

## Preface to special issue on hybrid and hydrogen technologies for railway operations

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# Preface to special issue on hybrid and hydrogen technologies for railway operations

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These are exciting times for those working to develop and introduce zero emission technologies for the manufacture and operation of clean transport systems. The automotive industry in particular is taking rapid and significant steps to develop and implement clean and sustainable transport technologies. The railway industry is, relatively speaking, conservative in its progress in this field because it requires expensive long-term financial investment in rolling stock and railway infrastructure. However, the rail industry is also beginning to increase the pace of development. With the transition to clean technologies in rail broadly expected to be implemented in 2030–2050, much of the research now in progress is focused on the appraisal of battery-electric, hydrogen, and hybrid technologies. This includes modelling, simulation, design, and the development of prototypes for testing on existing railway routes.

In this special issue, research teams from Australia, Canada, China, Italy, USA, and the UK contribute their reviews, design ideas and concepts in this field. They also outline the progress of several recent and current numerical, experimental, and field works on the development of hybrid and hydrogen solutions applicable to railway applications.

The editors of this special issue believe that the manuscripts published will provide thought provoking and interesting reading, covering their analysis of the development of new ideas in the field of hybrid and hydrogen technologies for rail; we also anticipate that it will stimulate further research in the area, with huge opportunities to make further improvements in alternative power technologies, rolling stock design, and railway infrastructure.

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