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#H2MAC

#NRMM

#construction

#mining

#fuelcellapplications

## Hydrogen fuel cell electric non-road mobile MACHinery for Mining And Construction: An innovative, efficient, scalable, silent and modular power-train concept

Non-Road Mobile Machinery (NRMM) includes a wide range of equipment powered by internal combustion engines, designed for off-road use and not intended to transport people or goods on public roads. These machines are widely used in sectors such as construction, mining, agriculture, forestry and public services. Internal combustion engines installed in NRMM significantly contribute to global GHG emissions, as well as local noise pollution. In this context, hydrogen emerges as a clean and promising alternative to reduce the environmental impact of these machines.

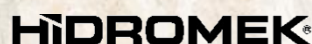
H2MAC is a four-year project focused on the design and demonstration of a cutting-edge hydrogen Fuel Cell Electric (FCE) powertrain for Non-Road Mobile Machinery (NRMM) used in construction and mining. The hydrogen FCE system in the NRMM shall operate under harsh working conditions (vibrations, dust, temperatures, etc.) and shall be modular and scalable to ensure the viability of its roadmap to market.

An excavator and a shredder powered by this advanced fuel cell powertrain will be developed and demonstrated, aiming to match the performance of current diesel-powered NRMM while providing a zero-emissions solution. The machines will showcase a scalable modular system: the excavator will use a single 120 kW fuel cell module, while the shredder will use two modules, increasing power to 240 kW. Their complementary operational profiles—dynamic movement for the excavator and more static operation for the shredder—will demonstrate the system's versatility.



Both prototypes will be tested simultaneously for 1000 hours under real working conditions at a quarry site in Arcos de la Frontera, Spain.

The consortium is composed of different research and technological partners (ITA, TAU), component manufacturers (POWERCELL, MANN+HUMMEL), Non-Road Mobile Machinery (NRMM) manufacturers (HIDROMEK, ZB) and private non-profit organizations (ANMOPYC, FHa), all committed to promote the use of hydrogen as an energy vector.



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The project is supported by the Clean Hydrogen Partnership and its members.