

Energy Issues

IEP Newsletter



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Germany and the UK are among the European countries with the highest electrical cost, based upon reported large consumer pricing.

Electricity Cost Trending Down for Industry

By: Thomas D. Mull, PE, PEM, CEM

Of all the energy sources available the most versatile is electricity. Whether it is used for fluid movement, space conditioning, air compressor operation, illumination or system controls, electricity is one source that is universally used. In the commercial and industrial sectors electricity typically represents a significant energy expenditure, often the largest. Therefore, the cost of electricity is a concern.

A brief review of current electrical costs was conducted by the IEP staff to determine a general trend. Over the past several decades we have experienced periods where the cost of fuels saw significant price variations from year to year. However, over the last several years the fluctuation in the cost of electricity, at least for the large user category, seems to have been fairly stable. To determine what actually happened, a sampling of countries from around the world was examined with two points in mind:

1. What was the typical cost of electricity in 2016?
2. How does 2016 compare to 2015?

Cost of Electricity in 2016

Recognizing that the cost of electricity can vary significantly along customer classifications (residential, commercial, industrial, wholesale, etc.), the review focused on larger consumers, typically industrial and large commercial. Where possible specific rate structures for the countries were examined. Note that

multiple rates, including time-of-use rate offerings, were available in some countries, but excluded due to the variations in how they were structured.

The following table represents a sampling of countries, with costs in U.S. dollars. Conversions from various currencies were made using exchange rates in effect in early April. These values are meant to be representative of the year ending 2016 and show a general relationship. They do not include specific "fixed" charges in the tariffs.

| <u>2016 Cost of Electricity</u> | |
|---------------------------------|---------------|
| <u>(Large Consumers)</u> | |
| <u>Country</u> | <u>\$/kWh</u> |
| Australia | \$0.0690 |
| China | \$0.1390 |
| France | \$0.1048 |
| Germany | \$0.1598 |
| India | \$0.0888 |
| Italy | \$0.1020 |
| Netherlands | \$0.0910 |
| Saudi Arabia | \$0.0799 |
| Sweden | \$0.0656 |
| United Kingdom | \$0.1461 |
| United States* | \$0.0768 |

* Excluding Northeastern states, Alaska and Hawaii the average cost is \$0.0651/kWh.

2016 Prices vs. 2015

In assessing how prices changed from 2015 to 2016 additional data sources were used. Unfortunately, 2015 data for all of the countries was not available. Some referenced prior years, but, the most consistent findings were for 2015.

Electricity Cost Trending Down for Industry (cont.)

By: Thomas D. Mull, PE, PEM, CEM

The data below highlights the variation in the cost.

2016 Cost of Electricity (Large Consumers) Country Variation from 2015

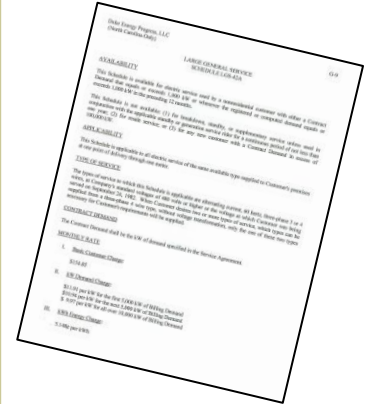
| | |
|----------------|-----------|
| France | ↓ 2.0% |
| Germany | Unchanged |
| Italy | ↓ 5.0% |
| Netherlands | ↓ 4.0% |
| Saudi Arabia | Unchanged |
| Sweden | Unchanged |
| United Kingdom | ↓ 7.0% |
| United States | ↑ 3.0% |

From this sampling, the price of electricity

is generally trending downward. In reviewing projections for various countries, this appears to be short term, with prices expected to take an upward trend within the next few years.

Residential Rates

For those of you wondering about the cost of residential electricity, it typically runs approximately twice that of the larger consumers. Within the lower 48 states of the U.S. the highest cost residential power is in the Northeast (Connecticut – \$0.1902/kWh) with the rest of the NE states and California close behind. The highest cost for residential electricity in the U.S. is in Hawaii, where the cost averages \$0.2768/kWh.



U.S. electrical cost for 2016 reflected a 3% increase, while other industrialized countries remain unchanged or trended downward.

Oil to Stay Under US\$60 per Barrel

By: IEP Staff Writer

In an article published on-line in early March, a leading commodities researcher for Goldman Sachs projected that the long term price of crude oil should settle between US\$55 - \$60 per barrel. This value was attributed to results from a survey conducted with industry leaders in Texas and by the strong compliance of OPEC members in cutting production (1.2 million barrels per day) in November 2016. The wild card in this projection is shale oil production. U.S. shale oil production is responsive to price fluctuations and can be brought on line quickly when pricing is favorable.

The U.S. Energy Information Administration released a drilling productivity report in early 2017 that forecasted a monthly rise of 41,000 barrels per day in shale oil production for February to 4,748 million barrels per day. Improvement in shale oil production efficiency has spurred an increase in the volume of new oil per rig. According to a WTRG economist, this level of production is a concern OPEC countries.

The bottom line is that regardless of the ultimate price for oil, U.S. shale oil production could serve as a controlling factor.



The WTI price of oil fluctuated between slightly over US\$53 a barrel in early March to just under US\$49 per barrel on May 1st.

* Sources: Goldman Sachs Sees "Long-term" Oil Prices Below \$60 – By: Zainab Calcuttawala Market Watch – Rising U.S. shale-oil output threatens OPEC's production pact
By: Myra P. Saffong

Canada Plans to Increase Nuclear Generation

By: IEP Staff Writer

In an effort to offset a future shortfall in electricity and enhance climate change efforts, Canada plans to focus new power generation construction on a series of small modular nuclear reactors (SMRs).

On their website *Ontario Power Generation* highlights nuclear power as a “very attractive option for meeting the (Ontario) province’s electricity needs well into the future”. Specifically, they cited low operating costs and virtually no emissions. Reinforcing the cost benefit of nuclear power, an *Ontario Energy Board (OEB)* report issued in 2016 indicated the cost of electricity generated with nuclear power at 6.8¢/kWh, second only to hydro power generation at 5.7¢/kWh.

Overall, Canada’s electrical generation mix is currently 60% hydropower, 16% nuclear, with the remainder coming from coal-fired and natural gas-fired plants and wind turbines. In Ontario province approximately 58% of its electrical needs are provided by nuclear generation.

| Energy by Source | % of Total Supply | Total Unit Cost Cents per kWh |
|------------------|-------------------|-------------------------------|
| Nuclear | 58% | 6.8 |
| Hydro | 23% | 5.7 |
| Gas | 9% | 14.0 |
| Wind | 8% | 13.3 |
| Solar | 2% | 48.1 |

Source: Ontario Energy Board (OEB), May 2016
 Numbers may not equal 100% as they have been rounded.



Professional Energy Manager



Tesla Supercharger
 Picture: Courtesy of Tesla

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Tesla to Double Supercharger Network

By: IEP Staff Writer

By the end of 2017 Tesla plans to double the number of their Superchargers worldwide. The announcement of the charging station expansion coincides with the release of their Model 3, which joins their luxury Models S and X. The Model 3 is Tesla’s initial venture into the mid-priced electric sedan market.

Tesla’s charging network consists of two basic types, Destination Chargers and Superchargers. The company partners with shopping centers, resorts, restaurants, and hotels to provide Destination Chargers for their customers. They typically provide 30 to 50 amps (with a few as high as 100 amps). Intended as a convenience, they allow customers to “top off” a charge while shopping, dining or spending the night.

The Tesla Supercharger is a 480-volt fast-charging station to allow for extended travel. Using a proprietary design, Tesla began a global network of these stations in 2016. Providing up to 120 kW of power, a vehicle’s range can be extended 170 miles with a charge of about 30 minutes. A full battery charge takes about 75 minutes.

With approximately 5,000 Superchargers and 9,000 Destination Chargers comprising the network at the end of 2016, Tesla plans to have 10,000 Superchargers and 15,000 Destination Chargers in service globally by the end of 2017. This includes adding 1,000 Superchargers in California, contributing to the expected 150% increase in North America.

An interactive map showing charging locations for all Tesla models can be found at <http://www.teslarati.com/map>. The map can be downloaded to your phone by an iOS and Android app available at the site.