Residential fuel cell backup power

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A home fuel cell or a residential fuel cell is an electrochemical cell used for primary or backup power generation. They are similar to the larger industrial stationary fuel cells, but built on a smaller scale for residential use. These fuel cells are usually based on combined heat and power (CHP) or micro combined heat and power (m-CHP) technology, generating both power and heated water or air.

Home fuel cells are installed alongside grid to consistently produce the exact amount of electricity and heat needed. Additionally, a home fuel cell may be combined with a traditional furnace that produces only heat. For example, the German company Viessmann produces a home fuel cell with an electric power of 0. kW and a thermal power of 1 kW, integrated with a traditional 19 kW heat producing furnace, using the grid for electricity needs below and above the fuel cell production.[1]

PEMFC fuel cell m-CHP operates at low temperature (50 to 100?C) and requires high purity hydrogen. It is prone to contamination, and changes can be made to operate at higher temperatures and improve the fuel reformer. The SOFC fuel cell m-CHP operates at a high temperature (500 to 1,000 ?CP) and can handle different energy sources, but the high temperature requires expensive materials to handle the temperature. Changes can be made to operate at a lower temperature. Because of the higher temperature, SOFCs in general have a longer start-up time.

The high efficiency of home fuel cells has caused some countries, such as Germany, to economically support their installation as part of a policy reacting to climate change.[2]

Twenty companies have installed Bloom Energy fuel cells in their buildings, including Google, eBay, and FedEx.[3] The CEO of eBay told 60 Minutes in 2010 that they had saved $100,000 in electricity bills in the 9 months since they were installed.[4]

Oregon-based ClearEdge Power had until 2014 installed 5 kW systems at the homes of Jackie Autry,[5] Bay Area Wealth Manager Bruce Raabe[6] and VC investor Gary Dillabough.[7]

Fuel cells have an average lifetime of around 60,000 hours. For PEM fuel cell units, which shut down at night, this equates to an estimated lifetime of between ten and fifteen years.[9]

Operating costs for home fuel cells can be as low as 6.0? per kWh based on $1.20 per therm for natural gas, assuming full electrical and heat load utilization.[where?][citation needed]

Residential fuel cells can have high initial capital costs - As of December 2012, Panasonic and Tokyo Gas Co., Ltd. sold about 21,000 PEM Eni-Farm units in Japan for a price of $22,600 before

installation.[10]

In the U.S.A., home fuel cells are eligible for substantial incentives and rebates at both the state and federal levels as a part of renewable energy policy. For example, the California Self Generation Incentive Program (SGIP) rebate ($2,500 per kW) and Federal Tax Credits ($1,000 per kW residential and $3,000 per kW commercial) significantly reduce the net capital cost to the customer. For businesses, additional cash advantages can be realized from bonuses and accelerated depreciation of fuel cells.[11]

In addition, home fuel cells receive net metering credit in many service areas for any excess electricity generated but not used by putting it back on the utility grid.[12]

The Database of State Incentives for Renewables & Efficiency (DSIRE) provides comprehensive information on state, local, utility, and federal incentives that promote renewable energy and energy efficiency.[13]

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