ene.field project

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Fuel Cell micro-CHP in the Context of EU Energy Transition

Policy Analysis & Recommendations

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About COGEN Europe

COGEN Europe promotes the widespread development of cogeneration in Europe and worldwide. To achieve this goal, COGEN Europe works at the EU level and with member states to develop sustainable energy policies and remove unnecessary barriers to implementation.

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Executive Summary

The ene.field project (*European-wide field trials for residential fuel cell micro-CHP*) has been Europe's largest (to date) demonstration project for fuel cell based micro-cogeneration (micro combined heat and power or micro-CHP) systems. The project has demonstrated more than 1000 stationary fuel cell systems for residential and commercial applications across Europe between 2012 and 2017.

Fuel Cell micro-Cogeneration (FC micro-CHP) is a highly efficient approach to providing energy for electricity and space heating (hot water or event cooling) suitable for domestic and commercial use. It is an innovative technology at the start of market entry and must gain volume to reduce costs for mass market adoption.

This report makes policy recommendations to support the widespread deployment of fuel cell micro-cogeneration systems, while providing a review of policy frameworks at the EU and national levels expected to impact the uptake of the technology in the coming decade. It highlights the benefits of fuel cell micro-cogeneration in relation to Europe's energy and climate objectives, taking into account ene.field findings providing definite evidence on the macro-economic and micro-environmental impact of the technology[1].

Comprehensive analysis carried out by the ene.field project shows that FC micro-CHP can deliver important system wide efficiency and decarbonisation benefits across Europe between 2020-2050, as it is expected to mainly displace more inefficient and carbon intensive generation up to 2050. This can be achieved at a lower cost for the energy system and the consumer compared to a scenario with no uptake of fuel cell micro-CHP [2]. With the right policy framework in place, FC micro-CHP can deliver 32 million tonnes of CO2 emission reductions in 2030, while reducing infrastructure and operational cost for the energy system by more than € 6,000 (gross) for each kilowatt-electric of installed capacity until 2050.

Despite these benefits, EU and national policy impacting FC micro-CHP is fragmented and in the most part ill-suited for an energy solution providing both heat and power. The current policy approach of favouring energy efficiency ("energy efficiency first" principle) as a main tool in decarbonising energy should be supportive of micro-CHP deployment, but the individual focus of the legislation fails to consider the whole energy system. The full benefits of FC micro-CHP deployment risk remaining unrecognised, unless the following policy barriers are addressed:

- Focus on energy reduction at the end-user level instead of on energy system – i.e. final energy vs. primary energy reduction (e.g. Article 7 in the Energy Efficiency Directive)
- Addressing heat or electricity separately rather than total energy (e.g. Eco-design & energy labelling of space heating appliances)
- Enabling electricity-using technologies over other decarbonisation/energy efficiency solutions, specifically in the heat sector (e.g. promoting an inadequate primary energy factor value for electricity (EU PEF))

[1] All ene.field reports are available on the project website: http://enefield.eu/category/news/reports/

[2] Pundjianto D., Djapic P and Strbac G, 2017. Benefits of Widespread Deployment of Fuel Cell micro-CHP in Securing and Decarbonising the Future European Electricity System

- Greater focus on renewable electricity rather than fairly rewarding renewable energy across all energy vectors and networks (e.g. heat and gas)
- Allowing renewable energy to count as energy efficiency (e.g. Energy Savings Obligation in the Energy Efficiency Directive)
- Electricity self-production and self-consumption is often penalised through disproportionately high grid connection and grid tariffs compared to real grid use
- In addition, administrative barriers (e.g. for grid connection or support scheme access) at the national level persist and, thus, hinder the large-scale deployment of micro-CHP systems.

All of the 10 European countries which took part in ene.field face challenges in decarbonising their domestic heat supply. In addition, with an increasing penetration of intermittent renewable electricity and the growing role of electricity in heating and transport, ensuring grid stability is also becoming a priority. So far Germany is leading in Member State approach to supporting FC micro-CHP technology, which represents a benchmark of best practise for support in the sector, as has happened with other innovative renewables technologies. Germany has put in place a dedicated programme (KfW433) to encourage early adopter uptake of FC micro-CHP and promote the further industrialisation of this technology. Other countries, including Belgium, France, UK, are supporting FC micro-CHP through more general mechanisms (i.e. feed-in premiums, feed-in tariffs, white certificates/green certificates). The choice of accounting methodologies to implement building codes or other policies at the national level, also seems to affect the market entry prospects of the technology. ene.field workshops were held with policymakers and other interested stakeholders in Belgium, France, Germany, Italy, The Netherlands, UK, and the findings show market interest and requests for tailored support schemes to help the early adopter market to take hold.

The EU and national policy frameworks should create a level playing field for renewable energy, decarbonisation and energy efficiency solutions across the whole energy system (electricity, gas, heat networks). Only such an approach will deliver a comprehensive, balanced and cost-effective energy transition for the European consumer.

A more comprehensive approach to energy policy will also better recognise the system wide benefits of FC micro-CHP, thus untapping the important efficiency, decarbonisation and flexibility potential of this energy solution. To achieve this the ene.field project proposes the following policy recommendations:

- A coherent, steady and predictable policy framework is the key for the European heating sector to invest in new products and develop new business models.
- Consumer and energy system benefits of micro-CHP systems should be fully recognised and rewarded by policy at the EU and national levels
- In particular, accounting methodologies used in key decarbonisation and energy efficiency policy mechanisms, including building codes, energy labelling, Covenant of Mayors, should fully reflect the benefits of FC micro-CHP for consumers and the energy system as a whole. This will be an important driver for the micro-CHP technology to reach the mass market.
- Simplified administrative procedures to access the grid or different support scheme should be introduced for the potential users or FC micro-CHP
- Accounting for the decarbonisation and flexibility potential of gas networks (renewable gas), as part of a comprehensive energy and climate strategy

About ene.field

The ene.field project is the largest European demonstration project of the latest smart energy solution for private homes, micro-CHP. It will see up to 1,000 households across Europe able to experience the benefits of this new energy solution. The five-year project uses modern fuel cell technology to produce heat and electricity in households and empowers them in their electricity and heat choices.

The ene.field project is co-funded by the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) and brings together 27 partners, including 11 European manufacturers who will make the products available across 11 European countries.

The ene.field partners are:

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