

Europe-Vision for an Organization with 60 Regions

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Cogeneration Units

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This is a translation. The original is in German: * blockheizkraftwerke.pdf.

Explanation of terms Cogeneration Unit

Description

Below we summarize the information from Wikipedia.org, BHKW-Infozentrum.de and other documentation.

We explain the Cogeneration Unit (CHP) with split into Unit and Cogeneration. Cogeneration means Heating Generation, and Electric Power Plant.

“Heating Generation” means that the system produces heat by converting energy.

“Electric Power Plant” means that the system produces electricity by converting energy.

The word “Unit” means that the Heating Generation and the Electric Power Plant together form a Unit.

CHP systems can be used economically wherever electricity and heat are used in proximity. The higher overall degree of utilization compared to the combination of local heating and a central power plant results from the fact that the waste heat from electricity generation is used.

Technic

The technical implementation takes place using the fuel cell or the engine principle.

The fuel cell runs on hydrogen or methanol. The hydrogen is obtained from natural gas in some plants.

The CHP engine runs on fuel. Natural gas, biogas, oil, gasoline and diesel are common. The internal combustion engine, the Stirling engine and the gas turbine are used. These motors are optimized for high efficiency.

With fuel cells, electricity production is greater. Heat generation is greater with a CHP engine. The trend is towards fuel cells. The overall efficiency is higher, the operating costs are lower and the systems are almost silent.

Documentations on internet

Cogeneration Units by Wikipedia

* [Link to German Wikipedia.org](#)

Cogeneration Units by BHKW Info Center

* [Link to bhkw-infozentrum.de](#)

Cogeneration Units together with long-term storage

Convert hydrogen Energy into Electricity and Heat

The CHP converts the hydrogen energy into electricity and heat. Fuel cell technology is used for this purpose. The ratio of electricity and heat production is constant. The CHP usually runs for a longer period. Short-term storage is used to compensate for fluctuating energy usage. This is done for electricity and heat.

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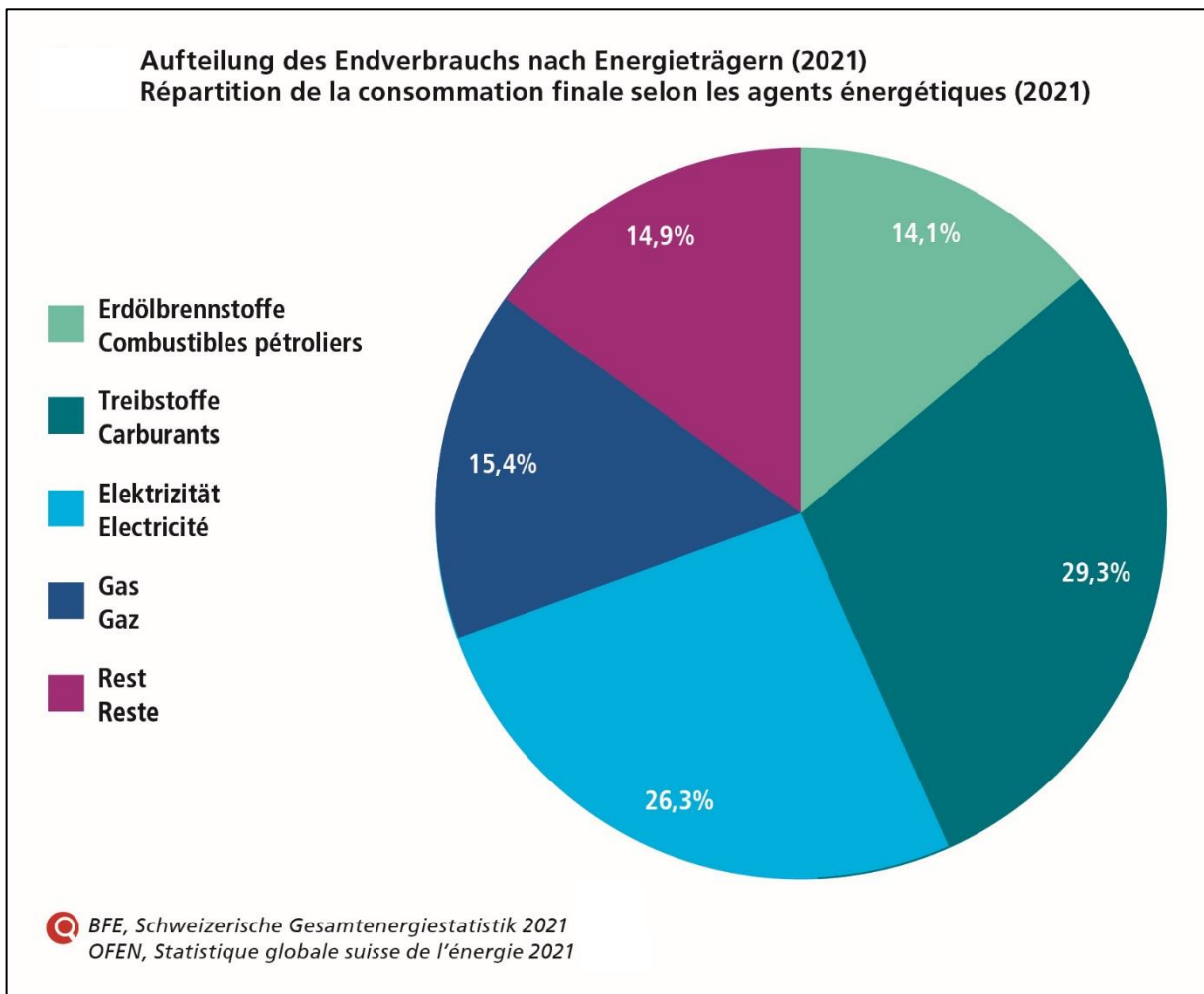
Cogeneration Units in the energy transition

Calculations and thoughts for use in Switzerland

Impact of a Cogeneration Unit

The Cogeneration Units generate the same amount of heat energy as an oil burner, or as a gas Brenner, which is also called gas boiler. In addition, the Cogeneration Unit generates 50% of the Heat energy in the form of electrical energy. The Cogeneration Unit includes fuel cell or an optimized engine.

Potential of Combined heat and power plants (Switzerland)



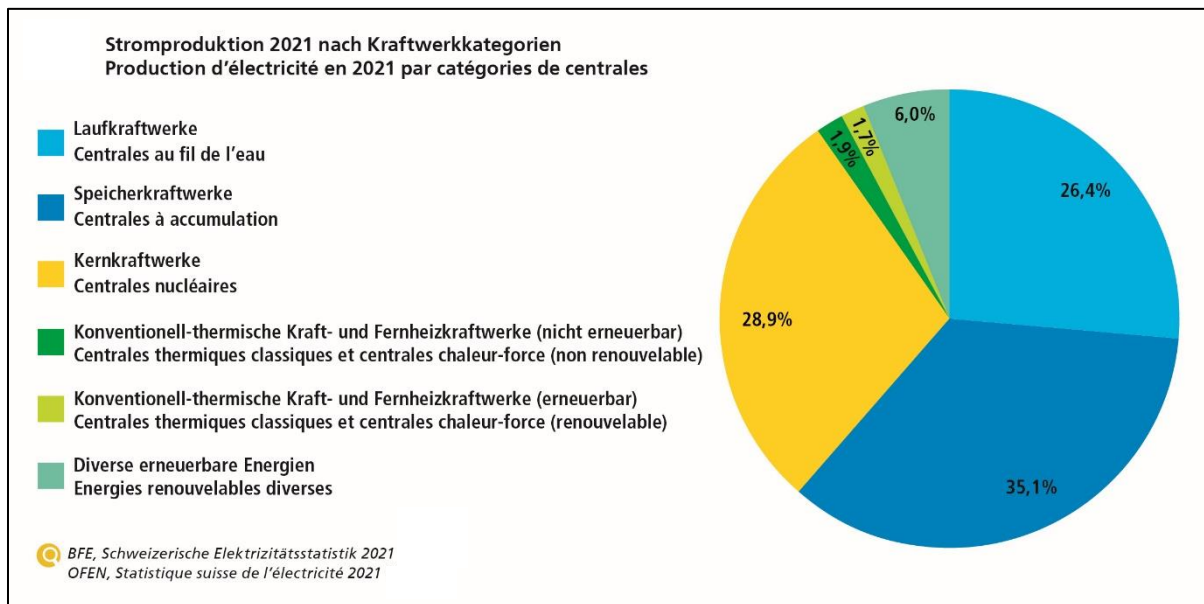
In consumption, petroleum fuels and gas make up 29.5% (15.4% + 14.1%). The potential calculation of the electro-energy component of Cogeneration Units: $29.5\% * 1/2 * 100\% / 25\% = 59\%$

The potential for Cogeneration Units is 59% of the consumed electrical energy. Is after in our estimation half feasible. This matches with a share of around 30% in the consumption of electrical energy.

The calculation is based on a Cogeneration Unit with engine. In a combined heat and power unit with fuel cell, more electricity is generated, but the heat output is then smaller.

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Electricity production in Switzerland



The various renewable energies accounted for 6.0% of electricity production in 2021. The Nuclear power plants produced 28.9%. The imports are not included in this calculation.

In Switzerland, the Cogeneration Units **can replace** the energy of nuclear power in terms of quantity. It is not generated evenly throughout the year. The cogeneration plants supply their main energy during the **cold season**. The current electricity shortfall is during this time of year. The control for the daily compensation can be carried out in the same way as it has been done so far for boilers, washing machines, storage heaters, heat pumps and electric cars.

The seasonal fluctuations become with the increased use of Cogeneration Units in one balanced in the first phase. In a second phase, there is an excess of electricity in the cold Season. This can be compensated to a certain extent by the storage power plants. If our western neighbour relies on nuclear energy, the power gaps, and the Overproduction of us with this state very well together.

Use of Cogeneration Units

The Cogeneration Units are to be used in office buildings, apartment buildings, seminar buildings, hotels, shopping centres, schools, hospitals, and public swimming pools. In our estimation, renewable energies can only be implemented in these buildings to a very limited extent.

Cogeneration Units and Heat Pumps

The two technologies, Cogeneration Unit and Heat Pump, are interesting. When we describe the advantages of the individual technologies, we look at many factors. As an overall solution, we should use good combinations of Cogeneration Units and Heat Pumps.

Fuel cells are used as a partial replacement for nuclear power plants

In Japan, fuel cells were further developed during the major outages of the nuclear power plants. These fuel cells are now often used in Cogeneration Units. The fuel cells replaced part of the electricity generation that previously came from nuclear power plants. These fuel cells are well suited for combined heat and power plants.

Annotation

Other posts on this topic

There are only a few contributions to the use of CHPs with fossil energies. There are several articles for the use of hydrogen-powered CHP units. Most articles describe which system each university uses to heat its own buildings.

Many combined heat and power plants are in use in universities. Some of them are in laboratories for experimental purposes and some of them are used to heat classrooms. Often it is a combination of both.

Comments on this statement

We would be happy to receive further comments on the statements in this article.

Conclusion

The Cogeneration units are suitable to contribute significantly to the energy transition.