Waste heat from automotive hydrogen fuel cell utilized in reducing energy demand on cabin space-heating.

Ryan J P O'Neill, MRes Student, Swansea University, Wales.

Charles W. Dunnill

Abstract (300 word limit)

The aim is to produce a fully functioning hydrogen car with the least energy consumption possible. One way this aim is trying to be achieved is efficient design to reduce energy losses or requirements. Where energy loss is inevitable it'll try to be repurposed, such as in the heat generated by the fuel cell.

In my work, I aim to utilise the heat energy lost in the production of electricity within the fuel cell and redirect this heat into the car's cabin – while keeping the fuel cell within the satisfactory operating conditions.

To achieve this goal the cooling system architecture will be evaluated, as well as the components used and alternate systems.

At present the issues for heat recovery is that fuel cells run at a temperature of ~65°C where current car heat recovery work on combustion engines that run at ~100°C. This means the temperature gradients available to drive heat transfer is much lower, in turn lowering the rate heat can be extracted and utilised.



Figure 1 River Simple's Rasa. The hydrogen car at the center of the Cogeneration Heat Power (CHP) work. https://www.riversimple.com/the-blog/

Recent Publications

1. A. Fly, R.H. Thring (2016) A comparison of evaporative and liquid cooling methods for fuel cell vehicles 14217-14229
2. Guangsheng Zhang, Satish G. Kandlikar (2012) A critical review of cooling techniques in proton exchange membrane fuel cell stacks 2412-2429
3. Ulrich Soupremanien et al. (2012) Tools for designing the cooling system of a proton exchange membrane fuel cell. 161-173
4. M. Gandiglio et al. (2013) Design and optimization of a proton exchange membrane fuel cell CHP system for residential use. 381-393
5. Tabbi Wilberforce et al. (2017) Developments of electric cars and fuel cell hydrogen electric cars. 25695-25734

Biography

Ryan James Patrick O'Neill is currently a Research Masters student at Swansea university after completing a bachelor's in chemical engineering, also at Swansea university. He has an interest in sustainable energy and technology, particularly in the use of hydrogen as an energy vector.

Email: 831553@Swansea.ac.uk

Notes/Comments:

Presenting author details
Full name: Ryan James Patrick O'Neill
Contact number:
Mail id:
Category: Poster presentation