



biosweet

Biomass for Swiss Energy Future
Swiss Competence Center for Energy Research

In cooperation with the CTI



Energy

Swiss Competence Centers for Energy Research



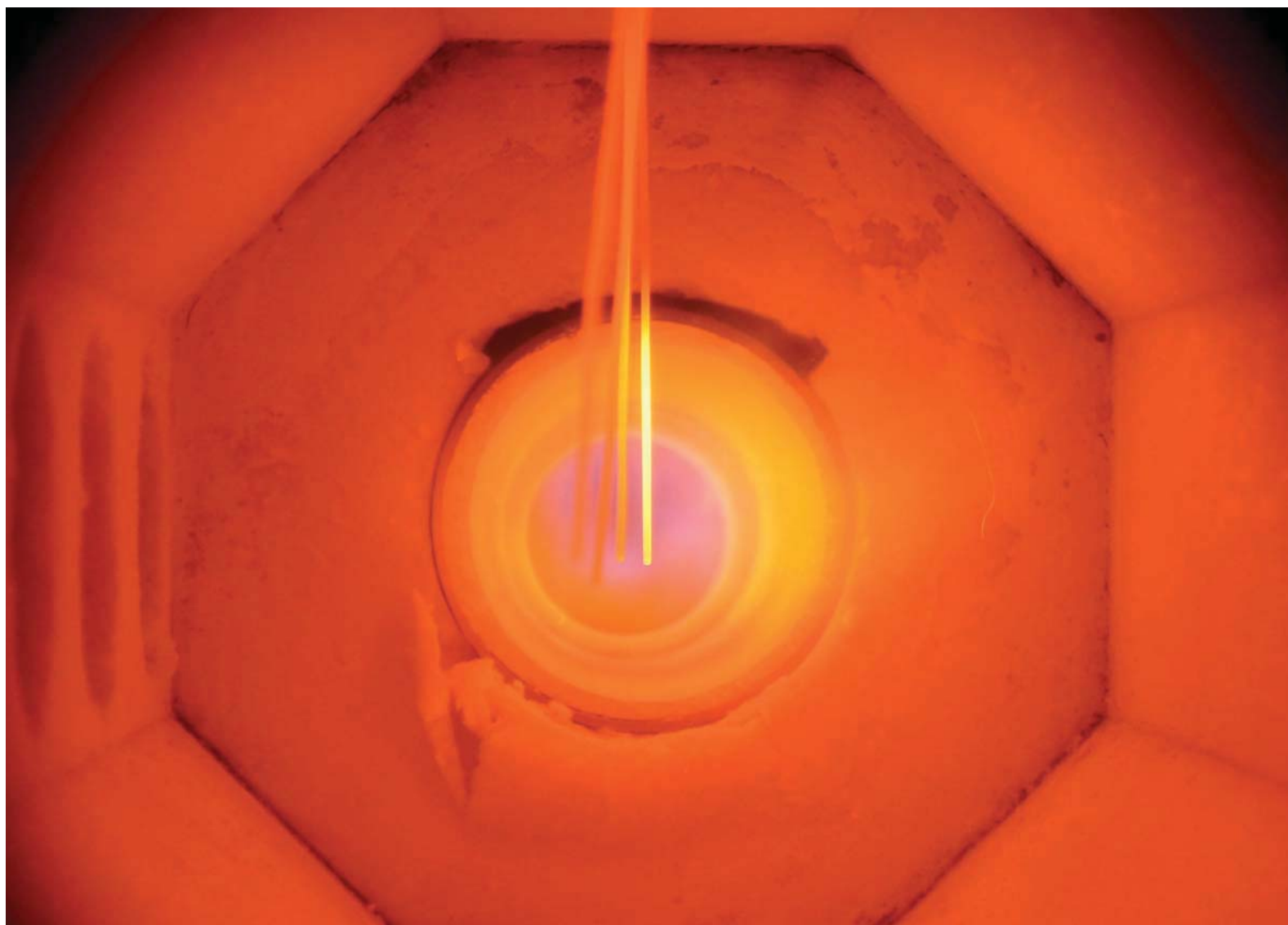
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Retrofit Wood Gas Burner

High-temperature heat from locally-sourced,
renewable wood





Energy Transition – Substitution of Fossil Fuels

In the private sector more than 80 % of energy consumption is used for heating and warm water production, of which more than 65 % is produced by oil and gas combustion. This leads to an annual emission of 9 million tones of CO₂ into the Swiss environment. Substituting fossil fuels with regional, CO₂-neutral wood can significantly reduce greenhouse gas emissions as well as strengthen local value chains.

SCCER BIOSWEET is currently developing in cooperation with Liebi LNC AG an innovative retrofit approach for heating systems in which oil or gas burners can be replaced with a wood gas burner. Other components in the existing heating system with long service lifetimes (up to 20 years) should remain in operation. In the future, heat pumps and solar thermal heating systems may dominate the market. However, for historical buildings or those in mountainous regions, where such heating systems are not suitable as well as for industrial high-temperature heat applications, wood-based heating systems offer an attractive, CO₂-mitigating alternative.

Low-Emission Staged Combustion Concept

The retrofit wood gas burner, based on wood pellets combustion, is a flexible system with a high degree of power adjustment (factor 1:3, for example from 7 – 20 kW or 15 – 50 kW). For clean and stable combustion a modern two-stage concept is applied. In the first stage, the wood is gasified at fuel rich conditions, to produce wood gas, which is subsequently burned in the second stage in a highly turbulent, aerodynamically stabilized flame. The realized staged combustion achieves high temperatures (>1000 °C) with low CO, NO_x, UHC as well as particulate emissions.

Suitable Feedstock

> Standard wood pellets

Marketable Product

- > Heat for residential and office buildings
- > High temperature heat for industrial applications

Technology Readiness and Roadmap 2020

The market introduction for the wood gas burner is planned in 2019. Therefore, we are working on the successful commissioning of the prototype in 2017, and demonstrating the retrofit function in extended field tests in 2018.

For industrial high-temperature applications a scale up to higher capacities is planned. Furthermore, the use of alternative biomass fuels, for which there is less competitive use, lower cost and more attractive economics, will be investigated.



**Retrofit wood gas burner (black) attached to
standard fossil boiler (red)**

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