

## **The Project eco2jet**

The transport sector is responsible for about a quarter of all greenhouse gas emissions in the EU, from which around almost  $\frac{3}{4}$  of the road, making it the second largest emitter of greenhouse gases after the energy sector.

Since the railway sector can offer considerable advantages for the reduction here, there is a clear political objective on Austrian and European level towards a sustainable modal shift from the road to rail, not least in passenger transport. However, this shift requires solutions that improve the attractiveness of rail and increase the acceptance by the user accordingly. This means the development and use of innovations and technologies supporting the image of railways as a being a "green, sustainable" mode of transport towards this direction.

The project consortium of eco2jet has therefore decided to develop an innovative, system-wide optimized, environmentally friendly, based on R744 air conditioning with heat pump function incl. new energy-efficient, cost-effective and production-related components, which will be demonstrated and evaluated in regular operation in a train of the railway operator ÖBB.

Compared to conventional air conditioning systems, by the eco2jet HVAC system with heat pump function an increase in energy efficiency by at least 30% in real rail transport is achieved, at the same time also the amount of the greenhouse gas CO<sub>2</sub> from energy production will be reduced by 30%!

The use of the refrigerant R744 here represents an innovative, future-oriented technology for applications in the railway sector. Systems and components can be used for long-distance trains; the findings can be transferred to local trains, trams or subways.

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### Project Title: **eco2jet**

- Duration: 42 months
- Project Start: 01.March 2017
- Consortium: 8 Austrian partners
- Project Budget: 5.798.181 €
- Project Funding: 2.865.488 €

This project is funded by the Climate and Energy Fonds und realized in the programme „flagship projects of energy research program“.

Subsequently, also non-rail vehicles such as trucks, cars or airplanes, will benefit from the eco2jet solution. Therefore, eco2jet will have a sustainable effect going far beyond the immediate context of this project.

The industry-driven consortium of eco2jet includes relevant, internationally active partners that cover the full necessary value chain for the development, integration and demonstration / operation of the HVAC system in a real train (operators, system integrators, Tier X-suppliers, engineering service providers and research institutions). One of the top railway operators in Europe (ÖBB) with decades of experience with customer wishes and requirements represents the "voice of the customer" in eco2jet along the entire chain from development to evaluation.

In addition to the sustainable safeguarding of the Austrian competitiveness in the railway sector, thus the course for an appropriate market penetration in Austria, but also the opportunity for rapid penetration of the European rail market through the innovative HVAC solution developed in eco2jet is set.

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**WP1: Demonstration**



WP1 is focussing on the R744 Air Conditioning demonstration and benchmark during 12 month field test under regular train operation including the R744 Air conditioning demonstrator for one passenger wagon of railjet and the data acquisition for benchmark R744 and existing R134a vapour cycle.

**WP2: System Architecture**



WP2 is focussing on the development of rail applicable system architecture with heat pump optimized in terms of performance, energy efficiency and costs, applicable to different rail vehicle types, flexible to different climatic regions and will be evaluated in close cooperation to WP6.

**WP3: Component Development**

WP3 is focussed on the development of energy-efficient, cost-efficient, modular, mass-producible components for the R744 Air Conditioning System – heat

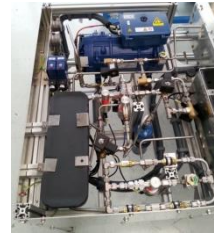


exchanger, piping, heat register – and reach maturity and robustness ready for installation on the demonstrator.



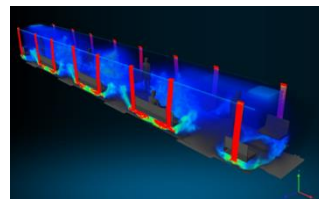
**WP4: System Development & Integration**

WP4 is focussed on the development of energy-efficient, cost-efficient, mass-producible R744 air conditioning system (demonstrator) in the boundary of railjet, the Integration of the WP3 development results and the development of demonstrator data acquisition system.



**WP5: Research for Improvement**

WP5 is focussed on the development of energy- & cost-efficient components for the R744 Air Conditioning System to increase the TRL of heat exchanger de-icing, intelligent control & predictive maintenance and wagon heating from Level 1 to Level 3



**WP6: Evaluation**

WP6 is focussed on supporting the evaluation of requirement and development phase, the overall evaluation of development results under real world conditions and the evaluation of development results vs. existing railjet components (R744-Cycle vs HFC-Cycle)



**The Consortium**



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