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DEMAND SIDE MANAGEMENT WITH HYBRID HEATING PROCESSES – A CONTRIBUTION FOR COST EFFICIENT RENEWABLE ENERGY INTEGRATION

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Overview

With the development of renewable energies like wind turbines and photovoltaic, a reliable power supply is becoming of crucial importance in Europe. In future, the challenge for the power system is therefore the permanent balancing between energy availability and demand over time and distance. To integrate the fluctuating energy into the power supply and ensure the stability of the electric grid different approaches exist. Due to the requirement of large equalization capacities a combination of options like demand side management, generation management, storage and grid optimization are indispensable with increasing share of renewable energies. The priority of power supply with energy from renewables is interrupted, when the grid is not stabilized facilitating the mentioned options. Beside grid integration difficulties of renewable surplus energy, a cost effectiveness decline is associated with power management applications.

Method

With hybrid heating processes energy from renewables can be used for heating processes instead of fossil fuels. By switching to electric heating in periods of renewable surplus energy, fossil fuels are saved which can be used on their part for energy generation to bypass periods of high demand and low renewable energy production. The economic model compares different approaches for alternative use of renewable surplus energy instead of fossil fuels. One approach is to calculate the cost effectiveness of hybrid heating processes in comparison with the solely fossil fuels usage. The economic efficiency of saved gas from hybrid heating processes is also compared with producible gas by methanization using electricity. Furthermore, the economic benefits of the renewable energy load extension are analyzed.

Results

The cost effectiveness of hybrid heating processes depends on the ratio of gas prices and dues for renewable surplus energy such as costs for grid use. Most scenarios evaluate higher cost effectiveness when using hybrid heating processes. It is also expectable, considering the low efficiency of methanization using electricity, than hybrid heating processes provide gas more efficient. Besides that, the planning objective must be the reduction of costs, resulting from the minimized expansion of the grid and generator capacities.

Conclusions

The use of renewable surplus energy in hybrid heating processes facilitates the integration of renewable energies. Fluctuating power supply is balanced by cutting capacity peaks from sources like wind turbines and photovoltaic. The use of renewable surplus energy also improves the cost effectiveness of renewable energies due to load extension caused by reduced power management applications. This leads to a simplified integration, improved cost efficiency and therefore sustainability of renewable energy generation.

References

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