Potential of Steam Energy in PV-Hybrid Systems

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Abstract:

This paper presents an overview of the newest technical developments of modern steam engines [1] and gives an outlook of the potential of steam energy to play an important role in future concepts and constructions of decentralised energy supply systems.

In contrast to the historical constructions of steam engines in the beginning of the industrialisation, today there exist already not used potentials concerning small scale machines and modified thermodynamic processes. This presentation gives an impression of modern innovative concepts and possibilities with regard to new materials and methods to minimise emission.

New ideas with respect to the above mentioned developments and potentials are given, in order to integrate these modern steam engines in decentralised PV-hybrid systems. These concepts lead to complex combined heat and power systems with the advantage to use biomass [3] for the steam generation with a maximum degree of flexibility.

Fundamental dimensioning principles are worked out, with respect to the combining effects of the characteristics of a PV-plant with an additional stochastic converter, for example like a wind turbine [2], and the addition of a steam engine as controllable converter (figure 1).

Last but not least, still remaining problems which are to be solved are presented, as well own ideas, which may lead to further development activities.

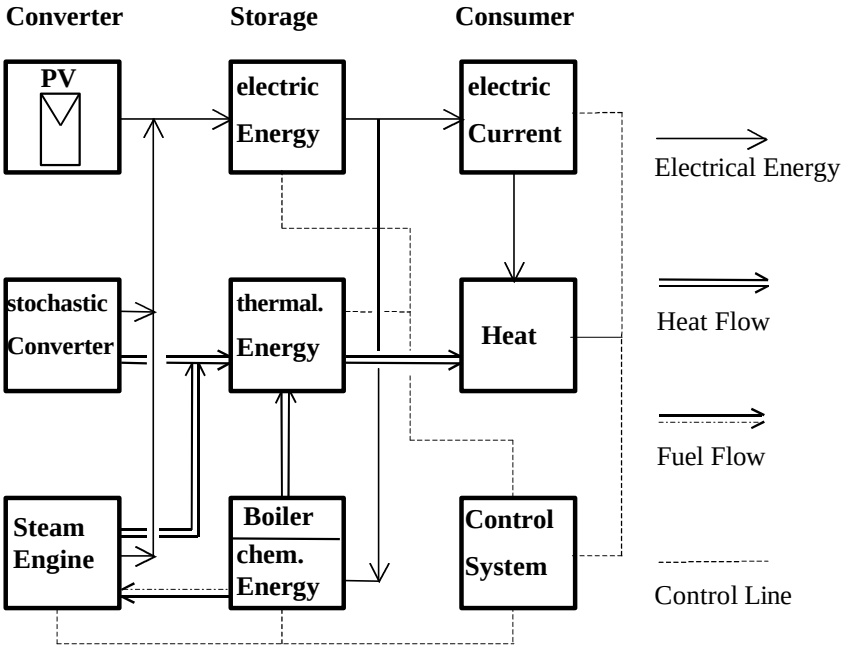

Figure 1 Fundamental Systematic of PV-Hybrid Systems with Steam Engine

References:

[1] K. Brinkmann, "Moderne Dampfmaschinen" Sechstes Kasseler Symposium Energie-Systemtechnik, Enereuerbare Energien und Rationelle Energieverwendung,, 'Innovative Energiewandler'. 15.-16. November 2001 Kassel, ISET.

[2] K. Brinkmann, "Dimensioning Principles of Hybrid Systems Based on Renewable Energies including Wind Turbines and Combined Heat and Power", Wind Power for the 21st Century, Kassel 25.-27. September 2000.

[3] K. Brinkmann, Possibilities and Effects of Biomass Energy Conversion in Renewable Hybrid Systems with Combined Heat and Power, 12th European Conference on Biomass for Energy, 17-21 June 2002, Amsterdam, The Netherlands.