

Please note that this PDF is subject to specific restrictions that limit its use and distribution. The terms and conditions are available online at <http://www.iea.org/t&c>

## KEY ELECTRICITY TRENDS

Excerpt from:

# ELECTRICITY INFORMATION

2015



International  
Energy Agency

Secure • Sustainable • Together

The following analysis is an excerpt from the publication *Electricity Information (2015 edition)*.

Please note that we strongly advise users to read the definitions, detailed methodology and country-specific notes which can be found online under *References* at ([www.iea.org/statistics/topics/electricity/](http://www.iea.org/statistics/topics/electricity/))

Please address your inquiries to [eleaq@iea.org](mailto:eleaq@iea.org).

*Please note that all IEA data are subject to the following Terms and Conditions found on the IEA website:*  
[www.iea.org/t&c/termsandconditions/](http://www.iea.org/t&c/termsandconditions/)

# RECENT ELECTRICITY TRENDS

## Production

In 2014, gross electricity production in OECD countries fell by 0.8%. This was mainly the result of a decrease in electricity production from fossil fuels, notably oil (-17.1%), brown coal (-3.4%) and natural gas (-1.2%) ordered by decreasing importance in absolute values. On the other hand, electricity generation from wind (+8.1%), nuclear (+0.9%) and solar photovoltaic (PV) (+26.9%) increased.

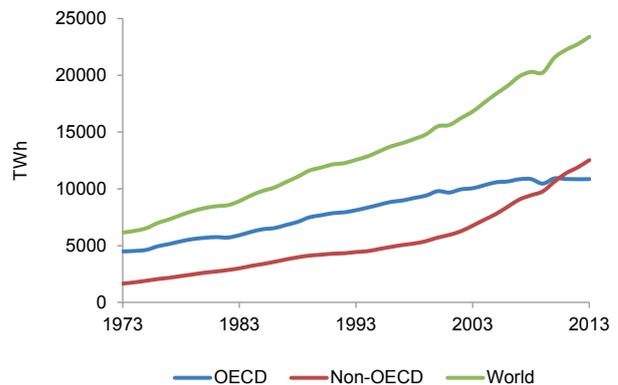
Total OECD electricity production in 2014 was lower than its 2007 level.

Nuclear electricity production increased in 2014 for the second year in a row after the accident at the Fukushima plant in Japan in 2011. However, Japan nuclear electricity production reached zero in October 2013 and, as of publication, no nuclear plant started operation under new regulations.

From 1973 to 2013, world gross electricity production increased from 6 144 TWh to 23 391 TWh, an average annual growth rate of 3.4%. Compared to the 22 740 TWh produced in 2012, global power production in 2013 increased (2.9%) for a fourth year in a row after the economic crisis in OECD countries led to a visible decline in global production in 2008 and 2009.

The increasing share of non-OECD countries in total world electricity production reflects the higher average growth rate which has prevailed since 1973. In the last 40 years, electricity production increased at an average annual rate of 5.2% in non-OECD countries, while in OECD countries the average annual growth rate during the same period was 2.2%. Indeed, in 2011 non-OECD electricity production surpassed OECD production for the first time.

Figure 1: Total Electricity production



In 2013, 67.2% of world electricity production was from fossil fuel-powered plants. Hydroelectric plants provided 16.6%, nuclear plants 10.6%, biofuels and waste 2.0%, and geothermal, solar, wind and other sources made up the remainder.

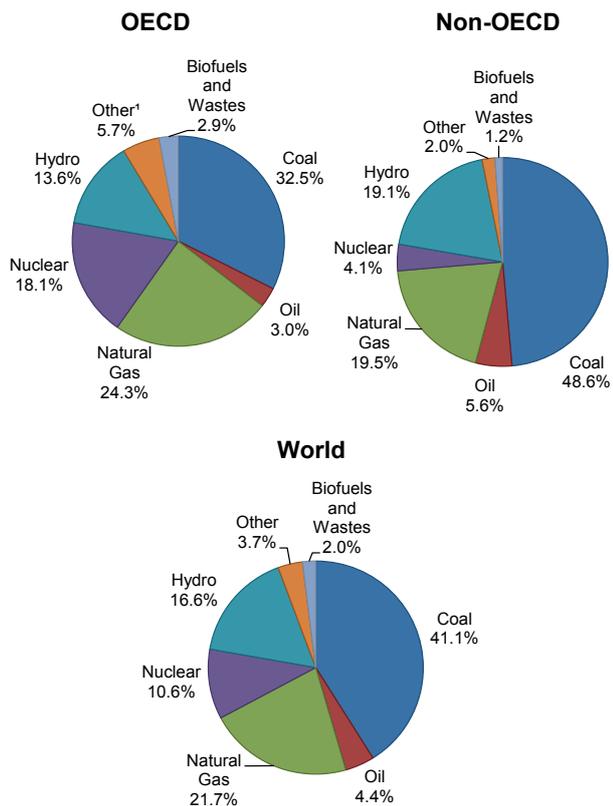
## OECD production

Gross electricity production in 2014 in OECD countries (including generation from pumped storage plants) was 10 773 TWh, a decrease of 0.8% from the 2013 level and 1.4% lower than the level in 2010.

Nuclear plants accounted for 18.4% of total gross electricity production, hydroelectric plants 13.5%, total combustible fuel<sup>1</sup> plants 61.4% (made up of 58.7% from fossil-fuel-fired plants and 3.0% from biofuels and waste plants) and geothermal, solar, wind and other plants 6.4%.

1. Combustible fuels refer to fuel that are capable of igniting or burning, i.e. reacting with oxygen to produce a significant rise in temperature. Fuels included are: coal and coal products, oil and oil products, natural gas, and biofuels and waste including solid biomass and animal products, gas/liquids from biomass, industrial waste and municipal waste.

**Figure 2: 2013 fuel shares in electricity production**



**Non-OECD production**

While complete statistics are not available for electricity production in all non-OECD countries for 2014, comprehensive data are available for 2013. Gross electricity production in 2013 in non-OECD countries was 12 533 TWh, an increase of 5.4% from the 2012 level, in contrast to a small 0.1% increase in the gross production of the OECD countries from 2012 to 2013.

In 2013, 73.8% of non-OECD electricity production was generated from fossil fuels, 19.0% was provided by hydroelectric plants, 4.1% by nuclear plants and 3.1% by biofuels and waste and geothermal/solar/wind capacity.

**Capacity**

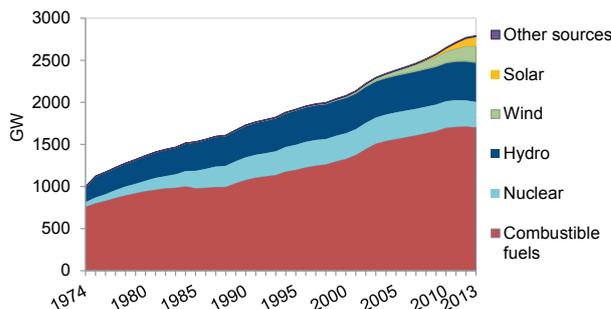
Capacity data are available only for OECD countries.

In 2013, OECD countries reported 2 794 GW of total installed capacity, a 0.8% increase from 2012. This consisted of 1 704 GW of plants fired by fossil and other combustible fuels, 302 GW of nuclear power,

470 GW of hydroelectric power (including pumped storage capacity), 194 GW of wind, 114 GW of solar (of which 110 GW came from solar PV and 11 GW of geothermal, tide/wave/ocean and other capacity combined). A total of 22.6 GW of capacity was added in 2013, with the biggest contributors being solar PV (25.2%), wind (7.2%) and hydro (0.8 %).

Total OECD generating capacity increased at an average annual rate of 3.5% from 1974 to 1990, with nuclear, hydroelectric and combustible fuel capacity increasing by average annual rates of 10.6%, 4.8%, and 2.2%, respectively. By comparison, from 1990 to 2013 total generating capacity increased at an average annual rate of 2.1%, with nuclear, hydroelectric and combustible fuels increasing by 0.5%, 1.0%, and 2.0%, respectively. In this period there were also substantial additions of solar PV and wind capacity, increasing at average annual rates of 47.7% and 21.1%, respectively, as many countries began to invest in renewable energy resources.

**Figure 3: OECD net electrical capacity by source**



Note: Other Sources includes geothermal, tide, wave, ocean, chemical heat and other non-specified (e.g. fuel cells) sources of electricity production.

The slower overall growth of total capacity additions since 1990 is partly attributable to economic evolution, which has resulted in the growth of less energy-intensive service industries. The OECD-wide pattern of electric power capacity and production conceals large differences among countries that reflect different resource endowments and economics of electricity generation, as well as different policy approaches. Data on the growth and type of installed capacity in individual OECD countries and regions are reported in detail in Table 15 in Part IV of the paper version of this report. The fuel used in individual OECD countries in the production of electricity is illustrated in the graphs in Part IV.

## Consumption

### OECD consumption

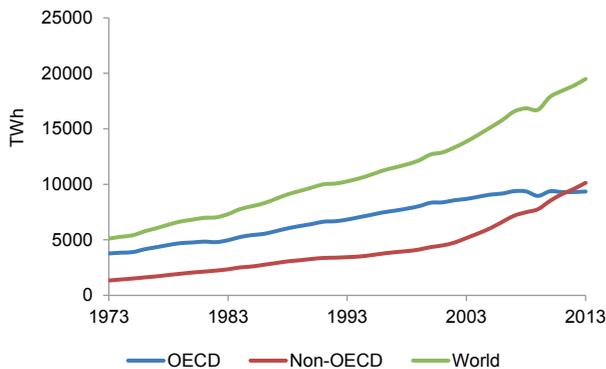
In 2013, calculated electricity consumption in OECD countries was 9 331 TWh, 0.6% higher than in 2012.

Based on provisional data, 2014 *apparent* consumption of electricity (gross production plus imports minus exports) in OECD countries was 10 771 TWh a 0.9% decrease compared with 2013.

### Non-OECD consumption

In 2013, *calculated* final electricity consumption, which is equal to production plus imports minus exports, own use, other use, transmission losses and energy sector consumption, in non-OECD countries was 10 142 TWh. This represents an increase of 5.8% over the *calculated* final consumption in 2012.

Figure 4: Total final consumption of electricity



## Trade

Transfers of electricity between utilities in neighbouring regions have been common for many years. Exchanges based on differences in national production costs between regions are economically efficient, and fluctuations in load can be balanced by exchanges with neighbouring utilities with different load profiles. Such exchanges reduce the necessary overall reserve margins by diversifying the potential sources of supply. Surplus capacity in a neighbouring region can result not only from simple differences in load timing, but also from differences in climate (e.g. seasonal peaks or renewable resources), economic structure, or the timing of forced and scheduled unit outages.

Often when reporting electricity flows, countries use electricity trade as a “balancing” item. This leads to

some distortion of the import and export data. In addition, the transmission and distribution line losses between net importers and net exporters are difficult to determine. Both of these factors lead to differences between reported net imports and net exports in trading countries.

### OECD electricity trade

OECD imports of electricity grew from 88 TWh in 1973 to 474 TWh in 2014, an average annual growth rate of 4.2%. OECD exports of electricity grew from 81 TWh in 1973 to 476 TWh in 2014, an average annual growth rate of 4.4%.

Substantial trade in electricity occurred in OECD Europe, principally among OECD countries, and in OECD Americas. In OECD Europe, electricity imports grew at an average annual rate of 7.0% from 1973 to 1990, but slowed to a rate of 2.3% annually from 1990 to 2014. In OECD Americas, total imports increased by an average annual rate of 4.5% from 1973 to 1990, and by 3.4% from 1990 to 2014.

### Non-OECD electricity trade

When considered as a single entity, non-OECD countries were net importers of electricity. In 2013, these countries reported electricity imports of 242 TWh and electricity exports of 219 TWh, resulting in net imports of 22 TWh.

Outside of the OECD there is substantial electricity trade among Russia, Kyrgyzstan, Turkmenistan, Ukraine and other countries of the former Soviet Union. These countries export significant quantities of electricity to net-importing countries such as Belarus, Moldova, and Latvia as well as to countries in Central and Western Europe.

In South America, electricity produced by large hydroelectric plants in Paraguay is exported to Brazil and Argentina (in 2013, net exports from Paraguay were 47.4 TWh).

In Africa, there is sizeable trade in the southern portion of the continent. South Africa exports a significant amount of power to Zimbabwe. Mozambique, which had been a net electricity importer, became a net exporter in 1998 as a new hydro project came into service. In 2013, net exports by South Africa were 4.5 TWh.

The People’s Republic of China exports electricity from southern nuclear and hydroelectric plants to Hong Kong, China. In 2013, net exports from the People’s Republic of China were 11.7 TWh.

India also imports a significant amount of electricity (5.6 TWh of net imports), a substantial part of which is produced by hydro facilities in Bhutan.

## OECD prices

Average real electricity prices in the OECD increased by 1.9% in 2014 from 2013 levels. Prices for industry increased by 2.2% and prices for households by 1.6%.

Electricity prices for consumers vary widely among OECD countries. Based on available 2014 data, electricity prices for industry were the lowest in the United States (USD 70.14 per MWh) and the highest in Italy (USD 327.79 per MWh). Electricity prices for households varied from USD 90.08 per MWh in Mexico to USD 403.12 per MWh in Denmark.