



## The Price of Energy

Posted by [Robert Rapier](#) on January 29, 2010 - 8:41am

Topic: [Demand/Consumption](#)

Tags: [coal](#), [eia](#), [electricity](#), [ethanol prices](#), [ethanol subsidies](#), [gas prices](#), [oil prices](#)  
[\[list all tags\]](#)

*Robert Rapier has been asked to contribute articles to Forbes blog, and [this article](#) is the first of his posts there.*

The price of energy has a very strong influence on the energy choices governments and individuals make. I sometimes hear people ask "Why are we still building coal-fired power plants?" or "Why don't we replace more petroleum with biomass?" One reason is that biomass is generally more difficult to use from a logistical point of view. Another is that there just isn't enough biomass to meet present energy demands. But a major factor comes down to price.

The price and convenience of energy sources are ultimately the keys to customer acceptance. Homes can be heated with wood, heating oil, natural gas, or electricity. Automobiles can be fueled with gasoline, ethanol, natural gas, diesel, electricity, and a wide variety of more unconventional fuels. If consumers have a choice and the supply is convenient, they will tend toward the cheapest energy source they can get.

---

The price of energy has a very strong influence on the energy choices governments and individuals make. I sometimes hear people ask "Why are we still building coal-fired power plants?" or "Why don't we replace more petroleum with biomass?" One reason is that biomass is generally more difficult to use from a logistical point of view. Another is that there just isn't enough biomass to meet present energy demands. But a major factor comes down to price.

The price and convenience of energy sources are ultimately the keys to customer acceptance. Homes can be heated with wood, heating oil, natural gas, or electricity. Automobiles can be fueled with gasoline, ethanol, natural gas, diesel, electricity, and a wide variety of more unconventional fuels. If consumers have a choice and the supply is convenient, they will tend toward the cheapest energy source they can get.

(a note: Robert has been asked to contribute articles to Forbes blog, and [this article](#) is the first of his posts there.)

Below I have compiled a list of current prices for some of the more common energy options on an energy equivalent basis - the British Thermal Unit (BTU). A BTU is simply the amount of heat energy it takes to raise the temperature of one pound of water by 1 degree Fahrenheit. Everything has been converted into U.S. dollars per million BTU (MMBTU). The sources for the data are listed below. Of course there can be very strong local variations that may change the ordering, but the ordering below is likely consistent across the majority of the U.S.

I have included the cost of electricity, although it is important to note that the efficiency of electric

motors is higher than for internal combustion engines. For comparison, I have also included the cost of the federal ethanol tax credit (Volumetric Ethanol Excise Tax Credit), which is \$0.45 per gallon of ethanol for 2010.

### Energy Prices per Million BTU

- Coal - Powder River Basin<sup>1</sup> - \$0.56
- Coal - Northern Appalachia<sup>1</sup> - \$2.08
- Natural gas<sup>2</sup> - \$5.69
- Ethanol tax credit<sup>3</sup> - \$5.92
- Propane<sup>4</sup> - \$13.28
- Petroleum<sup>5</sup> - \$13.43
- #2 Heating oil<sup>4</sup> - \$14.74
- Jet fuel<sup>4</sup> - \$15.48
- Diesel<sup>4</sup> - \$15.59
- Wood pellets<sup>6</sup> - \$17.33
- Gasoline<sup>4</sup> - \$17.81
- Corn ethanol<sup>7</sup> - \$23.46
- Electricity<sup>8</sup> - \$26.31
- Cellulosic ethanol from corn cobs<sup>9</sup> - \$30.92

### Observations

The list above illustrates why wood pellets for home heating have not had the same sort of market acceptance as they have in Europe. Wood pellets are much more expensive and generally less convenient to use than natural gas in North America. It isn't difficult then to see why wood pellets have a difficult market in North America. For people with access to natural gas, the lower price and convenience of natural gas is compelling. In Europe, a combination of taxes and supply insecurity has resulted in high natural gas prices, so wood pellets are more competitive there.

The cost of the ethanol subsidy is interesting. Taxpayers presently pay more for the subsidy than natural gas costs. However, if you consider that the subsidy is on a per gallon basis - and a large fraction of that gallon of ethanol is fossil fuel-derived, the subsidy for the renewable component is higher.

For instance, consider an energy output of 1.5 BTUs of ethanol (and by-products) per BTU of fossil fuel input (this is approximately where today's corn ethanol plants operate). In this case the renewable component per gallon is only 1/3rd of a gallon; the rest of the subsidy is essentially subsidizing the fossil fuel inputs. (An energy return of 1.5 indicates that it took 1 BTU of fossil fuel to produce 1.5 BTUs of ethanol; hence the renewable component of the ethanol in that case is 1/3rd). That means that the subsidy on simply the renewable component is actually three times as high - \$17.76/MMBTU. Also bear in mind that this is only the subsidy; the consumer then has to pay \$23.46/MMBTU for the ethanol itself.

Of course there are many other considerations, and government subsidies can tilt the playing field toward or away from different options. But if you ever wonder why those long railroad cars filled with coal are headed east from Wyoming, or why we tend to heat homes in North America with natural gas or heating oil, now you know.

### Sources for Data

1. U.S. Energy Information Administration (EIA), *Coal News and Markets Report* for the Week Ending 1/15/2010. ([Link](#)).
2. EIA, *Natural Gas Futures Prices* for 1/15/2010. ([Link](#)).
3. U.S. Department of Energy, *Volumetric Ethanol Excise Tax Credit (VEETC)*. ([Link](#)).
4. EIA, *Spot Prices* for 1/15/2010. ([Link](#)).
5. EIA, *World Crude Oil Prices*, U.S. average price for 1/15/2010. ([Link](#)).
6. WoodPelletPrice.com, typical premium wood pellet prices in New England for premium hardwood pellets on 1/15/2010. ([Link](#)).
7. CME Group, *Chicago Board of Trade Ethanol Futures* for February 2010 Contract. ([Link](#)).
8. EIA, *Wholesale Day Ahead Prices at Selected Hubs* for New England 12/31/09. ([Link](#)).
9. POET, *POET Announces Cost Reductions in Cellulosic Ethanol*. ([Link](#)).

## Conversion factors

- Petroleum - 138,000 BTU/gal
- Gasoline - 115,000 BTU/gal
- Diesel - 131,000 BTU/gal
- Ethanol - 76,000 BTU/gal
- Heating oil 138,000 BTU/gal
- Jet fuel - 135,000 BTU/gal
- Propane - 91,500 BTU/gal
- Northern Appalachia Coal - 13,000 BTU/lb
- Powder River Basin Coal - 8,800 BTU/lb
- Wood pellets - 7,500 BTU/lb
- Electricity - 3,412 BTU/kWh



This work is licensed under a [Creative Commons Attribution-Share Alike 3.0 United States License](#).