PROBIOGAS

Economic effects, barriers and incentives of biogas from centralised co-digestion

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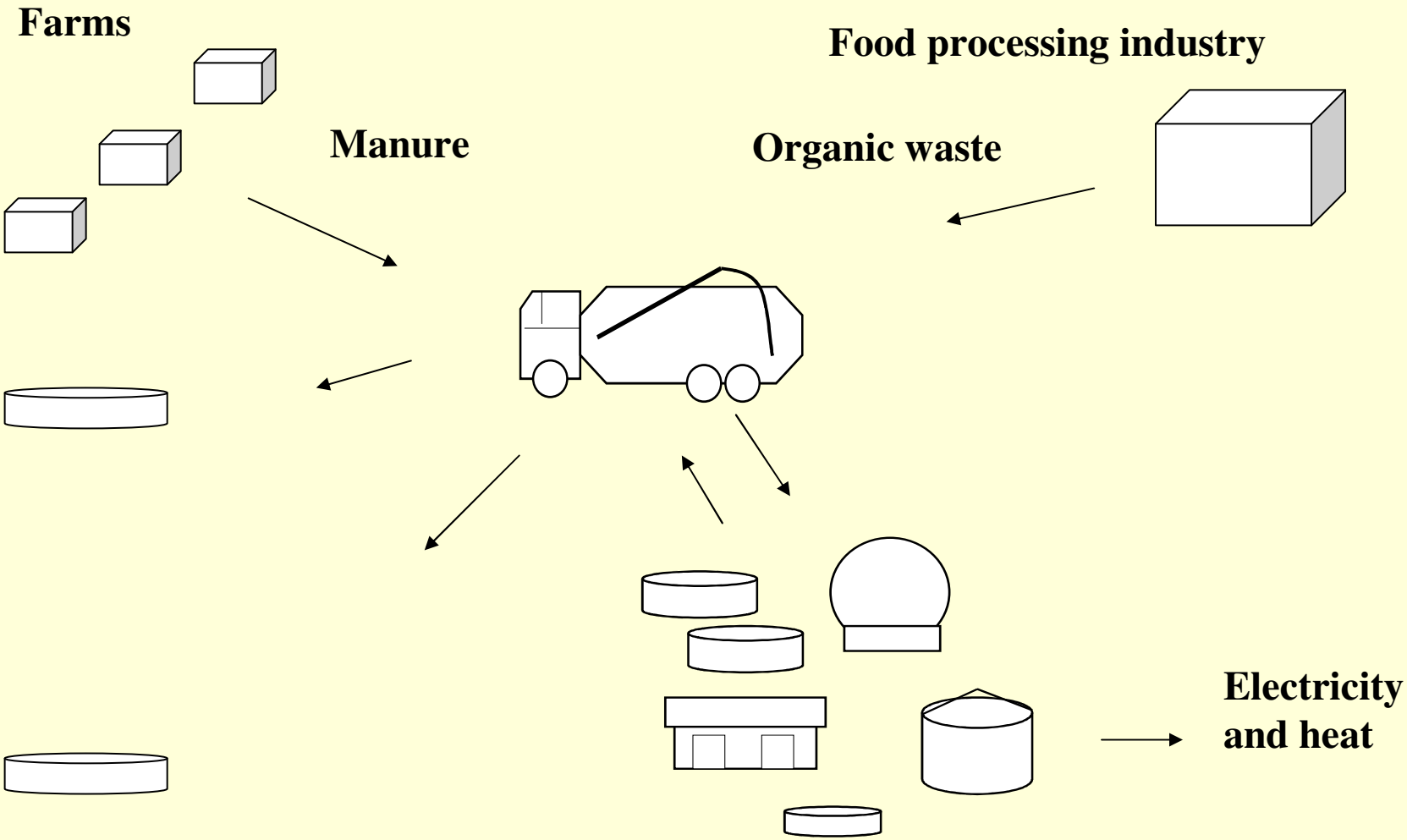
Centralised Co-digestion Plant Concept

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What did we do in the PROBIOGAS project ?

Clarify the potential of a hypothetical CAD-plant in 6 EU countries based on local preconditions

With respect to:

-Plant size, biomass resources, methane, heat and electricity production

-Effects on GHG emissions and Nitrogen leaches

-Effects on nutrient utilisation and fertiliser value

-Effects on farmers economy

-Economic performance of the CAD system

-Socio-economic evaluation of the whole system

However

The assessments may not be regarded as adequate feasibility studies ready for decision. More detailed analysis and planning must be carried out for the specific situation before final decisions are made.

Difference analysis

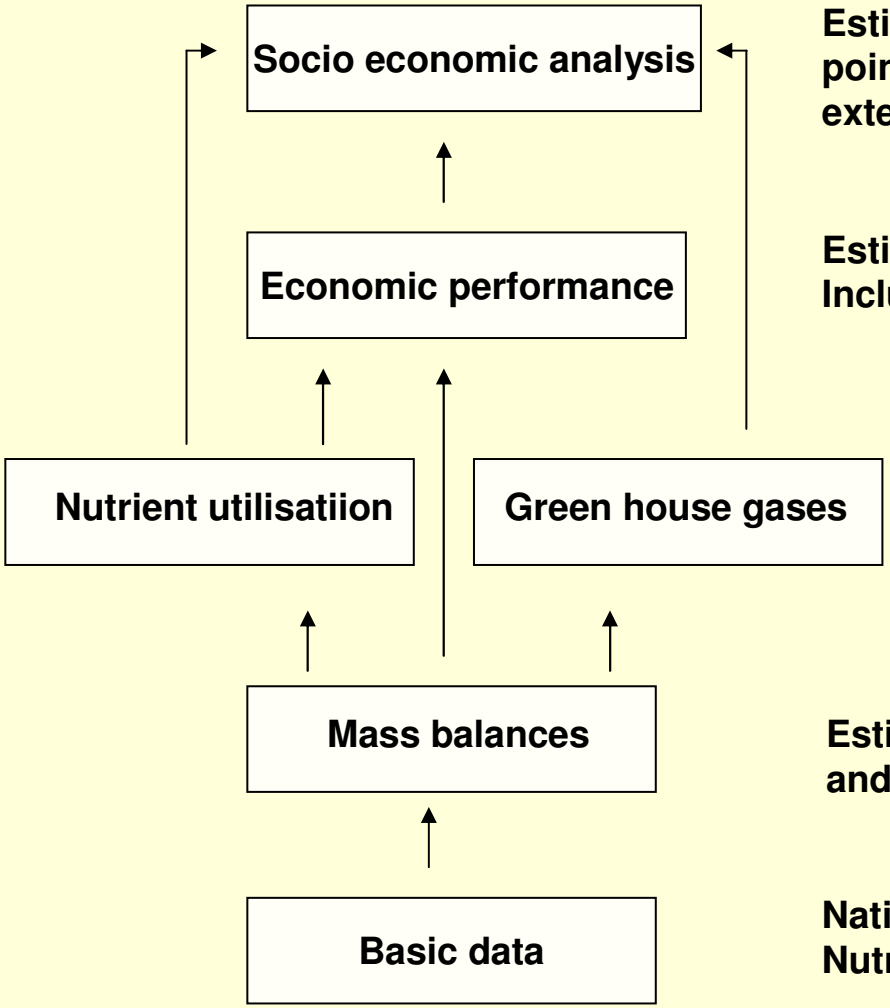
A comparison between:

-Reference situation = Business as usual

-Alternative = If a CAD plant was installed

Covering the area of the case studies

The stepwise structure of the analyses in the PROBIOGAS project



Estimated costs and benefits from the society point of view, including quantified and monetised external effects from the operation of the plant.

Estimated sales and costs of the CAD system Including farmers benefits and transport costs

Estimated effects on GHG emissions

Estimated effects for nutrient utilisation and Nitrate leaching

Estimated amounts, methane production and nutrient contents

National data on manure, waste, temperature Nutrient contents, heat and electricity prices etc.

Estimated treatment capacities and biogas production

	NL	B	F	IRL	SP	GR
Treatment capacity 1000 tons/y	**220**	**75**	**44**	**53**	**168**	**34**
Treatment capacity Tons/d	**600**	**200**	**120**	**144**	**460**	**93**
Biogas production Mil m^3 CH_4	**6,4**	**1,5**	**1,6**	**1,1**	**4,4**	**1**
Methane yield, m^3 CH_4/ton	**29**	**20**	**37**	**21**	**26**	**30**

Estimated effects on fertiliser utilisation and value, as a result of the operation of the CAD plant

The table include potential benefits for both manure supplying farmers and crop producing farmers who receive surplus manure

	NL	B	F	IRL	SP	GR
Saved ton N	413	73	61	30	198*)	44*)
Saved ton P_2O_5	0	1,5	31	0	2*)	27*)
Saved ton K_2O	0	65	35	0	2*)	27*)
Total savings fertiliser, 1000 €/year	308	82	79	21	160*)	76*)
Average savings per hectare, €/year	25	27	53	5	-	-

*) potential but not actually utilised, as surplus is not redistributed

Economic benefits for farmers (manure suppliers) in national 2005 prices

1000 €/year	NL	B	F	IRL	SP	GR
Manure storage	0	-7	-7	-14	0	0
Manure spreading	16	-11	-1	-22	0	0
Fertiliser value *)	0	17	16	40	0	0
Long distance transportation	1054	22	0	0	0	0
Total cost savings	1070	21	8	4	0	0

*) Achieved by farmers in the local area. Potential fertiliser values for crop producing farmers in other regions are not included in this table.

Investment costs, mil €, 2005 national prices

Mil €	NL	B	F	IRL	SP	GR
Capacity ton/day	600	200	120	144	460	93
Biogas plant	6,1	3,9	4,2	3,7	5,3	2,7
CHP facility	2,1	0,5	0,5	0,4	1,3	0,3
Total investment costs	8,2	4,4	4,7	4,1	6,6	3,0

Economic performance of the CAD system

1000 € per year

1000 €	NL	B	F	IRL	SP	GR
Capacity, tons/day	600	200	120	144	460	93
Transport	-1540	-209	-133	-111	-595	-45
Waste storage	0	-19	-7	-22	-1	-0,1
Separation	0	0	0	-40	0	0
Net result biogas plant	-24	88	486	-53	197	129
Profit	-1564	-140	346	-226	-399	84

Important preconditions

	NL	B	F	IRL	SP	GR
Electricity, €/KWh	**0,06**	**0,11**	**0,14**	**0,07**	**0,07**	**0,07**
Heat Price, €/MWh	**0**	**30**	**25**	**20**	**0**	**0**
Treatment fees. €/ton	**0**	**4,8**	**30**	**13**	**27**	**120**

Conclusions

The assessments carried out in the PROBIOGAS project show there is a potential for CAD plants in all the analysed cases.

But apart from the French case, they all suffer from one or several disadvantageous preconditons. These preconditions may be seen as non technical barriers that are dewastating the eoconomic performance of the hypothetical plants in the case studies.

Consequently, these barriers must be removed before an enlargement with plants are likely to take place in the countries looked upon

Most important non technical barriers identified were:

1. **Restrictions on waste supplies.**

(Especially The Netherlands and Ireland, but also Belgium and Spain)

Most important non technical barriers identified were:

2. Poor electricity prices.

(The Netherlands, Ireland, Spain, Greece)

Most important non technical barriers identified were:

3. Insufficient marketing options for heat production

(The Netherlands, Spain, Greece)

Most important non technical barriers identified were:

4. Legal, administrative barriers and informations

(All, more or less)

Evaluation of preconditions:

- = poor, + = good, ++ = optimal

	DK	NL	B	F	IRL	SP	GR
Electricity price	+	-	++	++	-	-	-
Heat marketing options	++	-	+	+	+	-	-
Waste allowed, use of digestate	++	-	+	++	-	+/-	++
Administrative procedures, Authorities helpful	++	-	+/-	+/-	-	-	-

The French case turns out the be the only one with almost optimal preconditions.

So given almost optimal preconditions, the French case shows that:

-The CAD system is profitable even when transport costs are included
-It is very close to socio-economic break even
-Farmers benefit economically
-Reduced Nitrate leakage of 15 ton N per year
-GHG reduction of 186 kg CO2 eqv. per ton input
-Cost efficiency of GHG reduction of 26 € per ton CO2 eqv.

Even though it is a relatively small plant

So what should be done

1. **Remove restrictions on supplies of unproblematic wastes in especially The Netherlands, Ireland, but also Belgium and Spain**

2. **Improve electricity prices for exabmple by green electricity bonus in Ireland, The Netherlands, Spain and Greece**

3. **Encourage industrial use of heat from biogas. Alternatively consider other than CHP from biogas, distribution via natural gas grid in The Netherlands and vehicle fuel in Spain and Greece**

4. **Specific information about the potentials og the technology shold be given to authorities involved in biogas projects.**

And:

Governmental support must be unambiguous.

Involvement and engagement of farmers is very important

A demonstration programme is recommended:

-investment grants for a number of plants

-monitoring programme for the build up of experience

Soon, available on the PROBIOGAS web site:

http://websrv4.sdu.dk/bio/Probiogas/sub/home.htm

-6 national reports and

-Final Assessment Report

Thank you for your attention