Landwirtschaftliche Rentenbank

The Future of Biogas and Biomethane

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1. Landwirtschaftliche Rentenbank
Rentenbank at a Glance

- Corporate organization: Public law institution
- Established: May 11, 1949
- Located: Frankfurt am Main
- Corporate objectives: Promotion of the agricultural sector and rural areas
- Refinancing institution
- Total assets 2016: EUR 86.3 billion
- Employees: 282
- Promotional Lending 2016: EUR 7.69 billion
A Time-Honored Business Model

Special Promotional Loans: no end-borrower risk through on-lending

- Rentenbank *raises funds* in capital markets

- Local banks grant loans to the end-borrower. These loans are refinanced by Rentenbank. Having a collateralized claim against the local bank, Rentenbank *does not bear any end-borrower risk*

- Local banks *assess and bear the credit risk* for an adequate margin but do not *bear any liquidity risk*

Rentenbank provides *long-term credit* for agriculture and rural areas. The application process ensures that promotional rates *reach the end-borrower*
2. Perspectives for Biogas
Importance of Biogas in Germany

Flexible, storable and environmentally beneficial

- About **9000 biogas plants** in Germany with a total installed electric output of **more than 4.1 GW** (about **4,6% of current consumption**)

- Germany is the biggest biogas industry in the world

- Biogas is not only important for Germany’s power generation, but also makes a significant contribution to a shift to renewables in the heating sector

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*1: Umweltbundesamt auf Basis AGEE Stat., 02/2017
Importance of Biogas in Germany

- An average biogas plant with an electric capacity of 190 kW provides 450 households with electricity and 100 households with heat

- Different types of biogas plants
  - Biogas from renewable resources
  - Small manure plants
  - Waste fermentation installations

- Common feedstock in German biogas plants
  - By weight: about 48% energy crops
  - By energy output: about 77% energy crops

- In 2015 about 2.2 million hectares for cultivation of energy crops

- Most used energy crop for bioenergy production is maize (73% in 2015) → at odds with social interest

- Success of biogas plant is highly dependant on commodity prices since feed-in-tariffs are fix
Effects of Renewable Energy Act and its reforms

Number of Biogas Plants and Total Installed Electric Output*2

*2: Fachverband Biogas e.V
Importance of Biogas in Germany

- Different operator models:
  - Typically operated by farmers
  - Public institution
  - Institutional investors

- Advantages of biogas:
  - Power generation from biogas plants is controllable and can be demand-oriented (in contrast to photovoltaic and wind power)
  - Great variability in the utilized substrates
  - Substitution of synthetic fertilizers
  - Nutrient recycling
  → Storable and flexible energy source

- Disadvantages of biogas:
  - High discrepancies in profits and losses of biogas plants
  - Higher electricity generation costs
EEG 2017

Chances by follow-up investments for established biogas plants

- As a result of the EEG 2014 only 23 MW of biogas power were newly installed in 2015 – the lowest growth rate since the existence of the EEG in 2000

- In 2015 only 150 new biogas plants were completed, most were small manure plants with a capacity under 75 kW

- The EEG 2017 determines that all bioenergy power plants > 150 kW are required to participate in tenders – since maximum bid limits for new biogas plants are very strict, there may be not so many investments in new biogas plants

- For existing installations there are chances by investing in
  - CHP units and gas storage and therefore the transition to a flexible electricity generation (premium payment for flexibility, additional revenues from EPEX Spot SE)
  - Storage capacities for digestives
  - Microgas networks (additional premium payment for direct sales)
  - Biomethane production
Levelized Costs of Electricity (LCOE) *3

Actual and estimated future costs

electricity generation costs (min/max)

0 5 10 15 20 25 30
Euro cents/kWh

onshore wind energy offshore wind energy photovoltaics biogas lignite stone coal gas (CCPP)

BMWi, Marktanalyse 2016 – Stand und Entwicklung der weltweiten Erneuerbare-Energien-Märkte, Dec 2016
Fraunhofer ISE, Stromgestehungskosten Erneuerbare Energien, Nov 2013
www.forschungsradar.de, Studienvergleich: Stromgestehungskosten verschiedener Erzeugungstechnologien, Sep 2014

CCPP: Combined Cycle Power Plant (gas)
Levelized Costs of Electricity

- Levelized costs of electricity for renewable energy sources continue decreasing whereas costs for lignite, stone coal and CCPP will rise in the long term

- Electricity generation costs for biogas are higher than for other renewable energy sources

- Disadvantages of wind energy and photovoltaic:
  - Weather dependent and fluctuating power generation → logistical challenges for the grid
  - Not storable or external storage system needed

- Beneficial side-effects of biogas:
  - Avoidance of methane emissions
  - Substitution of synthetic fertilizers and therefore conservation of fossil resources
  - Decentral energy production / rural development

Key position of biogas for climate-friendly transformation of the energy supply system
Biogas projects are characterised by high specific costs

- High portion of costs are feedstock and labour costs → decide on success or failure

High costs of knowledge

- In contrast to photovoltaic and wind energy there is a professional expert needed for the operation and maintenance of the plant

- Different requirements respective to the abundance of resources and technical facilities necessitate special knowledge regarding the valuation of financing options
3. Promotional Lending
Promotional Lending

- Agriculture
  - Growth
  - Sustainability
  - Production Maintenance
  - Liquidity Assistance

- Aquaculture and Fisheries
  - Growth
  - Sustainability
  - Aquaculture Inputs

- Agribusiness
  - Growth and Competition
  - Environmental and Consumer Protection
  - Agribusiness Inputs

- Renewable Energy
  - Rural Energy

- Rural Development
  - Rural Living
  - Rural Infrastructure

Innovations

LR-TOP
LR-BASIC
Promotion of Biogas Plants

Promotional Loans for Investments and Commodities

- Long-term loans, usually 15-20 years
- Fixed interest rates up to 10 years
- TOP interest rates for investments in biogas plants (favorable interest rates)
- Lean and simple granting (same-day processing of loan applications)
- Risk-adjusted interest system
Reflection of current market situation

- Rarely investments in new installations in the past years → high portion of investments in making existing installations more flexible
- Investment decisions highly dependent on the government’s funding
4. Conclusion and Prospects
Conclusion and Prospects

- Biogas makes an important contribution to the energy transition, alongside its promising heating potential and other ecological benefits

- Challenges for biogas production despite its mentioned advantages
  - Shifts in public policy and issues over public acceptance
  - Biogas will remain one of the most expensive renewable sources of power
  - Difficult transportability of manure

- Future of the biogas sector
  - Research and development: innovative technologies needed for maximising heat potential and making manure storable and transportable
  - Public discussion: accentuation of valuableness of biogas for Germany’s future power system
  - Political decisions: flexibility that biomass can provide, should be rewarded
Thank you for your attention!

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Questions

How can biogas ever get competitive?

How can the biogas sector be expanded in a sustainable way?

Which regulatory arrangements and financial incentives are needed to make biogas production more profitable?
Biogas from Renewable Resources

- In 2015 about 2,2 million hectares for cultivation of energy crops
- Most used energy crop for bioenergy production is maize (73% in 2015) → at odds with social interest
- Feedstock in german biogas plants
  - By weight: about 48% energy crops
  - By energy output: about 77% energy crops
- Success of biogas plant is highly dependant on commodity prices since feed-in-tariffs are fix
- Biogas plants will only be granted funding for half of the hours of a year – as an adjustment there will be premium payment for flexibility
- Feed-in tariffs for plants up to 150 kW: 13,32 ct/kWh (Degression = 0,5%/half-year)
- Maximum bid limits for plants > 150 kW (Degression = 1%/year):
  - Existing plants: 16,9 ct/kWh, 10 years of remuneration
  - New plants: 14,88 ct/kWh, 20 years of remuneration
In Germany about 400 biogas plants exclusively use waste

- At least 90% of the following substrates have to be used:
  - Garden and park waste
  - Household bio-waste
  - Market waste (e.g. expired food)

The remaining 10% are arbitrary

- Unfortunately only certain waste materials are accepted in this class

- Feed-in tariffs (degression = 0.5%/half-year):
  - Up to 500 kW: 14.88 ct/kWh
  - > 500 kW – 1 MW: 13.05 ct/kWh

- For plants that do not participate in direct marketing: degression of 0.2 ct/kWh
About 660 small manure installations in Germany

Use of 80% manure on an annual average (poultry manure is not creditable to the 80%); the remaining 20% are arbitrary

Maximum admissible installed electric output: 75 kW

Feed-in tariffs: 23.14 ct/kWh (degression = 0.5%/half-year)

For plants that do not participate in direct marketing: degression of 0.2 ct/kWh
Advantages and disadvantages of using manure and waste for biogas plants

Ecology versus economy

- Advantages:
  - No competition with land used for agricultural goods
  - Reduction of greenhouse gas emissions
  - Reduction of odors
  - Production of high-quality fertilizer
  - Reduction of chemical fertilizer

- Disadvantages:
  - Liquid manure has high amounts of water with little energy density and is barely transportable
  - Less output than biogas plants using energy crops with similar installation costs
Requirements for using manure and waste economically

- Beneficial for plants with animal husbandry and storage capacities

- For exclusive biogas plants transportation costs are restrictive → innovations in drying and pelletizing

- Regulatory framework and financial incentives

- Rewarding the contribution to closed nutrient cycles and replacing fossil fuel based mineral fertilizers by using the digestate as a fertilizer could make biogas production more profitable