Gas grid injection in France
First plant in farm

Arcy Farm, an agricultural biomethane project

Actors for injection in France

- Rules and regulation: Ministry national level
- Local authorities or groups: authorities on the local distribution (gas grid construction)
- Gas operators:
  - Transport of gas: GRTgaz or TIGF
  - Local distribution: GrDF and local entities
  - Sells of gas: GDFSuez, E-on, Total energy...
French context

**PRODUCER**

Substrats
Guarantee to sell, with a « last buyer »

**Gas grid OPERATOR**

In charge for injection

**BUYER**

Garanty of origin

Feed in tariff: gas from farms
(90-125 €/MWh)

Feasibility studies
Authorization
financing
contracts
Construction

Gas SELLER

Gas grid injection tariffs

- **landfills**: 45 to 95 €/MWh / production
- **AD plants**: 69 to 125 €/MWh depending substrat and size
- **Sewage sludge water treatment plant**: tariffs in 2013?
Gas grid consumption

local consumption in green and project production in red:
Case 1 = OK but Case 2 = problems

Electricity feed-in tariff

between 11,9 et 199,7 €/MWh
(+ 10 % pour les DOM)

- Bonus farming substrats
- Bonus Energy Efficiency

BASE

Power installed in kW

150 300 500 1000

0-26 133,7 136,7 121,8 116,8 111,9

0-40 119,7 133,7 126,7 121,8 116,8 111,9
First plant in farm

SAS Bioénergie de la Brie

The farm

- Field farm near Paris 4km away from the village

- 50% crops
  - 260 ha crops
  - 90 ha grass lands

- 50% cattles breeding
  - 200 cattles
  - 500 animals
The Project

- STRAW
- ENERGETIC BIO WASTES
- CROPS
- COWS
- FERTILIZER
- MANURE
- ANAEROBIC DIGESTION
- ENERGY PRODUCTION

Objectives

- No more chemical fertilizers
- High environmental efficiency
  - Fossil fuel substitution ratio ~ 6
  - Primary energy efficiency > 78%
  - Energetic efficiency > 94%
- Economic profitability
  - Biomethane production cost < 110€/MWh
- Repeatable as a standard
Partners

• Bioenergie de la Brie SAS
• AIR LIQUIDE (coordinator)
• SOLAGRO
• Chambre d’Agriculture
• CRIGEN (GDF Suez)

Financement : ADEME
Grid operator : GrDF
Biomethane Buyer : TEGAZ

The Project

- ~1M Nm3/year biomethane (equivalent to 1M gasoline litre)
- 2000 tonnes avoided CO₂ emission/year
Key figures

2 farmers

• Substrats: ~14600 tons
  – 2500 tons liquid and solid manure
  – 2000 tons mill offals
  – 1200 tons intermediate crops
  – 6300 tons of waste from agrofood industries

• Injection: 110 m³/h of biomethane

• Investment: ~5 M€

Grid constraint

- 110 m³/h winter time
- 50 m³/h summer time
The reality

Anaerobic Digestion:
• BIOGAS NORD

Upgrading unit
Upgrading Unit:
• Air Liquide membrane based patented system

Operation
• Grid injection started August the 28th after 1 months continuous operation without any stop
• Biomethane quality is conform and stable whatever the fluctuation of flow or biogas quality
• Technical performances higher than the expectations
Seasonality

• Before the patented dynamic regulation

• The Farmer has to stop during the summer week end nights due to grid over pressure

Seasonality

• After the patented dynamic regulation

• The plant never stop...
...And the Farmer sleep well and inject more gas!
Conclusion

• The first French farm based biomethane plant is a great success up to now
• Membrane technology allow small scale plant with economical profitability and high quality biomethane production for grid injection
• Dynamic regulation increase project profitability
• Performances will be followed for 1 year to share a complete experience feedback for the biogas community (economical, technical, environmental)