

AUSTRALIAN NUCLEAR FORUM

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Primary Energy of Mineral Fuel Resources

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The following table lists major primary energy mineral resources of several countries and regions. (Note: the methods of gathering such information may vary between resources and regions, hence the information presented below should be regarded as approximate only.)

There are several points of interest in these data:

- The Middle East has 40% of the gas and about half of the oil.
- The US has 27% of the coal.
- Uranium used in fast breeder reactors provides four and a half times as much energy as all of the world's fossil fuels combined.
- Australia has 31% of the uranium which (if used in FBRs) would provide about 40% more energy than that in the world's total fossil fuels.

Primary energy is not the whole story however. All of these energy sources are used to produce electricity by means of heat engines (e.g., boilers & turbines) where some 60-70% of the energy is lost in the process. Some fuels however, such as natural gas can be used directly (such as for heating), thereby reducing processing losses. Another point of interest is the lifetimes of the world reserves at current consumption rates: coal 120y, oil 50y, natural gas 63y, uranium 100y.

Primary Energy Resources, Exajoules

Region	Nat Gas	Oil	Hard Coals	Soft Coals	Fossil Totals	Uranium (LWRs)*	Uranium (FBRs)*
Australia	116	19.9	888	667	1691	837	46800
Russia	1760	363	1170	1830	5123	240	13440
China	111	123	1490	887	2611	85.5	4788
US	286	125	2590	2180	5181	103.5	5796
Canada	65	1058	82.5	53.9	1258	242.5	13580
Europe	154	71.9	150	1190	1566	?	?
Middle East	2820	4550	28.2	?	7398	56	3136
World	7010	8890	9670	7740	33310	2700	151200

Notes: Hard Coals = Anthracite + bituminous; Soft Coals = Sub-bituminous + Lignite
References: DOE EIA International Energy Annual 2011; *=World Nuclear Association

Worldwide about 1.6 million tonnes of uranium has been mined since WWII. This has been sold to various countries mainly for reactors that use slightly enriched fuel. The unused depleted uranium left over after the enrichment process actually contains most of the energy of the originally supplied uranium. This energy can be released if the depleted uranium is burned in fast breeder reactors. Thus countries that have bought Australia's uranium are currently stockpiling the depleted uranium for future use. Already the energy value of the depleted uranium stored in the UK exceeds the energy value of all the UK's economically recoverable coal reserves.

Another available nuclear energy resource is thorium, an element that is even more abundant in the earth's crust than uranium. Thorium can be used to fuel other types of breeder or near-breeder reactors that could then more than double the nuclear energy available to the world.