

Promoting Renewable Energies in Tourism

An actor-based analysis of biogas waste heat usage

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Background

In tourism, energy demands are particularly high. Tourism facilities such as hotels require large amounts of electric and heating/cooling energy. Their supply however is usually still based on fossil energies [1]. Its effectiveness on climate change addresses the need for promoting renewable energies in tourism [2]. Biogas enables the combined production of electrical and thermal energy. Plants are widely spread across Germany, particularly due to the political promotion by the renewable energy law (Erneuerbare-Energien-Gesetz) [3]. Despite its high potential within the energy system transformation, the biogas branch faces an uncertain future. When regular government subsidies terminate after 20 years, proprietors must decide to continue operating their plant under unfavourable market economy conditions or to shut it down [4]. This would imply rising energy costs for combined heat and power facilities.

Methodology

Primary data collection

- > A survey amongst proprietors of biogas plants has been conducted, focusing on the efficiency of waste heat usage, operating strategies, and interest in feeding (possible) short distance network [6].
- > Furthermore, stakeholders in tourism were polled. They were asked about their current heat supply and their interest in joining micro-cooperation (*results still due*).
- > Experts are investigated about planning and financial issues as well as technical, political and social aspects (*results still due*) [7].

Secondary data collection

- > The spatial scope of the particular study region Black Forest was defined according to its physio-geographical specifications [5].
- > Heat consuming objects in tourism were conducted and localised via GIS-analysis, including swimming pools, thermal baths, laundry service facilities supplying tourism and accommodations such as hotels.
- > In relation to these, biogas plants were identified within a five kilometre radius.

Focus of Research



Fig. 1: Scheme of short distance network concept between biogas plants as an example of renewable energies and tourism facilities (own diagram)

To face this problem, the research approach analyses the feasibility of short distance networks (short energy supply between tourism and biogas plants that are located within a five kilometre radius around the former) (see fig. 1). The current study region is the Black Forest, Germany. The key aspect here is tourism's all-season energy and especially heat demand [8]. Focusing on a combined and hence highly efficient production of both electric and thermal energy, it considers regional resource availability as well as socio-economic aspects [9, 10]. Strengths, weaknesses, opportunities and threats are analysed. While focusing on the stakeholders involved, solutions to possible impediments or conflicts of interest of this form of micro-cooperation are evaluated. This integrated research approach thus contributes to analysing the reciprocal effects within the triad of tourism, energy and climate change.

Results

Strengths

The response rate of over 56% shows a high interest towards the subject. According to that, the usage of waste heat is quite common. Other purposes are for the heating of other homes, municipal building like schools and community houses, or as process heat for industrial usage.

Opportunities

Since waste heat is mostly used for the heating of own residential and farm building, it is usually free of charge. An opportunity lies within the adequate charge of this top quality product. Almost 60% of the respondents declare their interest in feeding a local heat network that is mainly used by tourist objects.

Main objectives towards feeding local heat networks

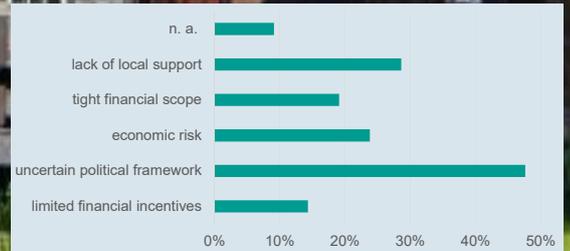


Fig. 3: Main obstacles in joining short distance network (own diagram based on results of survey amongst biogas plant proprietors in Black Forest, DE)

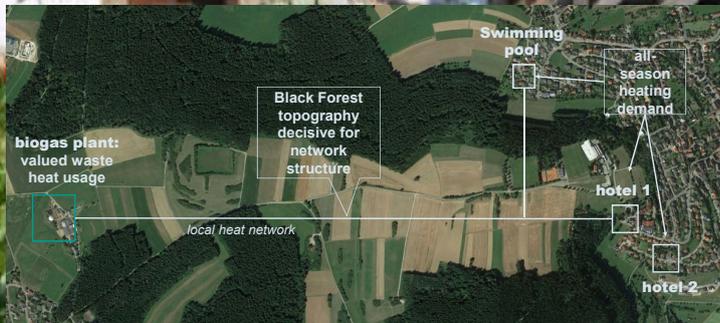


Fig. 4: realistic example of a biogas-tourism heat network cooperation (source: Google Earth Professional, altered)

Threats

According to the survey results, the main obstacles to foster waste heat usage and develop short distance heating networks are political frameworks and little financial incentives, thus limiting the scope of action (see fig. 3).

Weaknesses

With regard to the wide spread of installed power, concepts for short distance networks should be elaborated individually (cf. fig. 4). The lack of communal support could be addressed and altered towards desired direction.

References

[1] IPCC Working Group III, Panel on Climate Change, Climate Change 2014 Synthesis Report: A Report of the Intergovernmental Panel on Climate Change, Geneva, 2014.
 [2] G. Rajan and DEHOGA Arbeitskreis Umwelt, Nachhaltiges Wirtschaften in Hotellerie und Gastronomie, Tipps und Handlungsempfehlungen, Berlin, 2016.
 [3] Ministerium für Umwelt, Klima und Energiewirtschaft und Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (Klimaanpassung in Baden-Württemberg: Berg-Region – Planungsleitfaden), Karlsruhe, 2016.
 [4] Gesetz für den Ausbau erneuerbarer Energien (Erneuerbare-Energien-Gesetz), EEG, 2017.
 [5] Karle Schwärzle, Landesanstalt für Umwelt, Messungen und Naturschutz, 2017/2019.
 [6] R. Jacob, Umfrage, Einführung in die Methoden der Umfrageforschung, 2nd ed., München, Oldenbourg, 2012.
 [7] J. Mayring, Qualitative Sozialforschung, Weinheim, Basel: Beltz Verlag, 2002.
 [8] G. Rajan and DEHOGA Arbeitskreis Umwelt, Nachhaltiges Wirtschaften in Hotellerie und Gastronomie, Tipps und Handlungsempfehlungen, Berlin, 2016.
 [9] R. Lück and B. Rothstein, 'Biodiversität im Kontext der Energiewende – eine energiepolitische Reflexion', BfN-Skript, vol. 2013, no. Biodiversitätsziele bei der energetischen Waldnutzung als Beitrag zur Nachhaltigkeit, 330.
 [10] J. Perrigot et al., 'Biogas + Quo vadis?', Enderlecht, Berlin, 2016.

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