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KOLPING UNIVERSITY OF APPLIED SCIENCES

**IŠŠŪKIAI IR SOCIALINĖ ATSAKOMYBĖ
VERSLE**

*CHALLENGES AND SOCIAL RESPONSIBILITY IN
BUSINESS*

**Tarptautinės mokslinės-praktinės konferencijos pranešimų
medžiaga**
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IŽANGA

Kolpingo kolegija savo veiklą grindžia krikščioniškomis vertybėmis, akcentuodama socialinį įsipareigojimą ir socialiai atsakingą požiūrį į bendruomenę ir visą kūriniją. Žmogus - socialinė būtybė, nešanti atsakomybę už save patį, aplinkinius ir aplinką. Pagrindinis Kolpingo kolegijos kultūros bruožas – didelis dėmesys ir pagarba asmenybei, bendruomeniškumo puoselėjimui, nuolatinė pagalba formuojant krikščioniškąsias moralines nuostatas ir kaupiant vidinį potencialą šalies socialinės ir ekonominės aplinkos humanizavimui.

Palaimintasis Adolfas Kolpingas yra pasakęs: „Krikščionių bendrija sudaro tokią pat visumą kaip ir šeima, kurios nariai skleidžia vienas kitam ypatingą meilę, visokeriopai vieni kitiems padeda ir paskatina vieni kitus“. Akivaizdu, bendruomenės atlieka visaverčio socialinio partnerio vaidmenį dalyvaudamos sprendžiant šalies ekonomines, socialines, politines, kultūrines, aplinkosaugines ir kitas darnaus vystymosi problemas. Pastaraisiais metais pasaulio ir Lietuvos bendruomenės susidūrė ne su vienu iššūkiu. Vykstančio karo ir pandemijos laikas mokė ir vis dar moko bendruomenes būti šalia skausmo, nevirties, būti lankstesnėmis, ieškoti naujų būdų padėti ir teikti pagalbą. Bendruomenė yra pagrindinis visuomenės gyvenimo kokybės socialinis junginys, užtikrinantis racionalų daugelio socialinių funkcijų veikimą, vystantis socialinį-psichologinį žmogaus amžių, palaikantis socializacijos procesą.

Šiame leidinyje pristatomos jaunimo patirtys bendruomenės veiklų kontekste, iššūkiai ugdant bendruomeniškumą, pateikti praktiniai eko sąmoningumo skatinimo bendruomenėse, bendruomeniškumo skatinimo per savanorystę pavyzdžiai, vertinama negalią turinčių asmenų įtrauktis į darnaus vystymosi veiklas.

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INTRODUCTION

Kolping University of Applied Sciences bases its activities on Christian values, emphasizing social commitment and a socially responsible approach to the community and the whole creation. A person is a social being who bears responsibility for himself, for others and for the environment. The main feature of the Kolping University of Applied Sciences culture is great attention and respect to the individual, fostering communality, constant help in forming Christian moral attitudes and accumulating internal potential for humanizing the social and economic environment of the country.

Blessed Adolf Kolping said: "The Christian community forms the same whole as a family, whose members spread special love to each other, help and encourage each other in every possible way." Obviously, communities play the role of a full-fledged social partner by participating in solving the country's economic, social, political, cultural, environmental and other sustainable development problems. In recent years, the communities of the world and Lithuania have faced many challenges. The time of ongoing war and pandemic taught and still teaches communities to be close to pain, despair, to be more flexible, to find new ways to help and provide assistance. The community is the main social unit of the quality of society's life, which ensures the rational functioning of many social functions, develops the social-psychological age of a person, and supports the process of socialization.

This publication presents the experiences of young people in the context of community activities, challenges in developing community spirit, practical examples of promoting eco-awareness in communities, promoting community spirit through volunteering, and evaluating the involvement of persons with disabilities in sustainable development activities

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EVALUATING CONCEPTS OF LOCAL HEAT SUPPLY SYSTEMS USING SUSTAINABILITY INDICATORS

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ANNOTATION

The heat transition is one of the central topics of future climate-neutral energy production and supply in Germany as well as in Europe. While renewable electricity already accounts for the largest share of German electricity generation at over 40 percent, the renewable share in heat supply has stagnated at a consistently low level of about 15 percent since 2010. With a comprehensive implementation of innovative, sustainable, municipal heat supply solutions and the associated investments in the necessary heat generation and heating infrastructures, significant, previously unimplemented CO₂ reduction potential and flexibility capacities necessary for sector coupling can be developed.

The research project KoWa - 'Heat transition in municipal energy supply' aims to support municipal utilities in the development of sustainable heat supply systems. For this purpose, different heat supply options were designed in six study areas and compared using a multi-criteria sustainability assessment. In order to ensure a comparable and transparent procedure, a methodology for the sustainability assessment of municipal heat supply concepts was developed and published in a method description. The article presents the evaluation framework and the operationalisation of selected criteria.

Keywords: heat-transition; sustainability indicators

INTRODUCTION

The heat transition is one of the central topics of future climate-neutral energy production and supply in Germany as well as in Europe. While in 2020 renewable electricity already accounts for the 44.7 % German electricity generation (20.2 % in Lithuania), the renewable share in heat supply in Germany has stagnated at a consistently low level of less than 15 % since 2010. In contrast to that, the renewable share in heat supply has risen in Lithuania to 50.4 % in 2020 (Eurostat, 2022, Code: NRG_IND_REN). With a comprehensive implementation of innovative, sustainable, municipal heat supply solutions and the associated investments in the necessary heat generation and heating infrastructures, significant, previously unimplemented CO₂ reduction potential and flexibility capacities necessary for sector coupling need to be developed.

The research project KoWa - 'Heat transition in municipal energy supply' aims to support municipal utilities in the development of sustainable heat supply systems and cooperation aimed at defossilisation and increasing energy efficiency. As part of the project, various heat supply options were designed in six study areas and compared using a multi-criteria sustainability assessment. In order to ensure a comparable and transparent procedure, the methodology presented here for the sustainability assessment of municipal heat supply concepts was developed on the basis of sustainable economics and published in a method description (Gapp-Schmeling et al., 2021).

The aim of this article is to give an insight into the methodical procedure of the sustainability assessment of municipal heat supply concepts. First, the development of the evaluation framework is presented below. A comprehensive explanation of all 15 sustainability criteria including indicators and their operationalisation is not possible due to the brevity of the article. Therefore, one selected criterion per dimension of sustainability is described in detail. The greenhouse gas emissions criterion is explained in more detail as a criterion with a quantitative indicator for the ecological dimension. For the economic dimension, the goal of uninterrupted security of supply is operationalized. The conflict potential of the resources used serves as a criterion in the socio-

cultural dimension. Section 4 shows how the strengths and weaknesses of the various supply options can be identified with the help of the sustainability assessment. The fifth section gives a brief conclusion.

Evaluation Framework Based on Sustainable Economics

In this section, the development of the assessment framework for the sustainability assessment of heat supply options based on the sustainable economics is presented. Sustainable development strives for appropriate ecological, economic and socio-cultural standards for all people living today and future generations within the natural capacity. Against this background, the instruments and measures used, such as heat supply solutions, must be assessed according to their contribution to the goals of sustainable development and thus to solving global problems (Rogall & Gapp-Schmeling, 2021, chapt. 1 & 8).

The preliminary work of the Sustainable Economics Network was used to develop a corresponding evaluation concept. Based on the work on several monographs (Rogall, 2000, 2002, 2003, 2004, 2008), sustainable economics summarizes the global problems and megatrends of the 21st century in the three dimensions of sustainability (ecological, economic and social -cultural dimension). The network identified five problem areas in each dimension and developed a target system that is suitable for evaluating the degree of sustainability of national economies, political strategies and technological options. The target system, slightly adapted for KoWa, is shown in table 1.

Table 1

Target System, criteria and indicators of a sustainable municipal heat solution		
Challenge	Goal	Criteria and Indicators
<i>Ecological Dimension</i>		
Global warming	Climate neutrality	GHG emissions in kg CO _{2eq} /MWh
Material requirement	Less primary raw materials	Cumulative material consumption in kg / MWh
Overexploitation of renewable resources	Sustainable use of renewable resources	Impact on regeneration rate compliance
Danger to human health	Healthy living conditions	Pollutant emissions in kg SO _{2eq} /MWh
Destruction of species and biotope diversity	Nature compatibility	Impact on nature compatibility
<i>Economic Dimension</i>		
Negative developments on the labour market	Decent work: secure jobs, no vulnerable employment	Contribution to regional added value
Lack of sustainable products to satisfy basic needs	Uninterrupted security of supply/ system stability	Redundancy
Instability of monetary value and on fin. markets (depreciation), external costs	Low heat generation costs	Heat generation costs (€ / MWh)
External economic imbalances	Low foreign trade dependency	Import rate of energy sources and operating materials
national debt; insufficient equipment with merit goods	Financial ability to act	Financial predictability
<i>Social and Cultural Dimension</i>		
Undesirable developments in economy, politics and society	good governance	Expected local acceptance
Uncertainty of long term energy supply	Long-term security of supply	Range of resources used (reflecting carbon budget)
<i>Table continued on next page</i>		

Challenge	Goal	Criteria and Indicators
Centralisation of supply structures	Appropriate decentralisation & participation	Complexity of decision-making structures
Violent conflicts	Conflict Avoidance	Conflict Potential of the resources used
Technical risks (e.g. nuclear technology, fracking)	Avoidance of risky technologies	Risk Assessment

(Gapp-Schmeling et al., 2021, p. 4)

For the application of the evaluation framework in KoWa, individual criteria and indicators were adjusted considering the overarching goal. For the comparison of different examination units (concepts), the evaluation of the individual criteria was operationalized in a qualitative step-by-step scheme, which makes it possible to compare the strengths and weaknesses of the heat-supply-system options using a vertical Likert chart. The operationalisation of three selected criteria in five evaluation levels is presented in next section.

Operationalisation of Selected Criteria

Ecological Dimension: Green House Gas Emissions

In order to effectively limit global warming, all anthropogenic activities must be climate-neutral. Global warming is being driven forward by anthropogenic greenhouse gas emissions (GHGE), which arise in the heat supply primarily through the use of fossil fuels. In order to be able to compare the supply options in the individual KoWa study areas, the specific CO₂-equivalent emissions in kg CO_{2eq} per MWh were used as an indicator.

The GHGE of the heat supply options is a quantitative indicator, i.e. the specific CO₂-equivalent emissions in kg CO_{2eq} per MWh can be determined. It must be considered that the concepts in the six study areas have different levels of detail. To work with comparable values, the specific emissions of the respective options are determined using the GEMIS database (Global Emissions Model of Integrated Systems). The GEMIS database contains various process data sets (PDS; IINAS, 2021). To be able to compare the data sets used, only PDS that were calculated based on energy equivalents and could be attributed to heat generation (functional output unit: space heating or hot water) are taken into account. Furthermore, only processes with a German location reference are included in the evaluation. In total, this results in a representative compilation of a total of 355 GEMIS-PDS for heat generation or provision via a wide variety of energy sources.

For these PDS, the specific greenhouse gas emissions in the air can be evaluated in kg CO_{2eq}/MWh. The statistical distribution of the values was examined for the classification of the evaluation levels and the determination of the level limits. It is shown in Figure 1.

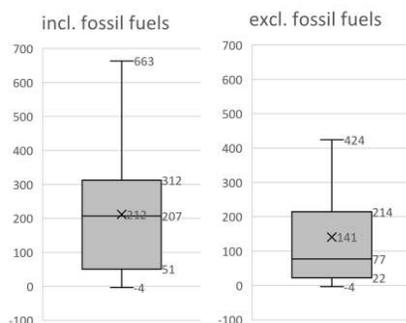


Figure 1: Boxplot of the GEMIS process data.

Figure 1 shows the values in kg CO_{2eq} / MWh for specific emissions of the heat supply technologies in a Boxplot (Gapp-Schmeling et al., 2021, p. 9). When determining the class limits for the operationalisation, the distribution of the values including and excluding directly used fossil fuels was considered. The following operationalisation levels were defined for the climate neutrality criterion.

Table 2

Rating Levels for the criterion GHGE		
Assessment	Meaning: The specific CO _{2eq} emissions are	
	greater than or equal to	(but) smaller than
Level 1	-	50 kg CO _{2eq} / MWh
Level 2	50 kg CO _{2eq} / MWh	100 kg CO _{2eq} / MWh
Level 3	100 kg CO _{2eq} / MWh	150 kg CO _{2eq} / MWh
Level 4	150 kg CO _{2eq} / MWh	200 kg CO _{2eq} / MWh
Level 5	200 kg CO _{2eq} / MWh	-

(Gapp-Schmeling et al., 2021, p. 10)

Economic Dimension: uninterrupted security of supply

The challenge of insufficiently satisfying basic needs with sustainable products can best be met in energy supply with the goal of uninterrupted security of supply (Rogall, 2014, 38 & 66). This goal can be ensured in the heat supply by a high degree of resilience (resistance to short-term changes) of the supply system. Therefore, the redundancy of the energy sources (including the short term supply via storage) is used as an evaluation criterion.

The uninterrupted security of supply is primarily ensured by the technical design of the systems. Provision can be made for short-term failures in heat supply concepts by planning redundancies. This criterion does not focus on the probability of incidents, but on the question of whether the supply can be maintained in the short term even in the event of an incident. The short-term security of supply is usually given when the failure of one particular heat source can be compensated for by other heat sources or be buffered by storage systems. Five evaluation levels were also defined for this criterion.

Table 3

Rating Levels for the criterion Redundancy	
Rating	Description
Level 1	very high level of resilience, failure of any heat source of more than three can be compensated.
Level 2	high level of resilience, the failure of one of three heat sources can be compensated by another, possibly by emergency units.
Level 3	The short-term security of supply is formally given. The failure of one of two heat sources can be compensated.
Level 4	The short-term security of supply is not completely given. If a heat source fails, the supply can only be partially guaranteed, possibly with noticeable restrictions.
Level 5	Uninterrupted supply cannot be guaranteed .

(Gapp-Schmeling et al., 2021, p. 22)

Social Dimension: Conflict potential of the resources used

The extraction of non-renewable resources leads to numerous conflicts around the world, as the current war in Ukraine shows. A sustainability assessment of different energy supply options must therefore also consider the conflict potential of the raw materials used.

As part of KoWa's sustainability assessment, the focus was on the fuels used in the utility. Compared to the mineral raw materials used in the set-up, the fuels account for the vast majority of raw materials used in the entire life cycle.

The conflict potential of an energy source is essentially determined by the concentration of countries of origin from which the energy source is imported (three-country concentration) and their weighted risk of conflict. A comparable approach can be found in Bähr and Neligan (2020). A country's risk of conflict can be compared using the Worldwide Governance Indicators (WGI) indicator 'political stability and no violence' (Bähr & Neligan, 2020, p. 55; Kaufmann, Kraay, & Matruzzi, 2020). The share of the three countries of origin with the largest import quantities of the energy source in Germany (three-country concentration) is used as a measure of the concentration. The weighted conflict risk of the individual energy sources is based on the proportional import quantities and the WGI conflict risk of the individual countries. The matrix shown in Figure 2 for evaluating the conflict potential of the energy sources used results from both indicators. The ranks correspond to the respective evaluation levels.

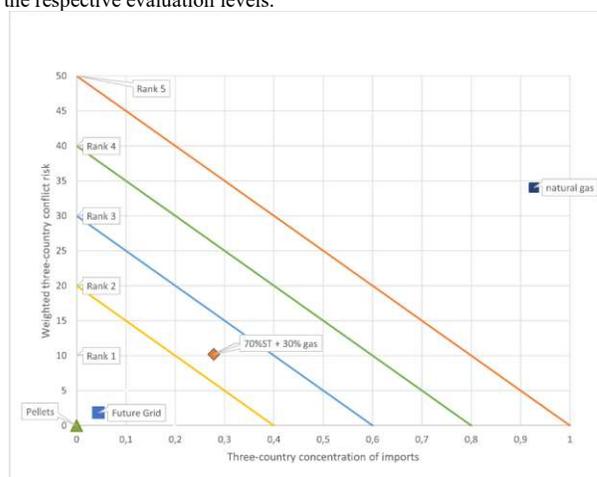


Figure 2: Evaluation of the conflict potential of the resources used. (Gapp-Schmeling et al., 2021, p. 34)

Presentation of Results and Possible Interpretations

The aim of the sustainability assessment is to identify and compare the strengths and weaknesses of the individual heat supply options within a study area. The vertical likert chart in Figure 3 shows the evaluation for the fictitious example 'KoWa city'. The evaluation of the heat supply options basically reveals the strengths and weaknesses of the individual options. The quantitative values stated based on the GEMIS-PDS are plausible estimates by GEMIS. However, the actual emissions depend on the specific implementation and design on site. The assessment of the qualitative criteria is based on the evaluation rules developed by the KoWa team in a discussion. It was validated in a KoWa evaluation team to reduce subjective influences and to ensure a consistent approach.

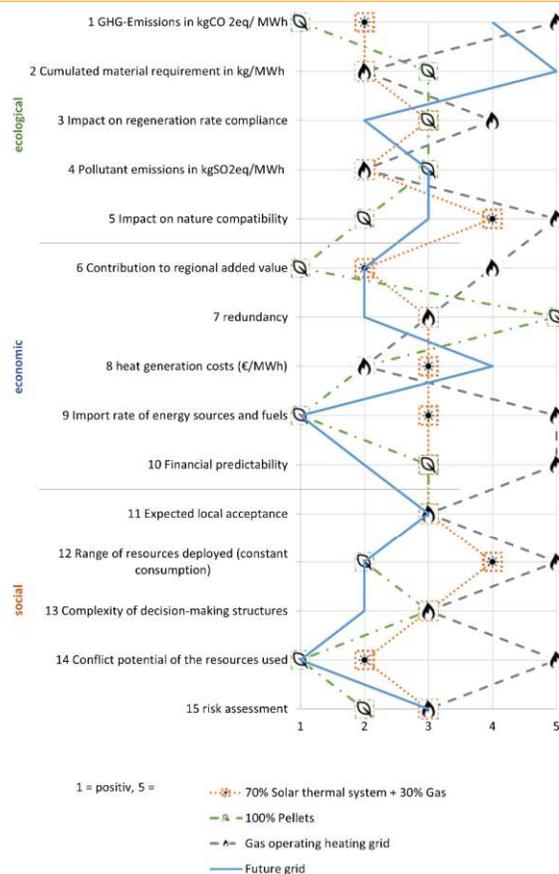


Figure 3: evaluation for the fictitious example KoWa city.

CONCLUSION

This article gave an insight into the methodical procedure of the sustainability assessment of municipal heat supply concepts based on 15 criteria in the three dimensions of sustainability. The sustainability criteria based on the target system of the sustainable economy (Rogall & Gapp-Schmeling, 2021, chapt. 8) have already been included several times in the trend articles of yearbook series (e.g. Rogall, Gapp-Schmeling, & Welz, 2021), as part of the evaluation of EE technologies (Rogall, 2014) and used to evaluate political and legal instruments (Gapp-Schmeling, 2020). The application within the framework of the KoWa research project shows the transferability of the evaluation framework, whereby the criteria and indicators based on the quality goals have to be adapted and specified for the respective application context.

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