

Energetic recovery of biogenic waste products in Germany

Main economic parameters of biogas plants –
Calculation tool exercise based on an example project

16th April 2018, Volker Jaensch (RENAC)

Introduction Volker Jaensch

- Degrees in Environmental Engineering and Master of Business Administration (MBA)
- 6 years project development and implementation of large scale biogas plants in Germany for the Danish company Krüger A/S
- 3 years project financing and implementation of wind energy projects in Germany for wind project developer EBV (in the meantime part of Gamesa Energia from Spain)



Introduction Volker Jaensch

- 3 years policy related renewable energy and biofuel projects at German Energy Agency. Study on second generation of biofuels
- 4 years development, financing and implementation of international Emission Reduction (CDM) Projects according to the Kyoto Protocol for the Dutch company OneCarbon International B.V.
- Since August 2010 Lecturer and Project Director at RENAC



- Introduction to an example German Biogas project and RENAC's ProForma Calculation Tool
- Calculation Tool Exercise on the main economic parameters of biogas plants

AGENDA

- In operation since 1998
- 4,000 cbm biogas digester with mesophilic (38 °C) process
- Pre-pasteurisation (70°C)
- Input:
 - 44,000 t manure / a;
 - 16,000 t organic waste / a
- CHP with 866 kWel. and 1,200 kWth.
- Investment costs: 4 Mio € (in 1998)



- Impact of changes in input parameters to profitability and bankability of the project
- Evaluation of main sensitivity parameters
- For training purposes only



- Calculation Exercise (I) – in groups of 2:
 - Calculate ***the required average electricity selling price*** to secure an equity Internal Rate of Return (IRR) of 12 % for the investor (assuming 100 % equity financing)



- Calculation Exercise (II) – in groups of 2:
 - Continue with the version 12 % equity IRR:
 - What would be the **impact on the equity IRR** if the project would be financed by **30 % equity and 70 % bank loan** (12 years debt period, 8 % interest, no grace period) **instead of 100 % equity** ?



- Calculation Exercise (III) – in groups of 2:
 - What would be the **impact on the equity IRR** if the fee for handling the waste would decrease from 20 € per tonne to
 - 10 € per tonne
 - 0 € per tonne



- Calculation Exercise (IV) – in groups of 2:
 - Continue with the version 10 € fee per tonne of handled organic waste:
 - What would be the **impact on the equity IRR** if the biogas plant would be able to sell 4,000 MWh heat per year for a price of 10 € per MWh_{th}



Thank you!

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