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

Biomethane production

- Heating of buildings
- Fuel / mobility
- Electricity production
- Raw material for the chemical industry

Public gas grid + Power-to-Gas in the future

Pictures: Nawaro BioEnergie AG
Renewable shares by sector 2019 [%]

- **Transport**: Germany: 7.7%, EU: 8.9%
- **Heating and cooling**: Germany: 14.6%, EU: 20.6%
- **Electricity**: Germany: 34.2%, EU: 40.8%

Source: Eurostat 2020
Biomethane production in Europe

Number of biomethane plants in the EU

- Germany 45%
- UK 19%
- Sweden 15%
- Switzerland 8%
- Rest 13%

- 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 Wüstehagen, 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; Wüstehagen 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 biogas (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

- High biomethane content
- Local / regional
- From waste (not from energy crops)
- Label
- Additional eco-benefit
Hypotheses based on past research

Underlying idea: providers’ pricing strategies take consumers’ preferences into account and try to skim additional 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

- Test
  - All countries in one data set
  - Country by country
Two levels of testing our hypotheses

- Test
  - All countries in one data set
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Product design: biomethane content by tariffs and country (number of tariffs)

**Germany**
- 1% tariffs: 15
- 5% tariffs: 2
- 10% tariffs: 8
- 15% tariffs: 14
- 20% tariffs: 5
- 30% tariffs: 1
- 100% tariffs: 82

**Austria**
- 0.01% tariffs: 1
- 5% tariffs: 4
- 10% tariffs: 3
- 20% tariffs: 4
- 30% tariffs: 2
- 50% tariffs: 1
- 60% tariffs: 7
- 100% tariffs: 3

**Switzerland**
- 2% tariffs: 1
- 5% tariffs: 41
- 10% tariffs: 23
- 15% tariffs: 16
- 20% tariffs: 2
- 25% tariffs: 1
- 30% tariffs: 1
- 35% tariffs: 3
- 50% tariffs: 1
- 100% tariffs: 55

**UK**
- 6% tariffs: 4
- 10% tariffs: 4
- 14% tariffs: 1
- 25% tariffs: 3
- 50% tariffs: 1
- 100% tariffs: 11
Biomethane content and price difference (H1)

Germany

\[ r = 0.642^{**} \]
\[ n = 94 \]

Austria

\[ r = 0.652^{**} \]
\[ n = 16 \]

Switzerland

\[ r = 0.941^{**} \]
\[ n = 177 \]

United Kingdom

Only 6 cases
Product design: origin by tariffs and country (number of tariffs)

**Germany**

- Regional: 9
- National: 6
- Origin unknown: 90

**Switzerland**

- Regional: 37
- National: 53
- International: 47

**Austria**: Only tariffs sourcing regionally available.

**United Kingdom**: Origin is unknown/not disclosed for all cases.
Origin and price difference (H2)

Germany

No significant differences
n = 15

Switzerland

No significant differences
n = 141
Product design: feedstocks by tariffs and country (number of tariffs)

- **Germany**
  - Waste: 70
  - Mix and energy crops: 18
  - Feedstock unknown: 15

- **Austria**
  - Waste: 10
  - Mix and energy crops: 5
  - Feedstock unknown: 4

- **Switzerland**
  - Waste: 151
  - Mix and energy crops: 22
  - Feedstock unknown: 5

- **United Kingdom**: Only one case
Feedstock and price difference (H3)

Germany
- $p = 0.017$
- $n = 33$

Austria
- $p = 0.839$
- $n = 14$

Switzerland
- $p = 0.972$
- $n = 156$

United Kingdom
- Only 1 case
Two levels of testing our hypotheses

- Test
  - All countries in one data set
  - Country by country
Regression analysis all countries (1/2)

- **Dependent variable:** Difference between biogas and comparable non-biomethane tariff (%): \( \text{difference}_100 \)

- **Independent variables:**
  - Share of biomethane in the product (%): \( \text{biomethane}_\text{content} \)
  - Geographic origin/location of production sites (recoded as dummy): \( \text{origin}_\text{dummy} \)
  - Feedstock/source material of biomethane (recoded as dummy): \( \text{feedstock}_\text{dummy} \)
  - Label(s) ascribed to the tariff (recoded as dummy): \( \text{label}_\text{dummy} \)
  - Country dummies (for GER, AT, CH and UK): \( \text{GER}_\text{dummy} \), \( \text{AT}_\text{dummy} \), \( \text{CH}_\text{dummy} \), \( \text{UK}_\text{dummy} \)

- **Regression model:** Linear regression, stepwise inclusion of independent variables
Regression analysis all countries (2/2)

<table>
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<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Significance</th>
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<td>(n)</td>
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<td>Corrected (R^2)</td>
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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) technologies 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
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