

## EIA-Short-Term Energy Outlook – Highlights

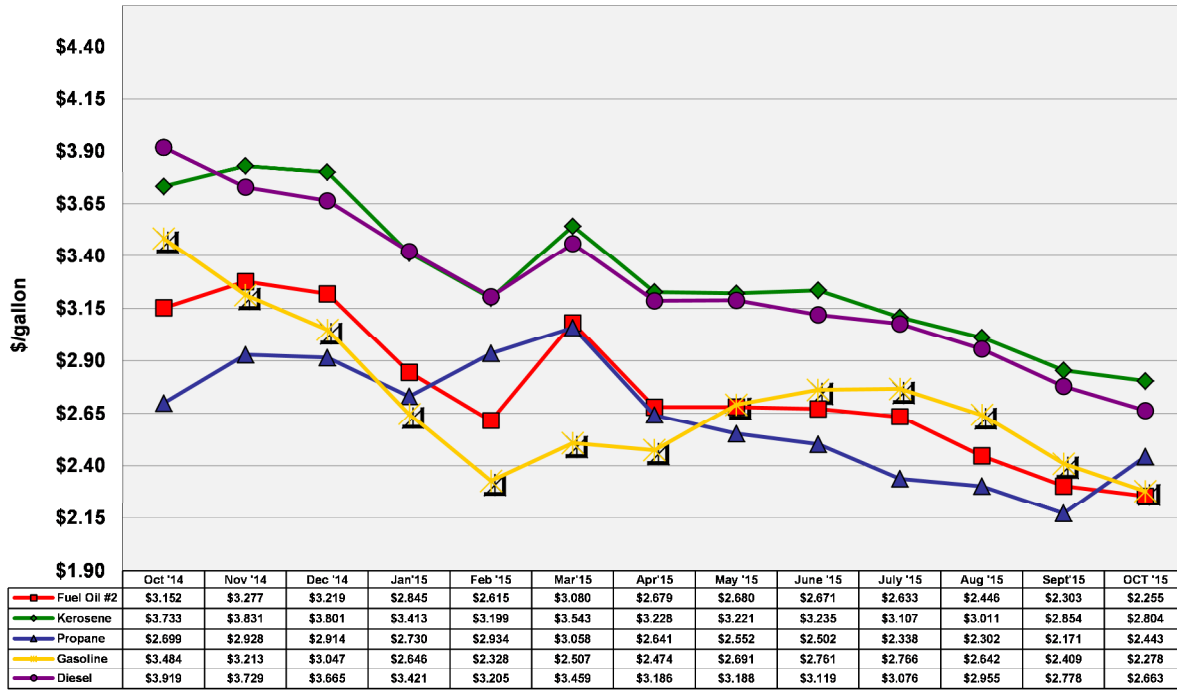
- EIA projects average U.S. household expenditures for natural gas, heating oil, and propane during the upcoming winter heating season (October 1 through March 31) will be 10%, 25%, and 18% lower, respectively, than last winter, because of lower fuel prices and lower heating demand. Forecast lower heating demand and relatively unchanged prices contribute to electricity expenditures that are 3% lower than last winter ([Winter Fuels Outlook slideshow](#)).
- North Sea Brent crude oil prices averaged \$48/barrel (b) in September, a \$1/b increase from August. However, volatility remained high during September. EIA forecasts that Brent crude oil prices will average \$54/b in 2015 and \$59/b in 2016, unchanged from last month's STEO. Forecast West Texas Intermediate (WTI) crude oil prices average \$4/b lower than the Brent price in 2015 and \$5/b lower in 2016. The current values of futures and options contracts for January 2016 delivery ([Market Prices and Uncertainty Report](#)) suggest the market expects WTI prices to range from \$32/b to \$67/b (at the 95% confidence interval) in January 2016.
- U.S. regular gasoline monthly retail prices averaged \$2.37/gallon (gal) in September, a decrease of 27 cents/gal from August and \$1.04/gal lower than in September 2014. EIA expects monthly gasoline prices to decline to an average of \$2.03/gal in December 2015. EIA forecasts U.S. regular gasoline retail prices to average \$2.38/gal in 2016.
- EIA estimates that total U.S. crude oil production declined by 120,000 barrels per day (b/d) in September compared with August. Crude oil production is forecast to decrease through mid-2016 before growth resumes late in 2016. Projected U.S. crude oil production averages 9.2 million b/d in 2015 and 8.9 million b/d in 2016.
- Natural gas working inventories were 3,538 billion cubic feet (Bcf) on September 25. This level was 15% higher than a year ago and 4% higher than the previous five-year average (2010-14) for this week. EIA projects inventories will close the injection season at the end of October at 3,956 Bcf, which would be the highest end-of-October level on record.

Editor's Note: Data presented in the Vermont Fuel Price Report as in the past, is collected on the first Monday of the month.

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### Vermont Fuel Prices -One-Year Trend



### Vermont Average Retail Petroleum Prices (per gallon)

	OCT '15	Sept'15	%change	Oct '14	%change
No. 2 Fuel Oil	\$2.255	\$2.303	-2.08%	\$3.152	-28.46%
Kerosene	\$2.804	\$2.854	-1.77%	\$3.733	-24.90%
Propane	\$2.443	\$2.171	12.53%	\$2.699	-9.47%
Reg. Unleaded Gasoline	\$2.278	\$2.409	-5.43%	\$3.484	-34.61%
Diesel	\$2.663	\$2.778	-4.12%	\$3.919	-32.04%

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Comparing the Cost of Heating Fuels						
Type of Energy	BTU/unit	Typ Effic	\$/unit	\$/MMBtu	High Efficiency	\$/MMBtu
Fuel Oil, gallon	138,200	80%	\$2.26	\$20.40	95%	\$17.18
Kerosene, gallon	136,600	80%	\$2.80	\$25.65		
Propane, gallon	91,600	80%	\$2.44	\$33.34	93%	\$28.68
Natural Gas, therm	100,000	79%	\$1.43	\$18.04	* 95%	\$15.04
Electricity, kWh (resistive heat)	3,412	100%	\$0.15	\$43.46		
Electricity, kWh (cold climate heat pump)	3,412		\$0.15		240%	\$18.32
Wood, cord (green)	22,000,000	60%	\$ 227.14	\$17.21	*	
Pellets, ton	16,400,000	80%	\$294.00	\$22.41	*	

\* The natural gas price is based on the rate effective 8/5/15. \*Wood green and Pellets updated 8/5/15

The *Comparing the Cost of Heating Fuels* table includes two additional columns “High Efficiency” and \$/MMBTU HF. The new furnaces which are manufactured to meet higher efficiency standards can result in savings on energy for the customer. If you are in need of or thinking of replacing your current system contact your dealer for information on high efficiency systems.

Since the Fuel Price Report’s *Comparing the Cost of Heating Fuels* section began including information on heat pumps, the Department has received a number of comments and suggestions concerning the value of the Coefficient of Performance (COP) for air source heat pumps (ASHP). A COP over 1 means that occupants of a home receive more heat than is contained in the electricity delivered to run the ASHP.

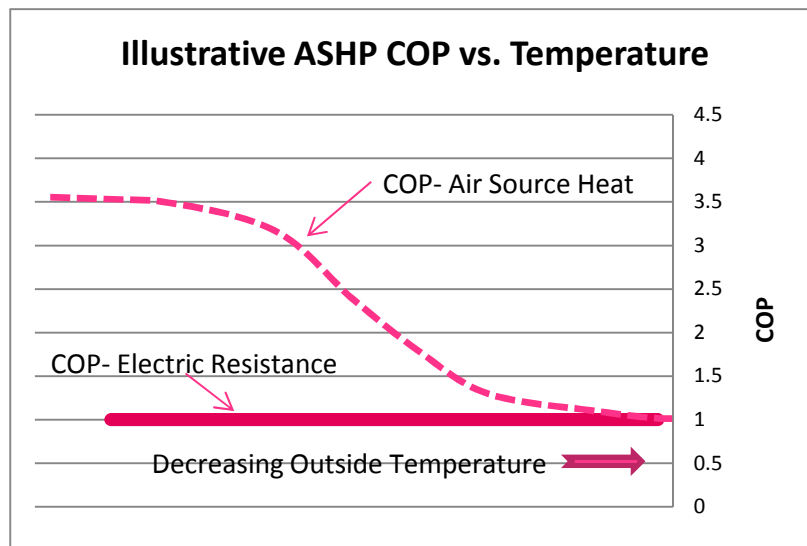
$$\text{Heat Pump Efficiency} = \frac{\text{Quantity of heating or cooling delivered}}{\text{Electricity required by the heat pump}}$$

Historically, the use of heat pumps has been concentrated in areas with temperate climates which rarely see temperatures much below freezing. This is because the performance of these systems tended to decline significantly at temperatures below freezing. These systems’ COPs remain high as temperature varies through cool, but not cold, weather. As ambient temperatures begin declining from the optimal operation range the operational efficiency begins to decline as well. At some point, depending on the refrigerant and configuration of the heat pump, the COP = 1 which is the same as for electric resistance heating. At that level the heat pump alone cannot supply enough heat to maintain a comfortable interior temperature and requires that a supplemental source of heat be available.

In recent years manufacturers have developed air source “cold climate” heat pumps which have improved performance over a larger temperature range, due in part to the introduction of new refrigerants and more advanced compressors. These ASHPs have the potential to displace other heating sources down to zero F or below, resulting in displacement of a significant fraction of Vermont winter heating. Here in Vermont several

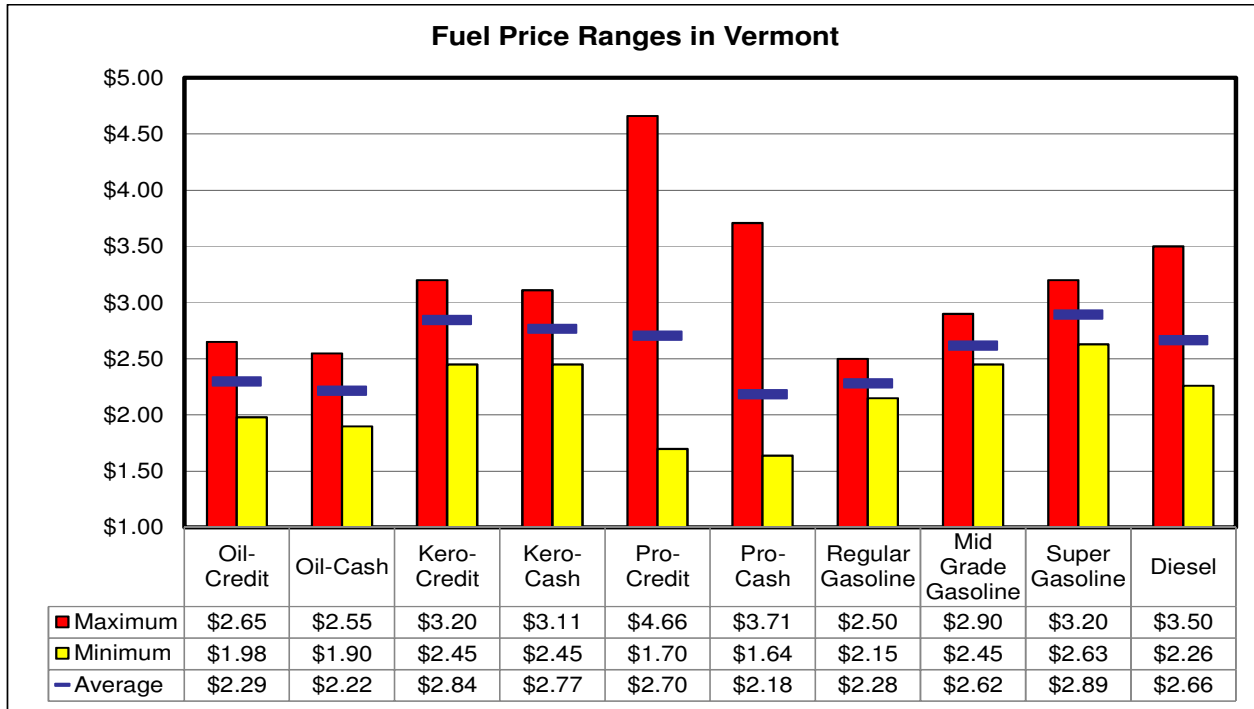
programs are currently in the process of collecting actual operational data from ASHPs; their goal is to determine real world annual COP under Vermont's annual temperature range of over 120 degrees. The average yearly heating COP is expected to lie somewhere at a value between 1 and 3 with 2.4 being a reasoned guesstimate based on average winter temperatures and product specifications. As information becomes available we will update the table accordingly.

The figure below is for illustrative purposes only and does not represent actual operational data.



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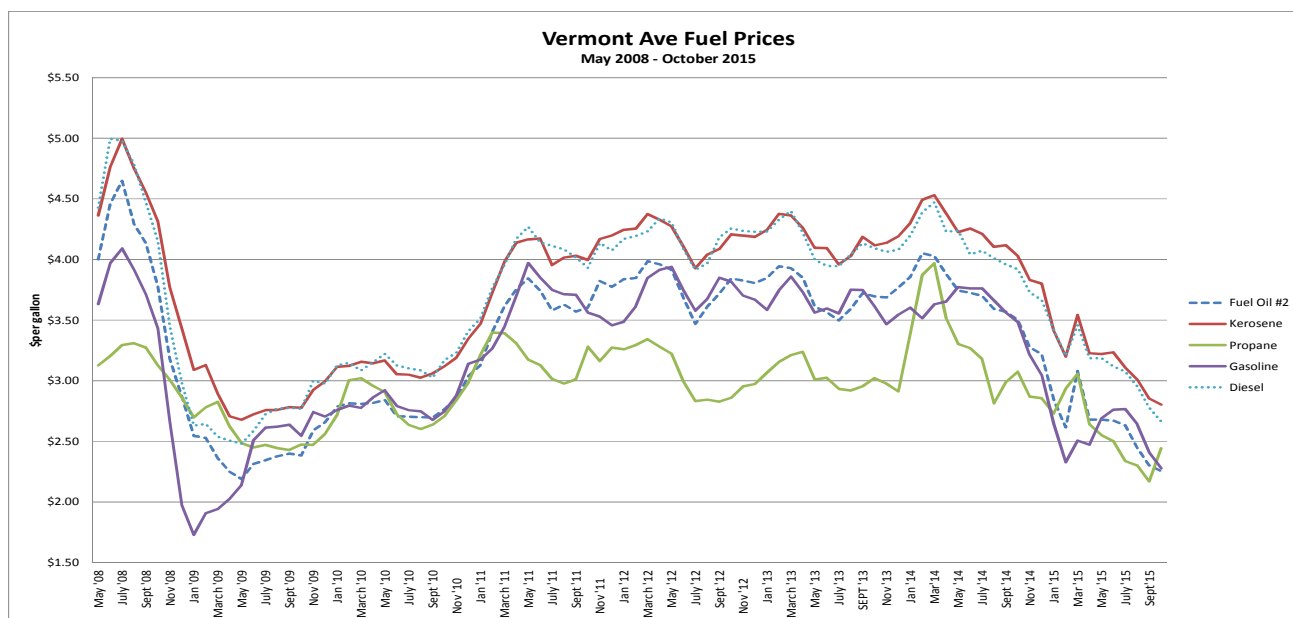


**Fuel Price Ranges in Vermont**

	<i>Oil-Credit</i>	<i>Oil-Cash</i>	<i>Kero-Credit</i>	<i>Kero-Cash</i>	<i>Pro-Credit</i>	<i>Pro-Cash</i>	<i>Regular Gasoline</i>	<i>Mid Grade Gasoline</i>	<i>Super Gasoline</i>	<i>Diesel</i>
<b>Stan.Dev \$</b>	\$0.16	\$0.16	\$0.21	\$0.21	\$0.70	\$0.46	\$0.26	\$0.94	\$0.24	\$0.42
<b>Stan.Dev%</b>	7.15%	7.01%	7.36%	7.49%	25.91%	21.12%	2.05%	5.88%	1.93%	2.22%

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## Vermont Historical Weather and Degree Day Data

CDD's are used during summer months to compare the current day's average temperature against the 65°F standard to determine the energy demands of cooling your home through air conditioning or fans. For example, if the current day's high is 85°F and the low is 65°F, the day's average temperature will be 75°F. Since 75°F-65°F is 10°F, this day would have 10 cooling degree days. Adding the degree days together for the whole month provides a way to compare previous months or years.

HDD's are used the same way during winter months to determine the energy demands of heating your home. The 65°F standard still is used; however, the day's average temperature is subtracted instead of added to the standard. For example, if the current day's high is 30°F and the low is 10°F, the day's average temperature will be 20°F. Since 65°F-20°F is 45°F, this day would have 45 heating degree days.

Just like cooling degree days, heating degree days may be added together for the entire month to compare to previous months or years.<sup>1</sup>

The primary online source for historical weather and degree day data is available from the NOAA - National Climatic Data Center (NCDC) web site at:

<http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp#>

NCDC maintains the world's largest climate data archive and provides climatological services. Records in the archive range from paleoclimatic data to centuries-old journals to data less than an hour old.

Another source is the Weather Data Depot web site. The data collection is not as extensive as the NOAA collection only covering the years from 1993 forward. But the site is more user friendly.

[http://www.weatherdatadepot.com/?pi\\_ad\\_id=8426228665&gclid=CIaZvMf8krQCFQqk4AodFRYArQ](http://www.weatherdatadepot.com/?pi_ad_id=8426228665&gclid=CIaZvMf8krQCFQqk4AodFRYArQ)

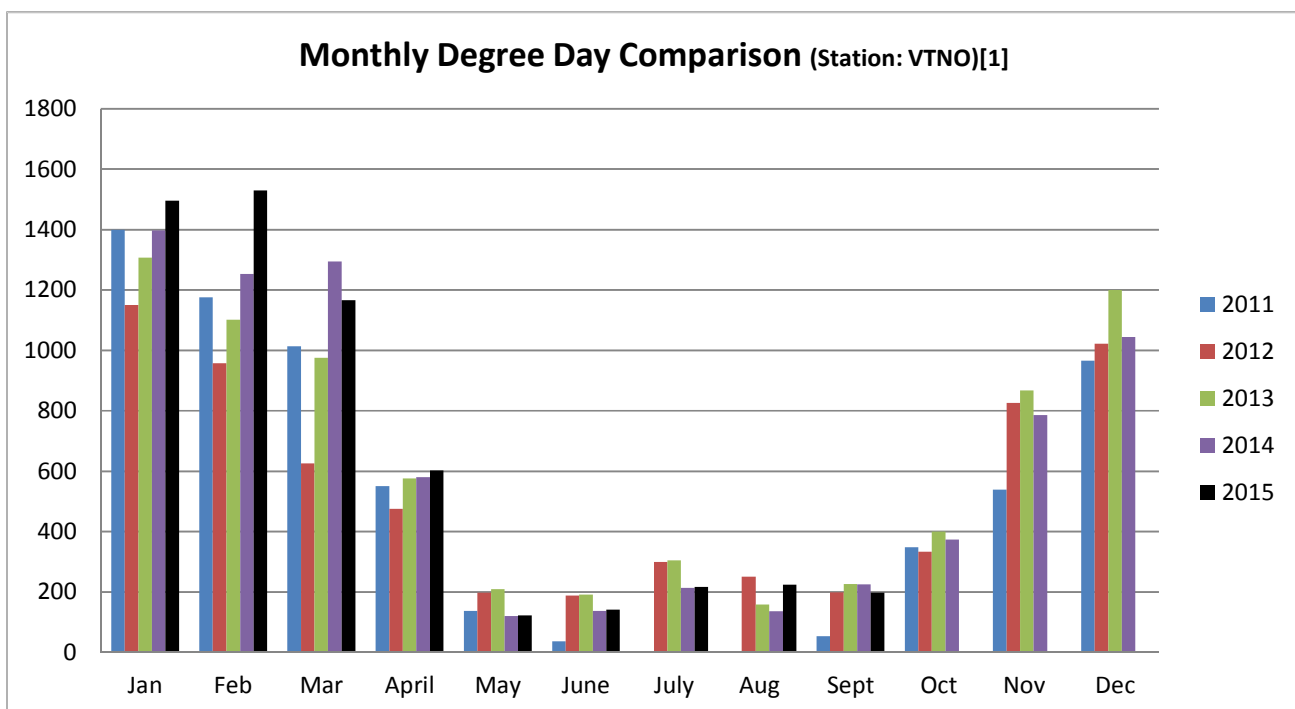
<sup>1</sup> <http://www.consumersenergy.com/content.aspx?id=4582>

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A negative percentage means the Comparison Year was milder than the Base Year. A positive percentage means the Comparison Year was more severe than the Base Year. When the monthly degree days in either the base year or the comparison year are less than 30, a percentage comparison is not calculated. However, the Annual Total comparison percentages include all heating and cooling degree days.

Monthly Degree Day Comparison (Station: VTNO)									
Month	Base Year (2014)			Comparison Year (2015)			Comparison Percentages		
	HDD	CDD	TDD	HDD	CDD	TDD	HDD	CDD	TDD
January	1398	0	1398	1496	0	1496	7%		7%
February	1253	0	1253	1530	0	1530	22%		22%
March	1294	0	1294	1166	0	1166	-9%		-9%
April	580	0	580	603	0	603	3%		3%
May	197	23	220	122	98	220	-38%		0%
June	28	109	137	71	71	142		-34%	3%
July	1	212	213	7	210	217		0%	1%
August	8	128	136	0	224	224		75%	64%
September	163	62	225	65	132	197	-60%	112%	-12%
October	357	16	373			0			
November	786	0	786			0			
December	1044	0	1044						
Through April	4525	0	4525	5060	735	5795	3%	38%	6%
Annual Total	7109	550	7659						



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*NOTE: The Vermont Fuel Price Report is published monthly by the Vermont Department of Public Service. Prices are collected on or about the first Monday of each month and reflect dealer discounts for cash or self-service, except propane prices, which are an average of the credit and discount price. Propane prices are based on 1,000 + gallons. For more information please contact Mike Kundrath at (802) 828-4081 or by email at [michael.kundrath@state.vt.us](mailto:michael.kundrath@state.vt.us).*