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ENERGY FOR THE FUTURE

The Year 2030 and Beyond

Your global future begins here

College of Engineering

Shawqi Al Dallal


Energy for the Future
The year 2030 and beyond
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CONTENT

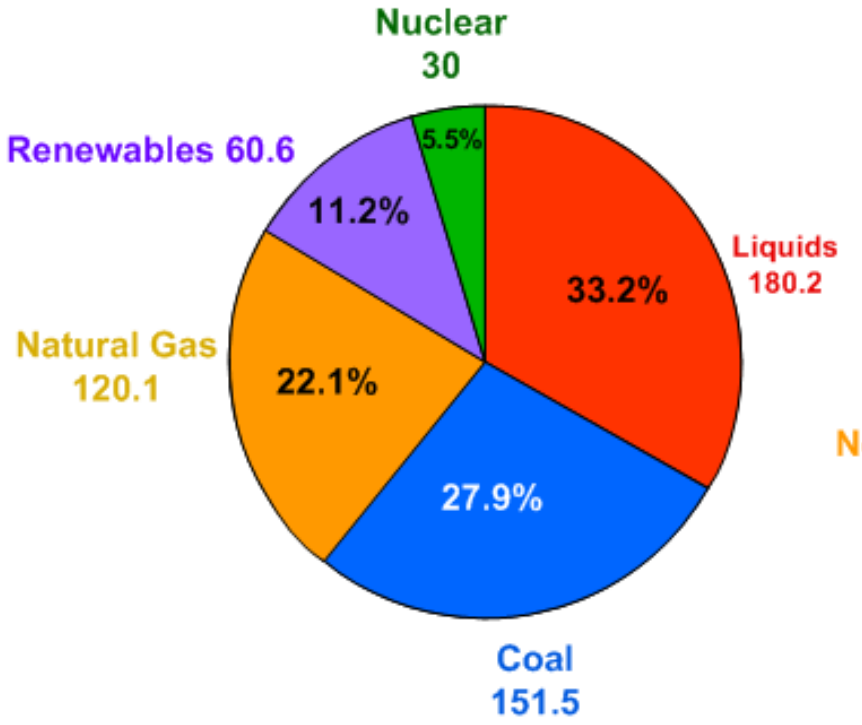
- Cosmic Civilization
- Planet Earth Energy Consumption
- Energy consumption by type
- Comparison of future energy sources
- Nuclear Fusion
- Space Solar Cells projects
- Energy from the solar wind
- Zero point Energy

Cosmic Civilizations

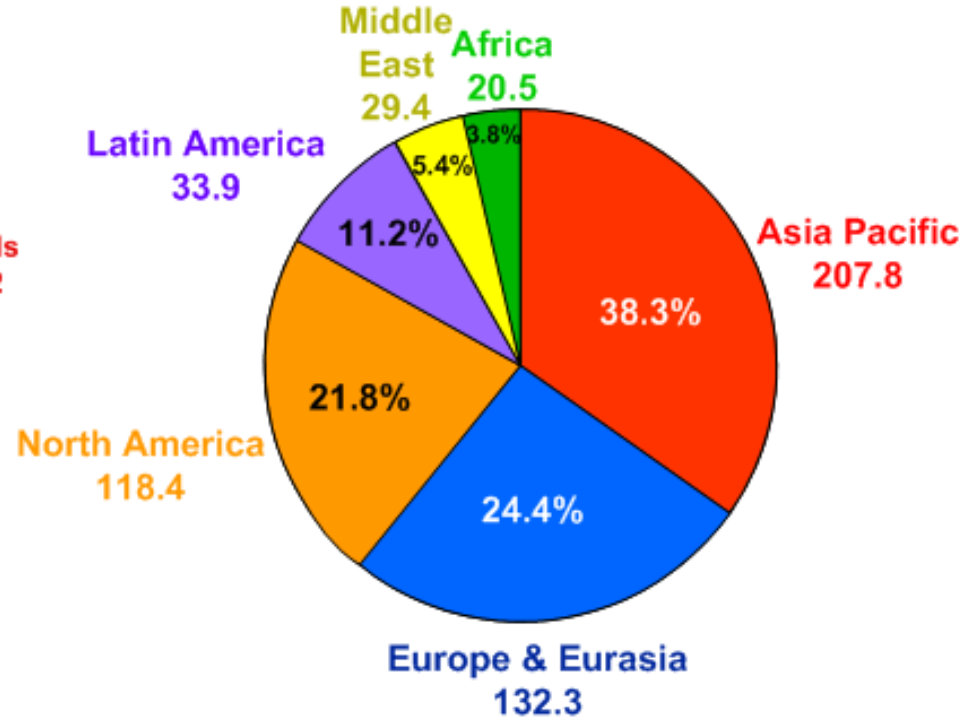
- Type I
- Type II
- Type III

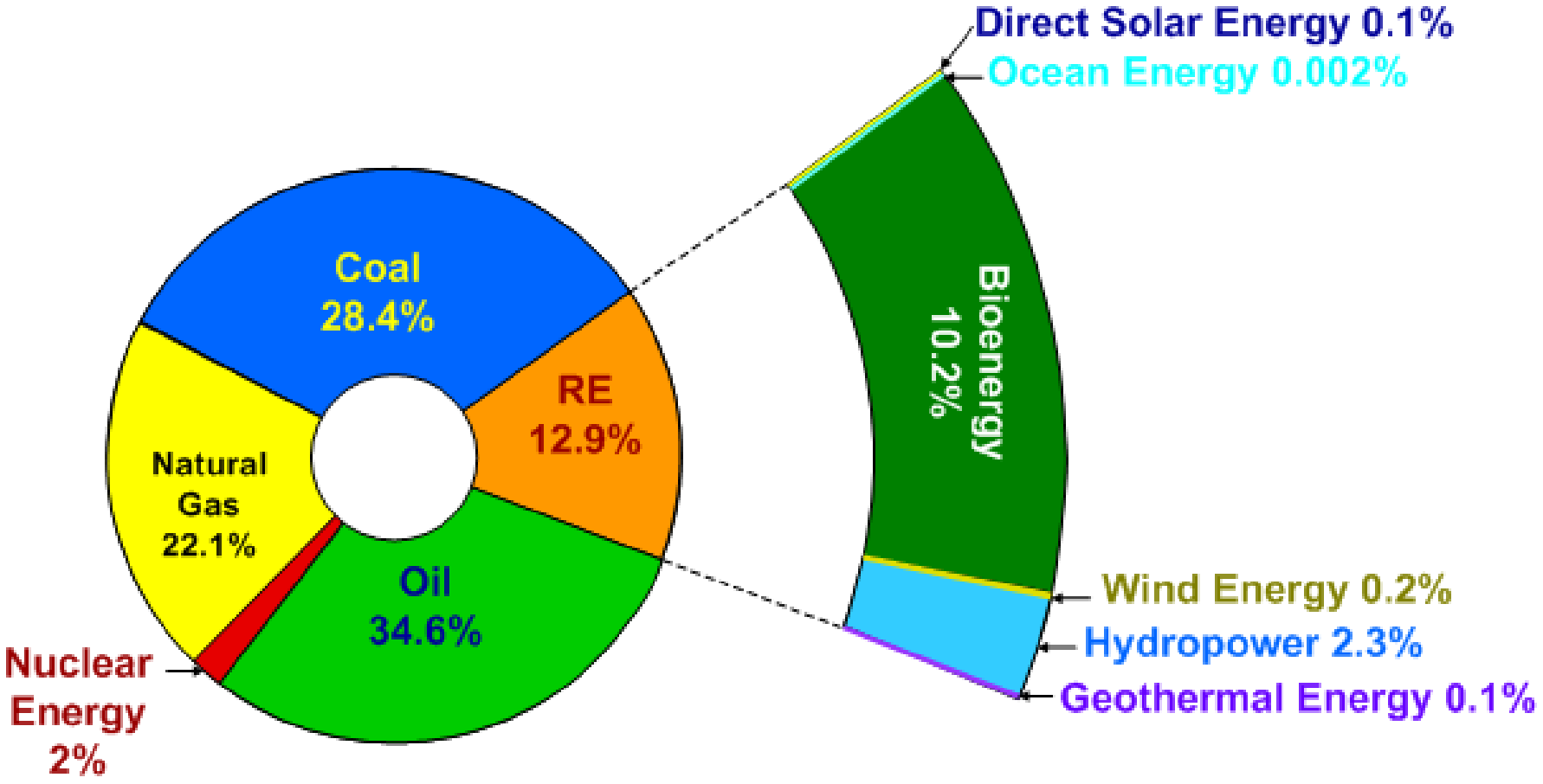
PHYSICS

World total Energy consumption by fuel type (Quadrillion Btu)



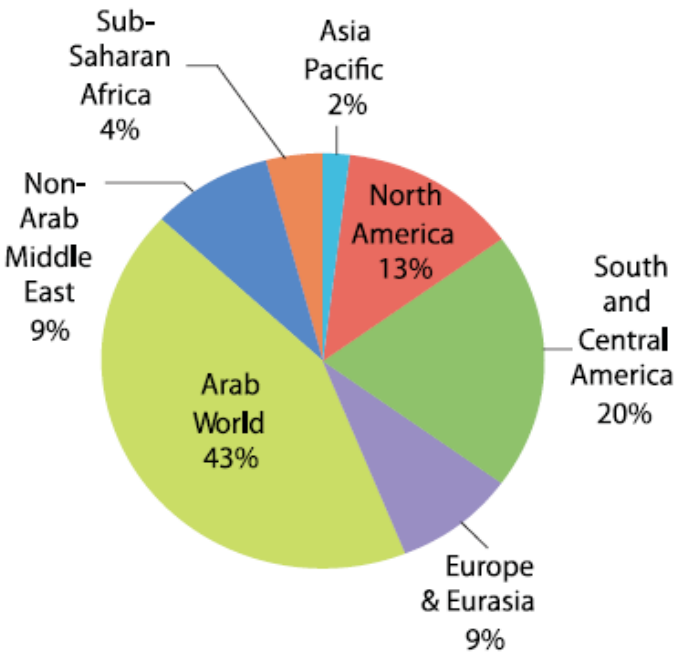
World total Energy consumption by region (Quadrillion Btu)





Share of Energy sources in total global energy supply

Reserves by Region, end-2011



Production by Region, 2011

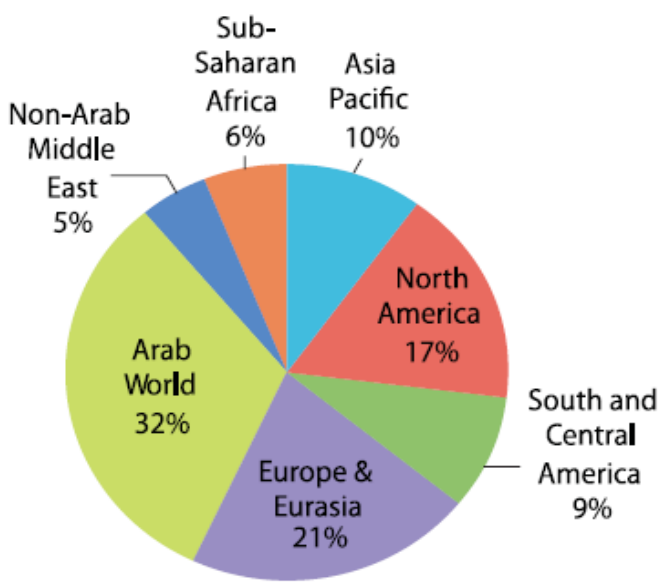


TABLE 1: PROVED OIL AND GAS RESERVES IN THE ARAB ECONOMIES AT END-20

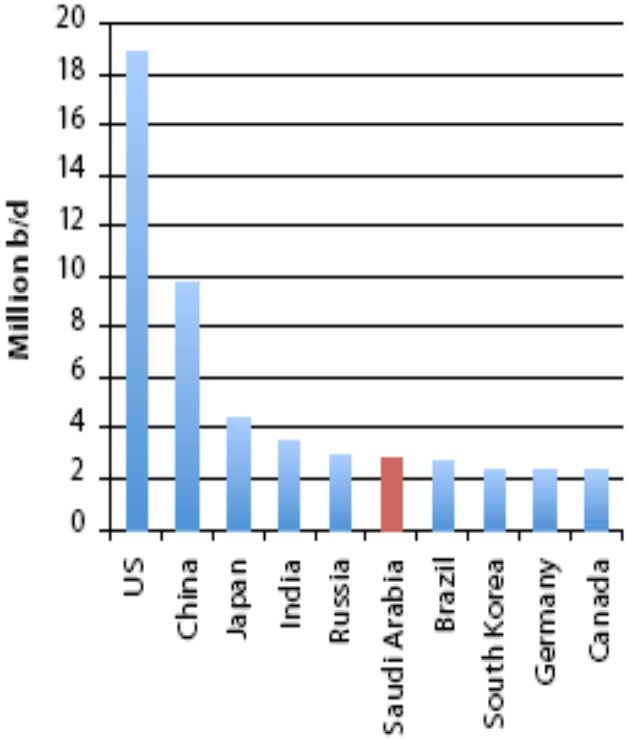
	Oil			Natural Gas		
	Proved reserves (bbl)	Share of world reserves	R/P ratio	Proved reserves (Tcm)	Share of world reserves	R/P ratio
The GCC States	495.0	29.9%	69.5	42.4	20.3%	121.0
Bahrain	0.1	< 0.05%	7.0	0.3	0.2%	26.8
Kuwait	101.5	6.1%	97.0	1.8	0.9%	> 100
Oman	5.5	0.3%	16.9	0.9	0.5%	35.8
Qatar	24.7	1.5%	39.3	25.0	12.0%	> 100
Saudi Arabia	265.4	16.1%	65.2	8.2	3.9%	82.1
UAE	97.8	5.9%	80.7	6.1	2.9%	> 100
Other Major Oil Producers	202.4	12.2%	110.5	9.6	4.6%	114.2
Algeria	12.2	0.7%	19.3	4.5	2.2%	57.7
IRAQ	143.1	8.7%	> 100	3.6	1.7%	> 100
Libya	47.1	2.9%	> 100	1.5	0.7%	> 100
Other Oil Producers	16.2	1.0%	26.8	12.6	1.4%	159.8
Egypt	4.3	0.3%	16.0	2.2	1.1%	35.7
Sudan and S. Sudan	6.7	0.4%	40.5	0.1	< 0.05%	-
Syria	2.5	0.2%	20.6	0.3	0.1%	34.3
Yemen	2.7	0.2%	32.0	0.5	0.2%	50.7
Total Arab World	713.6	43.2%	74.4	55.0	26.3%	107.2
Total World	1,652.6	100%	54.2	208.4	100%	63.6

TABLE 5: OIL AND GAS CONSUMPTION IN THE ARAB WORLD 2000–2010

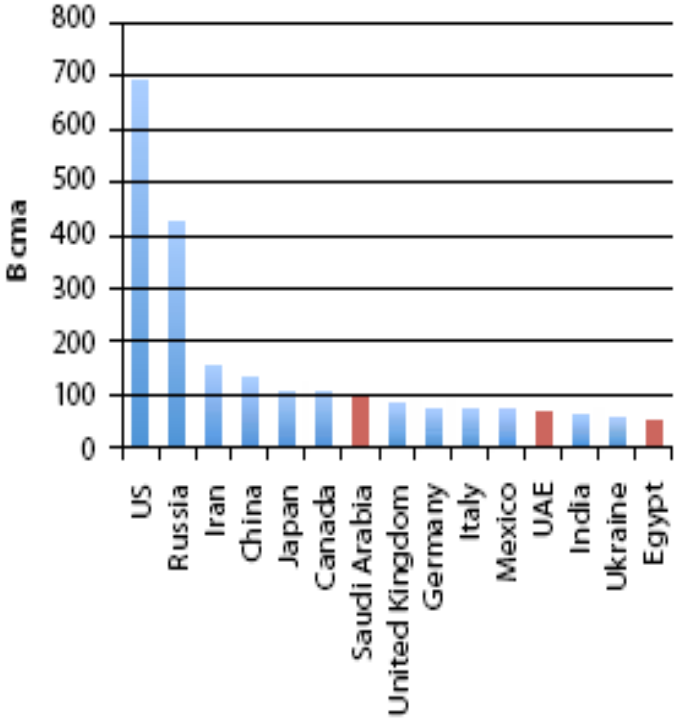
	Crude Oil and Petroleum Products ('000 b/d)		CAGR	Natural Gas (Bcm)		CAGR
	2000	2010	2000–2010	2000	2010	2000 – 2010
The GCC States	2,256	3,855	5.0%	111.48	214.5	6.1%
Bahrain	23	47	6.6%	8.5	12.3	3.4%
Kuwait	264	354	2.7%	6.9	14.5	7.0%
Oman	53	106	6.6%	5.68	17.5	10.8%
Qatar	48	152	11.0%	9.16	21.8	8.2%
Saudi Arabia	1,537	2,650	5.1%	49.81	87.7	5.3%
UAE	330	546	4.7%	31.43	60.8	6.2%
Other Major Oil Producers	879	1,295	3.6%	29.81	37.2	2.0%
Iraq	462	694	3.8%	2.9	1.3	-7.0%
Algeria	206	312	3.8%	21.83	28.8	2.6%
Libya	210	289	2.9%	5.08	7.1	3.0%
Other Oil Producers	948	1,321	3.1%	26.7	56.6	7.1%
Egypt	553	798	3.4%	21	46.2	7.4%
Sudan and S. Sudan	43	98	7.8%	n/a	n/a	n/a
Syria	256	268	0.4%	5.7	9.6	4.9%
Yemen	97	157	4.5%	n/a	0.8	n/a
Other Countries	485	503	0.3%	3.67	6.7	5.7%
Djibouti	11	12	0.6%	n/a		n/a
Jordan	101	98	-0.3%	0.29	2.7	22.7%
Lebanon	106	80	-2.5%	n/a	0.2	n/a
Mauritania	24	20	-1.4%	n/a	n/a	n/a
Morocco	158	209	2.5%	0.05	0.6	24.8%
Tunisia	85	84	-0.1%	3.33	3.3	-0.1%
Total Arab World	4,567	6,975	3.9%	171.66	315.0	5.7%
World	76,597	87,439	1.2%	2442.22	3,215.9	2.5%

ARAB OIL AND GAS CONSUMPTION IN PERSPECTIVE

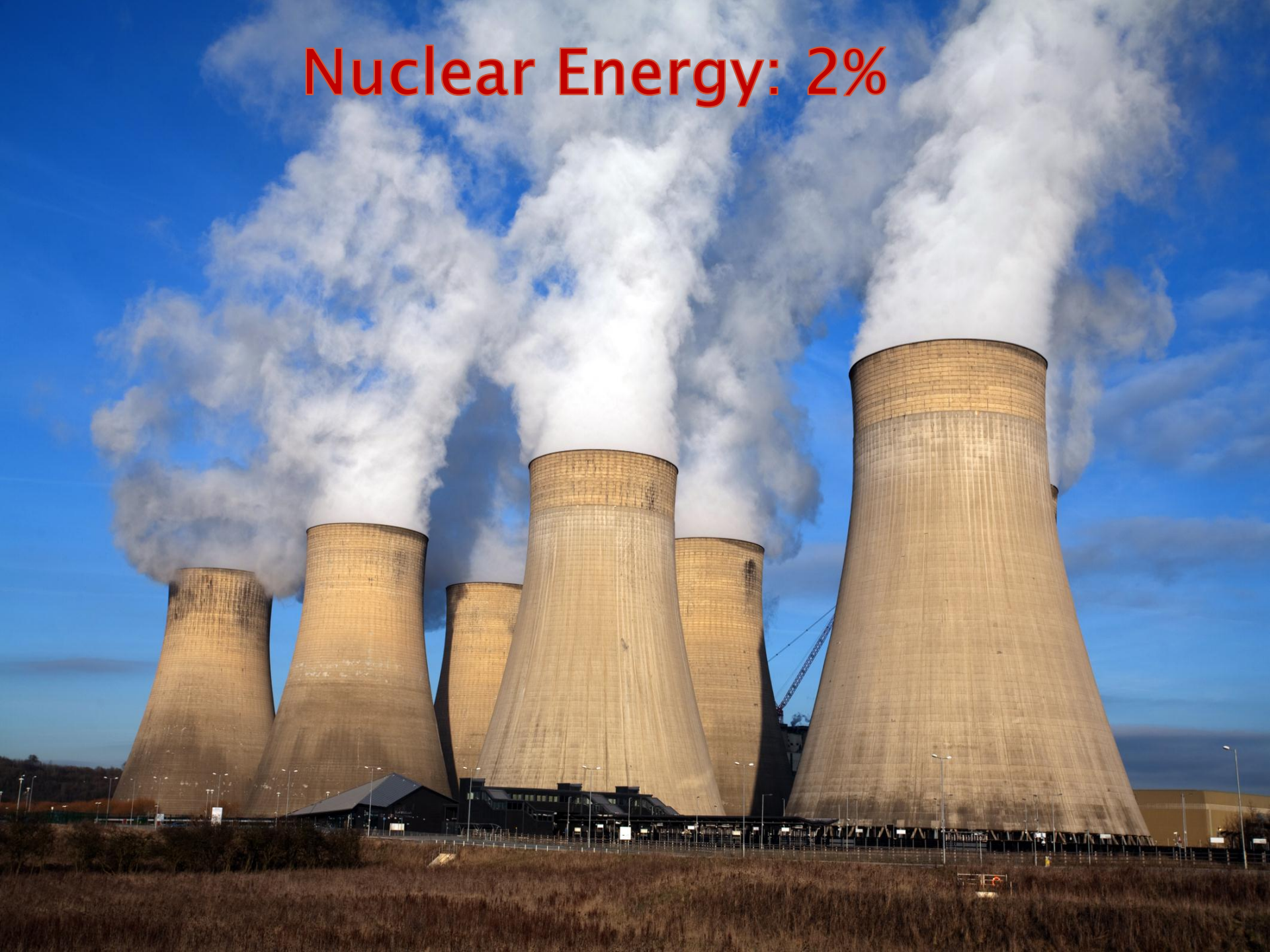
World's 10 Largest Oil Consumers, 2011



World's 15 Largest Gas Consumers, 2011




Coal: 28.4%

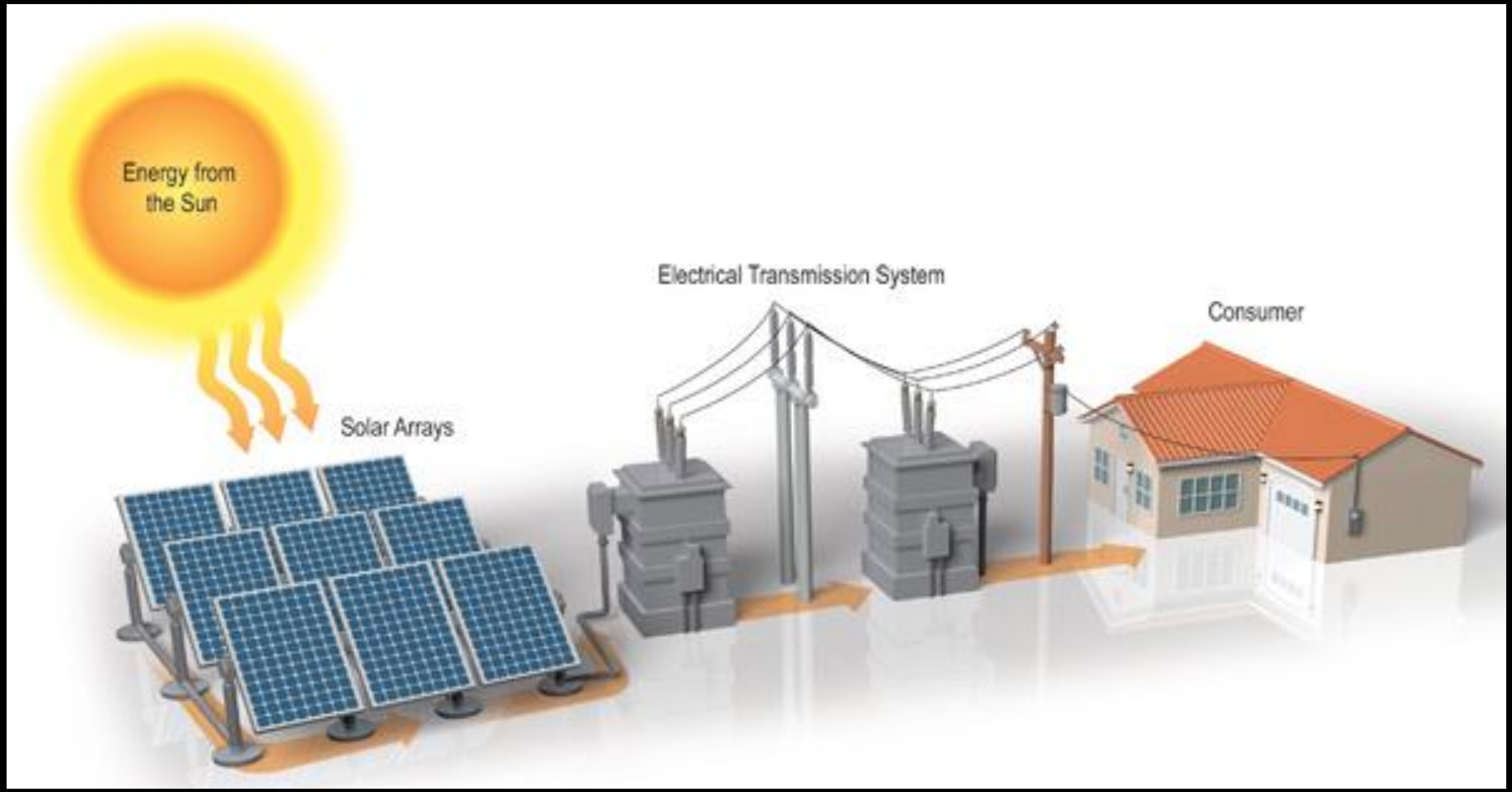

Nuclear Energy: 2%


Gas: 22.1%
IBHUBESI
GAS


Oil: 34.6%

Renewable Energy: 12.9%

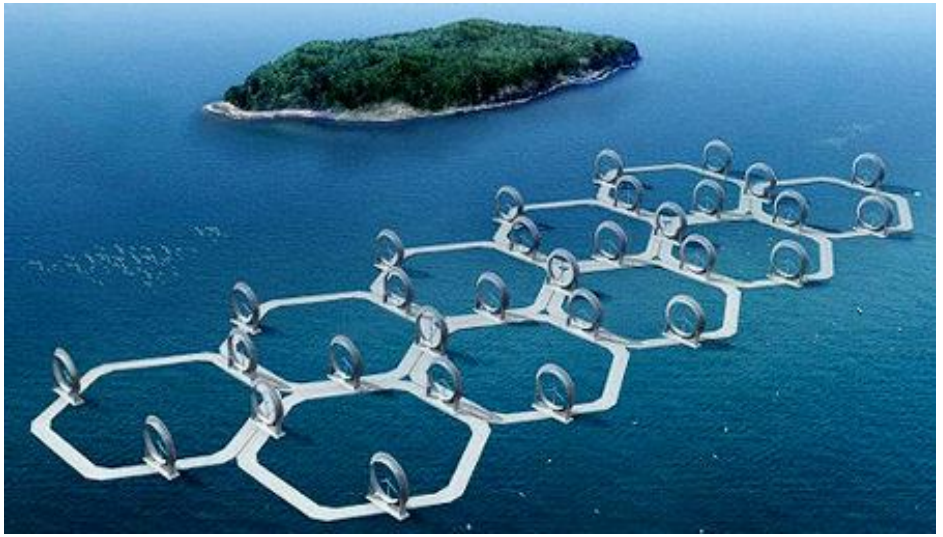
Direct Solar Energy:0.1%



Ocean Energy:0.002%

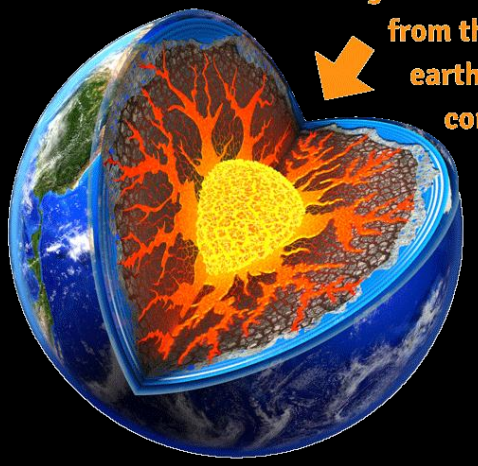
Wind ENERGY

'Wind Lens' Wind Turbine Could Boost Energy Generation 300%

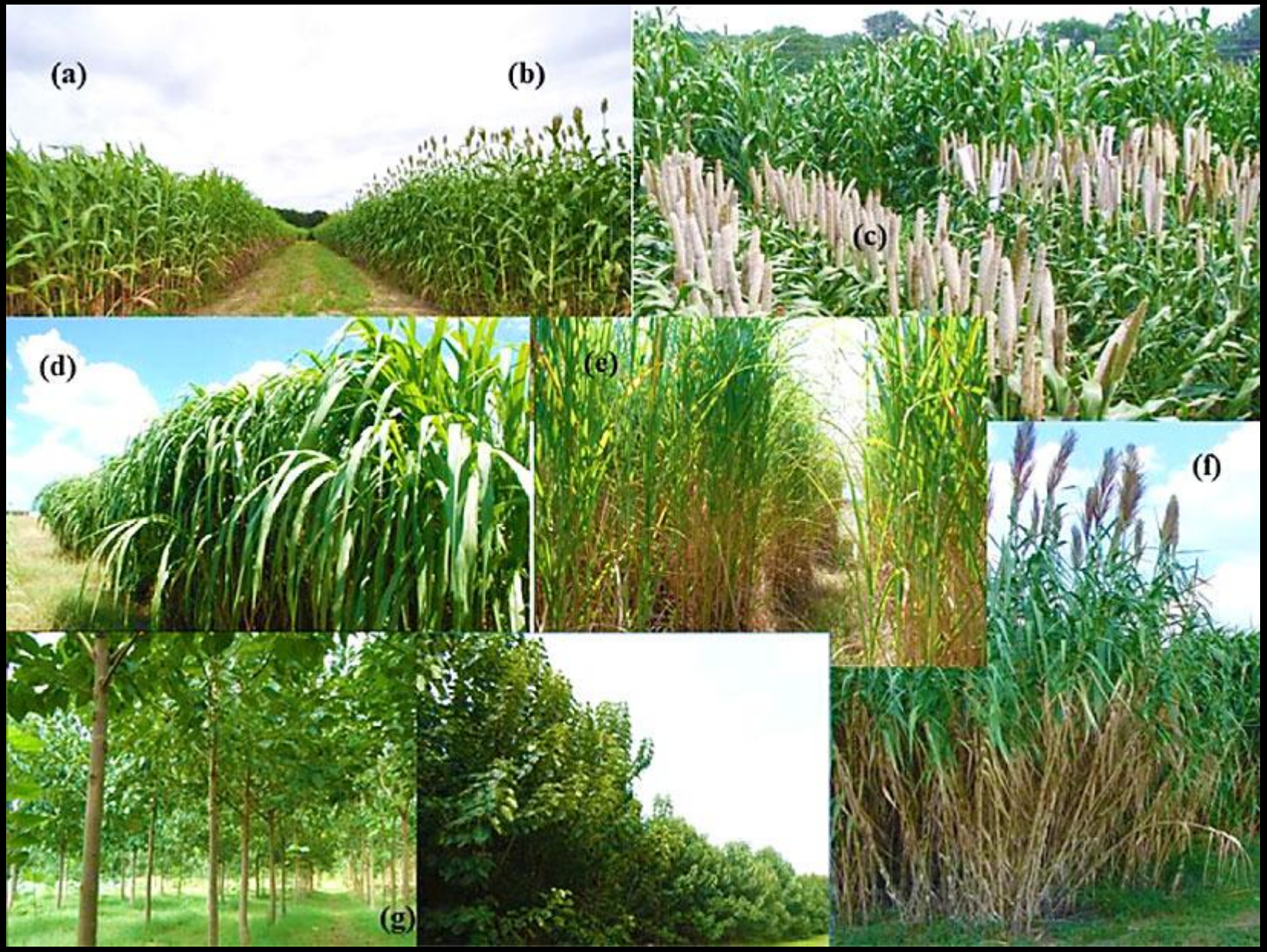


Hydropower: 2.3%

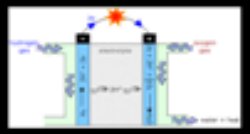
Geothermal : 0.1%

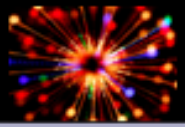


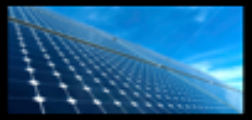
Bioenergy: 10.2%



Coparison of Future Energy Sources

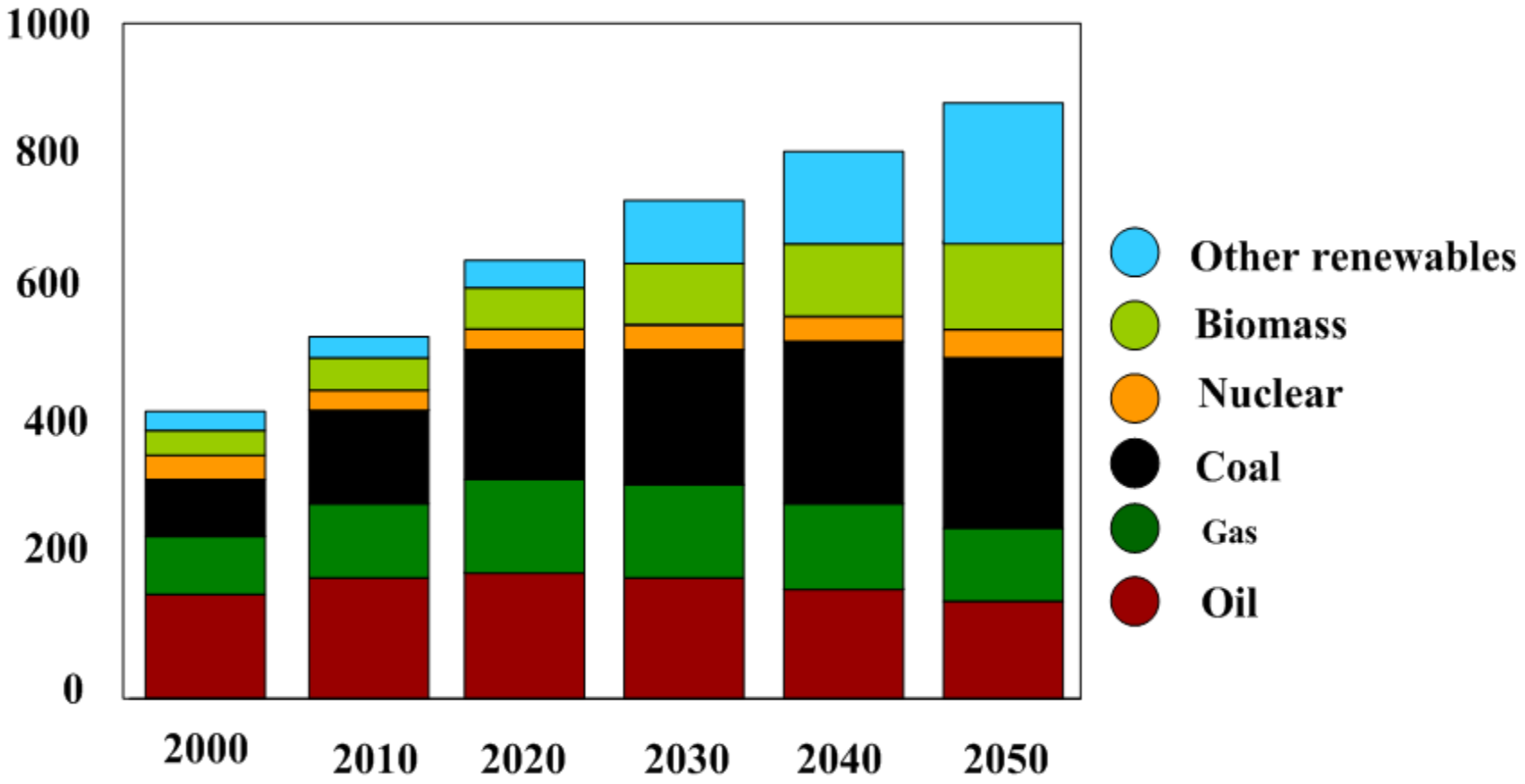


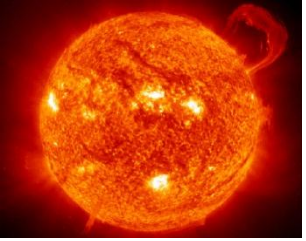




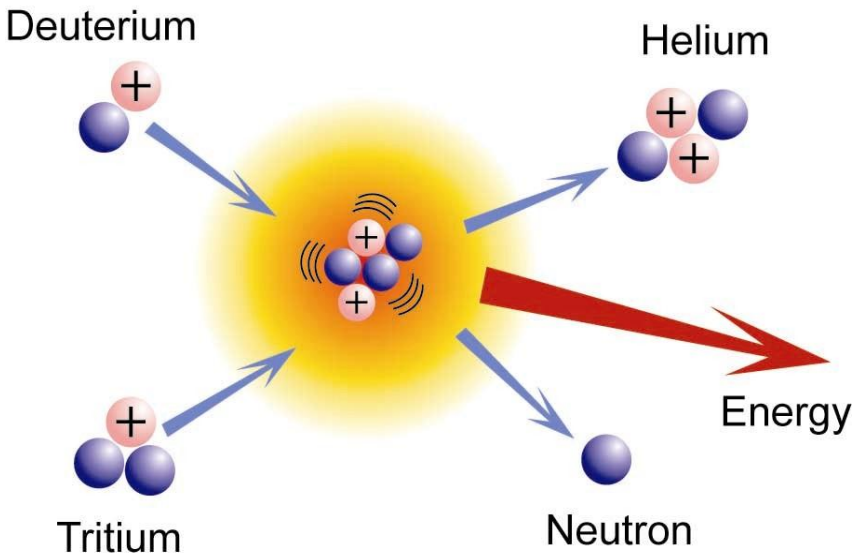
	Hydrogen Fuel Cell	Nuclear Fusion	Solar Energy
For	- Portable - Power efficient - produces only Water as a waste product	- Expensive - Obtaining pure hydrogen gas is problematic - Requires more energy to manufature than it supplies	- Portable - Zero emission - Free and plentiful fuel supply - Wide range of uses
Against	- Expensive -Obtaining pure hydrogen gas is problematic -Requires more energy to manufature than it supplies	- Very difficult to create - only in early stages of development	- Initial cost still too high - Solar panels are still not very power efficient - Limited by daylight hours and cloud cover

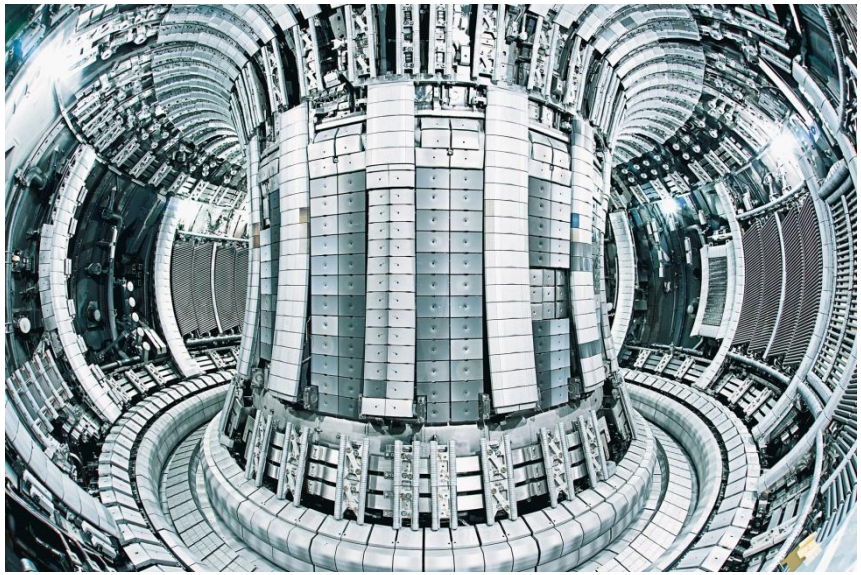
IEA : Total world Energy Consumption by the year 2013: 5.67×10^{20} Joule

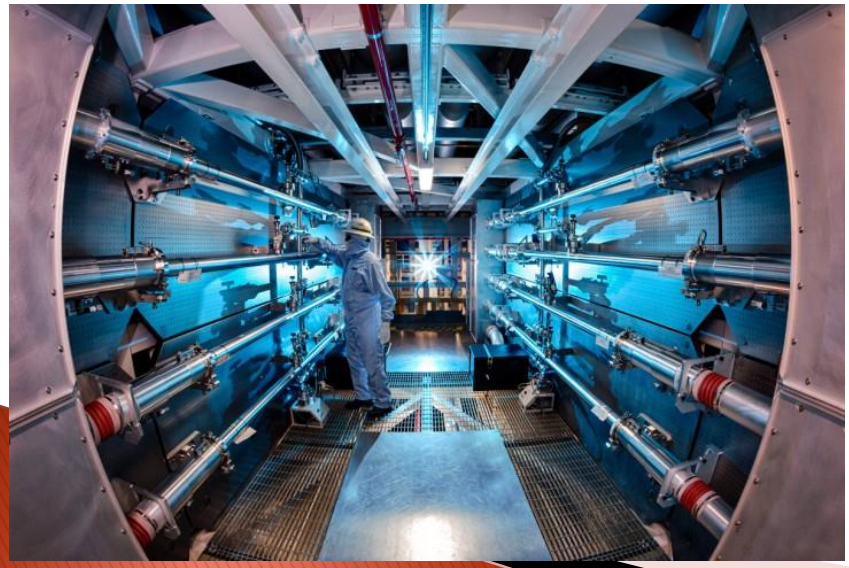


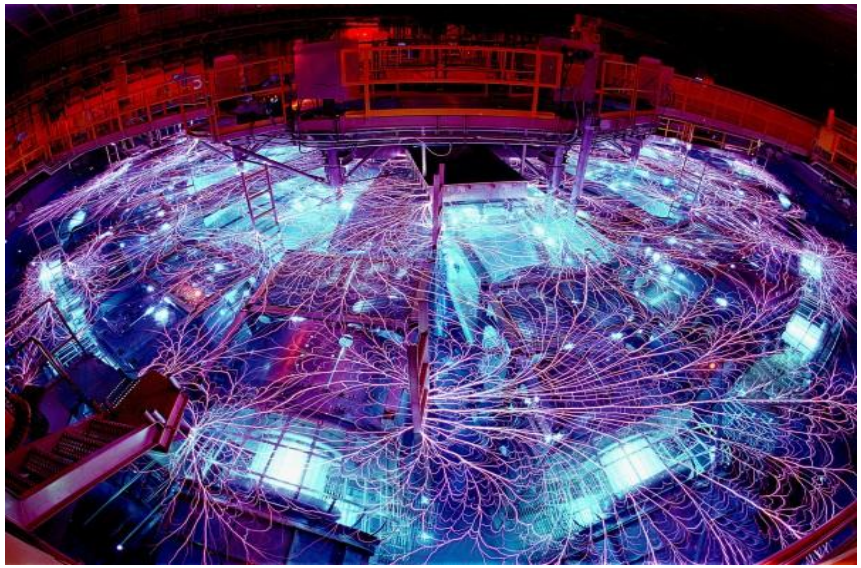


Nuclear Fusion

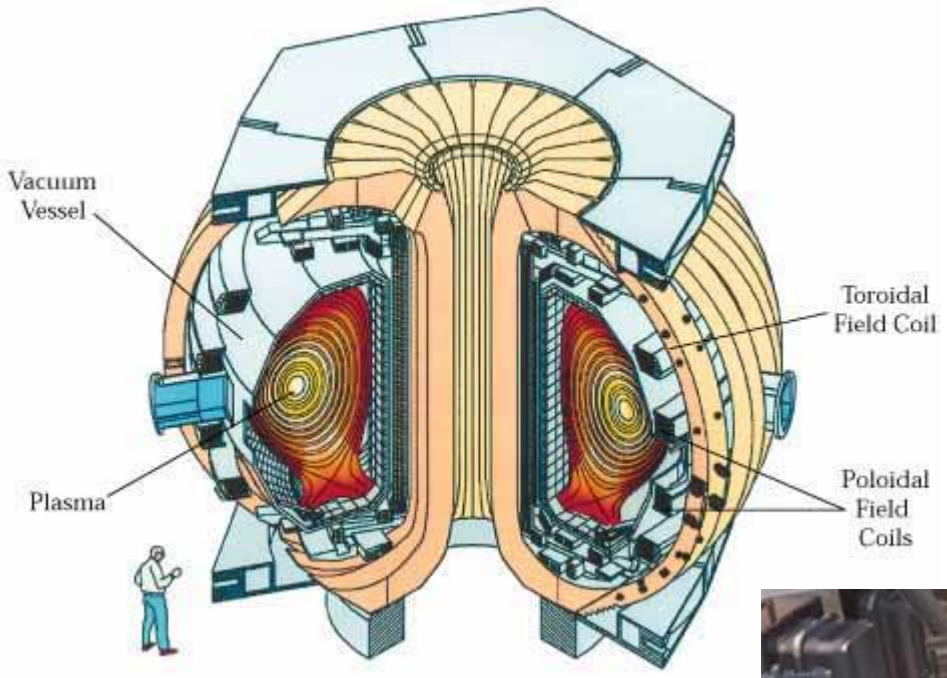


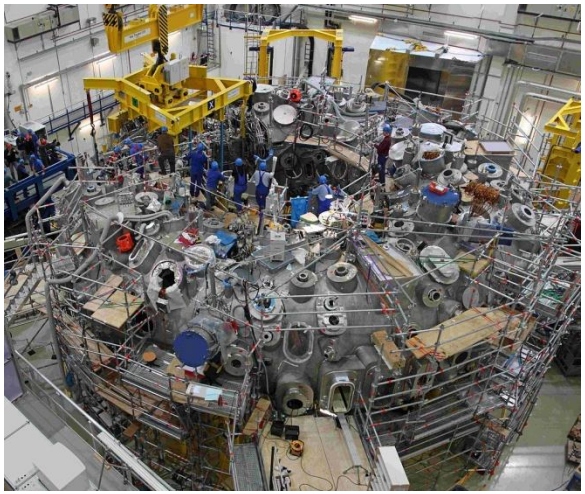


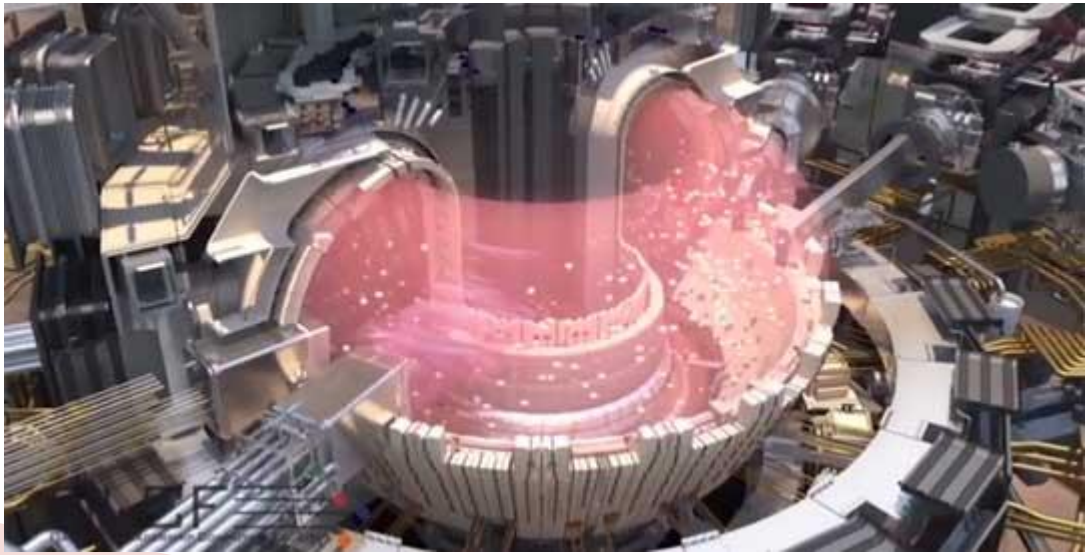


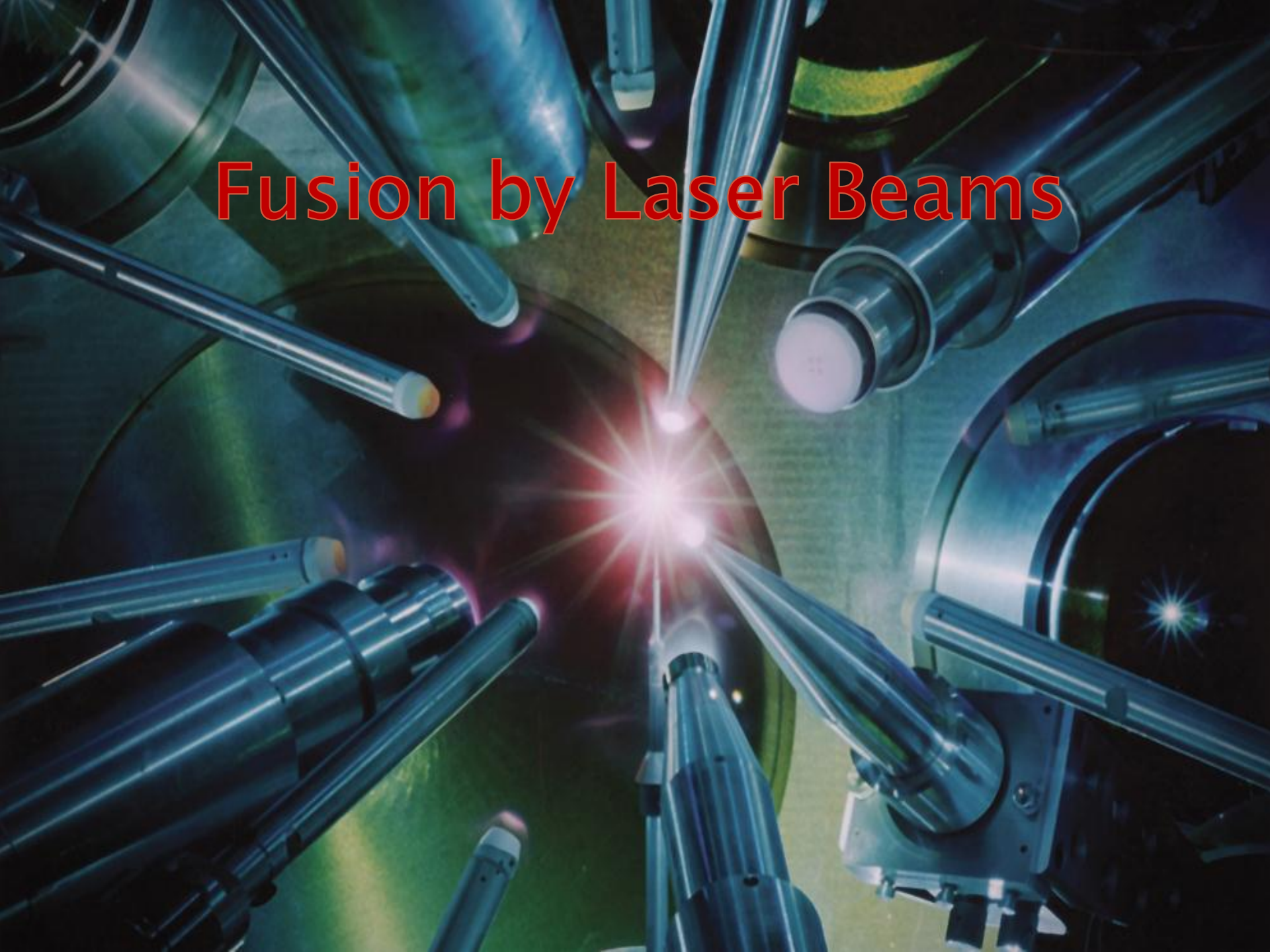


Nuclear Fusion: Tokomak








Fusion by Laser Beams

Laser Fusion

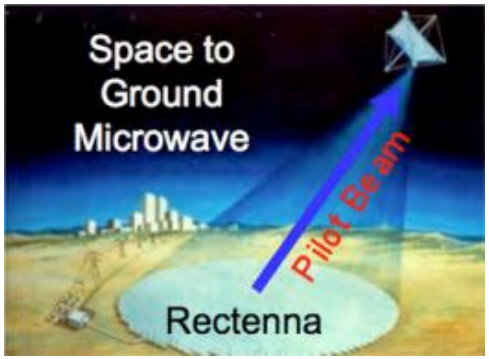
Is 'laser fusion' the future? Britain and U.S. join forces as laser flash releases more power than the whole world was using

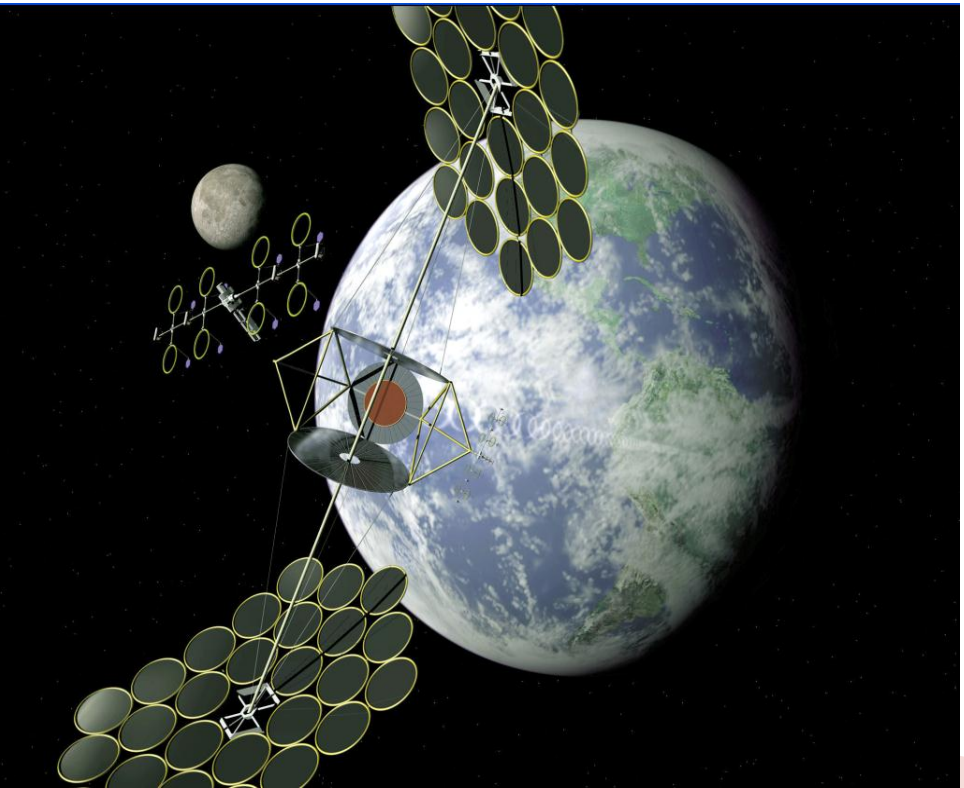
Britain has joined forces with America to investigate a hi-tech new way of producing 'clean energy' - not from wind or waves, but from firing huge arrays of high-powered lasers at pellets of hydrogen.

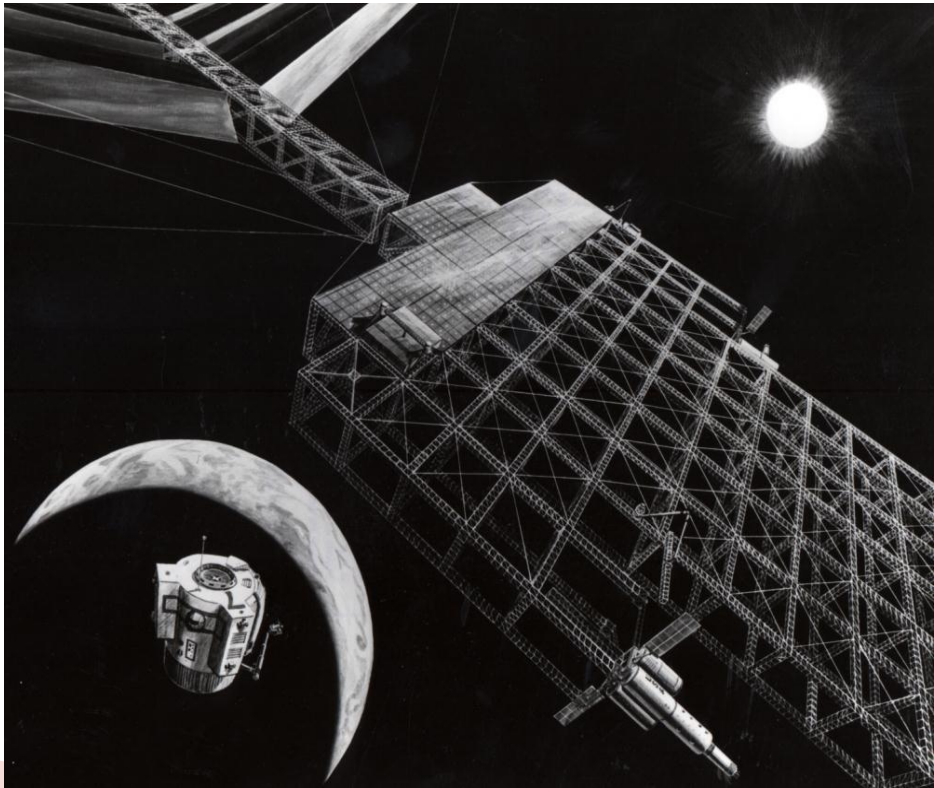
The process causes the hydrogen atoms to fuse together into helium - the same reaction found in hydrogen bombs and stars such as our Sun - but in a controlled reaction that could power homes and businesses.

Recent experiments at America's National Ignition Facility (NIF), have produced huge bursts of energy from the technology - using a stadium-sized building housing an array of 192 lasers which fire a 500-terawatt flash at a drop of hydrogen atoms just 1mm across.

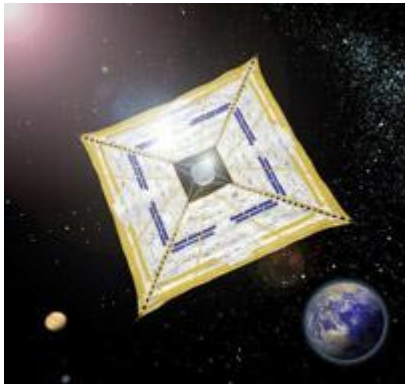
Space Solar cells projects







SOLAR WIND POWER: GENERATING POWER IN THE FUTURE

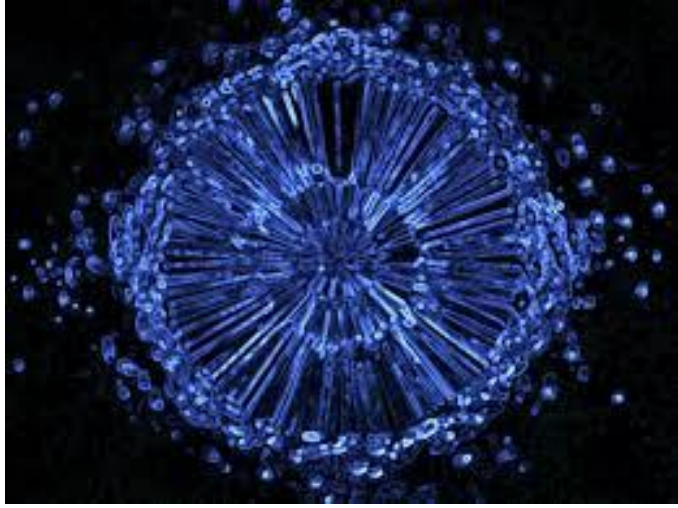


The solar wind is a stream of charged particles that heads outward from the sun's upper atmosphere . They move outward toward Earth and the rest of the planets, and provide the potential to power to the entire Earth, according to some researchers. And, even though we refer to the solar wind as "wind", it wouldn't provide energy in the way we see wind turbines act here on earth. Instead, energy from the solar wind would be collected by a gigantic sail deployed in space, between the sun and Earth.

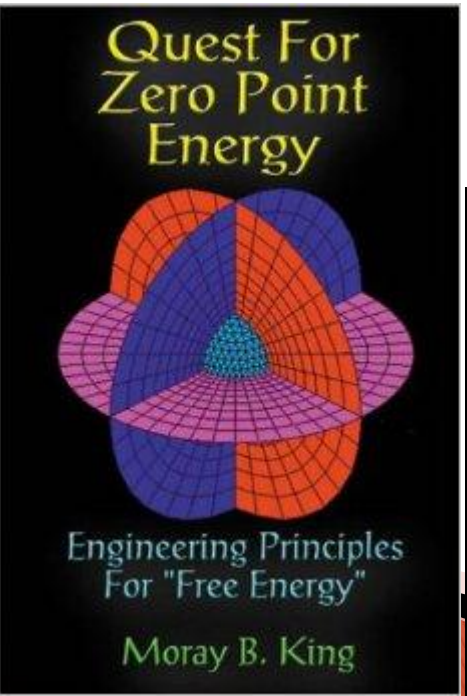
One proposal has been offered by scientists at Washington State University. Discovery News reports on the specs of a massive solar sail -- and its potential:

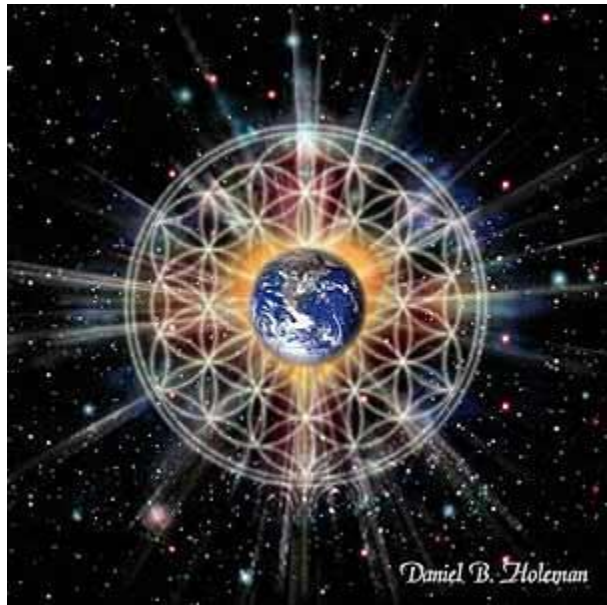
According to the team's calculations, 300 meters (984 feet) of copper wire, attached to a two-meter-wide (6.6-foot-wide) receiver and a 10-meter (32.8-foot) sail, would generate enough power for 1,000 homes.

A satellite with a 1,000-meter (3,280-foot) cable and a sail 8,400 kilometers (5,220 miles) across, placed at roughly the same orbit, would generate one billion billion gigawatts of power.



Zero Point Energy





CONCLUSION

- **Technology can ensure an everlasting sustainable energy sources in the foreseen future**

THANK YOU

'Wind Lens' Wind Turbine Could Boost Energy Generation 300%

Introducing the potential turbine of the future; the ultra efficient Wind Lens designed by Kyushu University professor Yuji Ohya. According to Yuji Ohya and his team the Wind Lens' honeycomb-like structure could triple the amount of wind energy that can be produced by offshore turbines.

The futuristic design was unveiled at Yokohama Renewable Energy International Exhibition 2010. The lens shape structure intensifies wind flow and allows the turbine blades to turn faster. Ohya's design doesn't have too many moving parts — just a hoop that "magnifies" wind power, and a turbine that is rotated by wind captured from the hoop. Each Lens, which measures 112 meters in diameter, can provide enough energy for an average household.