Exploring Fuel Cell Car Market Uptake in Europe

Jonatan Gómez Vilchez [1)*] Sebastiaan Deuten [1)] Christian Thiel [1)]

1) Sustainable Transport Unit, Directorate for Energy, Transport and Climate,

Joint Research Centre, European Commission, Via Enrico Fermi 2749, 21027 Ispra (VA), Italy

** E-mail: jonatan.gomez-vilchez@ec.europa.eu*

ABSTRACT

This paper illustrates an application of the system dynamics Powertrain Technology Transition Market Agent Model (PTTMAM) [1-2] to explore the potential market penetration of fuel cell electric cars in Europe. The model represents the behaviour and interactions of four main agents: users, manufacturers, infrastructure providers and authorities. It incorporates the results of a new discrete choice model based on a stated preference survey conducted in 2017 in France, Germany, Italy, Poland, Spain and the United Kingdom [3]. Furthermore, the plans of Member States for the future deployment of hydrogen infrastructure, as recently communicated [4], are considered. Sensitivity analysis on the cost of the key component of this powertrain (i.e. fuel cell system) was performed. The results show that the fuel cell technology is expected to have a rather limited impact on the European car market over the next decades. The purchase price remains the major barrier to successful market uptake of fuel cell electric cars. Without strong public purchase subsidies, the sales market share of this powertrain remains low. A main limitation of the model remains the absence of feedback loops connecting energy demand from cars to energy prices. Further research includes the soft-linkage of the model with an energy cost optimisation model to better understand the potential demand for hydrogen in road passenger transport. Finally, the possibility of linking this model with simulation tools that consider other major car markets is discussed.

REFERENCES

[1] G. Harrison, C. Thiel, and L. Jones, “Powertrain Technology Transition Market Agent Model (PTTMAM): An Introduction,” Publications Office of the European Union, EUR - Scientific and Technical Research Reports, 2016.

[2] G. Harrison and C. Thiel, “An exploratory policy analysis of electric vehicle sales competition and sensitivity to infrastructure in Europe,” *Technol. Forecast. Soc. Change*, vol. 114, pp. 165–178, Jan. 2017.

[3] J. Gomez Vilchez, G. Harrison, L. Kelleher, A. Smyth, and C. Thiel, “Quantifying the factors influencing people’s car type choices in Europe: Results of a stated preference survey,” Publications Office of the European Union, EUR - Scientific and Technical Research Reports, 2017.

[4] EU, “COMMISSION STAFF WORKING DOCUMENT Detailed Assessment of the National Policy Frameworks Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Towards the broadest use of alternative fuels - an Action Plan for Alternative Fuels Infrastructure under Article 10(6) of Directive 2014/94/EU, including the assessment of national policy frameworks under Article 10(2) of Directive 2014/94/EU,” 2017. [Online]. Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1512384850915&uri=CELEX:52017SC0365.