



Grid feed-in repowering of small-scale biogas plants

Dipl.-Ing. Zoltan Elek, Landwärme GmbH

Branchen-Exportforum

Hannover Messe

April 22nd, 2010

Project development & services

Focus on biogas grid feed-in

- founded in 2007
- based in Munich
- 15 professionals

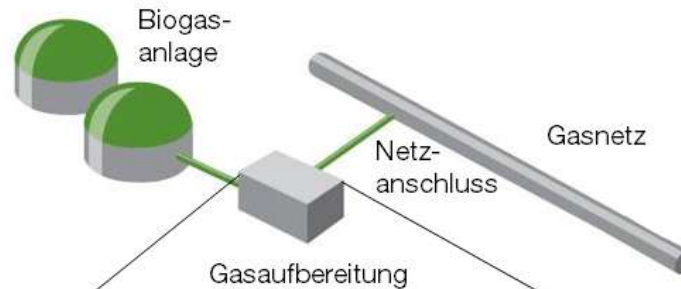
Business model

- Biomethane project development for bioenergy investors and utilities

Fields of competence

- Project acquisition & site analysis
- Contract -and project management
- Upgrade and feed-in plant engineering
- Grid access consulting and planning
- Permits
- Biomethane marketing
- Green gas certification
- Financing concepts

Biogas upgrade: steps



Raw biogas

- 55 - 65 % CH₄
- 35 - 45 % CO₂
- < 2% air
- H₂S
- Ammoniac
- Water steam

Upgrade

- CO₂ - separation
- Desulphurization
- Deliquification
- Bymatter separation
- Conditioning

Biomethane

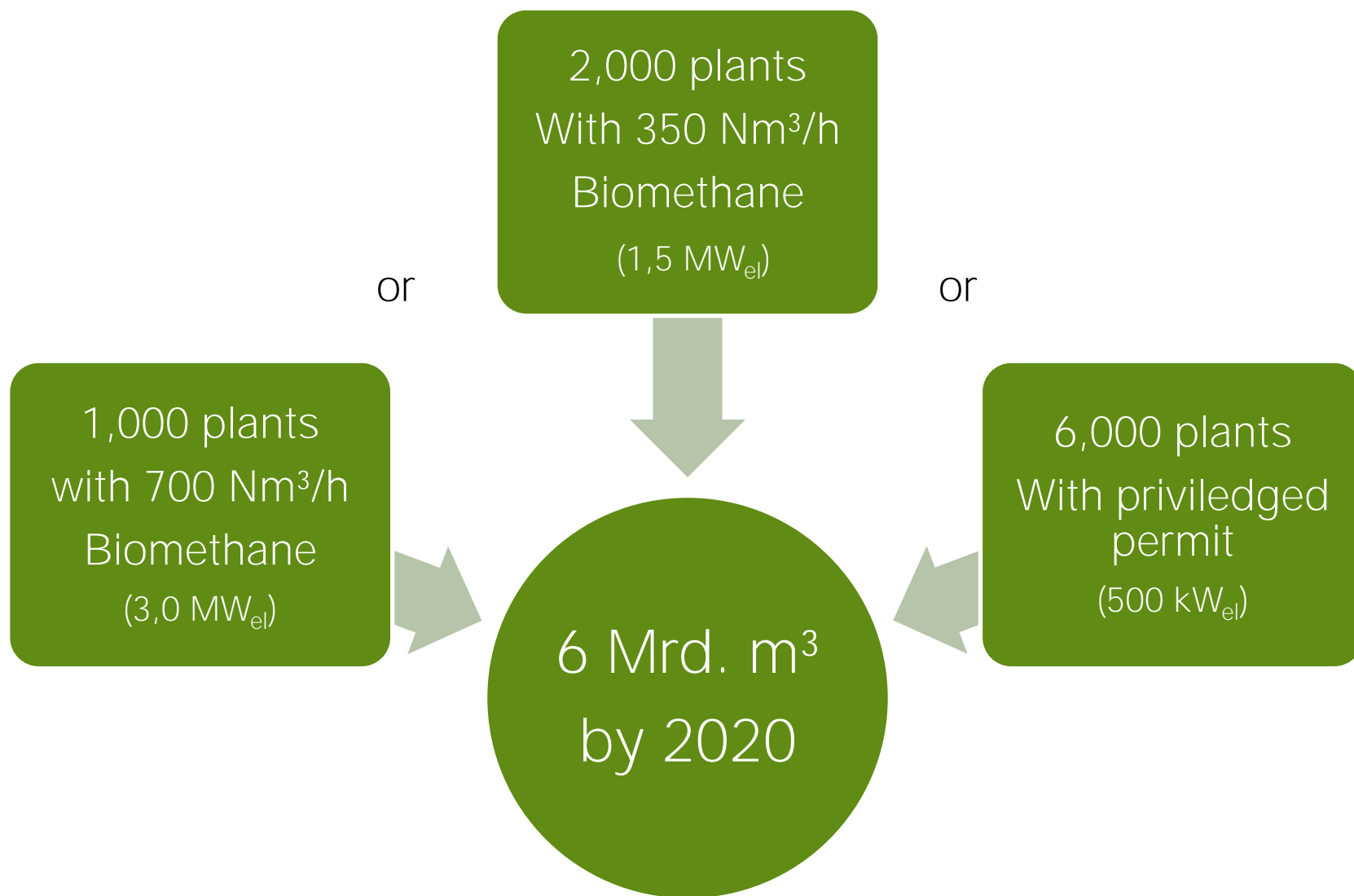
- >96 % CH₄
- < 2% CO₂
- < 2% N₂

Steps for grid feed-in

- LPG addition
- Further conditioning
- Odorization

- More than 30 projects currently feed biogas into the German gas grid
- Average feed-in capacity of 700 nm³ / h Biomethane

German biomethane targets 2020: necessary projects





Biogas grid feed-in with
150 Nm³/h biomethane

Projects in Europe

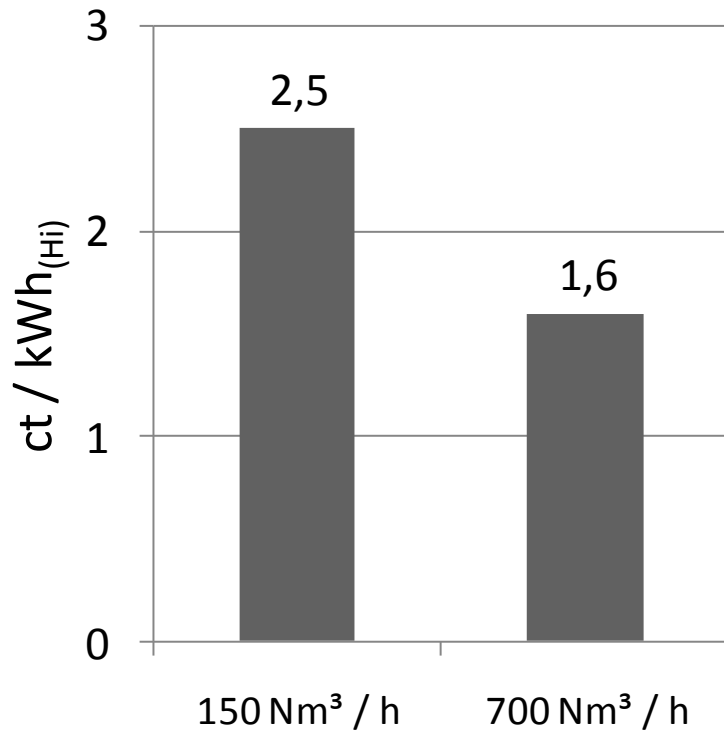
- Sweden
 - ca. 50 % of all projects
 - **15 projects** ≤ 150 Nm³ biomethane
- Switzerland
 - Almost all projects
 - **5 projects** ≤ 150 Nm³ biomethane
- Austria
 - Almost all projects
 - **5 projects** ≤ 150 Nm³ biomethane

Available technologies

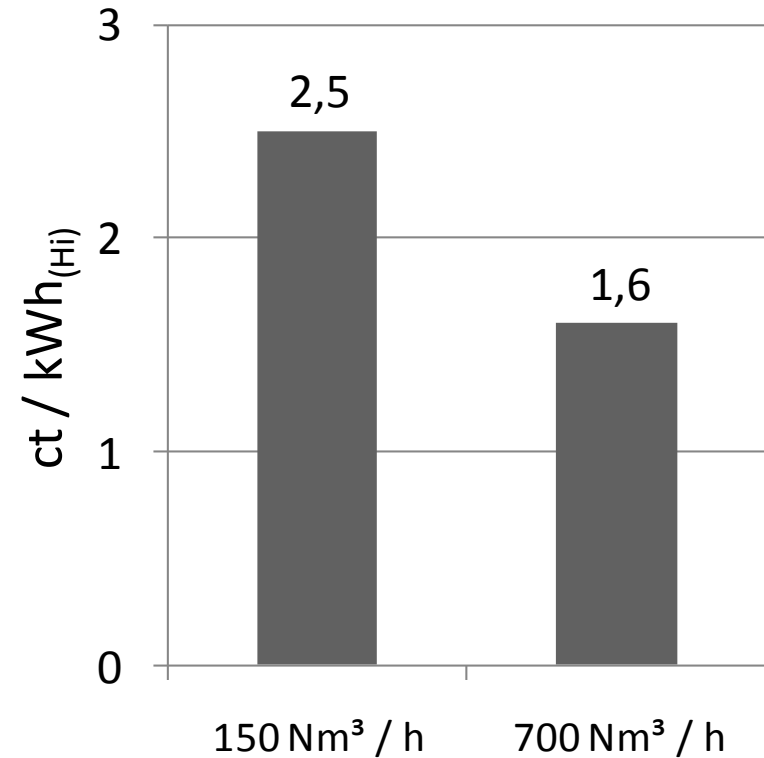
- Membrane
 - Cirmac
 - Axiom
 - Air Liquide
 - Borsig
- Pressure swing adsorption
 - QuestAir
- Scrubbing
 - Water: Malmberg
 - Amin: MT Energie
 - Selexol: Haase

Biogas upgrade costs

Amine scrubbing:
MT Energie

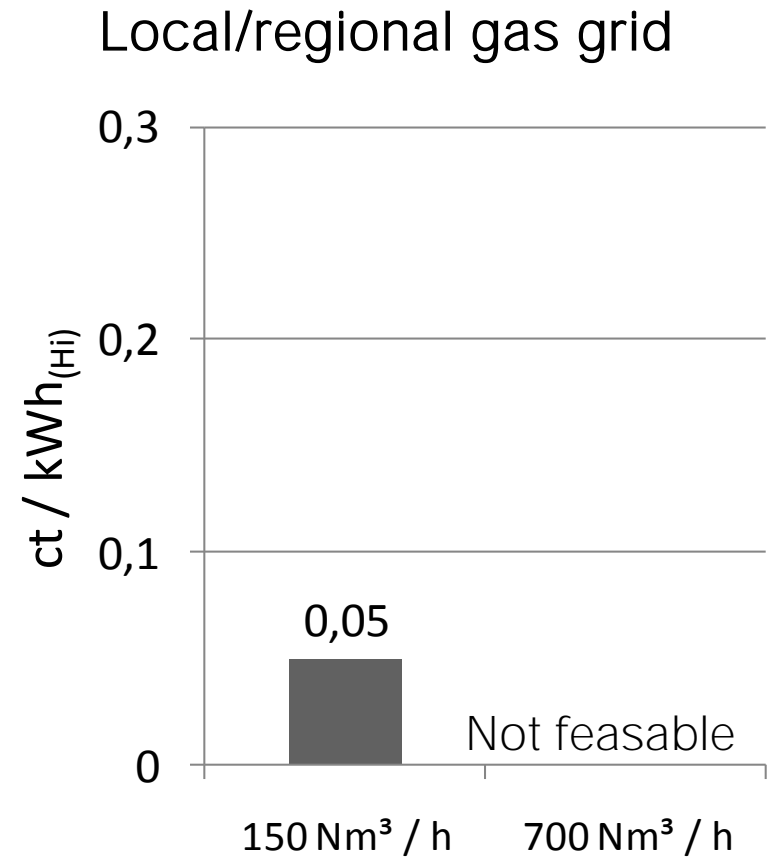
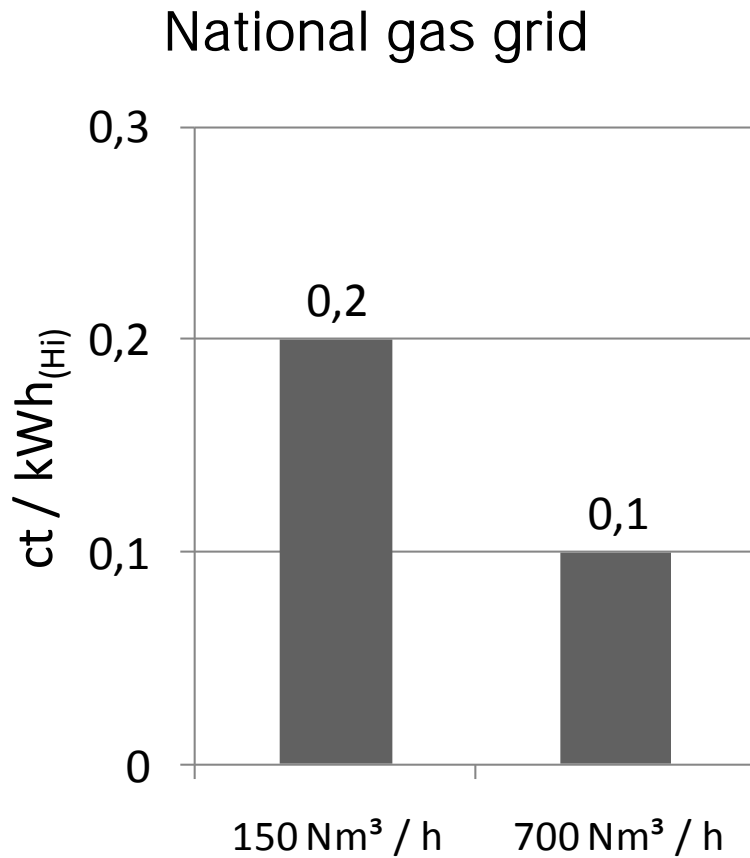


Pressurized water scrub:
Malmberg



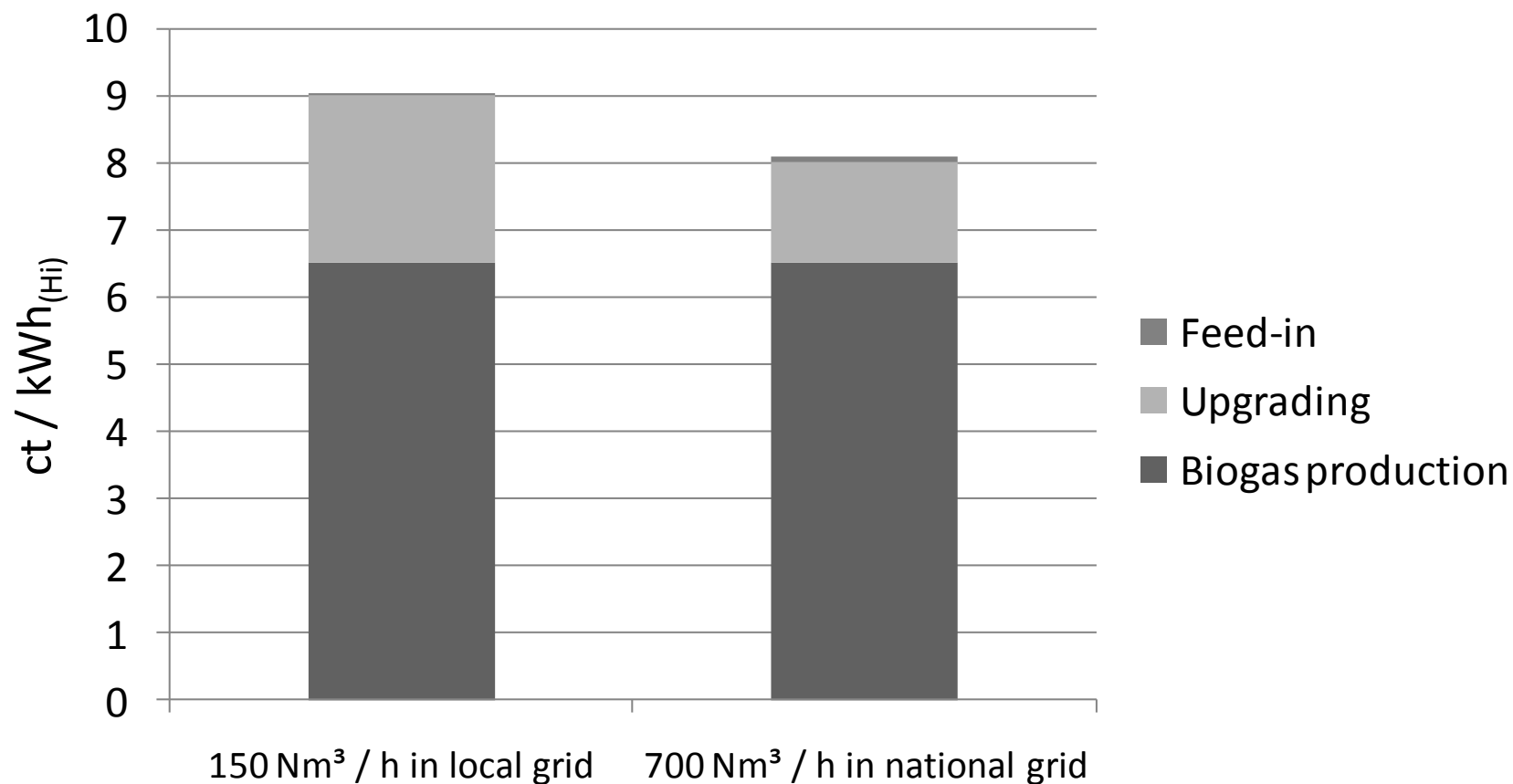
Source: Fraunhofer UMSICHT, FNR, manufacturer data

Gas grid feed-in costs



Source: Fraunhofer UMSICHT, FNR, manufacturer data

Total biomethane production costs



Source: Fraunhofer UMSICHT, FNR, manufacturer data

Characteristics of small scale plants

Advantages

- Priviledged construction permit
- Suits the structure of German agriculture
- Short biomass transport
- More than 2,000 existing plants
- KfW subsidies
- 2 ct technology bonus
(Renewable Energy Sources Act)

Disadvantages

- Higher specific costs
- Smaller components
- Higher specific planning demand

Potential for optimization

- Local gas grid feed-in
- Repowering of existing biogas plants
- Combination with power production on site



Chances

- Continuous gas production without ramp-up
- Standort genehmigt & Know-how der Behörden
- Operating experience of plant operator
- Acceptance → Repowering instead of new construction
- Attractive relation between invest and gas output



Challenges

- Utilization of existing CHP plants
- Heating concept
- Distance to gas grid
- Space demand
- Piece-by-piece financing of upgrading plants



Thank you

Landwärme GmbH
Zoltan Elek
Ungererstr.40
80802 München
zoltan.elek@landwaerme.de