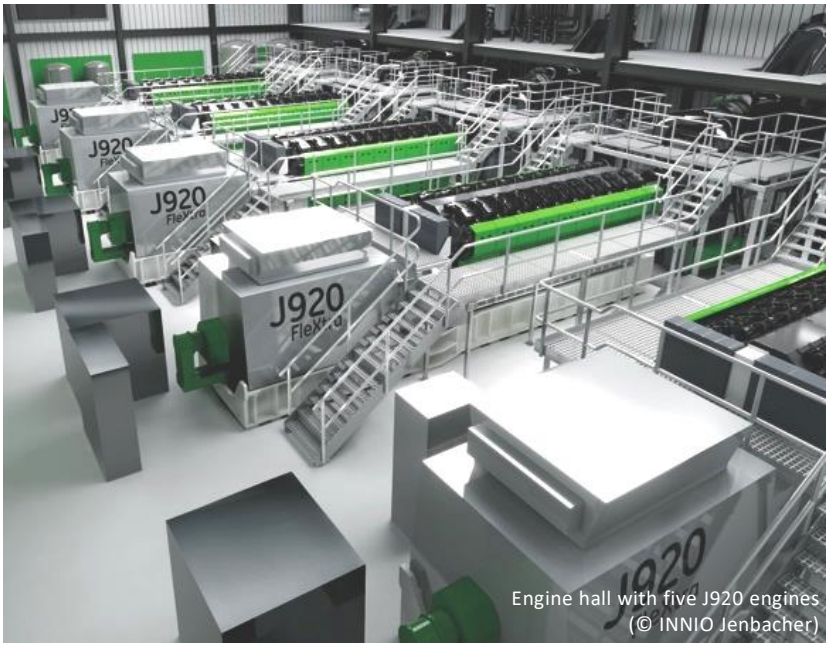
SUCCESS STORY

**LEC EvoLET**
**LEC Evolutionary Large Engines Technology for Sustainable Energy and Transport Systems**

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Centre K1

Type of project: single-firm
Duration: 2010-2017
Title: Combustion Concept for a New Gas Engine in the 10 MW Class



Engine hall with five J920 engines (© INNIO Jenbacher)

# SUSTAINABLE POWER PLANTS OF THE FUTURE

THE GLOBAL TREND IN THE ENERGY SECTOR? HIGHLY EFFICIENT, EXTREMELY FLEXIBLE GAS ENGINES WITH A LOW ENVIRONMENTAL IMPACT THAT ARE ABLE TO COMPENSATE QUICKLY FOR FLUCTUATIONS IN THE POWER GRID. THEREFORE, IN COOPERATION WITH THE LEC, INNIO JENBACHER HAS DEVELOPED A NEW ENGINE IN THE 10 MW CLASS WITH A MULTIPLE AWARD-WINNING COMBUSTION CONCEPT.

**Smart Grids** are the magic formula for the sustainable energy systems of the future. The internal combustion engine is not dead by a long shot. It is precisely in times of energy transition that highly flexible and efficient gas engines make an incredibly important contribution to the power supply — when used in power plants — by compensating for fluctuations in the power grid due to changes in climate with extremely quick reaction times. When solar power facilities are unavailable due to a lack of sunshine or there is no wind to drive wind turbines, the demand for electricity must be kept in balance as quickly as possible so the power grid remains stable. This is exactly where the Large Engines Competence Center (LEC) comes in. Specialized in the development of sustainable large engine solutions, the LEC has provided INNIO Jenbacher (previously GE Jenbacher) with support in developing a new gas engine for a sustainable energy future.

**The combustion concept** for the new gas engine was designed with the LEC's virtual design process. Virtual development included comprehensive thermodynamic predesign with 0D/1D models and

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detailed simulation using 3D CFD methods to optimize mixture formation and combustion chamber geometry. The LEC has received awards including the renowned Houska Prize for this outstanding result of the virtual design process.


Global use of J920 engines (© LEC GmbH)

With its very short reaction times, the concept provides the ideal basis for intelligent energy solutions. Thirty of these engines have already been deployed around the world. In 2018 twenty highly efficient J920 gas engines were installed in the K.I.E.L. coastal power plant to produce electricity and heat. Although it runs on gas, the new power plant makes a large contribution to the energy transition and climate protection by reducing carbon dioxide emissions to less than 70 percent of those of its predecessor. The gas engines are part of a carefully thought out overall concept that achieves a sensational overall efficiency of more than 90 percent thanks to the optimal use of excess heat for district heating, a 60-meter-high heat storage unit and other technological achievements. The modular construction of the coastal power plant allows it to react flexibly to the demands of the market and compensate quickly for fluctuations in the power grid, making it a model European project for a sustainable power supply.

K.I.E.L. coastal power plant: 60-meter-high heat storage unit, engine halls adjacent (© Stadtwerke Kiel AG)

The main objective of the LEC is to contribute with its research to the achievement of global climate goals. Its motto is "towards zero emissions." In addition to the energy sector, cargo transportation by both land and water is the most important field of application for the large engines research.

**Project coordination (Story)**
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**Project partner**

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  (previously GE Jenbacher GmbH & CO OG)

This success story was provided by the consortium leader/centre management and by the mentioned project partners for the purpose of being published on the FFG website. Further information on COMET: www.ffg.at/comet