Green gas providers' marketing strategy is out of step with consumer preferences: A comparative analysis of Germany, Austria, Switzerland and the UK

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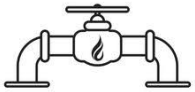
Agenda

- Introduction: The role of biomethane in the energy sector
- Hypotheses and methods
- Results
- Discussion and conclusion

Use paths of biomethane

Public gas grid



Biomethane production

+ Power-to-Gas in the future

- Heating of buildings

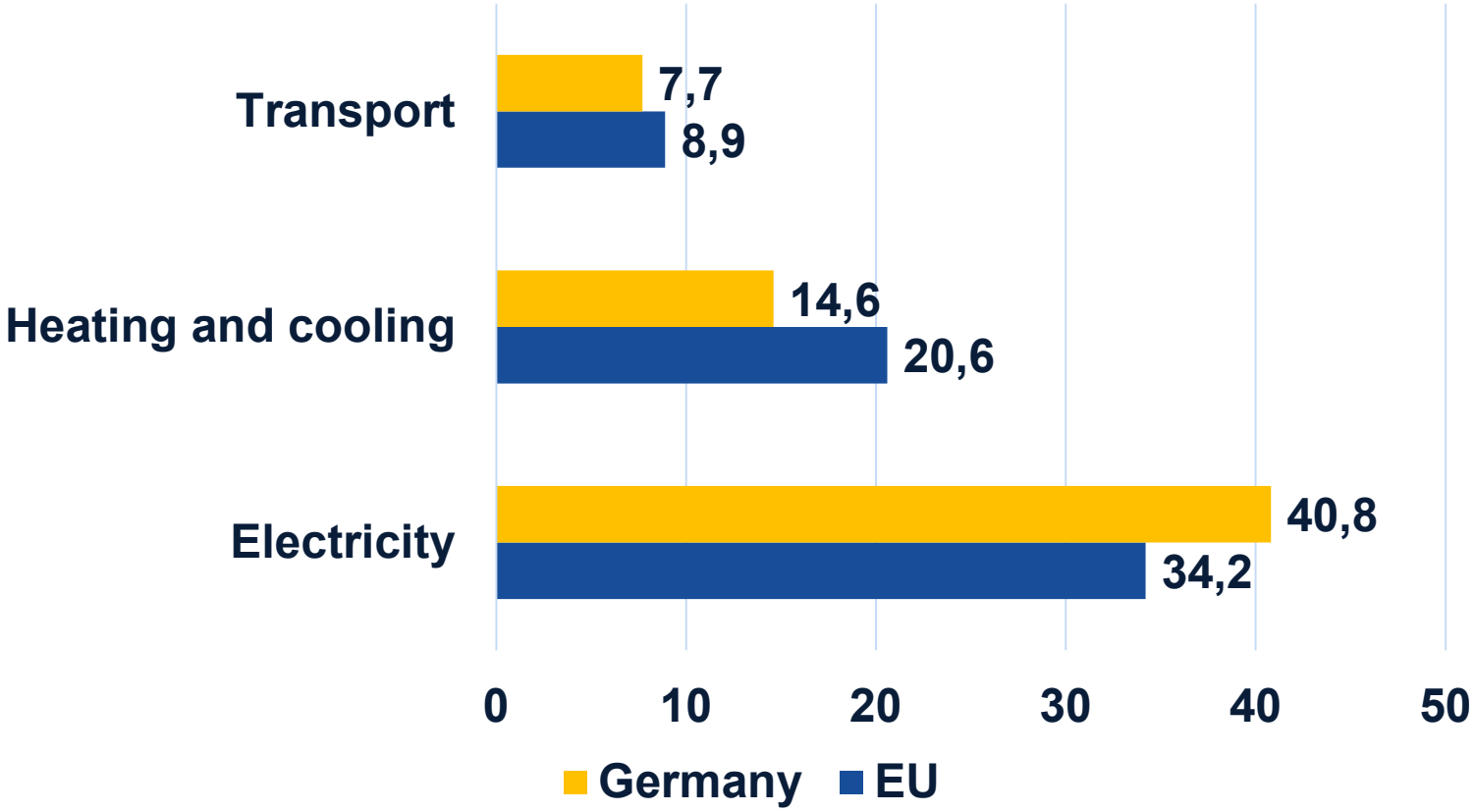
- Fuel / mobility

- Electricity production

- Raw material for the chemical industry

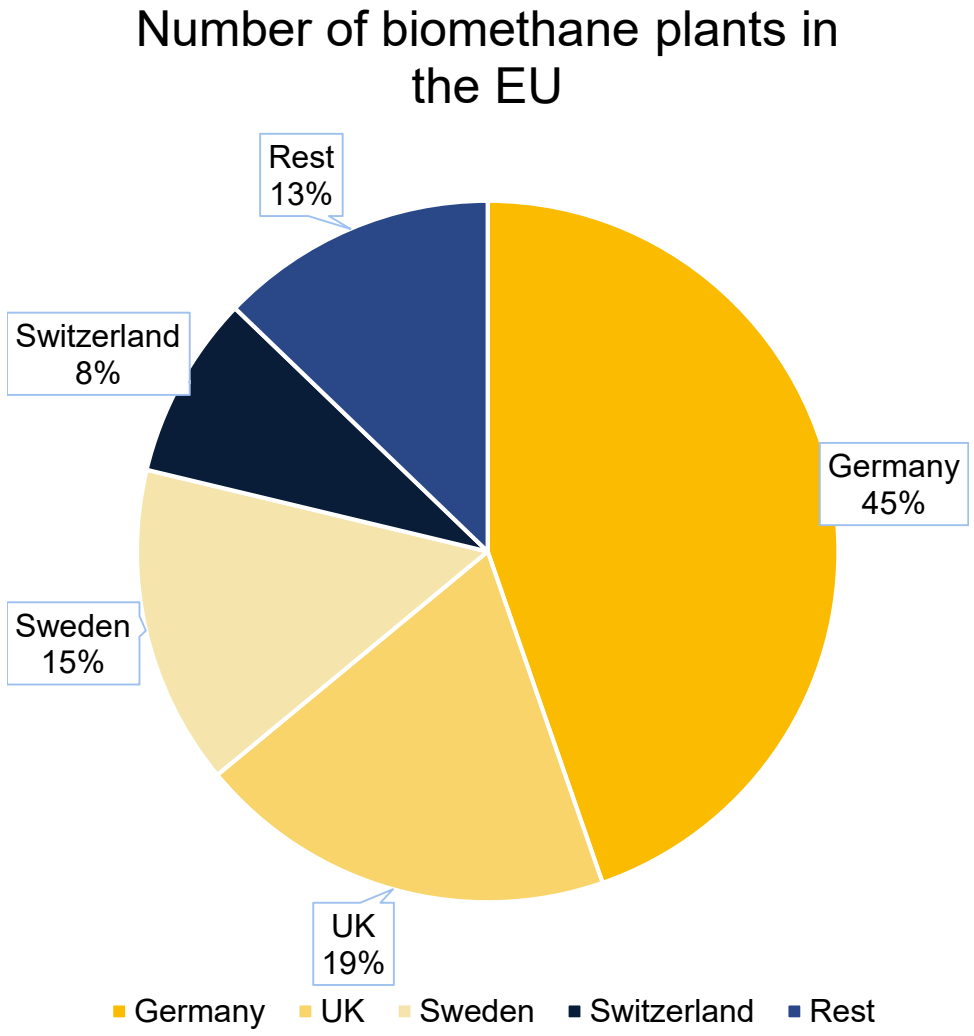
Pictures: Nawaro BioEnergie AG

Renewable shares by sector 2019 [%]



Source: Eurostat 2020

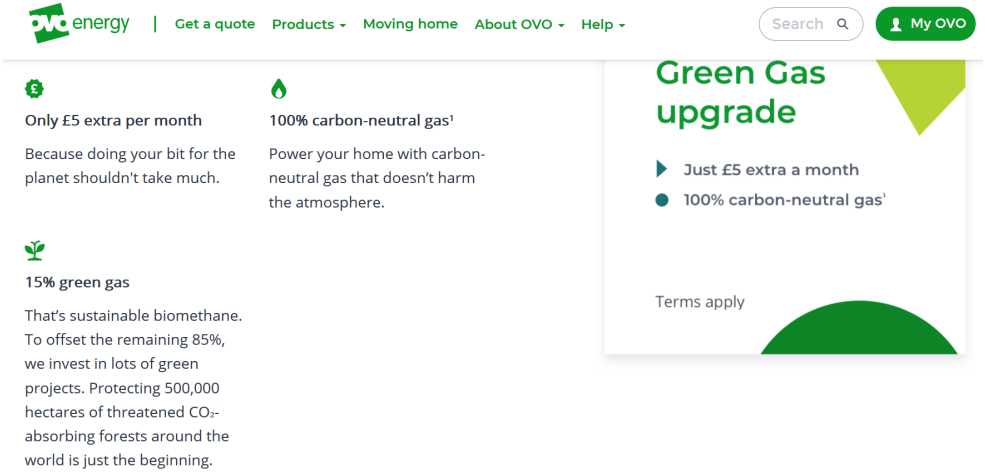
Biomethane production in Europe



- Total production in the EU 2015: 1.2 bn cubic meters = 12 TWh
- Various support schemes: feed-in-tariffs (e.g. France), quotas, indirect support schemes
- Different foci: e.g. in Germany CHP, in Sweden fuel
- Partly ambitious goals, e.g. France

Source: Scarlat et al. 2018

Products for private households



Source: Company websites

Past research on consumer preferences

Preferences for renewable energy

Preferences for renewable electricity

High renewable content: Grosche and Schroder, 2011; Mozumder et al., 2011
Local: Ebers and Wüstenhagen, 2016; Kaenzig et al., 2013; Kalkbrenner et al., 2017; Ma and Burton, 2016; Tabi et al., 2014; Vecchiato and Tempesta, 2015
Eco-label: Kaenzig et al., 2013; Mattes, 2012; Tabi et al., 2014; Wüstenhagen and Bilharz, 2006

Preferences for biomethane

High biomethane content: Forsa, 2013
Biomethane from waste: Forsa, 2013; Herbes et al. 2018
Eco-label: Forsa, 2013
WTP in general: Kim et al. 2020

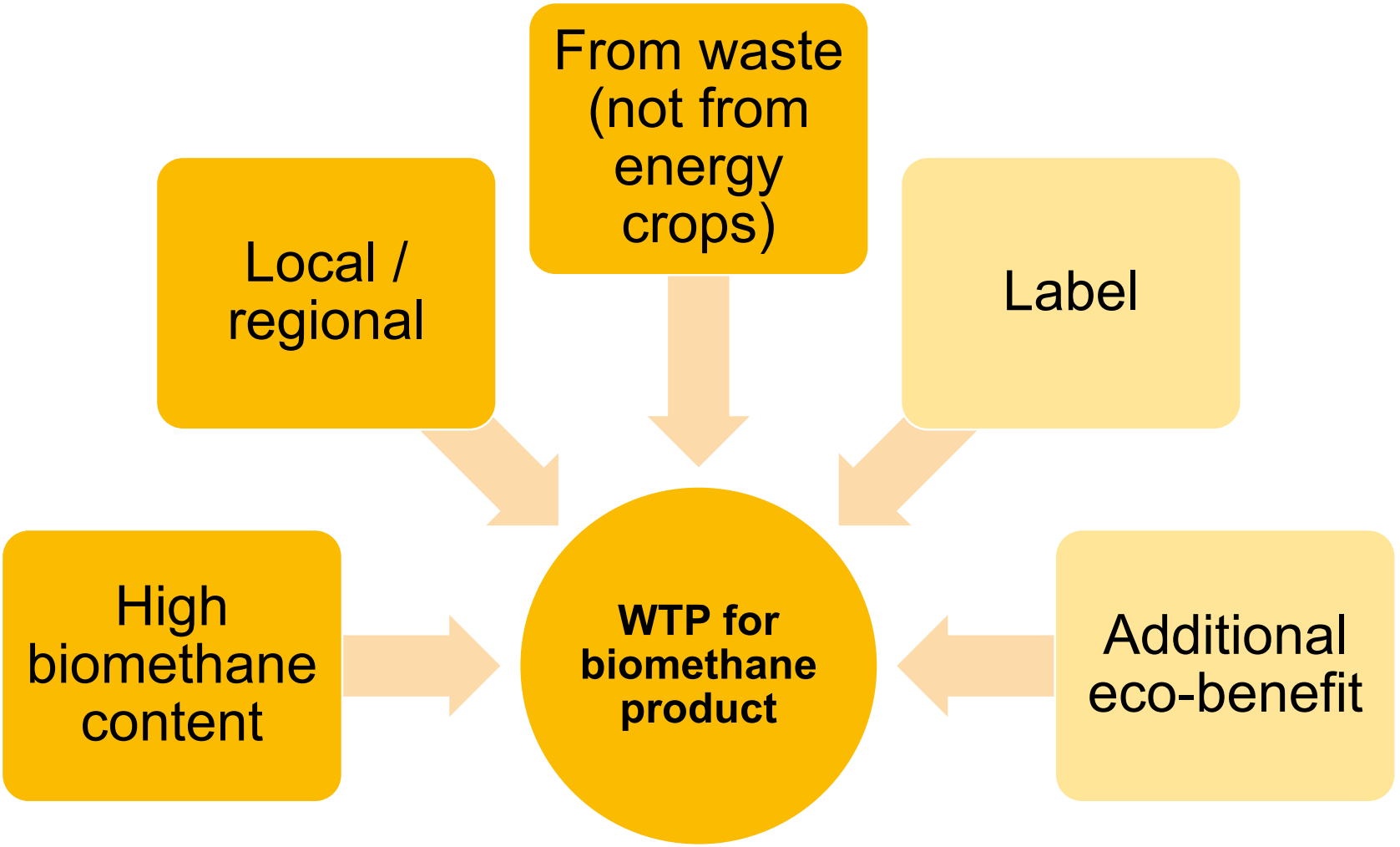
Discourse on bio-gas (in Germany)

Negative view on energy crops: Herbes et al. 2014a; 2014b

Providers' pricing strategies (Germany only)

Only biomethane content has an influence: Herbes et al. 2016

Factors possibly influencing WTP for biomethane



Hypotheses based on past research

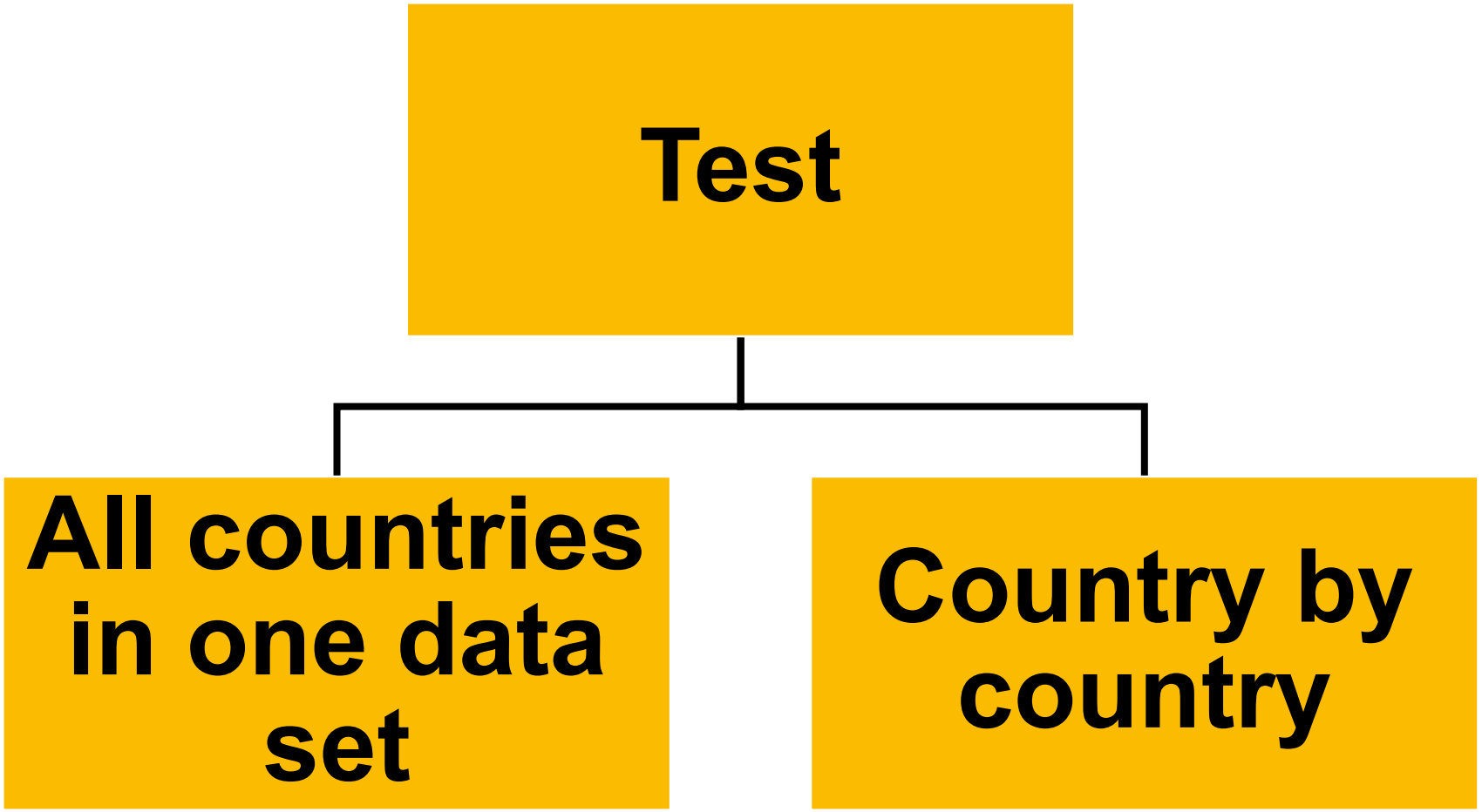
Underlying idea: providers‘ pricing strategies take consumers‘ preferences into account and try to skim addtional WTP for pro-environmental attribute levels

1. The attribute „biomethane content“ is positively related to the price (higher percentage => higher price)
2. The attribute level „regional“ is positively linked to the price
3. The attribute level „from waste“ is positively linked to the price

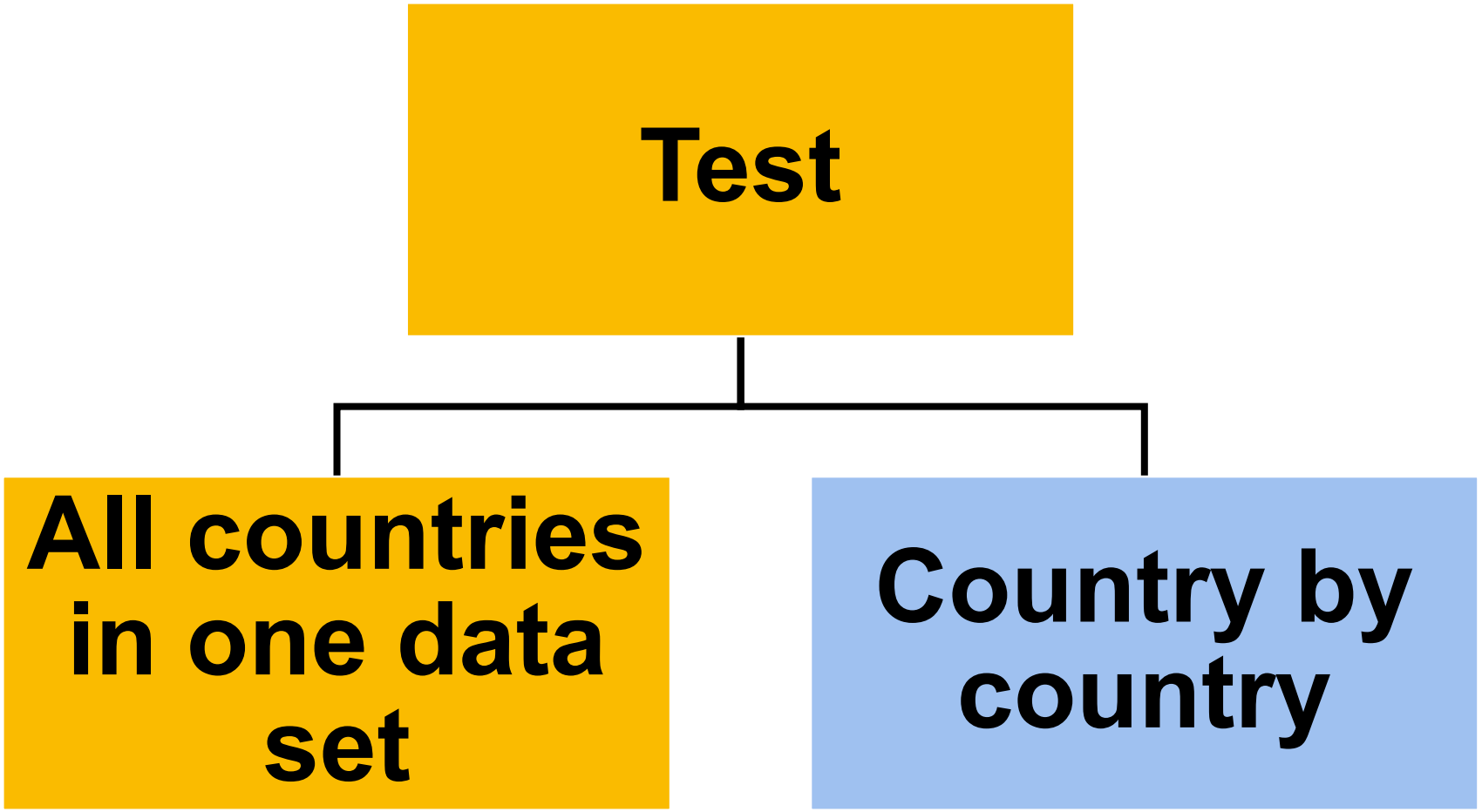
Sampling and data collection

- Number of bio methane tariffs and sampling per country:
  - Germany: 127 tariffs, sampling via previous research (Herbes et al 2016) and two comparison portals
  - Austria: 25 tariffs, sampling via regulatory authority and comparison portal
  - Switzerland: 188 tariffs, sampling via umbrella association of the Swiss gas industry
  - United Kingdom: 24 tariffs, sampling via regulatory authority and comparison portal
- Data collection between July 2018 and June 2019
- Regional differences in grid charges in Germany accounted for by comparison with comparable natural gas tariff in the same area

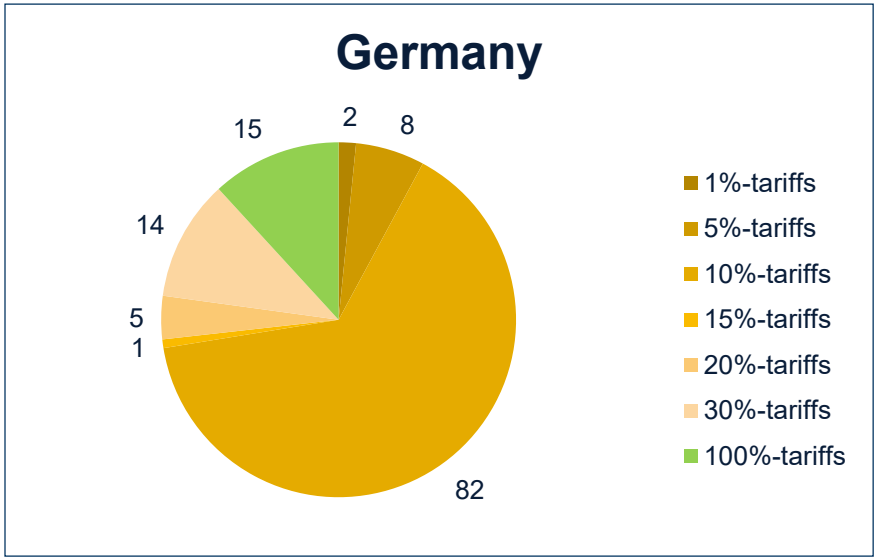
Two levels of testing our hypotheses

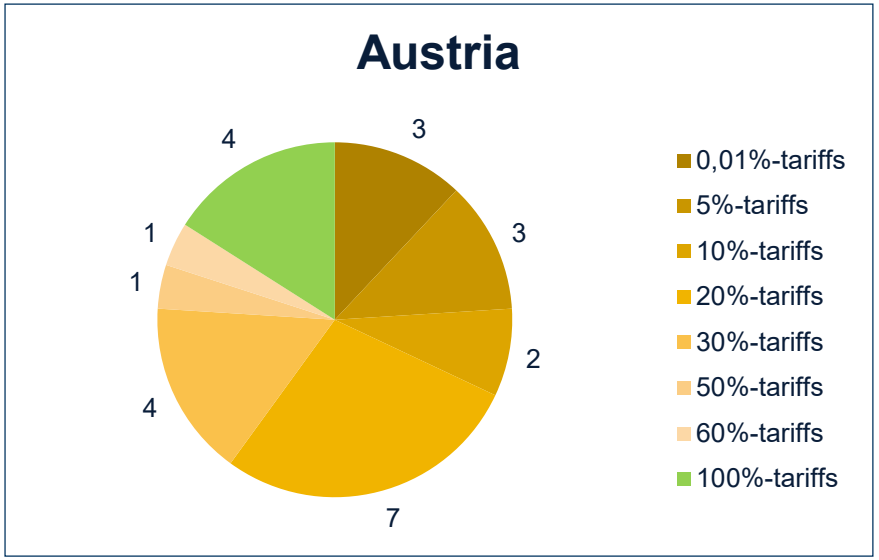


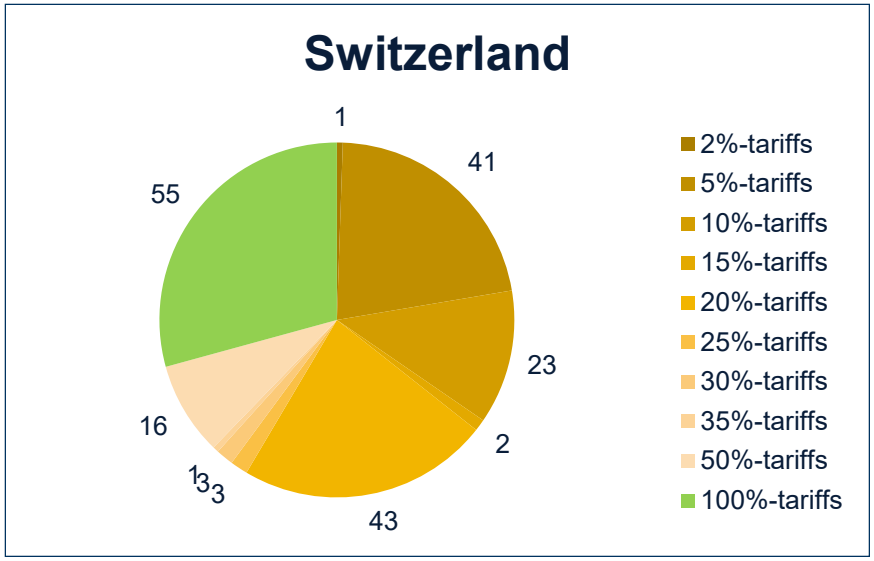
Two levels of testing our hypotheses

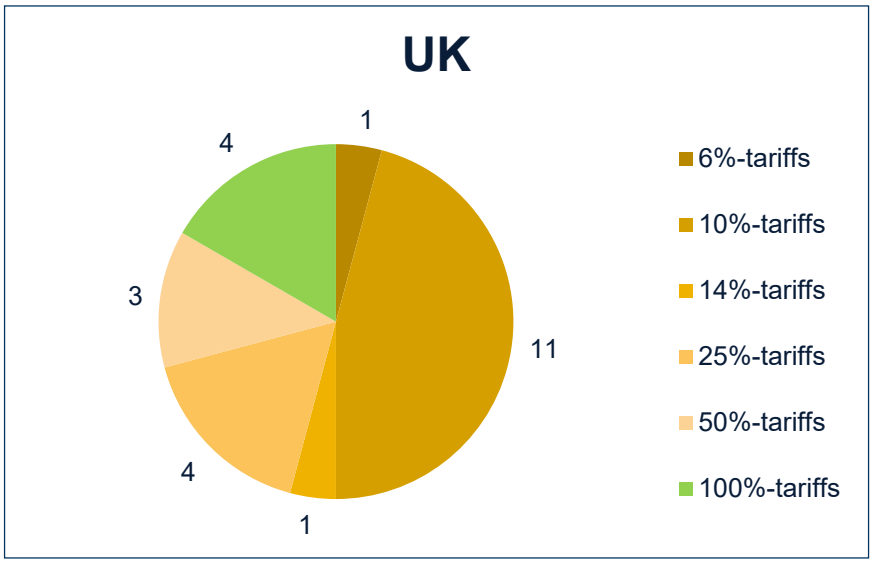


Product design: biomethane content by tariffs and country (number of tariffs)



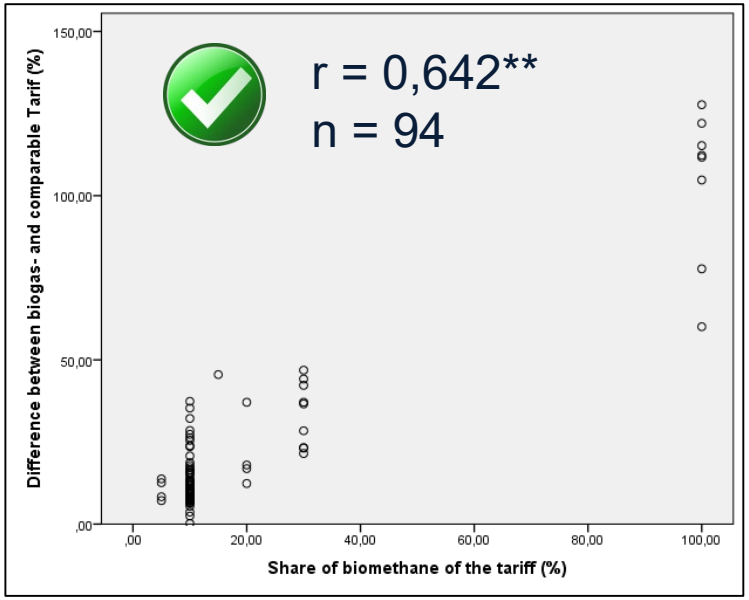




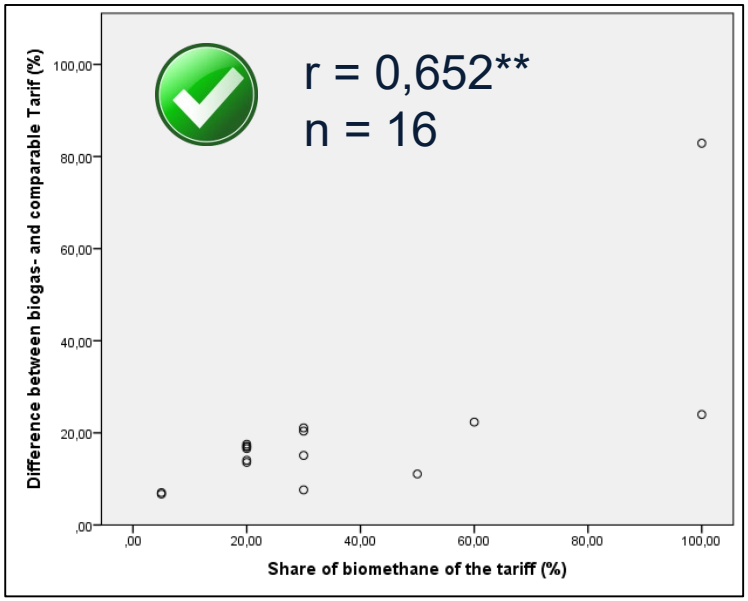


Biomethane content and price difference (H1)

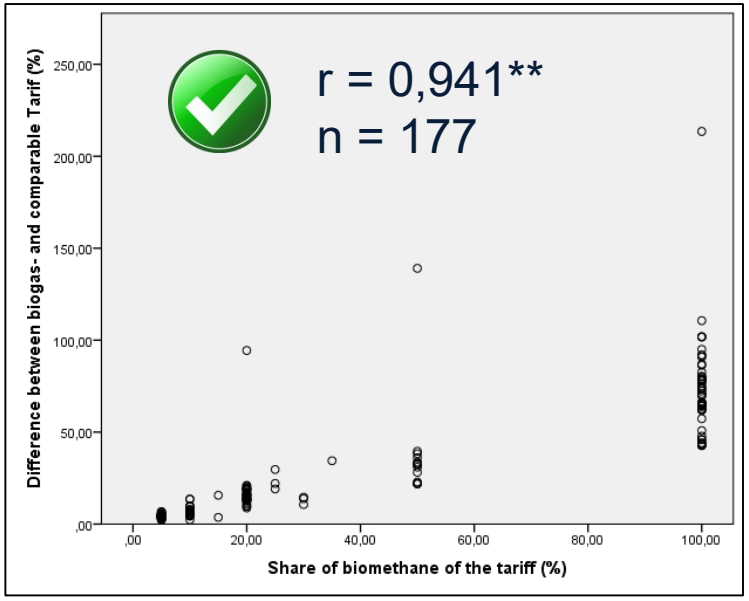
Germany



Austria



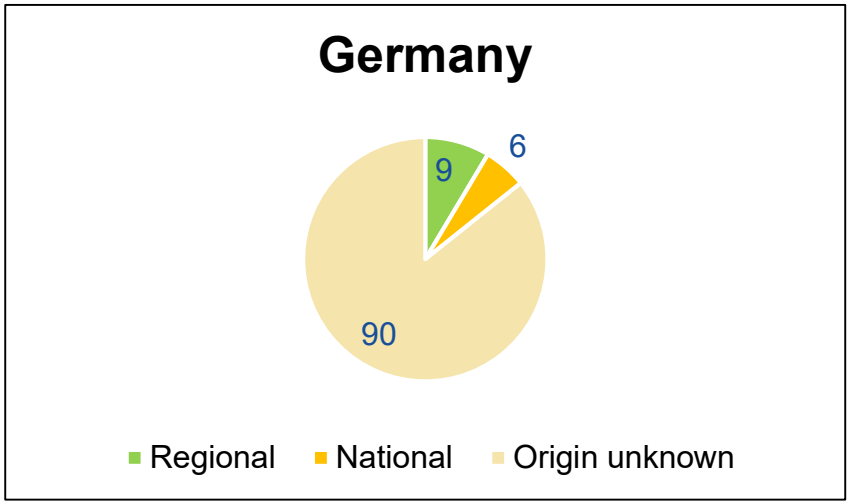
Switzerland

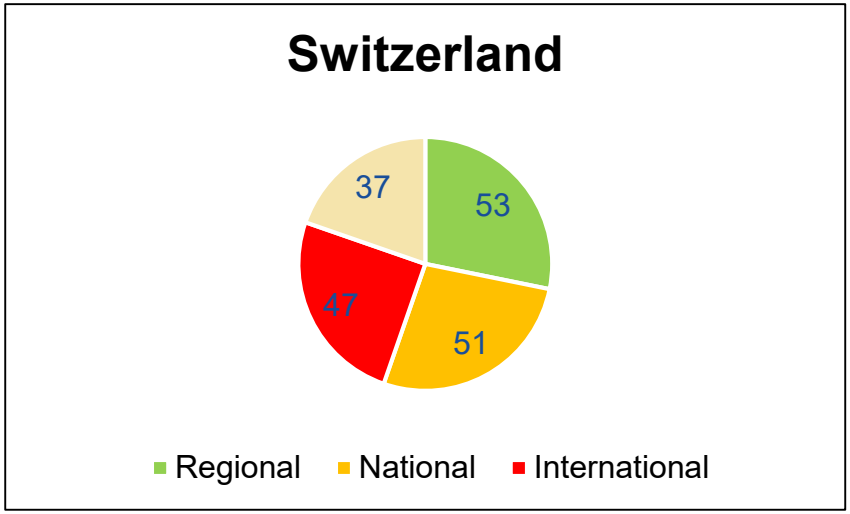


United Kingdom

Only 6 cases

Product design: origin by tariffs and country (number of tariffs)



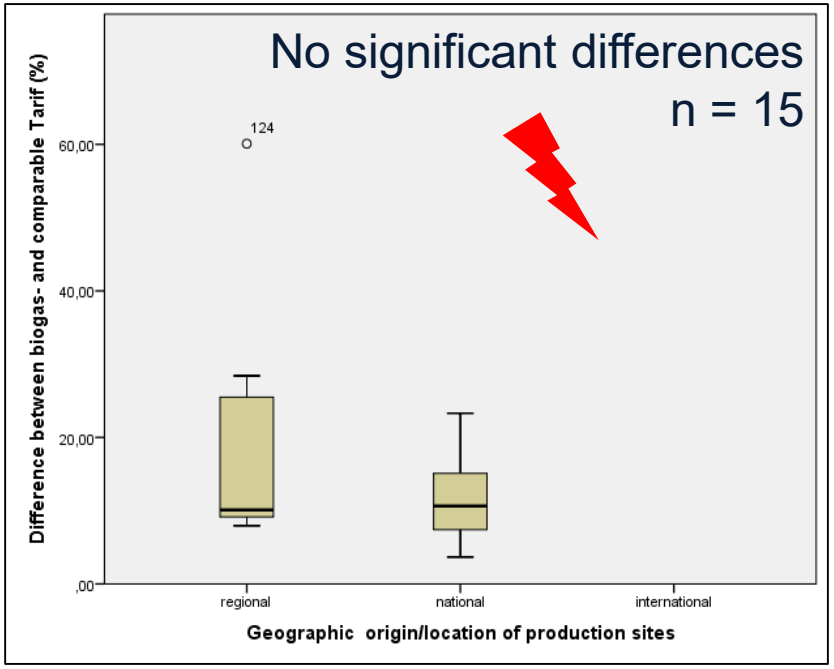


Austria: Only tariffs sourcing regionally available.

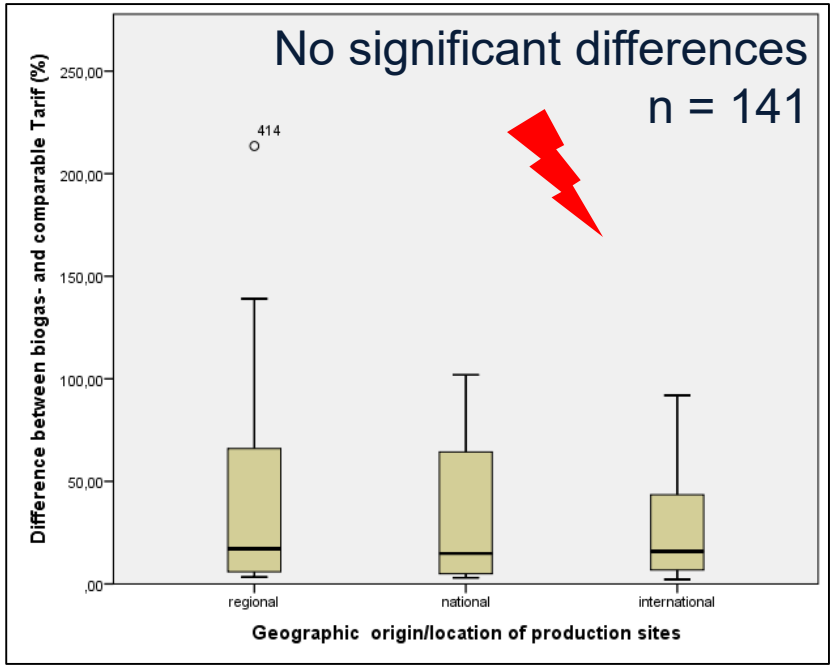
United Kingdom: Origin is unknown/not disclosed for all cases.

Origin and price difference (H2)

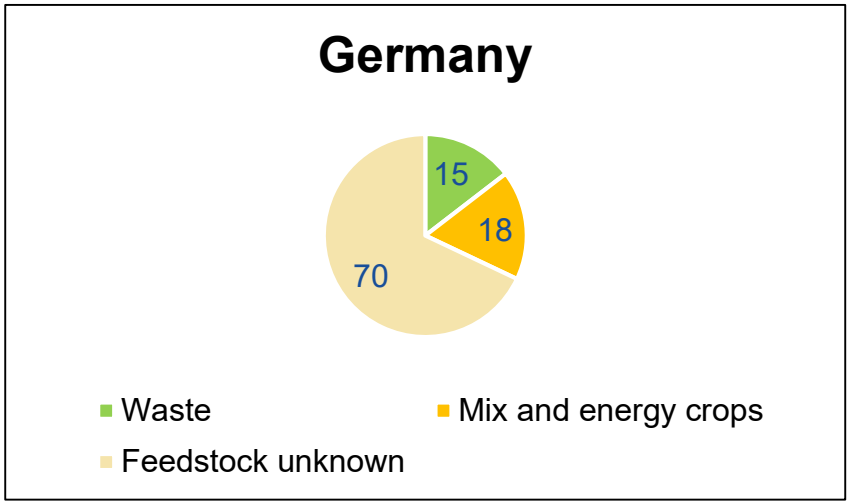
Germany

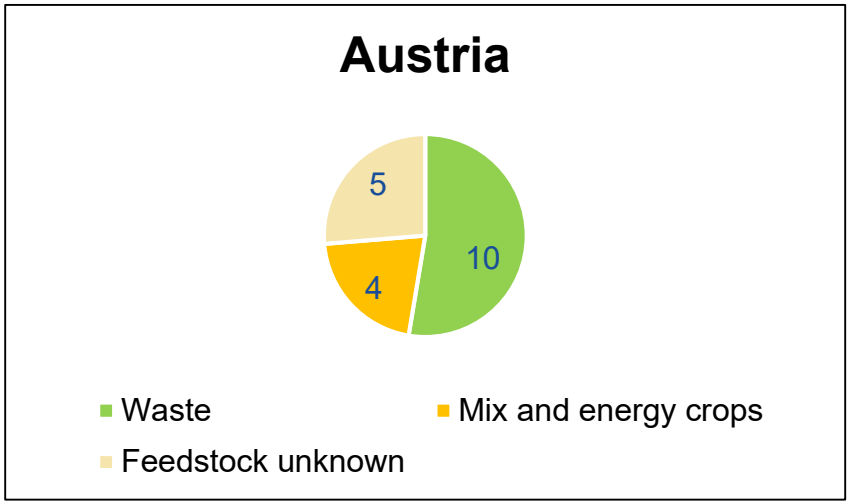


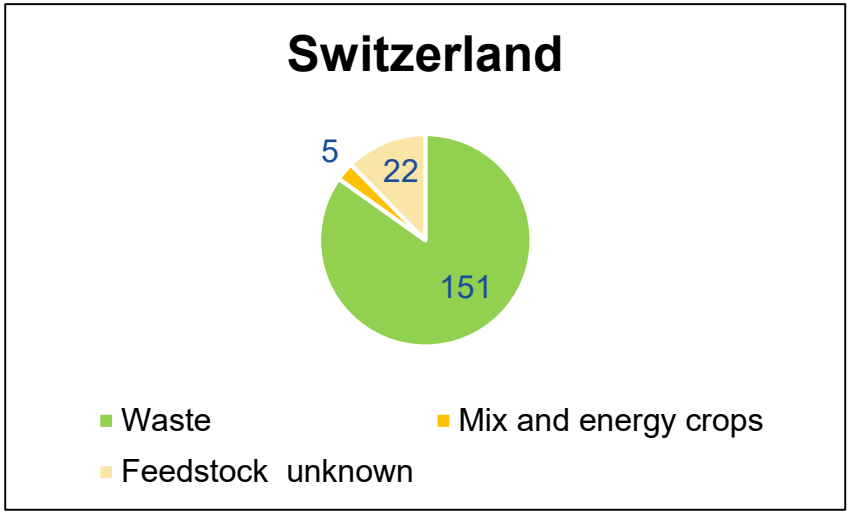
Switzerland



Product design: feedstocks by tariffs and country (number of tariffs)



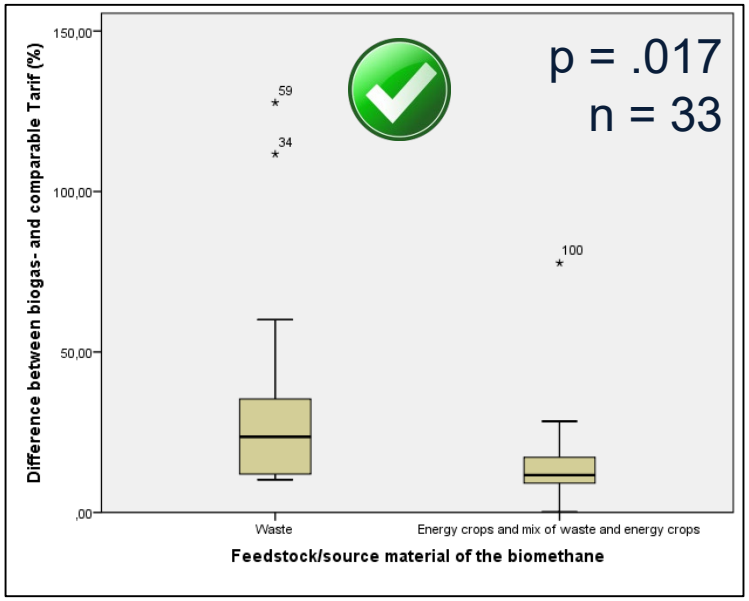




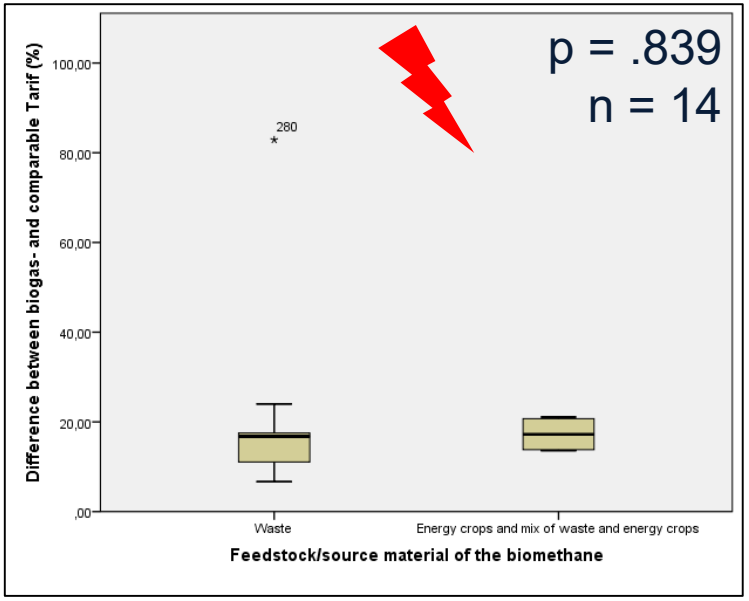
United Kingdom: Only one case

Feedstock and price difference (H3)

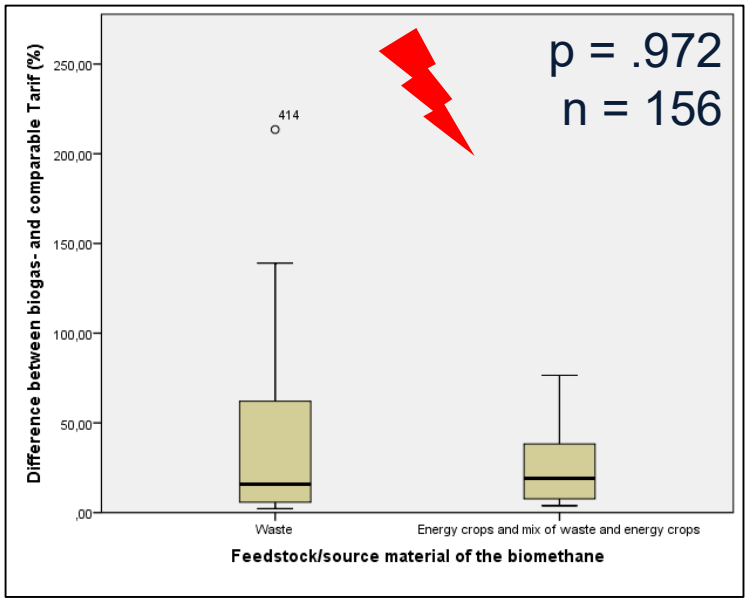
Germany



Austria



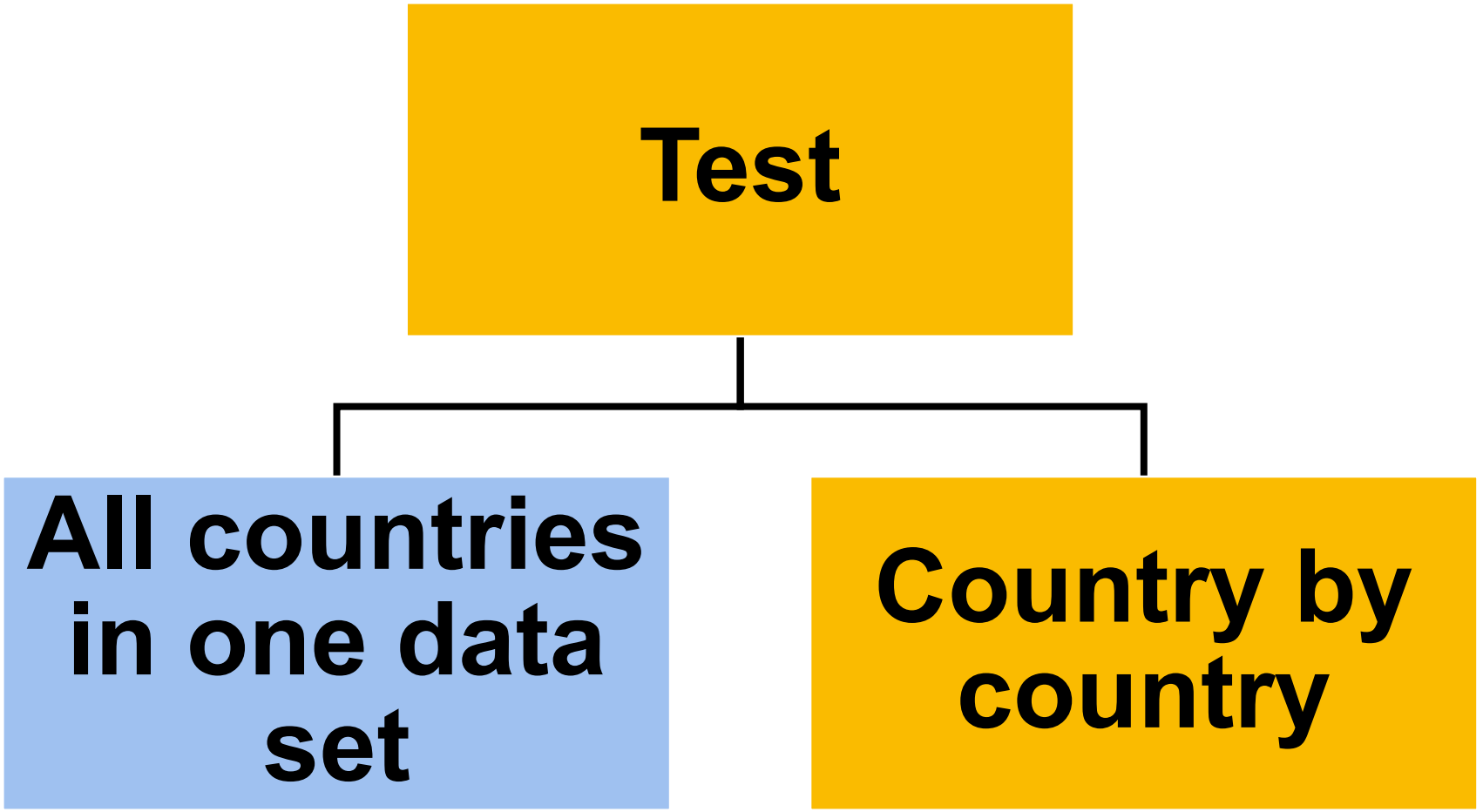
Switzerland



United Kingdom

Only 1 case

Two levels of testing our hypotheses



Regression analysis all countries (1/2)

- Dependent variable:
  Difference between biogas and comparable non-biomethane tariff (%): *difference_100*

- Independent variables:
  - Share of biomethane in the product (%): *biomethane_content*
  - Geographic origin/location of production sites (recoded as dummy): *origin_dummy*
  - Feedstock/source material of biomethane (recoded as dummy): *feedstock_dummy*
  - Label(s) ascribed to the tariff (recoded as dummy): *label_dummy*
  - Country dummies (for GER, AT, CH and UK): *GER_dummy, AT_dummy, CH_dummy, UK_dummy*

- Regression model: Linear regression, stepwise inclusion of independent variables

Regression analysis all countries (2/2)

Constant term	.709 (1.105)
biomethane_content	.690 (.020) ***
origin_dummy *feedstock_dummy* *label_dummy* *GER_dummy* *AT_dummy* *CH_dummy* *UK_dummy*	excluded from the model
n	159
Corrected R^2	.882

Regression coefficients, standard errors in brackets; * p<.05 ** p<.01 *** p<.001

→Biomethane content is the only significant predictor of the price difference between biomethane-based tariffs and the comparable non-biomethane tariff of the same provider.

Discussion (1/2)

- Clear differences in product design between countries
  - Biomethane content: Germany and UK markets dominated by 10%-tariffs; Switzerland and Austria more evenly distributed
    - In Germany driven by legal provisions which mandate a 10% biomethane content for fulfilling the renewable heat law of the state of Baden-Württemberg
    - Reason for UK still unclear
  - Geographical origin: German providers mostly do not disclose the geographical origin, Austria only has regional tariffs and the Swiss market shows even distribution
    - In Germany, many providers source biomethane from the market, partly short-term, therefore do not know origin beforehand
    - In Austria, biomethane plants receive a refund on the gas grid charges if their gas is used by a customer in the same region
  - Feedstock: The Austrian and Swiss markets are dominated by waste-based tariffs, German providers often do not disclose the feedstock

Discussion (2/2)

- H1 (biomethane content): supported for the model with all countries as well as for Germany, Austria and Switzerland, too few data for UK
  - In line with consumer preferences (and likely WTP)
  - Also cost-driven (consistent with markup-pricing approach)

- H2 (geographical origin): neither supported for all-country model nor for Germany or Switzerland, too few data for Austria and UK
  - Not in line with consumer preferences
  - Maybe due to lack of cost differentiation

- H3 (feedstock): supported for Germany, not supported for Austria and Switzerland and not for the all-country model
  - In line with consumer preferences in Germany
  - Change of pricing strategy as compared to five years ago
  - Despite the fact that waste-based gas can be sourced at lower cost since CHP units using waste-based gas receive lower feed-in-tariffs for electricity

Conclusion

- Disclosure of biomethane product attributes is still insufficient in Germany, providers could increase trust and possibly skim higher WTP if disclosing pro-environmental attributes

- German and Swiss providers could try to exploit the possibly higher WTP for local/regional gas products

- Austrian providers could try to exploit the possibly higher WTP for waste-based gas products

Outlook

- Renewable gas products from Power-to-Gas (PtG) techno-logies are entering the market

- PtG as an ally or competitor for biomethane?

=> **Ongoing consumer research on PtG, we welcome international cooperation on marketing of renewable energy carsten.herbes@hfwu.de**

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Policy Perspective

Policy frameworks and voluntary markets for biomethane – How do different policies influence providers' product strategies?

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ABSTRACT

Replacing natural gas with biomethane is an option to help decarbonize residential heating and cooling. But little biomethane is in the voluntary markets for heating. We examined biomethane-based gas tariff offerings in the UK, Germany, Austria and Switzerland, using qualitative content analysis and compared them to the national policy contexts. We find that current policies in all four countries under review clearly prioritize using biomethane for electricity generation and in transport, while leaving the heating market largely unregulated. Nonetheless, we find influence of policies on the heating market. Offerings in Germany show this influence in their biomethane content and underlying feedstock and in Austria regionality seems to be driven by grid charge regulations. If German policy makers want to channel more biomethane into residential heating, they are advised to harmonize competing support schemes for biomethane in electricity generation, transport and heating/cooling, waive mandatory CHP requirements, lower minimum biomethane content and to target existing, not just new, buildings. In the UK, the RHI should include residential buildings and using the Austrian refund system could help to develop biomethane tariffs from regional sources in Switzerland.

1. Introduction

Residential heating is responsible for a large part of the total final energy consumption and hence greenhouse gas emissions. In 2017, heating accounted for 48% of the end energy consumption worldwide in the residential sector and for more than 10% of the end energy consumption in all sectors (IEA, 2020). The share of renewables in heating represents only 10% of global heat consumption in 2017, less than half of the share of renewables in electricity consumption. The International Energy Agency (IEA) comments critically: "Greater ambition and stronger policy support are needed to ramp up the use of renewables for heat and to improve energy efficiency in both buildings and industry" (IEA, 2019).

Replacing natural gas with biomethane ("green gas") for heating purposes has strong appeal. In 2017, gas accounted for 43% of the final residential heating demand in the EU (Fleiter et al., 2017); almost none of the gas was green. Green gas can be injected into the public grid and used with existing heating technologies. This is especially important since the lifetime of heating equipment is measured in decades and rates of new construction in developed countries often fall below 1%. While replacing the current heating system stock will occur slowly over decades, renewable gas is available today to help decarbonize the heating of residential buildings.

A growing number of biogas plants upgrade their biogas to grid quality and inject biomethane into the public gas grid. Detailed data for Europe show that 610 biomethane plants were in operation at the end of 2018. Their total production volume for 2018 stood at 22,787 GWh (European Biogas Association, 2020), however that amounts to a mere 0.5% of total natural gas consumption (own calculation based on: European Biogas Association, 2020; Statista, 2020b).

Globally, the IEA estimates biomethane consumption to reach 23 Mtoe in 2025 and 77 Mtoe in 2040 in their *Stated Policy Scenario*. Under the more ambitious *Sustainable Development Scenario*, the consumption in 2040 could reach 206 Mtoe, highlighting the strong impact of energy policies on market developments. D'Adamo et al. (2020) assessed this impact on the industry on the basis of a SWOT analysis. They conclude that "… the adoption of an adequate incentive scheme is of the utmost importance." (D'Adamo et al., 2020, p. 12).

Most governments regard "incentive schemes" or subsidies for renewable energies which are still crucial for the profitability of biogas

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