USING ALTERNATIVE FUEL CELL ENERGY TECHNOLOGY TO REDUCE AIR POLLUTION AND IMPROVE PUBLIC HEALTH

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Fuel Cell Energy Technology

William Grove developed the first fuel cell in 1839. NASA uses hydrogen fuel to launch t he space shuttles since the 1970s.

Hydrogen is high in energy, yet an engine that burns pure hydrogen produce s almost no pollution and tremendous amounts of energy.

Fuel cell technology uses natural gas /Methane CH_4/ as a source of heat and electricit y for commercial buildings, homes, and industries. Fuel cells operate best on pure hydr ogen. But fuels like natural gas, methanol, and liquid gas can be reformed to produce the hydrogen required for fuel cells. Some fuel cells can even be fueled directly with m ethanol, without using a reformer.

The fuel cell module hooks up to natural gas supply and through its fuel proc essor, draws the hydrogen molecules out. Then, through an electrochemical process th at combines the hydrogen molecules with oxygen, the unit generates up to 400kwh-50 0kwh of electricity or more energy depending on its application for use throughout enti re ger district or business.

As electricity is generated through an electrochemical process that does not involve combustion (unlike traditional power plant generated electricity), it produces n egligible amounts of pollutants and reduces your carbon emissions by up to 80% to 90% Moreover, as heat is produced by electrochemical reaction, the low pressure of 80 Ce lsius and high pressure of 200 Celsius is enough to heat domestic hot water supply. Whe n used for both electricity and heat, the Fuel Cell energy systems operate at 90% efficie ncy and can cut your energy costs by as much as 50%.

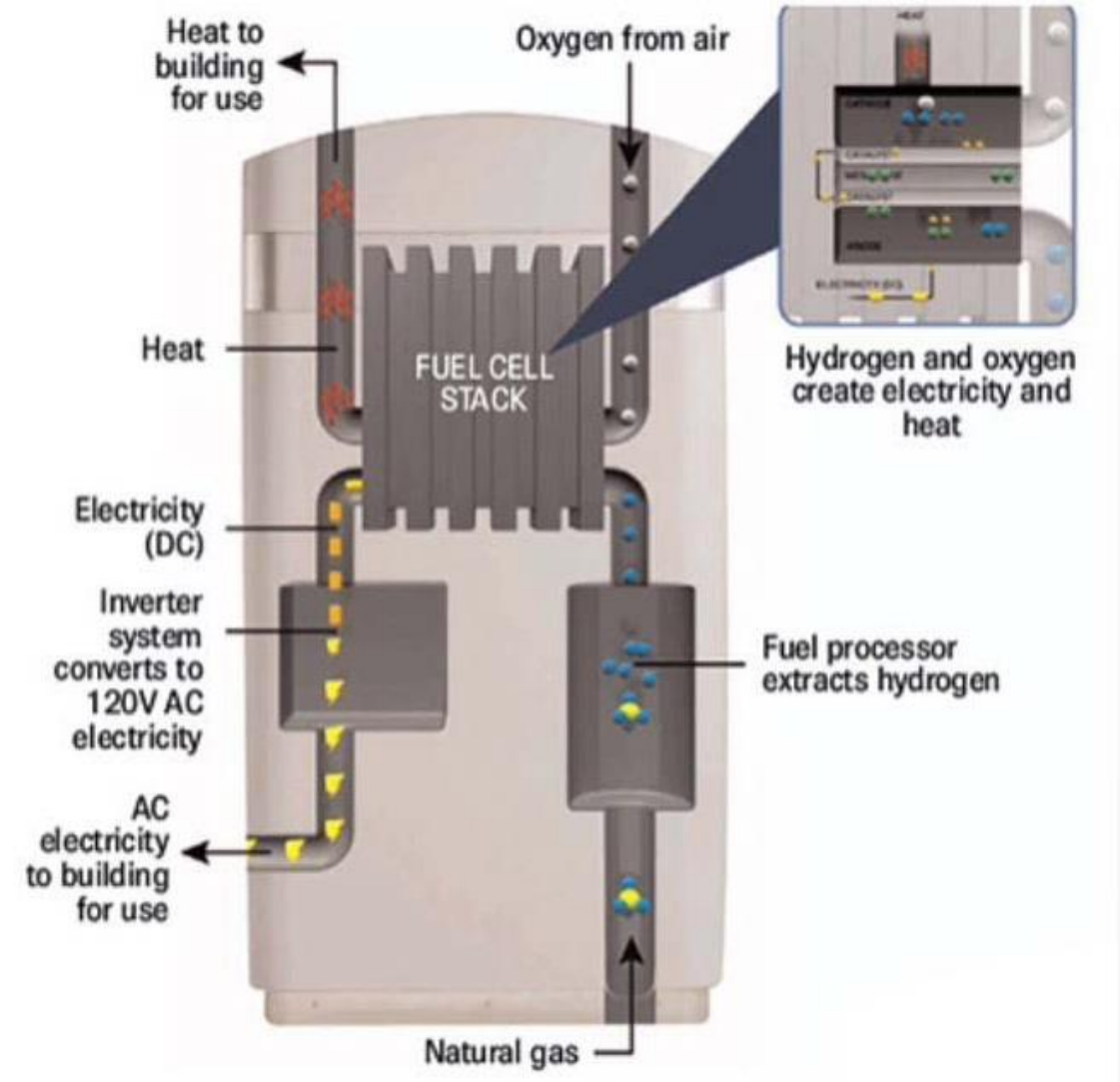
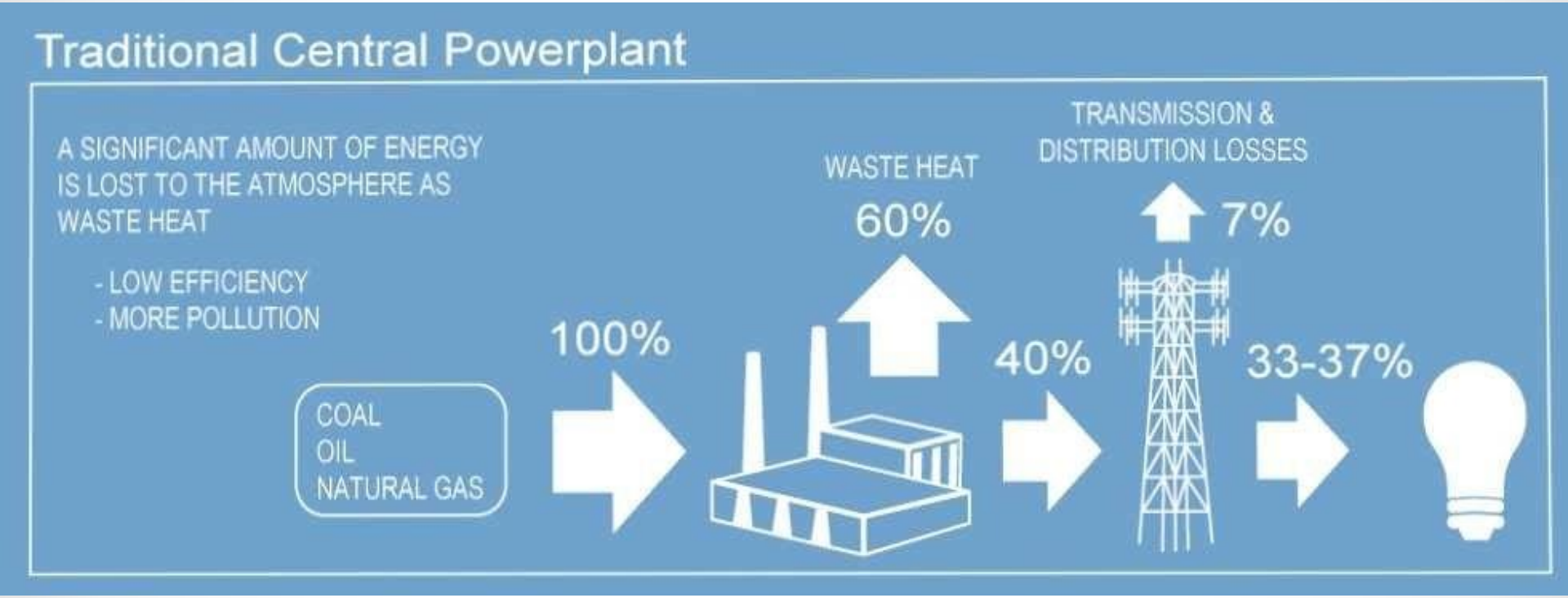
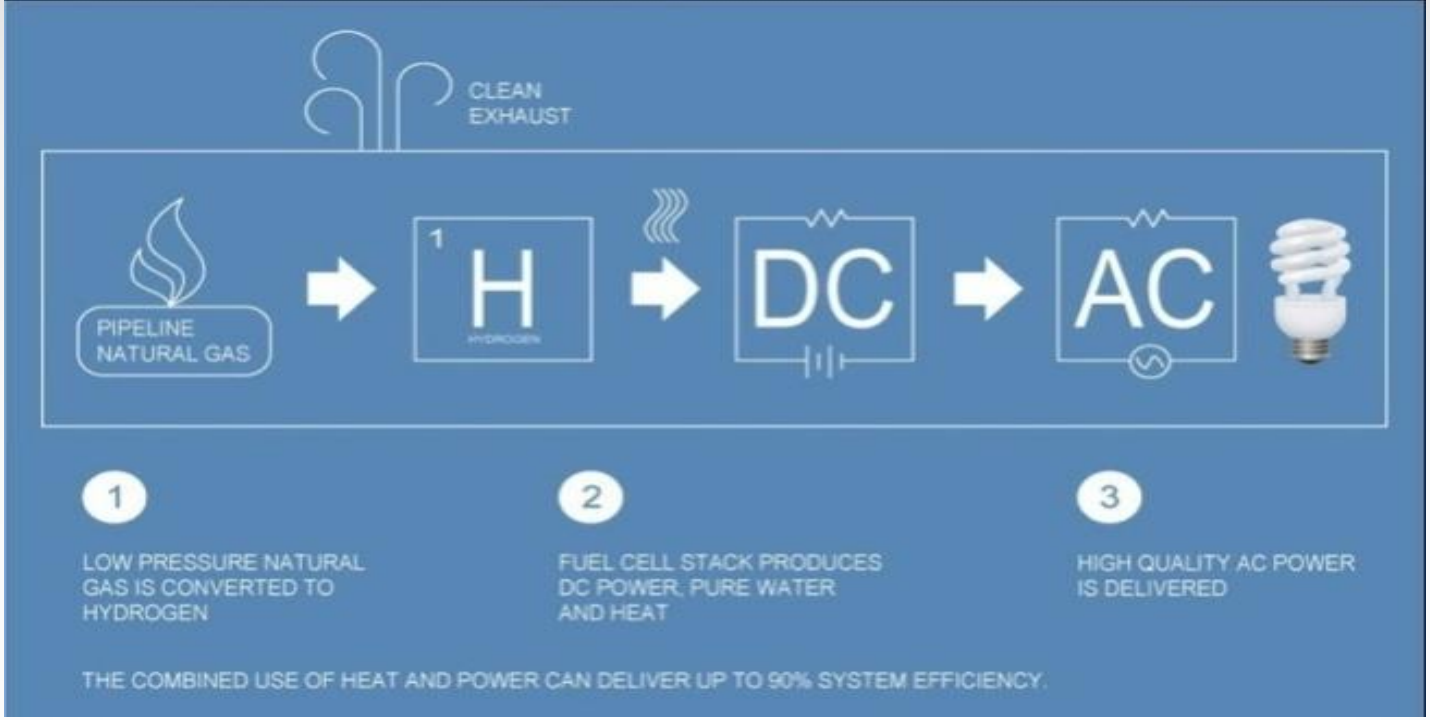


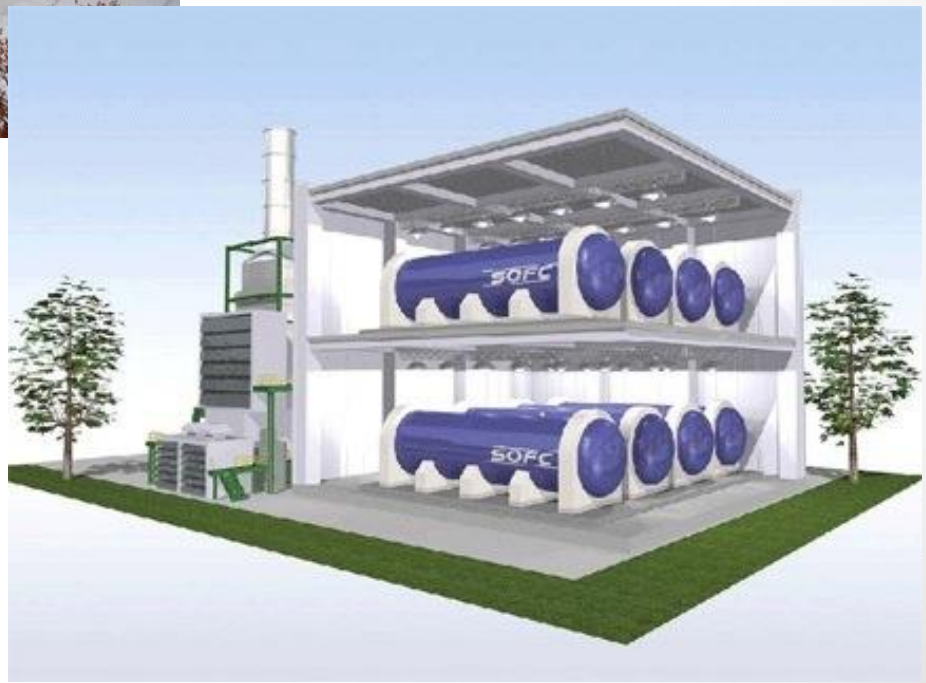
Fig 1. Fuel cell energy technology vs Traditional central power plant



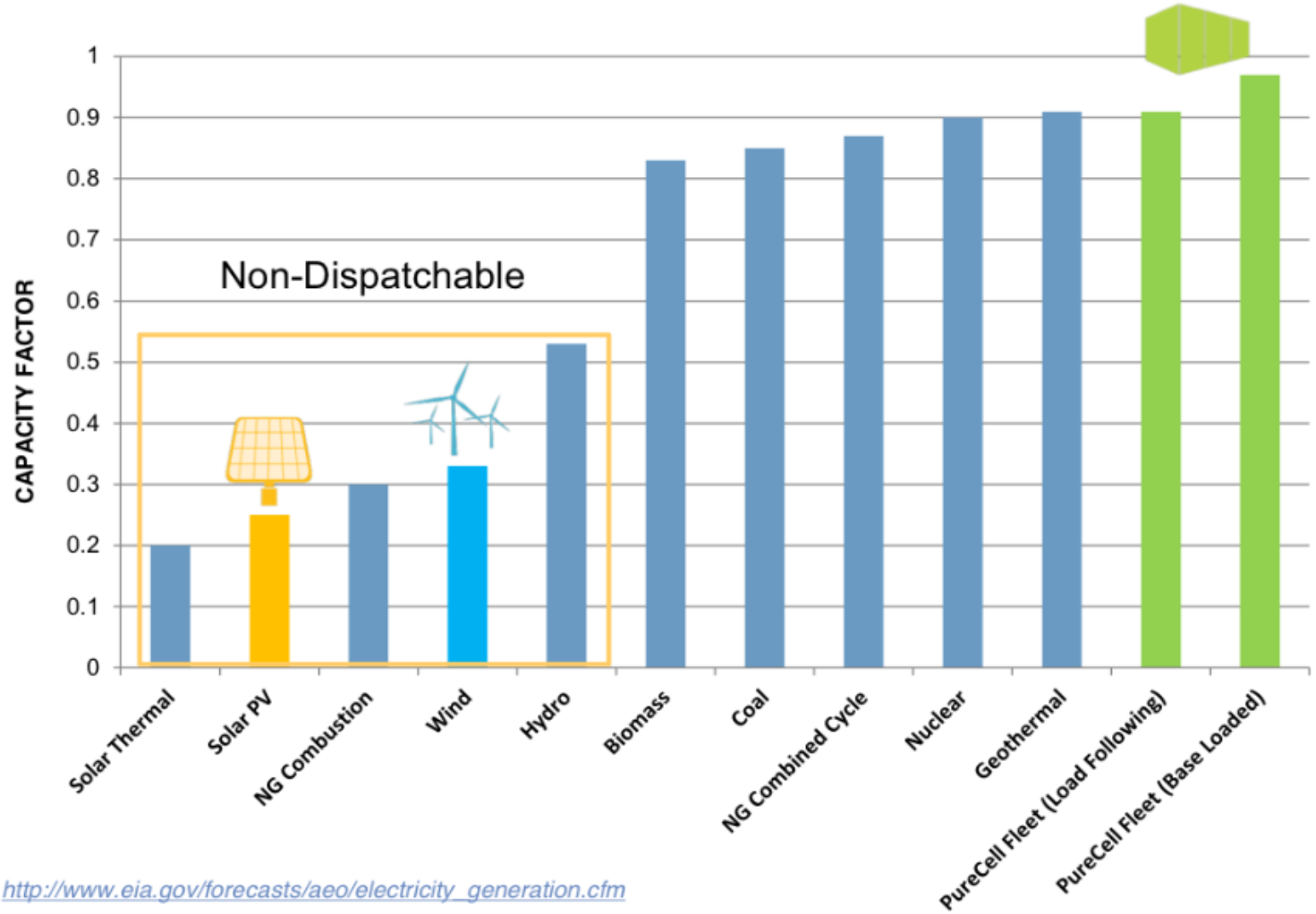


Stationary fuel cells are the largest, most powerful fuel cells. They are designed to provide a clean, reliable source of on-site power to hospitals, banks, airports, military bases, schools, homes, and business centers.

DFC plants are scalable power generation sources, allowing for an affordable and incremental energy investment that would meet the growing power needs over time, with multi-megawatt installations either on-site or distributed throughout an electric utility service area. Fuel Cell technology energy supply, which can be stored until it's needed. Fuel Cell technology DFCPP can also be transported to locations where it is needed. The advent of fuel cells technology would help provide the energy the world needs.



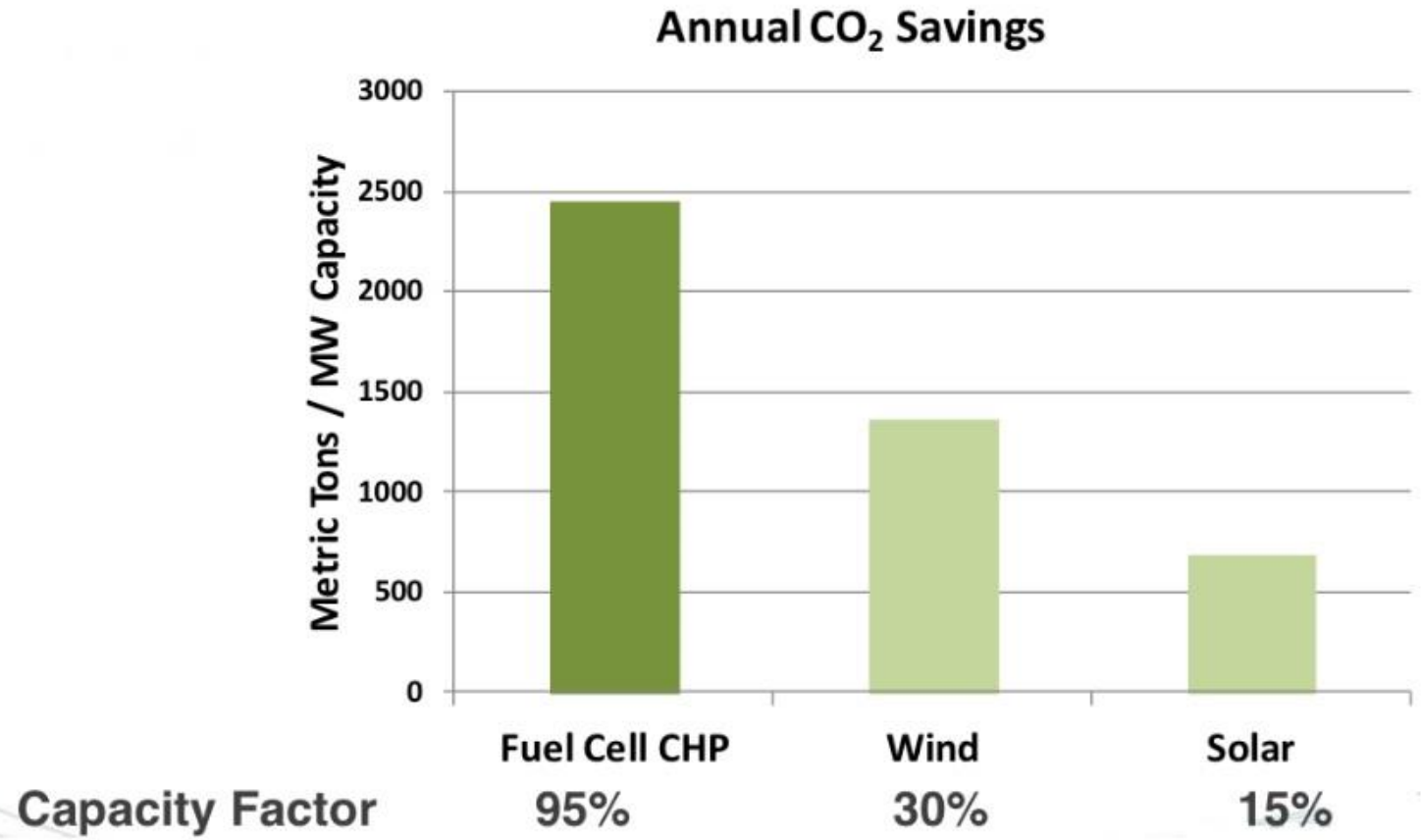
Capacity Factor by Technology



Source 1: http://www.eia.gov/forecasts/aeo/electricity_generation.cfm

Source 2: ClearEdge Power Fleet Data

Fuel cell versus other renewables



Fuel Cell Energy Supply

Natural gas is a vital component of the world's supply of energy. It is one of the cleanest, safest, and most useful of all energy sources.

We require energy constantly, to heat our homes, cook our food, and generate our electricity. Natural gas energy has elevated natural gas to a high level of importance in our society, and in our lives.

Natural gas is formed primarily of methane; it can also include ethane, propane, butane and pentane. The composition of natural gas can vary widely.

- Methane CH4
- Ethane C2H6
- Propane C3H8
- Butane C4H10
- Carbon Dioxide CO2
- Oxygen O2
- Nitrogen N2
- Hydrogen sulphide H2S
- Rare gases A, He, Ne, Xe trace
- In its purest form, such as the natural gas that is delivered to your home, it is almost pure methane. Methane is a molecule made up of one carbon atom and four hydrogen atoms, and is referred to as CH_4.

New energy technology impacts Mongolian air pollution.

According to data from the World Bank, World Health Organization, and the 2013 National Population Center census. Mongolian capital city residents in Ulan-Bator point out that Ger populations tend to grow faster during the (year after year) hard winters, roughly 40,000 to 50,000 citizens move to the capital every year.

Mongolian winter temperatures fall to negative 30 degrees Celsius (negative 22 degrees Fahrenheit), and the only option for the majority of the residents in the Ger districts is to burn coal in iron stoves to keep warm, thus turning the blue sky dark, and transforming Ulan-Bator into one of the world's most polluted cities.

Also severe air pollution of particulate matter is caused by coal combustion of three power plants, which provide electricity and hot water to the City, and approximately 200 medium-sized Heat Only Boilers for hot water supply. Also contributing to air pollution are the Ger district's iron stoves and the wall stoves of more than 190,000 households in the Ger areas. This has a serious impact on human health. A frightening fact is that the human brain uses more oxygen than other body parts.

At the same time, Mongolia's capital faces one of the biggest housing shortages in the region, with 70 percent of the population living in the Ger District. In many cases, residents have difficult access to water, sanitation and basic infrastructure.

An average Mongolian household has five family members. And every single household living in the Ger district in Ulan Bator city is burning coal. Making Ulan-Bator city the second most polluted city in the World.

Pregnant women who inhale coal smoke at home may put their babies at increased risk of birth defects, and the odds of having malformations of the brain, and spine neural tube defects are 60 percent higher for children whose mothers inhaled coal smoke than for the children of unexposed mothers.

World Health Organization estimated that 100 percent of rural households and the Ger district use coal and biomass fuel (such as wood, charcoal and dung) for cooking and heating. While coal is relatively inexpensive compared to other energy sources, there are also known health risks associated with breathing coal smoke, including lung cancer and other respiratory diseases

The indoor air pollution caused by coal and biomass burning at home is a major public health concern, especially given the very large numbers of households that rely on these fuels.

Coal smoke contains many chemicals known to cause health problems, including arsenic, carbon monoxide and lead. And 70 percent of Mongolian households rely on coal or biomass fuels and coal use in particular, this has tripled in the past 20 years and it is increasing. Ulan-Bator where many residents use coal for cooking and heating their homes has a rate of 10 to 20 cases of neural tube defects for every 1,000 births in some counties, and represents one of the highest in the world.

For comparison, the U.S. rate of neural tube defects, which include spinal bifida, a paralyzing deformation of the spine, is about 1 in 1,000 births.

The researchers collected information on coal use and other exposures for parents of 610 infants with neural tube defects and 837 healthy infants. Overall, nearly 90 percent of infants with neural tube defects lived in a house that used coal for cooking, compared to just over 80 percent of infants without the defects.

Infants were also more likely to have neural tube defects the higher their mothers' exposure to coal smoke, which is often a good indicator of a link between an apparent cause and an effect.

The study proves that exposure to burning coal produced the birth defects, and the results of the study provide further evidence that coal causes significant health problems and should be replaced by other fuel sources.

Coal can't be burned cleanly, thus it should be banned from all household use.

Fuel cell technology advantages

- Fuel Cell Energy systems operate at 90% efficiency and can cut your energy costs by as much as 50%.
- Ultra-clean due to their virtual absence of pollutants which supports sustainability goals, facilitates clean air permitting during installation, and benefits public health throughout the lifecycle of the power plant
- Economical because high efficiency reduces fuel costs
- Reliable base load power provides continuous electricity and heat around-the-clock
- On-site distributed generation improves power reliability and energy independence.
- Most important is the impact to economic growth and national security.
- Avoiding investments and maintenance in costly, difficult to site transmission & distribution (T&D) infrastructure.
- No water needed.
- Reduces greenhouse gas emissions.

Conclusion

In conclusion, the global energy strategy is changing. The world's highly developed countries USA, CANADA, United Kingdom. European Union, Japan, Korea, and Australia etc.., are already developing and implementing Fuel Cell Technology. Their governments and the public give the best support to the Fuel Cell Technology Energy companies.

In the near future, Fuel Cell technology will join the ranks of the most important energy carriers.

Also the Mongolian government is seeking new energy solutions.

The Mongolian Energy sector loses profits every single year. Last year the loss was about 50 million dollars. This year's estimate will approach 60 million or more dollars of loss. Now is the time for the Mongolian Government to give the highest priority to supporting this Alternative new energy technology for the sake of public health and to address air pollution.

We have had an on-line meeting with Prime Minister N. Altanhuyag. We have proposed this fuel cell technology to the Mongolian government.

In this case HYPHEN ENERGY SYSTEM Corporation is developing Clean Air, Clean Energy project and implementing a new Technology Fuel Cell power plant. This power plant produces electricity, heat and heat for domestic hot water supply.

We would like to cooperate with Fuel Cell Energy companies and financial institutions to make this crucial change that would benefit all people.

THANK YOU