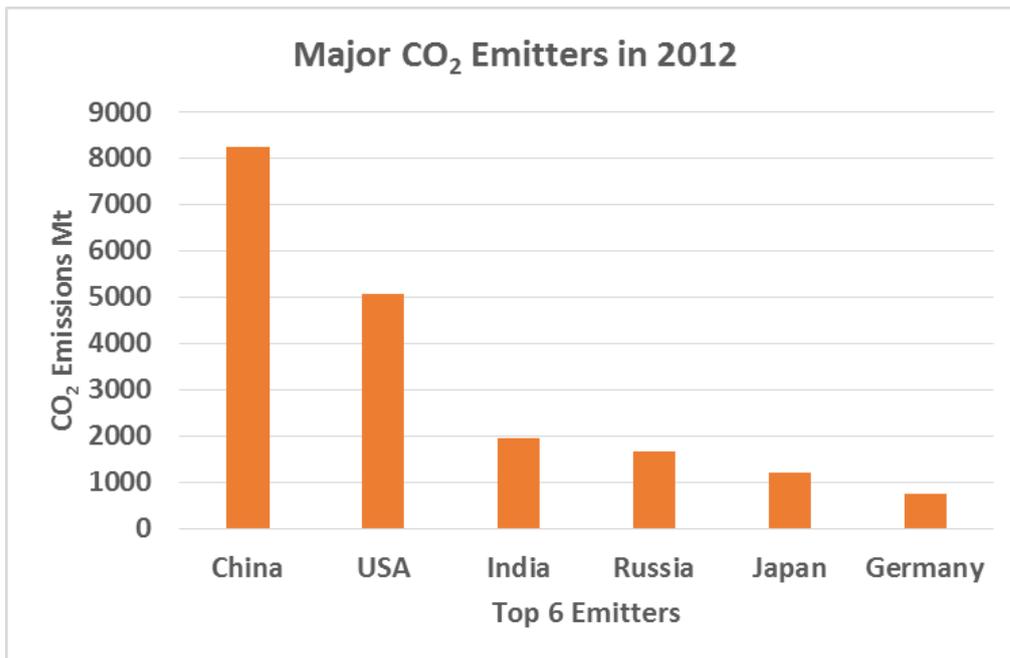


Energy in a Changing Climate

Nuclear Power to do the Heavy Lifting in Reducing Greenhouse Gas Emissions

On November 12, 2014, [China and the United States agreed to new limits on carbon emissions](#) starting in 2025. China's President Xi Jinping agreed to peak CO₂ emissions by 2030 and also promised to raise the share of zero-carbon energy to 20 percent of the country's total. United States would cut its own emissions by more than a quarter by 2025.

This agreement makes perfect sense when you realise that according to the [International Energy Agency \(IEA\)](#), China and the US are the two biggest emitters of CO₂ from energy production, contributing 42 percent of the world total in 2012. The top six countries make up 60 percent of the world total. IEA measures CO₂ emissions in each country from fuel combustion only.



Source: [IEA Key World Energy Statistics 2014](#).

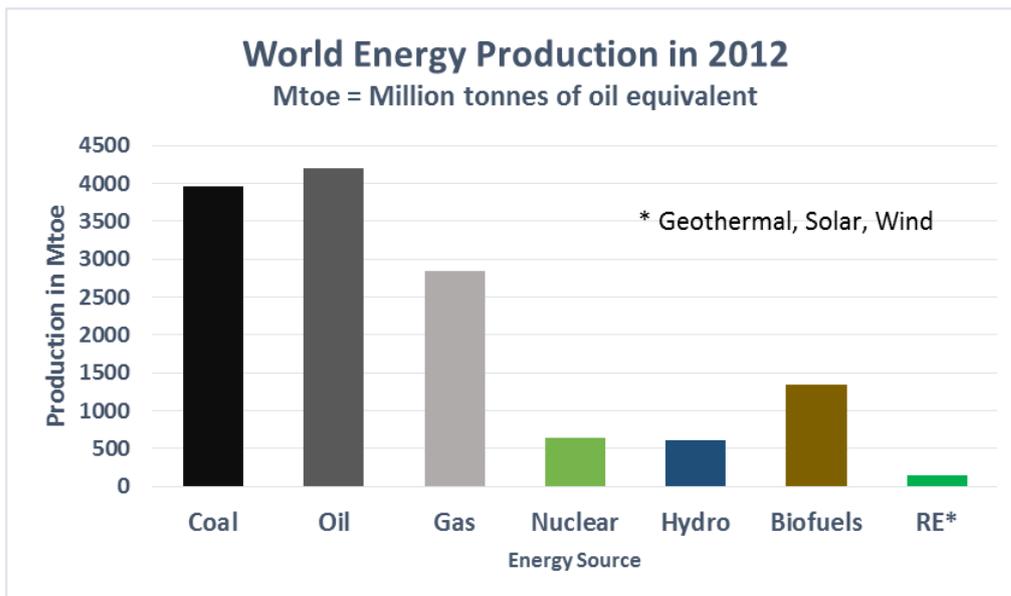
Accord to the [IPCC](#), CO₂ emissions from energy production in 2004, primarily from burning coal, oil and gas, accounted for about 60 percent of total greenhouse gas (GHG) emissions.

Countries can reduce their total GHG emissions significantly by switching to low-carbon energy sources made up of nuclear, hydro, biofuels and renewable energy (RE) including geothermal, solar and wind, then.

The table below shows the major energy sources in 2012. Coal, oil and gas are the largest contributors to GHG emissions but they also contributed 82 percent of total energy. Coal made up 30 percent, oil 31 percent and gas 21 percent. Biofuels made up 10 percent, nuclear and hydro 5 percent each, but RE only produced 1 percent of total energy. For the

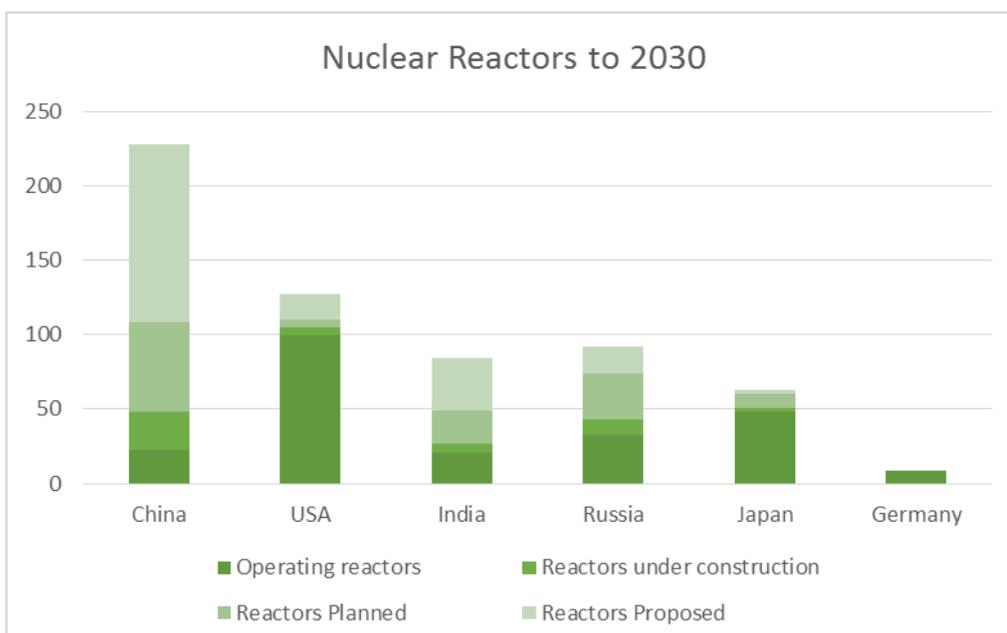
world to replace coal alone, low-carbon sources would need to produce 4000 million tonnes of oil equivalent (Mtoe) of energy annually.

For this to come from renewable energy alone, the world would need to increase its RE energy production almost 30 fold from 143 Mtoe to 4,000 Mtoe. To replace coal with nuclear power alone, nuclear energy would need to increase sixfold from 642 Mtoe to 4,000 Mtoe. This assumes no significant changes to hydro and biofuels. In reality, coal will be replaced by a mix of both more RE and more nuclear, both being low-carbon energy sources.



Source: [IEA Key World Energy Statistics 2014](#)

According to the [World Nuclear Association](#) (WNA), China currently has 22 operating reactors and is well on its way to a possible tenfold increase in nuclear power with as many as 228 nuclear plants operating by 2030 with an average capacity of 1.04 GW per plant.



Source: [World Nuclear Association](#)

The 5 other major GHG emitting countries identified above would need to significantly increase their installed and planned nuclear base to match China. The [World Nuclear Association](#) claims there are world plans to more than double the existing fleet of nuclear plants from the current 437 operating plants to 994 by 2030. Germany appears to have decided to stay with its remaining 9 operating plants until 2022 with no current plans for new ones.

If the world was to almost triple nuclear power capacity from 337 GW today to 983 GW by 2030, as shown in the WNA world plan assuming all planned & proposed plants were operable by then, this would only reduce coal consumption by about half. This still leaves a gigantic challenge for other low-carbon energy sources.

It is clear that we need to consider all low-carbon energy sources for the future. Nuclear power can clearly do the heavy lifting to reduce CO₂ emissions and it must not be ignored or unfairly vilified. When we consider the current very small energy contribution from renewable energy sources, about 1 percent (see World Energy Production above), then the task of substantially growing that contribution 30 fold by 2030 to replace coal would be enormous.

The exact mix of nuclear with renewable energy will be for individual countries to decide. China clearly sees a great advantage in using significantly more nuclear in the future to reduce its use of coal. Hopefully, the actual mix in each country would be driven more by cost and reliability than ideology and politics.

Written by Martin Nicholson and first published in Brave New Climate 8 December 2014