The general goal of this project was the concept development, design, evaluation and optimization of an ORC plant in power range of ca. 1 kW with a scroll expander Air Squared Inc., E1542N4.25.

The installation can be turned on manually using the controls. Once both the computer and the machine are up and running, the computer can be used to change certain parameters, such as the thermostatic flow, the feed pump speed, the condenser flow, and the sub-cooler rate. The minimum and maximum voltage required to turn lamps on and off can also be controlled from this screen.

The data that is collected from the equipment in the Data Acquisition aspect of the code is as follow: temperature, pressure, volume, and enthalpy for each of the seven characteristic points. The enthalpy is obtained from the code searching through a data table of known values for the working fluid, R245fa. The code runs through the table and finds the applicable data depending on the given values of temperature at each point in the installation. The second part of the LabVIEW code begins running further calculations as well as drawing up relevant graphs.

Innovative ORC concepts require practical validation through the testing of a new installation to confirm theoretical calculations and simulations. The new micro-ORC power plant at the Bremen University of the Applied Sciences Laboratory for Energetics provides the facilities necessary to test these theoretical values. A different challenge was faced in the building of this installation due to the use of the scroll engine in reverse, as an expansion machine. Additionally, the challenges of running an ORC power plant at a low temperature and pressure was considered. The generated and tested model, which is going to be installed and coupled with the ORC-plant to extend it to a complex installation using a renewable energy source. Additionally, some economical aspects have been taken into consideration by investigating the practical applicability.