A study conducted by the Graz University of Technology and Plasser & Theurer examines the possibility of achieving zero direct emissions during maintenance and construction work on railways using on-board battery technology. The study is part of a project funded by the Austrian Federal Railways (ÖBB). The project is called the FFF study and is conducted by TU Graz, the University of Technology in Graz. The FFF study recommends alternative solutions for track work machinery. The project has led to the development of a calculation tool called CalCAS (Calculation of Comparison for Alternative Solutions), which is used to evaluate different solutions for track work machinery. The outputs of CalCAS show that on-board battery technology is the preferred solution for track work machinery that requires less than 300 kWh of energy. By contrast, hydrogen fuel cell technology is suited to machinery that requires more than 800 kWh of energy. For machinery with energy requirements in between, either more advanced battery technology or diesel engines can be used.

Regarding the primary power source, track work machinery is highly influenced by market trends in the rail sector. The barriers for the market uptake of alternative drives in the rail sector include the technological concepts for powertrains and transmissions used in the construction sector, which are not applicable to rail machinery. The primary power source used in rail machinery is influenced by market trends in the rail sector. For example, a further rise in electric trains can be expected. Alternative drives for track work machinery are in their infancy. Research shows that the technological concepts for powertrains and transmissions used in the construction sector are not applicable to rail machinery. The barriers for the market uptake of alternative drives in the rail sector include the technological concepts for powertrains and transmissions used in the construction sector, which are not applicable to rail machinery.

Despite the benefits of alternative drives (such as fewer GHG emissions, less noise pollution, or higher efficiency), it does not automatically equal fossil free nor emission free. Alternative liquid fuels have limited potential (high demand for primary energy, contradictory findings on emissions, concerns regarding sustainability, etc.). Battery and hydrogen applications depend on the electricity mix, as well as on the production process and the end-of-life of their components. Nonetheless, in terms of mitigating environmental impacts, they are considered to have great potential. The findings of the FFF study have helped Plasser & Theurer assess both alternative drive technologies for track work machinery and the possibilities and risks they offer. The data provided by the study allows for a more effective assessment of future market developments, particularly in the railway and construction sector. Moreover, the calculation tool makes it possible to evaluate the fundamental requirements individual machine types have for alternative drives, and to integrate these requirements into strategic corporate decisions.