expected average annual heating fuel expenditures in comparison to previous years. While the STEWFO provides estimates of average annual heating expenses, individual expenses may vary regionally, by energy source utilized; by home size, energy efficiency, and individual temperature preference; by market size; and by local weather conditions.

Average annual heating fuels expenditures depend on the price of the fuel used, with natural gas, heating oil, propane, electricity, and wood products constituting the main heating fuels in the United States. Expenditures also depend on the quantity of fuel used, which is based on a variety of individual consumer decisions. Weather conditions, measured by heating degree-days, are the other key factor in determining expenditure levels.<sup>2</sup> The National Oceanic and Atmospheric Administration (NOAA) provides heating degree-day estimates to the EIA for the STEWFO.

The STEWFO is not a forecast in the statistical sense, but a projection based on assumed values of key variables. If, for example, the underlying fuel price estimates prove to be incorrect, or weather conditions vary from forecast trends, actual average heating expenditures will reflect those differences.

## Average Annual Heating Fuels Expenditures

NOAA forecasts a 1.6% reduction in heating degree-days for the 2011-2012 heating season compared to 2010-2011 for the United States as a whole. Regional differences in weather, along with regional fuel usage patterns, can cause regional expenditure projections to vary from the U.S. average.

In the Northeast, heating degree-days are expected to decrease by 1.4%, while in the West they are expected to increase by 3%. Estimated heating degree-days are expected to decline by 4.9% in the South, and decline by 1.6% in the Midwest.<sup>3</sup>

On average, the U.S. household expenditure on heating fuel for the 2011-2012 heating season is projected to be \$988, about the same as last year's estimate of \$986. The modest average expenditure increase reflects higher fuel prices for all fuels except electricity, and the offsetting quantity usage effects of generally milder weather. **Table 1** provides a summary of the percentage changes in the key components of average annual heating fuel expenditures by fuel.

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<sup>1</sup> The winter heating season runs from October 1 through March 31.

<sup>2</sup> Heating degree-days are defined as the day's average temperature, calculated as the high plus the low temperatures divided by two. If the number is less than 65, subtract the average temperature from 65. The result is the number of heating degree-days on a particular calendar day.

<sup>3</sup> All percentage changes in the STEWFO and this report are calculated on a yearly heating season basis. The estimated 2011-2012 values are compared to 2010-2011 levels.

**Table 1. U.S. Average Winter Fuels Projections, Winter 2011-2012**  
(percentage change)

	Natural Gas	Heating Oil	Propane	Electricity
Consumption	-0.9	-1.2	-3.2	-1.2
Price	3.5	9.8	11.0	0.7
Number of Households	0.5	-3.7	-2.6	1.7
Expenditure	2.6	8.4	7.5	-0.6

**Source:** Energy Information Administration, *Short-Term Energy and Winter Fuels Outlook*, Table WFO1, October 2011.

**Note:** Percentage change compares projected changes for the 2011-2012 heating season to 2010-2011 data.

Regionally, the EIA expects expenditures on natural gas to increase the most in the South, at 6.4%, and to increase by 3.4% in the Northeast. Expenditures on natural gas are expected to increase by 0.5% in the West and by 0.1% in the Midwest. Expenditures on heating oil, used primarily in the Northeast, are expected to increase by 8.4%. Expenditures on propane are expected to increase by 3.5% in the Northeast and by 8.9% in the Midwest.<sup>4</sup> Electricity expenditures are expected to decline by 1.6% in the Northeast, 0.4% in the Midwest, 1.8% in the South, and by 2.8% in the West.

Due to changing market conditions for primary fuels, the prices assumed in the STEWFO can differ from actual prices. Price volatility in the world oil market can have direct effects on the cost of heating oil and propane. Variations in natural gas prices can directly affect those households heating with that fuel, while indirectly affecting electricity prices. Projected consumption levels are likely to be affected by variations in the weather. If the observed weather is colder, or warmer, than forecast by NOAA, or if consumers change their consumption habits at any given price level, or at any given number of heating degree days, consumption levels would differ from those projected in the STEWFO.

## Natural Gas

The U.S. natural gas market is part of a North American regional market. The United States draws about 92% of its natural gas supplies from domestic sources. About 8% is imported by pipeline, largely from Canada, and small quantities of liquefied natural gas supplement supply, mostly from Trinidad.

Consumers of natural gas include households and commercial customers that largely use natural gas for space heating. Electric power generators, especially those that satisfy peak load demand, use natural gas as a fuel to power generators. Industrial consumers use natural gas as a raw material, for example in fertilizer production, and as a heat source in industrial processes. Household, commercial, and electric power generators are those consumers whose consumption is most likely to be affected by winter conditions.

<sup>4</sup> The 2011-2012 STEWFO does not include complete data broken down by region for heating oil and propane.

**Table 2** presents average household natural gas consumption and price data for the winter heating seasons 2007-2008 through projected values for winter 2011-2012.

**Table 2. Average Household Winter Natural Gas Consumption and Prices**

(thousands cubic feet, mcf)

	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Consumption	67.2	69.1	69.3	69.6	69.0
Price (\$/mcf)	12.35	12.86	10.83	10.42	10.79

**Source:** Energy Information Administration, *Short-Term Energy and Winter Fuels Outlook*, Table WFO1, October 2011.

**Note:** Data for Winter 2011-2012 are projected.

On a per-household basis, as presented in **Table 2**, winter consumption of natural gas has been relatively stable, with an observed variation of about 4% between the highest and lowest values over the five-year period. Similarly, consumer prices have been relatively stable, but falling in 2009-2010, and increasing somewhat in the projection for 2011-2012. The price-consumption relationship suggests that natural gas demand is price inelastic in the household sector, implying that consumption might not be expected to respond proportionally to changes in price.<sup>5</sup> An inelastic relationship is likely because home heating is typically considered to be a necessity by consumers. In addition, existing metering systems do not provide consumers with easy access to real-time quantity and price data. Lack of real-time information could result in consumers making ill-informed decisions with regard to heating expenditures. Income levels and the unemployment rate might also be important in determining natural gas consumption. Approximately 51% of all U.S. households heat with natural gas.

On the national level, over all consumer groups, total natural gas consumption rose by about 3.5% from 2008 through 2010. Over the period, the electric power generating sector's consumption rose by about 10.5%. Residential and commercial usage showed small consumption gains, while industrial demand declined by about 9%. The STEWFO projects an increase in total natural gas consumption of 2% from 2010 to 2011, but almost no growth from 2011 to 2012. Most of the increased consumption is expected to occur in the electric power generation sector.

The STEWFO projects an increase in U.S. natural gas production of about 6.5% for 2011 compared to 2010, and a 2% increase from 2011 to 2012. The relative weakness of wellhead natural gas prices in 2010 and 2011 reflects the increased production resulting from shale gas and other nonconventional sources. However, these lower prices, and the growing price spread between petroleum liquids and natural gas, may shift exploration and drilling activity in the direction of liquid deposits, slowing growth in natural gas.

Imports of natural gas are expected to decline by about 5% from 2010 to 2011, mostly on pipeline imports from Canada. Lower natural gas prices in North America than in Asia and Europe will continue to make liquefied natural gas imports a small component of the U.S. gas picture.

<sup>5</sup> Price elasticity of demand is calculated as the percentage change in quantity demanded divided by a percentage change in price. Demand is considered to be inelastic if the price elasticity computation yields a value less than one.

Natural gas demand from households and commercial customers peaks in the winter, and to a lesser extent in the summer. This leads to accumulation of natural gas in storage facilities in the off-peak seasons. At the beginning of the winter heating season, October 1, 2011, natural gas in storage was approximately 3.4 trillion cubic feet, above the five-year average storage quantity.

## Heating Oil

Home heating oil is a middle distillate, derived from the same part of the refining process as diesel fuel. As a result, the price of home heating oil is closely related to the price of crude oil as well as the price of diesel fuel. Approximately 6.2% of U.S. households heat with oil, and most of these consumers are in the Northeast, where about 80% of U.S. heating oil consumption takes place.

**Table 3. Average Household Heating Oil Consumption and Price**

(gallons, price per gallon)

	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Consumption	666.9	678.7	643.5	679.7	671.2
Price	3.33	2.65	2.85	3.38	3.71

**Source:** Energy Information Administration, *Short-Term Energy and Winter Fuels Outlook*, Table WFO1, October 2011.

**Note:** Data for 2011-2012 are projected.

The EIA expects average home heating oil expenditures per household to increase by \$193, or 8.4%, for the winter 2011-2012. While this dollar, and percentage, increase is the largest for any of the fuels reported in the STEWFO, it comes as an addition to the highest total expenditure for any winter fuels, \$2,300 per household. The projected amount for winter 2011-2012 is over three times as high as the total for a household heating with natural gas, which will spend \$744 on average for the season.

Diesel fuel, a product almost identical to home heating oil, has been more expensive than gasoline in 2011, averaging about \$0.15 per gallon higher. About the same premium has been observed in 2011 when comparing the price of home heating oil to the price of gasoline. These price differentials result from U.S. refiners' emphasis on gasoline production and the relatively high level of world demand for diesel fuel. The cost of gasoline, diesel fuel, and home heating oil are all directly related to the price of crude oil on the world market. The EIA projects the refiners acquisition cost of crude oil to rise to \$96 per barrel during the 2011-2012 heating season.<sup>6</sup> The spot price of West Texas Intermediate, a reference crude oil, averaged over \$95 per barrel for the first three quarters of 2011, and was trading above that level during the first months of the winter heating season.

The key risk factor for home heating oil consumers is the price of crude oil. Oil prices can be volatile. The economic recession, beginning in December 2007, and accompanied by record high crude oil prices in 2008, served to decrease demand. Overall liquid fuels consumption in the

<sup>6</sup> The refiners acquisition cost of crude oil is an average value that reflects the actual mix of crude oil by quality and domestic or imported source used in U.S. refineries.

United States is projected by the EIA to increase by 1.1% in 2011, and to increase by 0.5% in 2012. Within these overall increases, gasoline consumption is expected to decrease by 2% from 2010 to 2011, while distillate consumption is expected to increase by 1%. The relative increase in distillate consumption is likely to maintain, or increase, the price premium of these fuels over gasoline, and could create possible upside price risk over the STEWFO projection for heating oil consumers.

## Propane

Propane provides primary home heating for approximately 5.5 million households in the United States, about 5% of the total households. Propane consumers are projected to experience a \$63, or 3.5%, increase in heating expenses during the winter 2011-2012 season. This cost growth could drive average U.S. costs for this sector to \$1,880, the second-highest total of the STEWFO projected fuels. The number of households heating with propane has declined every year for the past five years, suggesting that propane is not a preferred fuel choice. The EIA expects a further decline of 2.6% in the number of households using propane for 2011-2012.

**Table 4. Average Household Propane Consumption and Price**

(gallons, price per gallon)

	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Consumption	794	821	841	814	N/A
Price	2.45	2.38	2.18	2.42	N/A

**Source:** Energy Information Administration, *Short-Term Energy and Winter Fuels Outlook*, Table WFOI, October 2011.

**Note:** Data for 2011-2012 U.S. average consumption and price were not provided.

The EIA sees propane expenditures rising by 3.5% in the Midwest, and 8.9% in the Northeast.<sup>7</sup> Propane price can vary; for the Northeast in 2011-2012 the STEWFO projects a price of \$3.56 per gallon, while the Midwest is projected to see a propane price of \$2.22 per gallon. While consumption in the two regions is expected to be, on average, within 10 gallons of each other, the difference in price leads to heating season expenditures of \$1,880 in the Midwest compared to \$2,979 in the Northeast.

Propane is unique compared to other fuels covered in this report in the sense that it is a by-product, and not directly produced itself. The production of gasoline and natural gas both contribute to the supply of propane. As a result, when the supply of those fuels is high, so is the supply of propane.

Many of the same factors that affect natural gas and home heating oil prices influence expected propane prices. However, in the case of propane, the relationship is indirect because propane is a by-product. Propane prices, unlike the other fuels covered in this report, are affected by distance and dispersion of consumers. The reason is that because the distribution process usually requires the delivery, by truck, of relatively small quantities, it tends to be high-cost.

<sup>7</sup> The EIA did not provide data on propane for the South and the West in the October 2011 STEWFO.



## Electricity

Electricity prices are related to natural gas and coal prices as well as the availability of nuclear and alternative fuel generating capacity.<sup>8</sup> In addition to electricity being generated using natural gas, direct combustion of natural gas is also a competitor to electricity as a home heating source. Approximately 37% of U.S. households use electricity as their primary heating source. In the Northeast, electricity use is lowest, at about 13.7%, while in the South it is highest, at 62%. Overall growth in the number of households using electricity for space heating is expected to be 1.7% year on year, driven by further expansion of market share in the South. In comparison, the number of propane and heating oil customers is declining, by an expected 2.6% and 3.7%, respectively. Natural gas is also a heating source with an expanding customer base, expected to rise by 0.5% in 2012.

**Table 5. Average Household Electricity Consumption and Price**

(kilowatt hours and dollars per kilowatt hour)

	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Consumption	8,196	8,372	8,629	8,475	8,370
Price	0.104	0.112	0.110	0.114	0.114

**Source:** Energy Information Administration, *Short-Term Energy and Winter Fuels Outlook*, Table WFO1, October 2011.

**Note:** Data for 2011-2012 are projected.

The EIA projects declining heating expenditures for most areas for those heating with electricity. In the Northeast the decline in expenditures is expected to be 1.6%, in the South 1.8%, and in the Midwest 0.4%. Expenditures in the West are expected to rise by 2.8% due to both higher usage and higher prices. In general, electricity prices have shown less volatility than many other heating source prices.

## Wood, Wood Pellets, and Biomass

Wood and wood pellets provided primary home heating for approximately 2.8 million U.S. households, and secondary heat for about 8.8 million households, over 10% of total households in 2009.<sup>9</sup> EIA data show the number of households heating with wood has remained relatively consistent over the past five years.<sup>10</sup> U.S. Census data show the number of occupied housing units using wood growing by about 1.6% to 2.1% per year between 2000 and 2010, resulting in a cumulative growth of about 22%.<sup>11</sup> The STEWFO projected that residential biomass would decline somewhat between 2010 and 2012, from 0.420 to 0.418 quadrillion Btu.<sup>12</sup> The EIA has

<sup>8</sup> In year-to-date 2011, coal fueled about 43.3% of U.S. electricity generating capacity, natural gas 23.4%, nuclear about 18.8%, hydro about 8.7%, and all other sources about 5.8%.

<sup>9</sup> Energy Information Administration, Residential Energy Consumption Survey, Table HC1.1, Fuels Used and End Uses in U.S. Homes, by House Unit Type, 2009.

<sup>10</sup> Ibid., Table HC4.2, Space Heating Characteristics by Type of Housing Unit, 2005.

<sup>11</sup> See [http://factfinder.census.gov/servlet/ACSSAFFHousing?\\_sse=on&\\_submenuId=housing\\_1](http://factfinder.census.gov/servlet/ACSSAFFHousing?_sse=on&_submenuId=housing_1).

<sup>12</sup> Energy Information Administration, *Short-Term Energy and Winter Fuels Outlook*, Table 8, p. 41, October 2011.

not started tracking price data for wood and wood pellets as of the October 2011 release date of the STEWFO. As a result, no seasonal heating expenditure projections for this fuel source are included in the STEWFO.

## Risk Factors

The primary risk factors concerning the STEWFO are weather and economic conditions. Total household expenditures on home heating are equal to the price of the fuel times the quantity of the fuel consumed. The weather, measured by the number of heating degree days, largely determines the quantity of fuel used. Conservation, in the form of reduced temperatures inside the home, also reduces the quantity of fuel consumed, but for a given desired temperature inside the home, heating degree days are the key factor. The 2011-2012 winter heating season is expected to be milder than last winter in all regions except the West.

The other component of total heating expenditures, the prices of the various fuels, is determined by a complex web of related prices, market conditions, expectations, and other economic variables. In a period of relatively weak economic growth, with persistent high unemployment, the key relationship may be that between the level of economic activity, measured by the real growth rate of gross domestic product, and the prices of natural gas and crude oil.

A higher price for crude oil directly increases the price of home heating oil and propane. Natural gas supplies tend to be reduced as a larger spread develops between oil and natural gas prices. Electricity prices are directly affected by natural gas and coal prices. Even in the face of a growing reserve base and increased production, U.S. natural gas prices are expected to increase by about 3.5% on average this heating season.

## Heating Expenditure Assistance

The Low Income Energy Assistance Program (LIHEAP) is the primary federal government program to supplement home heating expenditures.<sup>13</sup> LIHEAP is composed of two parts: funding for block grants to states and emergency contingency funds. For FY2012, the Administration has proposed \$1.98 billion for LIHEAP regular funds and \$590 million for emergency contingency funds. In contrast, for FY2011 the regular fund allocation was \$4.5 billion and the emergency contingency funds were set at \$200 million.

S. 1599 includes proposed funding for LIHEAP of \$3.4 billion in regular funds, and \$200 million in emergency contingency funds. H.R. 3070 would provide \$3.39 billion in regular LIHEAP funding and no emergency funds.

CITGO, the U.S. subsidiary of the Venezuelan national oil company PDVSA, has a Low Cost Heating Oil Program, which operates without any connection to the U.S. government.<sup>14</sup> The program, operated in conjunction with a nonprofit, the Citizens Energy Corporation, began in 2005. During the 2010-2011 heating season, 25 states and the District of Columbia participated in

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<sup>13</sup> See CRS Report RL31865, *The Low Income Home Energy Assistance Program (LIHEAP): Program and Funding*, by Libby Perl, for more detail on this program.

<sup>14</sup> For more details, see <http://www.citgoheatinoil.com>.

the program, which discounts the delivered cost of home heating oil by almost 40%. CITGO estimates that 181,000 households and hundreds of homeless shelters benefited from the program in 2010-2011. It has not been announced whether the program will continue in the 2011-2012 winter heating season.

## **Conclusion**

The STEWFO projects that Americans will generally face about the same heating costs during the winter of 2011-2012 as in the previous year. Fuel prices are generally expected to be higher, which is likely to offset the effects of generally milder temperatures. Any change in the level of economic activity, or changes in the price of fuels, coupled with variability in the actual weather experienced during the winter heating season, could change the expenditure projection.

Uncertainty concerning the funding level of LIHEAP, and concern as to whether the CITGO program will continue in 2011-2012, contribute to the potential burden of high heating costs for lower-income Americans.

## **Author Contact Information**

Robert Pirog  
Specialist in Energy Economics  
rpirog@crs.loc.gov, 7-6847