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analyst view

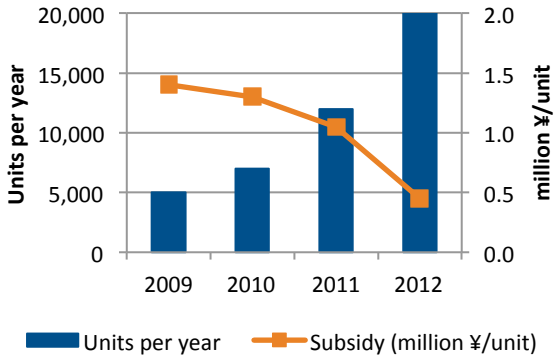
Latest Developments in the Ene-Farm Scheme

27 FEBRUARY 2013

Last year Fuel Cell Today published an Analyst View focussing on the residential micro combined heat and power (micro-CHP) market in Japan, known as Ene-Farm. The scheme has resulted in the largest number of fuel cell deployments for a single purpose in the world and continues to grow every year.

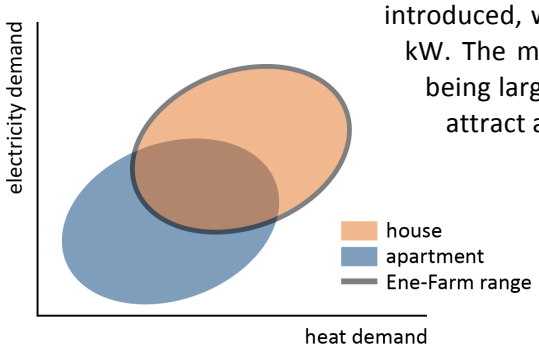
Since the beginning of the scheme the cost of the fuel cell units have fallen, their installed footprint reduced, their efficiency increased, and now a range of units are available to the customer which provide differing levels of hot water and electricity, so can be tailored to suit differing residential requirements.

The Ene-Farm scheme became commercial in 2009 after four years of demonstration and customer trials. In that year a subsidy was made available by the government of ¥1.4 million ($14,987) per unit to contribute to the purchase price. The government has been a big supporter of the Ene-Farm scheme, but from day one its aim has been for the fuel cell units to eventually become cost-competitive on their own. As such, the government has reduced its financial contribution (per unit) in each successive year with an aim to remove it altogether by 2015. In 2012, the subsidy was set at ¥450,000 ($4,817), a significant reduction on its original amount and, with sales increasing healthily each year, this serves to highlight the cost reduction achieved by the manufacturers. Cost evolution for the new units has arisen from the use of fewer components, increased economies of scale, and in the case of the PEM fuel cell system a significant reduction in platinum content. This has been achieved while at the same time increasing the durability of the fuel cell systems from 50,000 hours up to 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.



Each year the government allocates an amount of money to subsidise the scheme, which at a set rate per unit, equates to a specific number of units. To highlight the popularity of the scheme with the public, the subsidies during the past few years have been oversubscribed and the government has had to allocate additional funds in order to maintain sales momentum. The 2012 fiscal year was no different and within two months of the budget being set, it had sold all 12,500 units. In July 2012 the Japanese Ministry of Economy, Trade and Industry (METI) arranged an additional subsidy for 2,000 units, but this sold out within one week. Additional funds were then made available and the total number of units sold in the year reached around 20,000. For FY2013, an initial subsidy has been prepared which can fund more than 50,000 units; Fuel Cell Today is confident that this figure will be achieved judging by the popularity of previous years.

The latest Ene-Farm models can operate in a range of electrical output modes, providing between 250 W and 750 W of electricity. This new range has been optimised since the technology was introduced, when the fuel cells could operate between 300 W and 1 kW. The manufacturers believe this new range hits a sweet spot, being large enough for detached homes, but also small enough to attract apartment-dwelling customers.



The 2013 Ene-Farm models also boast a smaller footprint than their predecessors, with a reduction in depth of around 17% and the separation of the boiler unit, which allows for more flexibility during installation. Having a separate boiler also provides system flexibility because customers can now choose from a range of boiler sizes and orientations to suit both their needs and available space. Evolutions of this type make Ene-Farm units appealing to apartment owners who typically have less installation space available.

Two fuel cell technologies are available under the scheme, proton exchange membrane (PEMFC) and solid oxide (SOFC); currently the split is around 80% PEMFC and 20% SOFC. The units have differing advantages for the customer with PEMFC units able to switch off at night, operating at maximum efficiency only when required. SOFC units have an inherently higher maximum efficiency, but require continuous operation, so at night efficiency is sacrificed slightly. The net result of this means both types of unit have comparable average efficiencies during typical operation.

What about the potential for Ene-Farm manufacturers to export their technology to other markets, such as Europe, where residential micro-CHP is gaining momentum through programmes such as Callux and ene.field? A few technical obstacles remain which currently prevent this. First, CE certification must be obtained for sale within the European Economic Area. This will entail a rigorous reassessment of the existing units used in Japan in order to achieve compliance with EC directives. Another technical issue is gas quality. Japanese systems operate using city gas, typically derived from LPG. This gas has relatively few impurities, apart from a controlled amount of odorant. In Europe, natural gas is more widely used which contains varying amounts of sulphur, along with odorants and other potential fuel cell poisons; fuel processing systems will therefore need re-engineering in order to maintain fuel cell reliability.

In summary, the Ene-Farm scheme continues to go from strength to strength, offering an ever-wider choice of fuel cell unit to the customer at an ever-decreasing cost, and the scheme is increasing in popularity each year. Fuel Cell Today expects the systems to be cost-competitive without subsidies within four years, and also by then to see the units exported to markets outside Japan.

Dan Carter Manager
dancarter@fuelcelltoday.com
www.fuelcelltoday.com