

# COMET CENTRE (K1)

## LEC GMBH

### RESEARCH PROGRAMME: LEC EVOLET - LEC EVOLUTIONARY LARGE ENGINES TECHNOLOGY FOR SUSTAINABLE ENERGY AND TRANSPORT SYSTEMS

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**Main location:** Graz (Styria)

**Other locations:** none

**Thematic area:** Energy & Environment



#### Thematic focuses

- Sustainable energy and transport systems (towards zero emissions)
- E-fuels (hydrogen, ammonia, methanol, etc.) for climate-neutral large engine applications
- Virtual development platform (digital twins for various applications)
- Innovative sensor technology, systems for measurement data transmission and condition-based monitoring

#### Planned realization and outcomes

The objective of the LEC EvoLET research programme is to develop innovative solutions for sustainable energy and transport systems. The focus is on drastic emission reduction. Using renewable energy sources (hydrogen, methanol, ammonia, etc.) for climate-neutral large engine applications, optimizing the overall system and the intensive use of digital technologies form the core of research. Having a highly flexible infrastructure enables a wide range of experimental investigations from the basics to the entire energy or propulsion system. A key role in this is played by the permanent further development of detailed simulation models and methods (such as in the COMET-Modul LEC HybTec), their seamless integration into a consistent development methodology and their successful application. Based on innovative solutions in the field of sensor technology, measurement data transmission systems and condition-based monitoring, the LEC develops intelligent engine components in order to monitor the systems' condition under the most extreme environments and thus increase their robustness, life span and environmental soundness. To further minimize pollutant and greenhouse gas emissions, advanced exhaust gas aftertreatment systems are developed and integrated into the overall system. The permanent further development of the LEC simulation methodology has led to the fact that today this method can be successfully applied for emission reduction and overall energy system optimization of entire production sites.

#### History of establishment

The modern large engine research at Graz University of Technology started in 1994, when the first single-cylinder research engine, a Jenbacher type 6 gas engine, was established. A focus of the research work from the very beginning was the development and use of simulation methods for optimization. In 2002, the LEC brand was introduced. From 2002 to 2010, an industrial competence centre (K<sub>IND</sub>) existed within the framework of LEC GmbH, which was transferred to TU Graz and FVT GmbH after the programme expired. Since 2015, LEC EvoLET has existed as a funded K1 centre within the framework of LEC GmbH. In 2020, the COMET module LEC HybTec was approved.

## COMET FACTSHEET

### Selected company partners (max. 10):

1. AVL List GmbH
2. Robert Bosch AG
3. INNIO Jenbacher GmbH & Co OG
4. VERBUND Thermal Power GmbH
5. COMET-Partner Network: <https://www.lec.at/network/>

### Selected scientific partners (max. 5):

1. Graz University of Technology (Austria)
2. Montanuniversität Leoben (Austria)
3. AIT Austrian Institute of Technology GmbH (Austria)
4. Universitat Politècnica de València - CMT-Motores Térmicos (Spain)

### Selected international<sup>1</sup> partners (max. 5):

1. ABB Switzerland Ltd – Turbocharging (Switzerland)
2. OMT Officine Meccaniche Torino Spa (Italy)
3. WinGD (Switzerland/China)
4. Johnson Matthey GmbH & Co. KG (England/USA)

**Duration:** 01.01.2015 - 31.12.2022 (8 years)

**Staff employed at the Centre:** 62 FTE, thereof 40 scientists

**Management:** Ao. Univ.-Prof. Dipl.-Ing. Dr. Andreas Wimmer, CEO & CSO  
Dipl.-Ing. Nina Simon, COO & Interims CEO

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Status 06.09.2022

The COMET Centre is funded within COMET – Competence Centers for Excellent Technologies – by BMK, BMAW as well as the co-financing federal provinces Styria, Tyrol and Vienna. The COMET programme is managed by FFG. [www.ffg.at/comet](http://www.ffg.at/comet)

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<sup>1</sup> Partners with headquarters outside Austria