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NOAA Weather Forecast
Greater than 33% chance of above normal temperatures for Western, Central, and Downstate NY. Greater than 40% chance of above normal temperatures for Northern and Eastern NY.

NOAA Winter Weather Outlook 2017-2018

November 2017

November-January 2017-18
For the week ending October 28, NYS cumulative HDD’s since October 1 total 193 HDD and are 150 HDD or 43.7% below the normal level and 43 HDD’s or 18.2% below last year’s level.

The 193 HDD’s represent about 3.4% of the total normal heating season.
U.S. EIA Winter Fuels Outlook for 2017-18 Winter Season
U.S. EIA Winter Fuels Outlook for 2017-18

- EIA expects higher heating fuel prices this winter for all major home heating fuels including natural gas, heating oil, propane, and electricity compared to last year.

- Colder than last winter temperatures are expected with the Northeast projected to have 6.1% more heating degree-days.

- With colder temperatures and higher prices, EIA projects higher average household heating fuel expenditures.
EIA’s outlook includes scenarios with temperature forecasts that are 10% warmer and 10% colder than the base case.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Base Case</th>
<th>If 10% warmer than forecast</th>
<th>If 10% colder than forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating oil*</td>
<td>17%</td>
<td>5%</td>
<td>32%</td>
</tr>
<tr>
<td>Natural gas</td>
<td>12%</td>
<td>3%</td>
<td>19%</td>
</tr>
<tr>
<td>Propane *</td>
<td>18%</td>
<td>2%</td>
<td>41%</td>
</tr>
<tr>
<td>Electricity</td>
<td>8%</td>
<td>4%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Note: * Propane expenditures are a volume-weighted average of the Northeast and Midwest regions. All other fuels are U.S. volume-weighted averages. Propane and heating oil prices do not reflect prices locked in before the winter heating season starts.

- Expenditures are predicted to be higher this winter.
- The amount higher is highly dependent on the weather.

Source: EIA Short-Term Energy Outlook, October 2017.
Fuel prices are forecast to be slightly higher than last winter, but heating oil prices are expected to remain below levels from 2011–14 when crude oil prices were higher.

U.S. average residential winter heating fuel prices

<table>
<thead>
<tr>
<th>Natural gas</th>
<th>Heating oil</th>
<th>Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>2012-13</td>
<td>2013-14</td>
</tr>
<tr>
<td>2014-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015-16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016-17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017-18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Forecast

Source: EIA Short-Term Energy Outlook, October 2017.
Heating fuel market shares vary across U.S. regions

Share of homes by primary space-heating fuel and Census region

2016 New York Percentages:
- 58.6% Natural Gas
- 21.4% Heating Oil
- 3.8% Propane
- 11.9% Electricity
- 1.8% Wood
- 2.5% Other

Source: U.S. Energy Information Administration based on 2016 American Community Survey
<table>
<thead>
<tr>
<th>New York State Household Heating Fuel</th>
<th>2016</th>
<th>%</th>
<th>2010</th>
<th>%</th>
<th>Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Occupied Housing Units</td>
<td>7,209,054</td>
<td>100%</td>
<td>7,196,427</td>
<td>100%</td>
<td>12,627</td>
<td>0%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>4,227,422</td>
<td>59%</td>
<td>3,961,085</td>
<td>55%</td>
<td>266,337</td>
<td>7%</td>
</tr>
<tr>
<td>Bottled Tank or LP Gas</td>
<td>273,838</td>
<td>4%</td>
<td>227,607</td>
<td>3%</td>
<td>46,231</td>
<td>20%</td>
</tr>
<tr>
<td>Electricity</td>
<td>860,856</td>
<td>12%</td>
<td>676,262</td>
<td>9%</td>
<td>184,594</td>
<td>27%</td>
</tr>
<tr>
<td>Fuel oil or Kerosene</td>
<td>1,540,787</td>
<td>21%</td>
<td>2,068,004</td>
<td>29%</td>
<td>-527,217</td>
<td>-25%</td>
</tr>
<tr>
<td>Coal or Coke</td>
<td>19,268</td>
<td>0%</td>
<td>19,949</td>
<td>0%</td>
<td>-681</td>
<td>-3%</td>
</tr>
<tr>
<td>Wood</td>
<td>126,890</td>
<td>2%</td>
<td>143,242</td>
<td>2%</td>
<td>-16,352</td>
<td>-11%</td>
</tr>
<tr>
<td>Solar Energy</td>
<td>6,535</td>
<td>0%</td>
<td>1,823</td>
<td>0%</td>
<td>4,712</td>
<td>258%</td>
</tr>
<tr>
<td>Other</td>
<td>79,479</td>
<td>1%</td>
<td>61,664</td>
<td>1%</td>
<td>17,815</td>
<td>29%</td>
</tr>
<tr>
<td>No Fuel Used</td>
<td>73,979</td>
<td>1%</td>
<td>36,791</td>
<td>1%</td>
<td>37,188</td>
<td>101%</td>
</tr>
</tbody>
</table>

- Natural Gas up 266k homes (+7%) over 6 years
- Heating Oil down 527k homes (-25%) over 6 years

Source: American Community Survey
# New York Winter Heating Oil and Propane Fuel Summary

<table>
<thead>
<tr>
<th>Household</th>
<th>Actual</th>
<th>Forecast</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heating Oil</strong></td>
<td>Avg. 12-16 16-17 17-18</td>
<td>% Change</td>
<td></td>
</tr>
<tr>
<td>Consumption (gals)</td>
<td>785 759 806</td>
<td>6.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Avg. Price ($/gal)</td>
<td>3.48 2.81 3.10</td>
<td>10.4</td>
<td>6.2</td>
</tr>
<tr>
<td>Expenditures ($)</td>
<td>2,734 2,131 2,499</td>
<td>17.2</td>
<td>11.1</td>
</tr>
<tr>
<td><strong>Propane</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption (gals)</td>
<td>1,180 1,141 1,194</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Avg. Price ($/gal)</td>
<td>2.92 2.87 3.05</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Expenditures ($)</td>
<td>3,442 3,279 3,642</td>
<td>11.1</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Note: Individual household volumes, and so, expenditures will vary.

Note: Heating Oil data reflect New York prices and adjusted consumption to New York Averages.

Note: Propane data reflect New York prices and adjusted consumption to Btu equivalent heating oil.

Source: EIA Short-Term Energy Outlook, October 2017, NYSERDA
New York Winter Natural Gas & Electric Fuel Summary

<table>
<thead>
<tr>
<th>Household</th>
<th>Actual</th>
<th>Forecast</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural Gas</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption (mcf)</td>
<td>78.8</td>
<td>73.6</td>
<td>77.5</td>
</tr>
<tr>
<td>Avg. Price ($/mcf)</td>
<td>11.62</td>
<td>11.16</td>
<td>11.70</td>
</tr>
<tr>
<td>Expenditures ($)</td>
<td>916</td>
<td>822</td>
<td>903</td>
</tr>
</tbody>
</table>

**Electricity**

| Consumption (kwh) | 6,910        | 6,713        | 6,878     | 2.5      |
| Avg. Price ($/kwh) | 0.184        | 0.175        | 0.178     | 1.7      |
| Expenditures ($) | 1,273        | 1,175        | 1,224     | 4.2      |

Note: Individual household volumes, and so, expenditures will vary.

Note: Natural Gas consumption is adjusted to New York Averages while Electricity consumption is based on Northeast Averages.

Note: Prices reflect New York average prices.

Source: EIA Short-Term Energy Outlook, October 2017, NYSERDA
### Estimated Average Heating Expenditures

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>% Change Last Year</th>
<th>% Change 5-Year Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>9.8%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Heating Oil</td>
<td>17.2%</td>
<td>-8.6%</td>
</tr>
<tr>
<td>Propane</td>
<td>11.1%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Electric</td>
<td>4.2%</td>
<td>-3.8%</td>
</tr>
</tbody>
</table>

#### NY Estimated Average Heating Bills by Fuel

Source: EIA, NYSERDA
New York State Retail Heating Fuel Surveys

Current Prices: Heating Oil - $2.76, Kerosene - $3.17, Propane - $2.67

• Year over year change:
  • Heating Oil: +11.3%
  • Kerosene: +9.7%
  • Propane: +14.3%
Crude Oil
U.S. Crude Oil Prices

• WTI crude oil prices have remained relatively flat over previous year
• Current weekly average WTI crude oil price for week of Oct. 20 is $51.74/bbl
Factors Affecting U.S. Crude Oil Prices and Inventories

• Ongoing OPEC production cut

• Tightening of global crude oil surplus

• Higher worldwide demand growth for crude oil

• U.S. crude oil exports
Widening Brent-WTI Price Spread

- Spread at its largest since 2015 – currently around $6 per barrel
- Not as large as 2011-2014 or expected to increase much larger or for much longer due to increased U.S. crude oil exports and pipeline capacity.
- Unlikely to be sufficient enough to change how East Coast refiners source crude oil.

Figure 1. Weekly average Brent-WTI crude oil spot price spread

East Coast Crude Oil Sources

**Figure 2. PADD 1 refinery crude receipts by transportation mode**

- Thousand barrels per day

**Figure 3. PADD 1 refinery crude oil sources and gross inputs**

- Thousand barrels per day


Note: Difference between total crude oil sources and gross inputs includes supply from inventory and refinery inputs of other oils.
U.S. Crude Oil Exports

- U.S. crude oil export ban lifted in December 2015
- Explosive growth - current 4-week average is more than 1.7 million barrels per day
- Additional pipeline infrastructure allows crude oil to reach Gulf Coast where it can be exported.

Source: U.S. Energy Information Administration
U.S. Crude Oil Stocks

- Current level 457 million barrels
- 11 million barrels below last year
- Peak 536 million barrels in March
- Decreased 78 million barrels since March

Source: U.S. Energy Information Administration
Heating Oil
Northeast Heating Oil Market

• U.S. home heating oil consumption is highly concentrated in the Northeast.

• Four-fifths of all homes in the United States that use heating oil are located in the Northeast (source: U.S. Census Bureau, 2016 American Community Survey).

• 21% of homes in the Northeast use oil as their main heating fuel, down from 25% five years ago as an increasing number of homes switch to using natural gas and electricity for space heating.
Winter 2017-18 takeaways – Heating oil

- Brent crude oil spot prices are expected to average $54 per barrel (bbl) this winter, $2/bbl (6 cents/gal) higher than last winter, but they are not expected to return to 2010-14 levels when the average price of Brent crude oil exceed $100/bbl.

- Distillate stocks in the Mid-Atlantic totaled 26.1 million barrels on October 20, 13.2 million barrels (34%) below the same time last year and 6% below the 5-year average.

- Distillate inventories have been falling heading into winter due to recent refinery outages along the U.S. Gulf Coast after Hurricane Harvey combined with strong demand.

- Mid-Atlantic ultra-low sulfur distillate inventories declined by 7.7 million barrels (26%) since late August.
Winter 2017-18 takeaways – Heating oil

- Distillate fuel demand growth (transportation) has been stronger in recent years.

- For winter 2017-18, EIA expects heating oil wholesale margins to be 14 cents per gallon higher than last year due to lower inventory levels, strong demand for U.S. distillate exports, and colder than last year temperatures.

- Unless severely cold temperatures in the Northeast coincide with severely cold temperatures in Europe, distillate supplies should be able to meet demand but localized supply issues and upward pressure on distillate prices are possible.

![U.S. distillate demand graph](image-url)
EIA expects average residential heating oil prices to be 10% higher than prices last winter.

Source: EIA Short-Term Energy Outlook, October 2017, and Thomson Reuters.
Mid-Atlantic Distillate Stocks

- For the week ending October 20, total Mid-Atlantic distillate stocks are 33.6% below last year’s level and 5.9% below the 5-year average.
- Ultra-low sulfur distillate stocks are 34.6% below last year’s level and 7.3% above the 5-year average.
Propane
Winter 2017-18 takeaways – Propane

• Propane production is forecast to be 7% higher this winter compared with last winter, while total propane consumption is expected to be 2% higher than last winter and net exports 4% lower.

• U.S. propane inventories on October 20 were 25.1 million barrels (24%) lower than year-ago levels, and 7.6 million barrels (9%) below the five-year average; while Mid-Atlantic propane inventories were 10% higher than the year-ago level and 20% above the five-year average.

• Increasing Mid-Atlantic propane inventories coincide with increasing propane exports out of the Mid-Atlantic. With increased production from shale formations and improved rail delivery networks for propane, this should contribute to more robust propane supply chains than previous years.
Propane inventories are starting the winter in the middle of the five-year range but below 2016 record high levels

U.S. total end-of-month propane inventories
million barrels

Note: Gray band represents the range between the minimum and maximum from 2012 to 2016.
Source: EIA Short-Term Energy Outlook, October 2017.
Regional Propane Stocks

- Mid-Atlantic propane stocks are above both the 5-year average and last year’s level heading into the winter season.
- Sea-3 terminal in NH remains operational and is the only remaining open marine propane terminal in New England. A shipment of propane was received in May.
Since 2010, East Coast propane production has increased by 984% while the U.S. propane production has increased by 117%.

Increased propane production primarily due to increased natural gas production.
Propane Sources of Supply

East Coast (PADD 1) Sources of Propane Supply

- Field Production
- Refinery and Blender
- Imports
- Pipeline, Tanker, and Barge

Source: EIA

East Coast (PADD 1) Sources of Propane Supply

- Field Production
- Refinery and Blender
- Imports
- Pipeline, Tanker, and Barge

Source: EIA
Questions and Discussion

matthew.milford@nyserda.ny.gov