Hydrogen Fueled Home Generators

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SITUATION

Burning fossil fuel, such as coal, oil and natural gases contribute to pollution and global warming due to the emission of carbon dioxide. 33% of green house emissions are due to electricity generation, which is the highest percentage amongst other factors [1]. Also, fossil fuels are finite resources that will eventually deplete. The suggested hydrogen fuel cell does not burn oxygen rather it simply combines itself with oxygen from air to form water [2]. Hydrogen fuel was already integrated to cars such as the BMW 740i Sedan but this concept has not yet been integrated to home generators [3].

PROBLEMS

What is Hydrogen fuel?

Hydrogen fuel is a substituent fuel to gasoline. It is much cleaner and has water as the main emission rather than CO2.

Limitations:

• Hydrogen in its pure gaseous form is expensive to obtain. [4]
• Hydrogen fueled machines tend to have a high fuel consumption . [5]
• Large scale hydrogen generators do not exist currently. [5]
• Hydrogen in its gaseous form is hard to store as it has a low volumetric energy density. [4]

SOLUTION

• Solar power is integrated in our design to create a self-filling cycle to eliminate the need of constantly refilling the motor
• The solar power system  utilizes water into its basic component and that way hydrogen is created.
• The system is a perfect replacement to the traditional gasoline cycle as it has double the efficiency.
• Hydrogen fuel cells are used to convert the chemical energy into electric energy.
• One fuel cell generates 236.7 kg/kmol, which is not sufficient energy to power a home, therefore a stacking fuel cells is the solution. [6]
• The amount of electricity generated by the fuel stack is proportional to the number of cells [1]

EVALUATION

Cost:

*"Comparing the delivered cost of hydrogen transportation fuel on an energy cost basis (dollars per gigajoule), we find that hydrogen is 50%–100% more costly than gasoline." [7]

Although the initial costs are high, in the long run the costs decrease. (see figure 2)

Efficiency:

The efficiency of these motors reaches 60-70 percent which is better than the efficiency of motors that work with gasoline which have 30% efficiency. [7]

REFERENCES