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Sector Study

Concerning prioritised innovative agro-environmental technologies for sustainable food production in the Baltic Sea Region

Prepared by:

AGRO BUSINESS PARK

Sector Study - Prioritised innovative agro-environmental technologies for sustainable food production in the Baltic Sea Region

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Contribution: Valuable contribution to the Market Description was provided by Baltic COMPASS partners and stakeholders.

Disclaimer: It is emphasized, that indications and descriptions in this report alone shall be considered as non-validated information and examples, and that the information cannot be used for feasibility calculations or other planning of bio energy projects or other. The information is given with the sole purpose to provide a quick introduction and overview of the sector for selected agro-environment technology; biogas production and separation of livestock manure, SCIEN drainage and phosphorus management in the Baltic Sea Region.

The Sector Study is prepared with support from EU's Baltic Sea Region Programme.

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Introduction

Background

The strategic objective of Baltic COMPASS is to contribute in reducing eutrophication (nutrient over-enrichment) of the Baltic Sea through fostering win-win solutions for agriculture, municipal and environmental sectors, based on problem definitions which are relevant for stakeholders within the whole drainage area.

Work package IV of Baltic COMPASS is especially dedicated to promote accelerated investments in best available environmental technologies and solutions, and do this via innovation networking activities, market analyses, knowledge transfer and investment support.

HELCOM[1] modelling activities have estimated that for good environmental status to be achieved, the maximum allowable annual nutrient pollution inputs into the Baltic Sea would be 21,000 tonnes of phosphorus and about 600,000 tonnes of nitrogen. Considering recent nutrient loads, the action plan proposes provisional country-wise annual nutrient input reduction targets for both nitrogen and phosphorus. These should result in total reductions of 15,250 tonnes of phosphorus and 135,000 tonnes of nitrogen inputs to the Baltic Sea.

Methods

This Sector Study is via a logic methodology defining the determining factors for dissemination of the prioritised, innovative, agro-environmental technologies that deserves a more widespread use in the region, and it holds country-wise analyses of the identified market barriers and enablers.

Biogas production, livestock manure separation, SCIEN drainage[2] and phosphorus measures[3] have been prioritised as agro-environmental technologies that deserve a wider dissemination in the Baltic Sea Region due to their beneficial and cost efficient effect on the loss of nitrogen (N) and phosphorus (P) to the aquatic environment. Phosphorus management measures (P-indices, P-norms and standards for livestock manure) are important drivers for biogas, separation and SCIEN drainage technologies, and are therefore focal issues in the analysis of enablers and barriers.

The prioritising of the technologies was especially done by Foged (2010), while SCIEN drainage technologies were added as a prioritised group of technologies after discussions within the Baltic COMPASS project partnership.

The parameters to describe the market possibilities for the prioritised technologies have been determined as: EU/national legislation, framework conditions, strategies,

[1] From http://www.helcom.fi

[2] SCIEN is an acronym for sustainable, controlled, intelligent, environmental friendly and nutrient loss mitigating, and the acronym itself associates to science.

[3] Phosphorus measures are here defined as P-indices, which inevitably are connected to phosphorus fertiliser norms and livestock manure standards.

investment environment, innovation environment, practical conditions, agricultural conditions, and technological conditions. The definition of these parameters is found in the following sections.

For each technology enablers and barriers are identified within the matrix of technologies and descriptive parameters.

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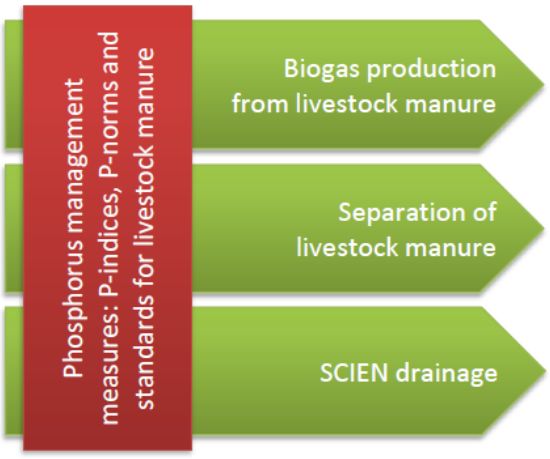
Prioritized technologies

The prioritised technolgies are here visualised. They are different in their nature, with biogas production as the most hardware-type and investment-requiring technology, and phosphorus management, including P-indices, rather is a knowledge-based technology.



Biogas production on livestock manure

Biogas production is based on anaerobic digestion of livestock manure and/or other biodegradable organic materials, for instance waste products from the food processing industry.

Anaerobic digestion is a series of biological processes in which microorganisms break down organic molecules in absence of oxygen, resulting in the production of a mixture of gases, named biogas, mainly composed of methane and carbon dioxide.

The substrate homogenised before the bacteriological fermentation, which happen at a constant temperature of 30-45°C (mesophile) or 55°C (termophile), and due to the ability for pumping with a maximal dry matter content of 12.5%. The anaerobic microorganisms are naturally occurring in especially cattle manure.

The fermentation leads to the biogas production, which typically has a methane content of 60-65%. The hydraulic retention time is normally from 15-40 days, and the process happens in one or two stages, with the latter giving a slightly higher biogas production.

Propellers are normally installed in the digestion tanks to ensure the digestate remains homogenous and gives a maximal release of biogas. The biogas production depend much of the type of biomass – see figures in the literature.

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Most biogas plants are farm-scale plants, like this one owned by a farm and situated at the farm.

While most biogas plants are owned and situated at a specific farm, meant for treatment of the farms' livestock manure, other biogas plants are organised as community / regional biogas plants, owned by a group of stakeholders. The community plants also serve as centres for re-distribution of manure in the region.

Lemvig Biogas is a community biogas plant, established by 79 livestock farmers

Anaerobic digestion has been prioritised due to its effects on the reduction of N leaching, while in the same time having other positive effects, here under, reduction of smell and nuisances from storing and spreading of manure, reduction of greenhouse gas emissions, contribution to renewable energy production, and sanitation of the livestock manure (destroying weed seeds and disease agents). Digested livestock manure has a well validated higher field effect, whereby more N is re-circulated in the agricultural production, and less is leaching, ultimately to the Baltic Sea. Each cubic metre of pig slurry that is anaerobic digested would result in around ½ kg less leached N, provided the digestate is used according a fertiliser plan. The estimate of ½ kg less leaching is based on a field effect of digested slurry, which is reported to be 17–30% higher than non-digested slurry (Birkmose et al., 2007), but considering as well that the increase in field effect is in the lower range for pig slurry, a conservative estimate of 10% increase in field effect is used (10% x 5 kg N per m3 slurry = ½ kg N/m3). Digested slurry is furthermore much more homogenous and can be spread on the fields with higher accuracy as fertiliser, and it better incorporates and binds to the soil. Break-even for the economic performance of an anaerobic digestion plant is much depending on its management and financing.

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The following table shows the current state of affairs concerning biogas production in the eight EU Member States in the Baltic Sea Region.

Table 1: Anaerobic treatment of livestock manure, distributed on EU Member States (Foged, 2011).

	Number of plants			Total treated amounts			
Member State	Farm size installations	Small/medium size installations, treating < 50,000 tons/year	Large-scale installations, treating > 50,000 tons/year	Livestock manure and other, 1000 tonnes	Livestock manure, 1000 tonnes	Nitrogen in livestock manure, tonnes	Phosphorus in livestock manure, tonnes
Denmark	57		19	4712	3534	18864	3701
Estonia		1		40	30	143	28
Finland	9		1	164	164	834	148
Germany	3800			58500	27495	132403	25272
Latvia	8	8		240	240	1704	317
Lithuania			1	54	54	166	11
Poland	3	2	2	337	252	1088	242
Sweden	7	2		106	61	241	29
Total	**3884**	**13**	**23**	**64153**	**31830**	**155443**	**29748**

It is unclear, if biogas production on livestock manure happens in Russia. Belarus has started to build up a biogas production, among other with assistance from Baltic COMPASS, and plans to have 39 biogas plants before end of 2012.

Separation of livestock manure

Manure separation is defined as a system with the objective of separating manure into two flows: a concentrate (solid fibre fraction) and a diluted fraction (liquid fraction).

There are a number of technologies in the market:

- **Coagulation-Flocculation**
  Physical- Chemical system where separation is enhanced by the help of a chemical agent (coagulant or flocculant) which improves the aggregation of colloids. Usual inorganic flocculants are multivalent cations such as aluminium, iron, calcium or magnesium, added as salt or hydroxide, and the organics ones are polyelectrolyte polymers such as polyacrylamide.

- **Electro coagulation**
  An electro coagulation reactor is made up of an electrolytic cell with one anode and one cathode. During electro coagulation, the positive charged ions (Fe_3^+, Al_3^+)

required for coagulation are obtained from a consumable metal electrodes (anode), released by electrical current, producing also electrolysis. Aggregates are separated by sedimentation and by flotation, induced by the hydrogen gas produced during water electrolysis at the cathode.

- **Separation by grate**
  Separation of particles by sizes using a grate, a frame composed of parallel or cross-bars.

- **Separation by screw pressing**
  The screw press is composed of a screw-type conveyor that forces the slurry through a tube and past a cylindrical screen. The screw conveys the solids retained on the screen to the end where the solids are discharged.

- **Separation by sieves**
  Named also screen separators, including stationary inclined, vibrating, rotating, and in-channel flighted conveyor screens. All separators of this type involve a screen of a specified pore size that allows only solid particles smaller in size than the openings to pass through.

- **Separation by filter pressing**
  The filter material is a belt, and the system consists of a flat, woven, fabric belt that runs horizontally between rollers. The liquid is forced through the belt by the rollers and the solids are carried along on the belt and dropped into a solids collection chamber.

- **Separation by centrifuge**
  Centrifugation involves solid-liquid separation using centrifugal forces to increase the settling velocity of suspended particles using either centrifuges or hydrocyclones. Typically centrifuges consist of a horizontal or vertical cylinder which is continuously turned at high velocities.

- **Separation by air flotation**
  Dissolved air flotation (DAF) method of separation consists of dissolving air under pressure and then releasing the air at atmospheric pressure in a flotation tank or basin. The released air forms tiny bubbles which adhere to the suspended matter causing the suspended matter to float to the surface, from where it is removed by a skimming device.

- **Separation by drum filters**
  Separation is done by inclined rotary drums made by a sieve material, which punctured pore size allows the filtration or screening.

- **Natural settling separation**

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Separation of particles by gravity in a settler.

Separation technologies can contribute to ensuring a balanced fertilisation on own agricultural lands and export of the P rich fibre fraction to regions where it can be used in an environmentally safe way. Storage and transport of the fibre fraction must happen in a way that avoids seepage and evaporation of ammonia and laughter gas.

Separation would typically be an integrated part of an anaerobic digestion plant, but it can also be a stand-alone technology. It is relatively easy to implement on a farm basis, but solutions have been seen with mobile separators, that can go from farm to farm and separate a batch of slurry, and in this way ensure a high utilisation of the investment.

Decanter centrifuge for post separation

Mobile decanter centrifuge with use of flocculation

The following table shows, that separation alone is used in three of the countries in the Baltic Sea Region.

Table 2: Activities concerning livestock manure separation, distributed on EU Member States (Foged, 2011).

Country	Number of plants			Total treated amounts			
	Farm size installations	Small/medium size installations, treating < 50,000 tons/year	Large-scale installations, treating > 50,000 tons/year	Livestock manure and other, 1000 tonnes	Livestock manure, 1000 tonnes	Nitrogen in livestock manure, tonnes	Phosphorus in livestock manure, tonnes
Denmark	79	2	3	1179	816	3633	774
Finland	31			61	61	286	57
Germany	106			1585			
Total	**1098**	**114**	**72**	**23115**	**16504**	**85697**	**19711**

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SCIEN drainage

SCIEN is an acronym for sustainable, controlled, intelligent, environmental friendly and nutrient loss mitigating, and the acronym itself associates to science. SCIEN drainage combines conventional and controlled drainage with innovative technologies to ensure a maximal recirculation of plant nutrients. It transforms the drainage concept from mere being a way to get rid of excess water into being a concept for intelligent managing of the water turnover for field crop production.

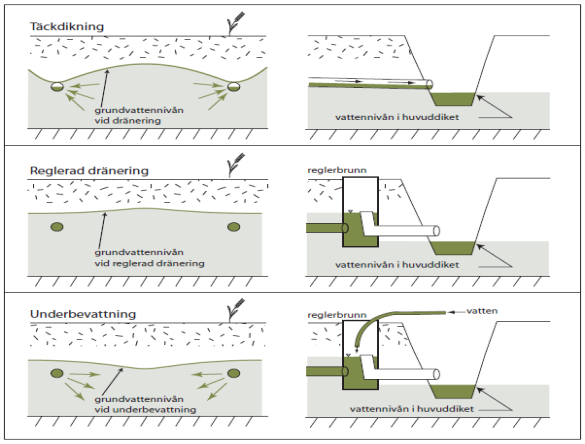
Drainage related technologies comprise for instance:

- **On/off**

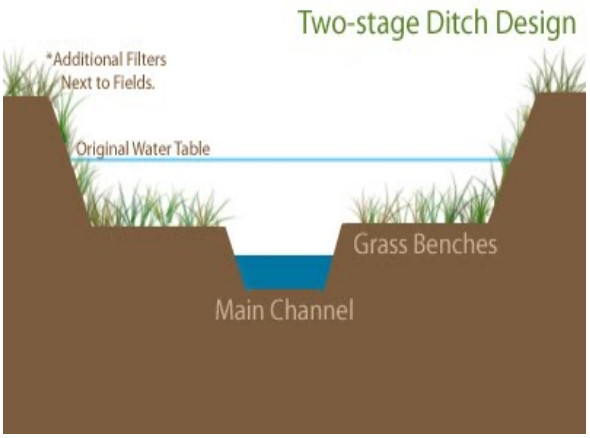
  An on/off drainage system, whereby drain pipes can be closed several places in the field in the winter time and in other periods without traffic in the field and where drainage is actually not needed. This will prevent loss of N and P in most of the year and allow for increased nitrification, and possibly higher yields due to better water availability for the crop. More shallow placed drain pipes can help to reduce water and nutrient discharge.

- **Controlled drainage**

  Drain water management as today known from "controlled drainage", where drain water discharge is regulated with a buffer store, so that the drain water can flow back to the drain pipes in dry periods, and the water level in the fields be controlled.



Principle of controlled drainage, here illustrated in a pamphlet from the Finnish "Landsbyverket", who administrate subsidies for that.



Principle of two-stage ditch drainage.

- **Algae production**

  Developing the drainage concept from mere being a way to get rid of excess water into being a concept for intelligent managing of the water turnover for field crop production, first of all to be with a minimum of plant nutrient loss, but also

to consider other possible incomes and beneficiary side effects. One example of this is growing algae on the plant nutrients in the drain water as a substrate for biogas production, thus enabling recirculation of plant nutrients while in the same time enable production of renewable energy.

- **Constructed wetlands**

  Another similar example could be constructed wetlands, a specific type being the two stage ditch drainage system, where green vegetation similarly could be harvested and used for recirculation of plant nutrient, possibly via biogas production.

- **Natural wetlands**

  Natural wetlands can be harvested, whereby the nutrients that are taken up in the biomass are recycled to the agricultural production, possibly after anaerobic digestion. The loss of nutrients to the aquatic environment can also happen in the form of growing short rotation forest crops like willow and poplar in the natural wetlands.

- **Drain filters**

  Relevant technologies that in parallel projects are being researched for their ability to catch plant nutrients, here under possibly the Baltic Sea 2020 project "Mitigation measures to reduce Phosphorus leakage from arable land, ditch dams and ditch filters", as well as other relevant projects (for instance "SUPREME-TECH" and "Drain filter technologies for optimised nutrient reduction").

- **Two stage ditch drainage**

  The traditional open drainage ditches are re-constructed so that the contain a plateau on each side of the ditch, which in periods are under the water level, and where green crops or willow is grown, and harvested for recycling of nutrients / avoidance of nutrient loss to the aquatic environment.

- **Gypsum**

  Alternative measures, aiming at similar effects, such as spreading gypsum on the fields.

SCIEN drainage technologies also comprise equipment for steering and management, and for measuring water flow and quality, and of course traditional drainage technology like drain pipes.

P-indices

P-index is a technology that supplements the P norms in the way that it further indicates, where there are high risks of P leaching despite the dosing is kept under the P norms. P-indexes are compulsory for installations for the intensive rearing of pigs in Iowa, USA, and have in Denmark been tested on pilot basis in a restricted area in connection to a LIFE project. Heckrath et al. (2007) made a review on P indexing tools for the Nordic countries, and concludes e.g. that:

- "Without addressing the role of critical source areas for P loss, policy measures to abate diffuse P losses are likely to be ineffective";

- "A common feature is that they are empirical, risk-based, user-friendly decision tools with low data requirements."; and
- "Phosphorus indices vary between the four Nordic countries in response to different agriculture, soil and climate."

Norms and standards are pre-requisites for a high re-circulation of expensive plant nutrients

The mandatory use of official P fertiliser norms is a way to ensure that livestock manure is not overdosed, as it easily happen when only the limits for N fertilization is respected. The HELCOM Convention decides that official P norms should be taken into use in all target countries, but this has so far only happened in four of the target countries.

Development of both P norms and a P-index would largely require cooperation among the relevant strategic and development research institutes around the Baltic Sea, as well as policy decisions, information campaigns and other measures for the implementation.

Table 3: Situation concerning official and legally based P-indices, P-norms and livestock manure standards in the countries in the Baltic Sea Region (partly after Foged, 2010).

Country	P-indices	P-norms	Livestock manures standards
Belarus			
Denmark			✓
Estonia			
Finland		✓	(✓)*
Germany	(✓)**	✓	✓
Latvia			

Country	P-indices	P-norms	Livestock manures standards
Lithuania			
Poland			
Russia			
Sweden		✓	✓

* Exists, but are not considered reliable.
** Simplified system, rather a P-balance calculation, but more advanced than a mere P-norm.

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Definition of descriptive parameters

The information to demonstrate / describe the different conditions for dissemination of the prioritised technologies in the Baltic Sea Region countries is structured by a set of parameters:

- **Strategies**
  'Strategies' refers more broadly to governmental recommendations or political goals, often based on expert commissions, gives an indication of the direction in which legislation is likely to be headed in the future.

- **Legislation**
  Legislation refers to the governing laws in the individual countries; primarily within the fields of agriculture, environment, and energy. It involves EU legislation as well as national legislation and the interconnection of the two with regards to implementation.

- **Framework conditions**
  'Framework conditions' refer to the administrative regulations issued by ministries on the basis of the laws. An example is economic measures such as grants and subsidies and how these are distributed in order to give incentives for developing certain projects or making certain investments.

- **Investment environment**
  Meant to contain the conditions for making investments in the given country; accessibility to investment capital, interest rate levels, inflation rates, technology prices compared to salary level, etc.

- **Innovation environment**
  With 'innovation environment' we refer to the conditions for starting up new businesses and activities. This might be help for growth via incubators, support opportunities, policies for entrepreneurship, and accessibility to advisory services.

- **Practical conditions**
  Encompasses basically all conditions that are of practical significance to the use of a specific technology, such as climate, infrastructure, etc.

- **Agricultural conditions**
  Refers to the general conditions which the agriculture in the country of interest offers. Specifically it might be livestock density, crop production, soil type, topography, climate, etc.

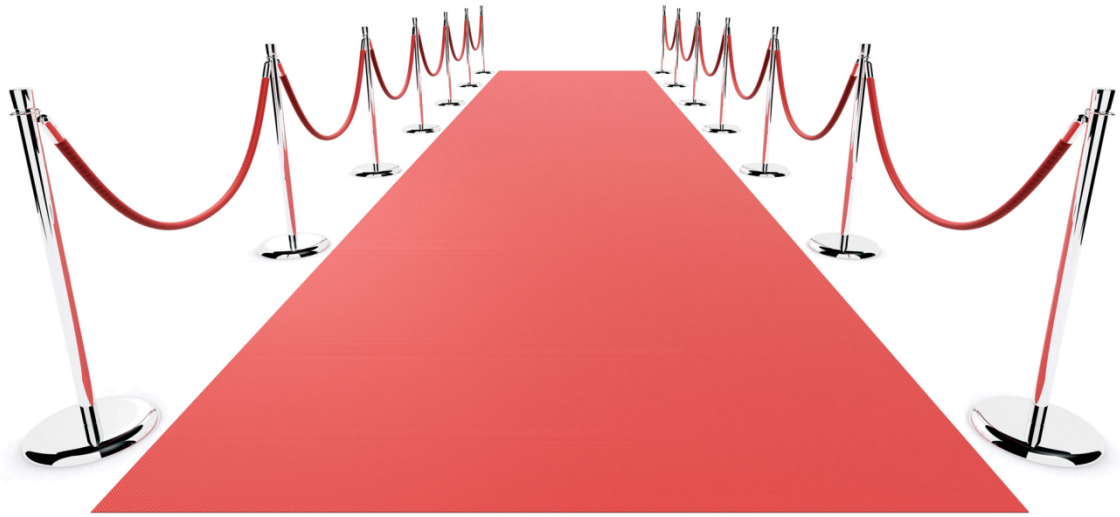
- **Technological conditions**
  'Technological conditions' is defined as the presence of existing structures and/or technologies that affects the possibility to introduce new technologies.

Universal enablers and barriers

Assuming that the selected / prioritised technologies as presented above deserves a wider use in all the countries in the Baltic Sea Region due to their overall positive contribution to the conservation of the environment and other policy goals, it is important to understand why / why not this disseminated use happen.

It is with other words important to clarify what motivates or deters farmers or other investors (farmers are normally investors in case of agro-environmental technology) from investing in the prioritised technologies.

The conditions that motivate or deter farmers from such investments are in this report called enablers and barriers.



A red carpet is a good expression of an enabler; something that pave the road and welcomes.

Especially politicians and NGO's are having influence on the overall strategies, the legislation, the framework conditions, the investment environment and the innovative environment. Researcher, (farm) advisers, the farmers/investors themselves as well as technology providers evaluates the practical, agricultural and technological conditions, and influence them where possible, in connection with investment decisions.

Although geography, climate, legislation, traditions and many other conditions are different in the countries in the Baltic Sea Region, there are certain universal conditions that promotes the use of technologies, and vice versa.

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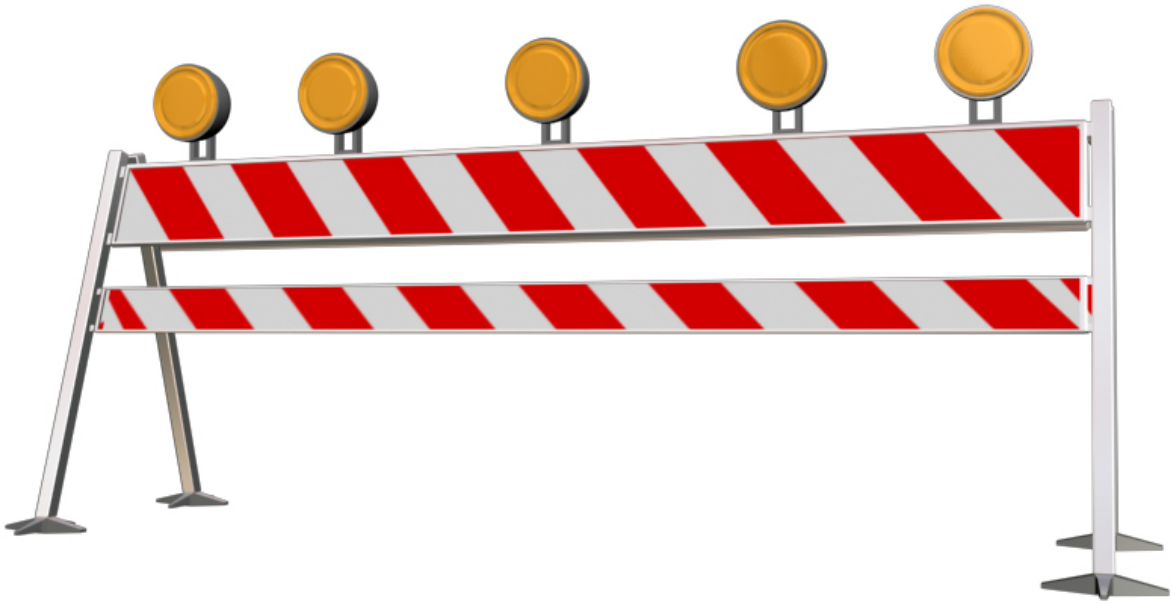

Road blocks are barriers for moving forward.

General barriers and enablers for implementation of each technology (non-country specific) have in the following sections been used to clarify the situation in each of the countries. It is in this way the intention of this Sector Study to demonstrate to all stakeholders how the technologies can be more widely disseminated; which barriers have to be removed, or which enablers must be established.

The country specific clarification is also meant to serve as a benchmark and as a code of good policy practice.

Examples

It is widely known and accepted that the subsidized price for electricity produced on basis of biogas, is an important parameter for the dissemination of biogas production. In Germany the price per kWh is up to € 0.25, while only € 0.10 in the neighbouring Denmark, and around € 0.15 in Latvia.

However, Table 1 above shows that there are more biogas plants in Denmark than in Latvia, wherefore the price is not the only decisive parameter. Latvia has had a period without subsidized biogas-electricity prices, and their farmers/investors have suffered under changing framework conditions that has been offered by the politicians during the last years.

Objective and subjective barriers and enablers

Whether a country's politicians offer stable framework conditions is quite difficult to measure in the given situation, while it is easy to make the conclusion retrospectively.

It is on the other hand easy to clarify objectively what the biogas electricity price is today.

We have therefore divided barriers and enablers into

- Objective parameters can immediately be clarified, quantified, described and documented through desk study.
- Subjective, important parameters, but impossible to measure in an objective way or document, wherefore our description will be based on peoples' perceptions via a Sector Study survey.

In order to illustrate the various results in the ten countries, a template has been developed. Please see below. The template introduces the specific descriptive parameter, whether or not the indicator is considered to be a subjectively or objectively, and if it is an enabler or a barriers towards the dissemination of the four prioritized technologies. The current situation is described, via the result of Desk Study (*Objectively)* or the Sector Study Survey (*Subjectively)*. A subjectively determined smiley gives a status on the current situation, and how it affects the dissemination of the technology in country.

DESCRIPTIVE PARAMETER		Indicator	Technology	Current situation	Status
Objectively	Enabler	Indicator	Which of the four technologies are affected by the indicator?	A **green smiley** signifies that the current situation in the country helps promote the technologies shown in the "technology" box. No matter if this is a barrier or an enabling indicator.	
	Barrier			A **yellow smiley** indicates that the current situation in the country is less than optimal, but somehow still promoting the technology to some extent. A yellow smiley also means that measures are taking to improve the situation. No matter if this is a barrier or an enabling indicator.	
Subjectively	Enabler			A red smiley signifies that the current condition in the country does not promote the giving technology. No matter if this is a barrier or an enabling indicator.	
	Barrier			Empty	

Throughout the Sector Study, some key ratios and other macro economical statistics and figures are used to give an indication of the situation in the ten countries. An arithmetic mean is calculated across the countries and used as a benchmark in order to describe the current situation. The authors recognize that this way of comparing for example consumer prices can be misleading, but still believes that it gives a good indication of barrier or enabler in the certain country.

Some spaces are empty, indicating that it was not possible to describe the certain situation in the country. This is especially the case of the Russian and Belarusian Sector Studies, mainly because no stakeholders from these countries filled out the survey and that objectively data was non-exiting.

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Sector Study: Overview

The following pages give a status of the situation in each of the ten countries, within the eight designated areas of analysis. Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor the through the result of the Sector Study. The information is especially insufficient in the case of Russia and Belarus, mainly because no Sector Study questionnaire has been filled out by stakeholders from these countries.

			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All										
			A strategy of agro-environmental technology development	All										
		Barrier												
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas										
			General focus on both the environmental and economic benefits of agro-environmental technologies	All										
			Political and public consensus on the future of the transport sector	Biogas										
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All										

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			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	POL	RUS	LIT	SWE
LEGISLATION	Objectively	Enabler	National water environmental plan	All										
			Educational requirements to farm owners	All										
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement										
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement										
			Official manure standards and norms	All										
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas										
			Smell regulations	Biogas										
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement										
		Barrier	Monopoly on electricity production and distribution	Biogas										
	Subjectively	Enabler												
		Barrier	Policy obstructions: Clashes between different stakeholders	All										
			Frequent policy changes in the country	All										
			Outdated legislations in the country	All										

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FRAMEWORK CONDITIONS			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All										
			A legislative demand for fertilizer plans and accounts.	All										
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas										
			Removal of taxes on electricity from biogas production.	Biogas										
		Barrier	Normal taxation on cars running on biogas	Biogas										
	Subjectively	Enabler												
		Barrier	Lack of regulative enforcement	Biogas										
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All										

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			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All										
			Low interest rates relative to Baltic Compass country average	All										
			Low inflation vs. Baltic Compass country average	All										
			Further increase in fossil fuels prices	Biogas										
			Increase in prices for farmland (average land rent)	SCIEN Drainage										
		Barrier	Low market prices for electricity	Biogas										
			High corruption vs. Baltic Compass country average	All										
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All										
		Barrier												

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			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
INNOVATION ENVIRONMENT	Objectively	Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All										
			High government and private R&D expenditures relative to GDP.	All										
			Lower company tax for SME, relative to bigger companies.	All										
			A overall positive entrepreneurial climate making innovation possible	All										
		Barrier												
	Subjectively	Enabler												
		Barrier	Low NGO support and influence	All										

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			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas										
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage										
		Barrier												
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage										
		Barrier	Poor baseline information	All										
			Low number of local contractors with drainage system experience	SCIEN Drainage										
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas										

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			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
AGRICULTURAL CONDITIONS	Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All										
		Barrier	National decrease in livestock production	Biogas, Separation										
		Barrier	Relative high taxations on farming and agricultural businesses	All										
	Subjectively	Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas										
		Barrier	Lack of cooperation between farmers	SCIEN Drainage, biogas										
		Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All										

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			Indicator	Technology	BEL	DK	EST	FIN	GER	LAT	LIT	POL	RUS	SWE
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas										
			Many biogas plants	Separation										
			A widely expanded and up to date drain system	SCIEN Drainage										
			High broadband connectivity in the country	All										
		Barrier												
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas										
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage										
			Lack of access to the different technologies and competences	All										
			Bad management of biogas plants	Biogas										

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Sector Study: Belarus

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Belarus. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

STRATEGIES		Indicator		Technology	Current situation	Status
	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All		
			A strategy of agro-environmental technology development	All		
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas		
			General focus on both the environmental and economic benefits of agro-environmental technologies	All		
			Political and public consensus on the future of the transport sector	Biogas		
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All		

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Indicator				Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All		
			A national requirement demanding people to have a minimum of educational before becoming farmers	All		
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	There is no requirement on storage capacity, no requirements on weather conditions when spreading manure or any requirements on green cover on fertilized fields during wintertime.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There is no regulation on the quantity of manure spread annually.	
			Official manure standards and norms	All		
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas		
			Smell regulations	Biogas		
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement		
		Barrier	Monopoly on electricity production and distribution	Biogas		
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All		
			Frequent policy changes in the country	All		
			Outdated legislations in the country	All		

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All		
			A legislative demand for fertilizer plans and accounts.	All	Each big industrial pig farm has a fertilization plan.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas		
			Removal of taxes on electricity from biogas production.	Biogas		
		Barrier	Normal taxation on cars running on biogas	Biogas		
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas		
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All		

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Indicator				Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All		
			Low interest rates relative to Baltic Compass country average	All	The interest rate is 16% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	Belarus has a high inflation compared to other countries: 7.3% 12 months average from 4/10-4/11 compared to the Baltic Compass country average 3.6%.	
			Further increase in fossil fuels prices	Biogas	Belarus has, like many other countries, experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage		
		Barrier	Low market prices for electricity	Biogas		
			High corruption vs. Baltic Compass country average	All	According to the Corruption Perception index, the corruption is high compared to other countries in the Baltic Compass project: 2.5 vs. Baltic Compass country average: 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All		
		Barrier				

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			Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively	Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All		
			High government and private R&D expenditures relative to GDP.	All		
			Lower company tax for SME, relative to bigger companies.	All		
			A overall positive entrepreneurial climate making innovation possible	All		
		Barrier				
	Subjectively	Enabler				
		Barrier	Low NGO support and influence	All		

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Indicator				Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The topography of Belarus is generally flat and contains much marshland. The highest point is 346 meter, which altogether makes Belarus a flat country suitable for draining.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
		Barrier	Poor baseline information	All		
			Low number of local contractors with drainage system experience	SCIEN Drainage		
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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			Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All		
		Barrier	National decrease in livestock production	Biogas, Separation	The livestock production was in index 150 in 2009 (Index 100: 1999-2001). So the livestock and manure production is increasing.	
			Relative high taxations on farming and agricultural businesses	All		
	Subjectively	Enabler	High livestock density	Biogas		
		Barrier	Lack of cooperation between farmers	SCIEN Drainage		
			A low risk willingness among farmers to try out new products and solutions will help promote	All		

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas		
			Many biogas plants	Separation		
			A widely expanded and up to date drain system	SCIEN Drainage		
			High broadband connectivity in the country	All	Around 32% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010).	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas		
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage		
			Lack of access to the different technologies and competences	All		
			Bad management of biogas plants	Biogas		

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Sector Study: Denmark

In this analysis, economic, environmental, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Denmark. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

STRATEGIES		Indicator	Technology	Current situation	Status
Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	According to national plans, 50% of all livestock manure must be used in energy production in 2020. In addition to this, there is a milestone that 30% of energy should come from RES by 2020; 12.1% of the renewable electricity will be based on biogas. Additionally, 5.4% of the renewable heat and cooling will be based on biogas. According to the survey, separation and biogas is mentioned as a part of the solution to fulfil these goals. SCIEN Drainage technologies are not being mentioned as a tool to reach the environmental goals.	
		A basic strategy of RE development	All	*"Energi Strategi 2050"* is a plan that describes how Denmark will get 100% of the energy from RES by 2050.	
	Barrier				
Subjectively	Enabler	Public acceptance, and local ownership to RE in the country	Biogas	Except of the NIMBY[4] hindrance, which can be found almost everywhere, there is a basic knowledge and a general acceptance of RES in Denmark. Furthermore, the local ownership is considered to be high, especially when it comes to minor investments and local economy.	
		General focus on both the environmental and economic benefits of RE technologies	All	An "*Expected job creations*" number is mentioned, but is not calculated in the National Renewable Energy Action Plan. The general tendency during the last years has been a growing focus on the economic opportunities derived from the various environmental legislations and technology development.	
		Political and public consensus on the future of the transport sector	Biogas	No transportation technology is dominant, but like the other EU countries, Denmark have signed the "*Directive on the promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Danish transport sector was 0%.	
	Barrier	General political standstill or hesitation to make political decisions within the RE area	All	Although some stakeholders ask for more action, the Danish politicians can be considered to be among the most active within RES politics in Europe. Furthermore, according to the Sector Study survey, there is a political understanding in Denmark to reduce the environmental impacts of agricultural production.	

[4] Not in my back yard

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			Indicator	Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan promoting "autumn green fields"	All	Denmark is a part of the *River Basin Management Plans 2009-2015*. Denmark has not yet adopted this plan, which is a part of the Water Framework Directive.	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	There are no requirements after 2010, where a new legislation was introduced. But education and certifications are offered.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	According to the Harmony Rules, the manure storage capacity should normally be at least 9 months.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There are no official P-norms, only recommendations.	
			Official manure standards and norms	Separation, biogas	According to the Sector Study survey, the official manure standards are implemented and used in the Danish agricultural sector.	
			Policies that make it possible for farmers to connect to energy grid and supply it with renewable electricity.	Biogas	It is possible for farmers and other biogas plant owners to supply electricity and heat produced from biogas. Since 1999, RE electricity has prioritized access to the grid.	
			Smell regulations	Biogas	Denmark is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it comply with all four ceilings (NO_x, VOC's, SO_2 and NH_3)	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Yes. Denmark has *Vandrammedirektivet* that contributes to the protection of drinking water reservoirs in Denmark. Furthermore, Denmark is committed to ensure high quality drinking water through *the EU Council Directive 98/83/EC* of 3 November 1998.	
		Barrier	Monopoly on electricity production and distribution	Biogas	The electricity market in Denmark has recently been liberalized, creating a market economy with many sellers. There are two companies with more than 5% share of generation capacity, and the share of the 3 biggest companies is around 75% (2007).	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All	Like many other countries and branches, there are some policy obstructions. For example between Nature Preservation Counsels and other nature NGO's. These clashes are considered to be difficult to avoid and a natural part of the political agenda.	
			Frequent policy changes in the country	All	There is tradition in Danish politics to make broad agreements across many political parties, but in the case of energy politics this is difficult to estimate. Due to the broad agreements across political and ideological interest and beliefs, frequent policy changes can be considered to be low.	
			Outdated legislations in the country	All	The Danish legislation is under constant change and evaluation, and there are no current examples of outdated legislation blocking dissemination of the three technologies.	

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		Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of RE technologies	All	For manure based centralized biogas plants and for farm scale biogas plants on organic farms, it is possible to receive grants up to 20% of the investment costs. No support for non-organic farm based biogas plants. According to the Sector Study survey, there are not enough economic incentives to build biogas plants in Denmark. In relation to drainage technology, it is possible to receive economic support for maintenance of drainage systems in Denmark.	
			A legislative demand for fertilizer plans and accounts.	All	The fertilization plan must be prepared for all farms over 10 ha prior to the start of the next harvest. It must be approved by the Danish Plant Directorate and kept for 5 years. Farmers have to calculate the amount of nitrogen in fertilizers used on the farm.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is 10 Euro cents per kWh, and the price is applied to all biogas plants and regulated once a year. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries.	
			Removal of taxes and tariffs on electricity from biogas production.	Biogas	Electricity and biogas from biogas plants are without tax and tariffs.	
		Barrier	Normal taxation on cars running on biogas	Biogas	There is normal taxation and duty on vehicles using biogas. Electric cars weighing less than 2000 kilo are exempt from registration tax, but this does not apply for hybrid cars. The taxation is based on fuel consumption and weight, and the tax on fuels is based on tax per energy unit, which does not favour biofuels. Tax exemptions on hydrogen cars and plug-in cars are being debated.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	According to the survey, Denmark can be considered to be a country where the agro-environmental legislation is met.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	According to the survey the permit process can be quite comprehensive.	

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		Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT – Objectively	Enabler	A central agency where farmers can receive advice concerning possible RES investments	All	The local Farmer Union section often helps farmers evaluating investments in different areas.	
		Low interest rates relative to Baltic Compass country average	All	1.3% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
		Low inflation vs. Baltic Compass country average	All	2.4% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
		Further increase in fossil fuels prices	Biogas	Denmark has, like many other countries experienced a rise in fuel prices. This is expected to continue.	
		Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Denmark was in index 160 (2008) Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of the farmland has risen from 2004-2008. High prices for farmland makes investments in drainage more economic reasonable.	
	Barrier	Low market prices for electricity	Biogas	Household: 25,5 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 9,3 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
		High corruption vs. Baltic Compass country average	All	9.3 Vs. Baltic Compass country average: 6.1.	
Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	The current economic condition of Danish farmers makes some of them incapable of lending money for investments in biogas, separation, drainage technologies and other bigger investments.	
	Barrier				

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		Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively – Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Denmark score 3.3 on the availability of venture capital and 3.5 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for these countries is 2.7 and 2.7 respectively. This shows that Danish entrepreneurs have better access to loans and venture capital than other countries in the Sector Study.	
		High government and private R&D expenditures relative to GDP.	All	The Corporate investment in R&D *(% of GDP)*: 1.5% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.7% (Baltic Compass countries: 0.6%, EU25: 0.6%)	
		Lower company tax for SME, relative to bigger companies.	All	The company tax is the same (25%) whatever the size of the company.	
		A overall positive entrepreneurial climate making innovation possible	All	The very positive entrepreneurial climate in Denmark does not seem to encourage entrepreneurship: while the country scores very high on the entrepreneurial climate index, Denmark scores low on the entrepreneurial activity index. From a competitiveness point of view, Denmark scores a 9th place worldwide when it comes to innovation and sophistication factor, with a 5.15 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
		Barrier			
	Subjectively – Enabler				
	Barrier	Low NGO support and influence	All	According to the Sector Study survey, the Danish NGOs have a say when making national and local politics.	

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			Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas	An adjustment of the Planning Act is a part of the Energy 2050 Strategy, and locations are being pointed out. But the survey respondents indicate that this commitment is far from fulfilled.	
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The average altitude of Denmark is about 30 m (98 ft), and the highest point is only 173 m. The topography in Denmark can be considered to be flat, which makes draining more suitable for optimization and usage of agricultural areas.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage	There are some wetlands, but these are mainly under nature conservation and not drainable.	
		Barrier	Poor baseline information	All	Information, on which to base a decision, is to a large extend available.	
			Low number of local contractors with drainage system experience	SCIEN Drainage	There are many companies with years of experience with establishing drains.	
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas	Wind power is a big industry and many turbines are build in Denmark, but do not in any way hinder the diffusion of biogas technology.	

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			Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 45% decline in the number of holdings from 1990 and 2007, and a smaller decrease (2%) in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Denmark.	
		Barrier	National decrease in livestock production	Biogas, Separation	The livestock production was in index 104 in 2009 (Index 100: 1999-2001), and has been increasing every year since 1992.	
			Relative high taxations on farming and agricultural businesses	All	There is no special tax on farming, but Denmark has the highest tax rate in the region. The VAT is 25%; the real estate tax on land used for agricultural purposes is set by local authorities (municipalities) but may not exceed 1.23%. There is also a tax on sale of real estate. The corporate income tax is 25% and among the highest.	
	Subjectively	Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	The livestock density is among the highest in the northern part of Europe; 1.72 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70.	
		Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All	According to the survey, there is a general willingness to invest and try new things in the Danish agricultural sector. But the economical situation makes it difficult to find available capital to invest.	
			Lack of cooperation between farmers	SCIEN Drainage, biogas	According to the Sector Study survey, the different players within the agricultural sector are willing to cooperate and do investments together.	

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	21% of the energy consumption comes from gas. Denmark is a net exporter of gas. Furthermore, the survey indicates that there is a market for upgraded gas, but the market is still in an early phase and it is not widespread. The consumption of natural gas and the existing natural gas grid makes biogas a relevant technology in Denmark.	
			Many biogas plants	Separation	There are a total of 81 centralized and farms based plants in Denmark. Many of them are older plants; few new plants have been built the last ten years. Once Denmark was a pioneer country within biogas plants, but this role has been taken over by Germany.	
			A widely expanded and up to date drain system	SCIEN Drainage	Between 50-60 % of farmland in Denmark is currently drained, but the condition of the drains is unknown.	
			High broadband connectivity in the country	All	Around 89% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010).	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	There is a large and well established gas grid in Denmark. The system is among the most widespread in Europe.	
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	Due to the demand for optimization, high tech products are used widely in the Danish agricultural sector.	
			Lack of access to the different technologies and competences	All	Local Agricultural Societies help diffuse new knowledge and technologies, according to the results from the Danish Sector Study survey.	
			Bad management of biogas plants	Biogas	Bad management has caused tribulations at several accounts, but there is also good practices when it comes to handling manure and smell from biogas plants.	

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Sector Study: Estonia

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Estonia. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

STRATEGIES		Indicator	Technology	Current situation	Status
Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	25% of energy should come from RES by 2020; None of the renewable electricity or heat/cooling will be based on biogas, according to the *National Renewable Energy Action Plan*. Neither SCIEN Drainage nor separation technologies are considered to be a part of the solution to meet the goals and targets.	
		A strategy of agro-environmental technology development	All	No strategy for biogas or other technologies. The government only views the benefits of biogas from an energy perspective, and not from an environmental point of view.	
	Barrier				
Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas	There was a growing concern that RE, including biogas received too many subsidies. The situation is uncertain due to political elections. On top of this, authorities consider biogas as an invalid technology, which has not yet been proven, according to the Sector Study survey.	
		General focus on both the environmental and economic benefits of agro-environmental technologies	All	Job creation is mentioned, but not calculated in the *National Renewable Energy Action Plan*.	
		Political and public consensus on the future of the transport sector	Biogas	No dominant technology, but like the other EU countries, Estonia have signed the "*Directive on the promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Estonian transport sector was not registered, but must be considered to be close to zero.	
	Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All		

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Indicator			Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All	Estonia has adapted the *River Basin Management Plan*, which is a part of the *EU Water Framework Directive*. The legislation is not fully implemented in the national legislation, but well under way.	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	There are no official educational requirements to become/be a farmer. If a farmer wants to get financial support/subsidy from a governmental organization, obligatory and specialized training must be fulfilled.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	There is a legal requirement to build storage capacity for the livestock manure. The required storage capacity is 8 months.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There are no official regulation standards regarding manure standards. There is a decree by the Environmental Ministry and the Ministry of Agriculture regarding water standards; however they need to be revised. No official P-norm or index exists.	
			Official manure standards and norms	All	There are no official regulation standards regarding manure standards, which is why these values are not implemented in Estonia.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	There are no policies, and the connection application is considered to be quite bureaucratic, especially for farmers with less time, application know-how and resources at his disposal.	
			Smell regulations	Biogas	Estonia is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it complies with all four ceilings (NO_x, VOC's, SO_2 and NH_3) There are no specialized legal acts in Estonia for odour-induced pollution detection and control. Currently, the issues pertinent to odour distribution limitation are being reviewed under the *Ambient Air Protection Act* (in force since 2004).	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Estonia is committed to ensure high quality drinking water through the *EU Council Directive 98/83/EC of 3 November 1998*. There are no drinking water supply systems in Estonia, which constantly fail to meet the requirements of microbiological parameters.	
		Barrier	Monopoly on electricity production and distribution	Biogas	Eesti Energia is obligated to cooperate with new energy companies, who want to sell electricity but they make the application practice very complex. Only around 10% of the market is open, mainly to large companies. All consumers should be able to choose between different suppliers in 2014. In Estonia, import and production of electricity requires a license. There is only one company with more than 5% share of generation capacity, and the share of the 3 biggest companies is 99% (2007). This company is Eesti Energia, which must be considered to be a monopolist player in the market.	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All	The legislation process is considered less complex than in other countries, according to the Sector Study survey.	
			Frequent policy changes in the country	All	To a large degree, there is a tradition for broad political consensus in Estonia. According to the Sector Study survey, frequent policy changes happen less often than in other countries.	
			Outdated legislations in the country	All		

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	Biogas: The feed in tariffs are considered insignificant (5 Euro cents per kWh) and the grants and soft credits to reduce investment and operational cost are not considered to have a significant effect. The investment support scheme for biogas plants is up to 19000 Euro. Subsidies, loans or grants are not seen to have an effect on the dissemination of separation and SCIEN Drainage technologies in Estonia.	
			A legislative demand for fertilizer plans and accounts.	All	The fertilization plans are a part of the IPPC directive, which only two industrial farms have received license to. The legislation is not fully implemented in the national legislation, but well under way.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is 5 Euro cents per kWh. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries, so the Estonian minimum price is low compared to other countries.	
			Removal of taxes and tariffs on electricity from biogas production.	Biogas	Electricity from biogas production is not treated differently than other energy sources.	
		Barrier	Normal taxation on cars running on biogas	Biogas	The only tax on all cars is VAT, but biofuels are exempted from excise tax.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	The regulative enforcement of agricultural-environmental issues is considered to be rather weak, according to the Sector Study survey.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	According to the survey, it is considered fairly easy to receive environmental permits for biogas plants.	

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			Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	According to the survey, Estonian investors and consultants are considered to be reasonable well informed about the possibilities in relation to the agro-environmental technologies.	
			Low interest rates relative to Baltic Compass country average	All	1.25% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	There is a 4.3% (12 months) average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Estonia has, like many other countries, experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings, it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Estonia was in index 206 (2008). Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of Estonian farmland has risen from 2004-2008.	
		Barrier	Low market prices for electricity	Biogas	The energy market is kept low, but the market is opening up. Household: 9,2 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 6,5 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. Baltic Compass country average	All	The perception index shows an above average corruption (6.5 vs. Baltic Compass country average: 6.1) which indicates a higher corruption in Estonia compared to other countries included in the Baltic Compass project.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	Difficult to evaluate, but the survey shows that the banking sector has a predominantly negative attitude towards investments in biogas, separation or drainage technologies.	
		Barrier				

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			Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively	Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Estonia score 3.3 on the availability of venture capital and 3.0 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for these countries are 2.7 and 2.7 respectively. This shows that Estonian entrepreneurs have better access to loans and venture capital than other countries.	
			High government and private R&D expenditures relative to GDP.	All	Corporate investment in R&D *(% of GDP)*: 0.4% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.5% (Baltic Compass countries: 0.6%, EU25: 0.6%)	
			Lower company tax for SME, relative to bigger companies.	All		
			A overall positive entrepreneurial climate making innovation possible	All	Compared with other EU25 Member States, Estonia has a slightly above-average score on the entrepreneurial activity index. This is despite its below-average score on the entrepreneurial climate index. From a competitiveness point of view, Estonia scores a 45th place worldwide when it comes to innovation and sophistication factor, with a 3.90 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
		Barrier				
	Subjectively	Enabler				
		Barrier	Low NGO support and influence	All	NGOs pay no taxes on grants and enjoy exemptions or deductions for income earned on the investment of grant funds or endowments. Following the Arhus Convention, NGOs are a part of the IPPC control system. Currently, the Estonian Biogas Association is working on raising the feed in tariffs, and the environmental NGO is considered to have a say in the Estonian legislation process.	

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		Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively – Enabler	A map of suitable sites for biogas plants	Biogas		
	Objectively – Enabler	Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	Estonia is a low, flat country with a hilly region in the southeast. This makes drainage technology relevant and suitable as a method for optimization.	
	Objectively – Barrier	No educational requirements for farmers	All	There are no official educational requirements to own a farm / be a farmer. If a farmer wants to get financial support / subsidy from a governmental organization, obligatory and specialized training hours must be fulfilled. But still, 32.9% are having basic or full agricultural training (EU27: 20%). In general, the Estonian farmer is considered rather modern and well managed, and according to the survey, the Estonian farmer knows how to manage manure.	
	Subjectively – Enabler	Large areas of wetlands	SCIEN Drainage	There are large areas of peat lands in Estonia, where around 59% have already been drained for forestry (50%) or agricultural purposes (9%).	
	Subjectively – Barrier	Poor baseline information	All	The Sector Study shows that the Estonian agricultural sector is interested in new technologies and eager to learn. But the level of information is difficult to estimate.	
	Subjectively – Barrier	Low number of local contractors with drainage system experience	SCIEN Drainage	There is a predominantly opinion that local Estonian contractors possess the capabilities to build and maintain biogas plants, separation equipment and advanced drainage technologies.	
	Subjectively – Barrier	Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas	All natural gas comes from Russia, which illustrates that the energy sector is highly dependent on the import from Gazprom. The former political connection to Russia and the energy dependence make Estonia highly vulnerable to Russian gas lobbyist.	

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		Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS – Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 37% decline in the number of holdings from 2003 and 2007, and an increase (21%) in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Estonia.	
	Barrier	National decrease in livestock production	Biogas, Separation	The livestock production risen to index 118 in 2009 (Index 100: 1999-2001), but compared to index 192 in 1992, the production has declined throughout the last twenty years.	
	Barrier	Relative high taxations on farming and agricultural businesses	All	There is no separate taxation on farming. The Estonian corporate income tax is 21%. Furthermore there is a pollution fee, where 75% goes to development within waste management. The fee is different from pollutant to pollutant and is paid per 1 ton of the pollutant. The tax on real estate is between 0.1 – 2.5% depending on the type; Tax for areas under cultivation is lower than the regular rate (between 0.1-2%). The Estonian VAT is 20% (standard), with reduced rates of 9% or 0%.	
AGRICULTURAL CONDITIONS – Subjectively	Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	0.35 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70. The livestock density, and by that the manure production per hectare must be considered to be low.	
	Barrier	Lack of cooperation between farmers	SCIEN Drainage, biogas	There is a general opposition against centralization, which often is associated with the planned economy rule in Soviet Union. Furthermore, a formal and effective cooperation between these stakeholders is not yet fully established or implemented.	
	Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All	The survey shows that there is a minor reluctance for investing in the three technologies. It is uncertain if this is a general unwillingness to invest in new technologies or a specific reluctance against investing in these three technologies.	

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	13% of the energy consumption comes from gas, in which almost 100% is imported (2008). The survey results indicate that there will be a market for upgraded biogas in Estonia.	
			Many biogas plants	Separation	There are currently 8 plants, but only one plant is an agricultural biogas plant. No new plants have been built since 2007.	
			A widely expanded and up to date drain system	SCIEN Drainage	Around 50-60% of the farmland is drainage, mainly by tiles which are outdated and need maintenance.	
			High broadband connectivity in the country	All	Around 74% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010). This indicates that knowledge and information diffusion happen less rapid in Estonia than in other countries, and also that IT is less used in Estonia than in other Baltic Compass countries.	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	46% of all heat comes from natural gas, so the grid exists, but is relatively old and needs to be upgraded and generally maintained. There are currently no biogas filling stations in Estonia. The Estonian electricity grid and the district heating are considered to be reliable, stable and well established, which makes is relatively easy for the diffusion of the three technologies.	
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	The Sector Study survey indicates that Estonian farmers use computers and high tech products in their daily work, although fewer people have access to the Internet than in other Baltic Compass countries.	
			Lack of access to the different technologies and competences	All	This is one of the major obstacles; there is a lack of information and knowledge on biogas plants, separation and SCIEN Drainage in Estonia.	
			Bad management of biogas plants	Biogas		

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Sector Study: Finland

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Finland. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

			Indicator	Technology	Current situation	Status
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	38% of energy should come from RES by 2020; Only 0.8% of the renewable electricity and heat/cooling will be based on biogas according to the *National Renewable Action Plan*. Controlled drainage and constructed wetlands are a part of the Finnish Agro-Environmental subsidy program.	
			A strategy of agro-environmental technology development	All	There is a target to get 400 constructed wetlands in Finland, but currently there is only around 100 agreements concerning investments. In addition to this, the survey indicates that there is a national Finnish strategy for increased biogas production.	
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas		
			General focus on both the environmental and economic benefits of agro-environmental technologies	All	Finland does not calculate the job creation or the socio-economic benefits of the implementation of the strategy in the *National Renewable Energy Action Plan*.	
			Political and public consensus on the future of the transport sector	Biogas	No dominant technology, but like the other EU countries, Finland has signed the "*Directive on the Promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Finnish transport sector was 2%.	
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	According to the survey, there is a political understanding to reduce the environmental effects of agricultural production. Whether or not there is a hesitation is unknown.	

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			Indicator	Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All	Finland is a part of the *River Basin Management Plans 2009-2015*, which has been adopted as a part of the *Water Framework Directive.*	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	In order to qualify for farm subsidies, a farmer needs to complete an agricultural education, which corresponds to 1/8 of a university degree.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	In order to receive subsidies, manure handling certificates are required. Furthermore, manure must be stored in storage tanks with a closed bottom, and farmers must have storage capacity equivalent to 12 months of manure production.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	P-norms are voluntary, but they must be complied with in order to receive environmental support. The P limits are based on crops grown and the soil P content. If only manure is used as P-fertilizer then 15-30 kg of manure total P can be spread depending on crop and soil P content.	
			Official manure standards and norms	All	No, but it is possible to use table values or own analyses in applications for environmental support. These are, according to the Sector Study survey, implemented and used in the agricultural sector.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	Rules concerning electricity plants linked to the network are uniform and equal to all. Access to the network is ensured through provisions of *the Electricity Market Act*, and the compliance with these provisions is monitored by the Energy Market Agency. Gas derived from biomass and other gases has access to the grid, if this gas is technically and safely supplied into the natural gas network and transferrable in that network. The technical rules on grid connection are not published.	
			Smell regulations	Biogas	Finland is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it complies with all four ceilings (NO_x, VOC's, SO_2 and NH_3).	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Finland is committed to ensure a high quality drinking water through *the EU Council Directive 98/83/EC of 3 November 1998*.	
		Barrier	Monopoly on electricity production and distribution	Biogas	There are four companies with more than 5% share of generation capacity, and the share of the 3 biggest companies is around 68%. (2007) This indicates that there is no monopoly or duopoly on the electricity production and distribution in Finland.	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All	The survey indicates that the different stakeholders have established a formal and effective cooperation.	
			Frequent policy changes in the country	All		
			Outdated legislations in the country	All		

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	Ministry of Agriculture and Forestry provides 15% grant and 20% soft loans for farm-scale biogas plants. Regional biogas plants can receive 10-35% investment support, dependent on the geographical location. Feed-in tariffs for electricity production on biogas are only available for regional biogas plants, and not for farm-scale biogas plants. According to the Sector Study survey there is a big interest in biogas plants but farm scale plants without any additional input and money from the food industry are still non-economical, and in general the support system for biogas plants is considered to be good enough promote the technology. For SCIEN Drainage, it is possible to apply for funds through the Rural Development Program, and these subsidies and grants help promoting drainage technologies in Finland. There are no existing subsidies for separation technologies, and in general the tools available for economic support are very limited. According to the survey, the cost of the separation equipment still makes the investment unfeasible.	
			A legislative demand for fertilizer plans and accounts.	All	Large-scale farms are obligated to posses fertilization plans, but the information about systems and fertilizer amount are not always accessible for the users.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is 13 Euro cents per kWh. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries. This tariff is still to be approved by the European Commission.	
			Removal of taxes on electricity from biogas production.	Biogas		
		Barrier	Normal taxation on cars running on biogas	Biogas	The registration tax is based on CO_2 emission; Every gram of carbon dioxide affects the size of the tax rate. No special tax exemption on hybrid cars or on biofuels in general.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	According to the survey, the regulative enforcement in Finland is making sure that the agro-environmental legislation is met.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	The Sector Study survey indicates that the process of receiving environmental permits for biogas plants can suffer from some degree of red tape.	

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Indicator				Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	Results from the Finnish Sector Study survey indicate that investors and their consultants are well informed about new technologies and their possibilities, and furthermore have access to data that make them capable of making reliable investments calculus.	
			Low interest rates relative to Baltic Compass country average	All	The interest rate in Finland is currently 1.25% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus). The low interest rate makes investments attractive, also within the agro-environmental sector.	
			Low inflation vs. Baltic Compass country average	All	The inflation rate is relatively low, also compared to the other countries: 2.3% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%. This contributes to an overall good investment environment.	
			Further increase in fossil fuels prices	Biogas	Finland has, like many other countries, experienced a rise in fuel prices. This is expected to continue, which will make the economic incentives for biogas production even stronger.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Finland was index 131 (2008). Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of the farmland has risen from 2004-2008. The increasing price of land makes investments in the farmland more economical profitable.	
		Barrier	Low market prices for electricity	Biogas	The market prices for electricity is considered to be just below average: Households: 12,9 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 6,8 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. Baltic Compass country average	All	There is a low rate of corruption in Finland. 9.2 Vs. Baltic Compass country average: 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	The economical situation of many animal farms is rather critical, so they are not able to fully invest in agro-environmental measures. The banking sector is more interested in the overall productivity of the farms in order to minimize risk and losses, according to the Sector Study survey.	
		Barrier				

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		Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively – Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Finland score 4.2 on the availability of venture capital and 4.5 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for these countries are 2.7 and 2.7 respectively. This shows that Finnish entrepreneurs have better access to loans and venture capital than other countries.	
		High government and private R&D expenditures relative to GDP.	All	Both the public and private R&D expenditures in Finland must be considered to be high, compared to the other countries: Corporate investment in R&D *(% of GDP)*: 2.3% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.9% (Baltic Compass countries: 0.6%, EU25: 0.6%) This means that there is a lot of focus on innovation in Finland in general, which the agro-environmental technology sector also could benefit from.	
		Lower company tax for SME, relative to bigger companies.	All		
		A overall positive entrepreneurial climate making innovation possible	All	Among the EU25 Member States, Finland scores highest on the entrepreneurial climate index. This favourable climate seems to have a positive effect on entrepreneurship: Finland has the highest rating on the entrepreneurial activity index. From a competitiveness point of view, Finland scores a 6th place worldwide when it comes to innovation and sophistication factor, with a 5.43 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
		Barrier			
	Subjectively – Enabler				
	Barrier	Low NGO support and influence	All		

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			Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The southern and western Finland consists of coastal plains suitable for draining. The northern part of Finland is mountainous, which makes SCIEN drainage less suitable.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
		Barrier	Poor baseline information	All		
			Low number of local contractors with drainage system experience	SCIEN Drainage	According to the Sector Study survey, local contractors possess the capabilities to build and maintain biogas plants, separation equipments and drainage technologies.	
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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		Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively – Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 32% decline in the number of holdings from 2003 and 2007, and a 106% increase in the number of holdings bigger than 50 hectare, there is a clear tendency that the farms become bigger and bigger in Finland. This makes it easier to achieve economies of scale and by that economical calculation that makes it feasible to invest in biogas and other agro-environmental technologies.	
	Objectively – Barrier	National decrease in livestock production	Biogas, Separation	The livestock production was in index 100 in 2009 (Index 100: 1999-2001), and with an index 98 in 1998 and 104 in 2003 as top and bottom, the production has not risen or fallen significantly throughout the last twenty years. This makes investments in the two technologies either more or less interesting.	
		Relative high taxations on farming and agricultural businesses	All	There is no special tax on farming in Finland. The VAT is 22% and the real estate tax is divided into two types: general tax (0.6-1.35%) and a special rate for permanent resident buildings and areas (0.32-0.75%).	
	Subjectively – Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	The Finnish livestock density is low compared to other countries, only 0.5 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70. But on a local level, there are areas with high livestock density where manure spreading is a problem.	
	Subjectively – Barrier	Lack of cooperation between farmers	SCIEN Drainage	According to the Finnish survey respondents, the different players in the agricultural sector are willing to cooperate and do investments together.	
		A low risk willingness among farmers to try out new products and solutions will help promote	All	The survey indicates that the agricultural sector is rather inventive, but the economical situation makes investments impossible.	

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	11% of the energy consumption comes from gas, in which almost 100% is imported (2008). The demand must therefore be considered to be fair and the incentives to produce biogas high.	
			Many biogas plants	Separation	69 biogas plants in 2009, over half is landfill based, but only 13 are using manure as their main input. The overall experience and technical expertise concerning biogas plants must be considered to be low. Furthermore, the demand for separation technologies is also low, even though the low livestock density makes investments in separation equipment more economical sound.	
			A widely expanded and up to date drain system	SCIEN Drainage		
			High broadband connectivity in the country	All	Around 87% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010). This indicates a high connectivity and usage of the Internet in Finland, and, thereby, a good base for knowledge sharing.	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	According to the Sector Study survey, district heating is widespread, but the natural distances from the farms often make investments unfeasible. In relation to the power grid, storms can cause blackouts especially in the rural areas. Otherwise the grid is considered to be rather stable.	
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	Results from the survey indicate that the agricultural sector in Finland use computers and high tech products in their daily work. Therefore, an introduction of a new high tech tool to manage SCIEN drainage is more likely to be accepted.	
			Lack of access to the different technologies and competences	All	Results from the Finnish Sector Study survey indicate that investors and their consultants are well informed about new technologies and their possibilities. Therefore, they are well informed about how to access the different technologies and competences.	
			Bad management of biogas plants	Biogas		

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Sector Study: Germany

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Germany. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

			Indicator	Technology	Current situation	Status
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	According to the targets, 20% of energy should come from RES by 2020; 10.8% of the renewable electricity will be based on biogas. Additionally, 11.7% of the renewable heat and cooling will be based on biogas. But according to the German Sector Study survey, there are no environmental criteria which biogas, separation or SCIEN drainage has to meet.	
			A strategy of agro-environmental technology development	All	The Sector Study survey indicates that Germany has a national strategy for biogas production, but no strategy for either separation or SCIEN drainage. A lack of a strategy to increase the use of drainage and separation will not promote the technologies.	
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas	According to the Sector Study survey, there is a public discussion among stakeholders concerning that all the maize used in biogas production is changing the German landscape in a negative way. Furthermore there is a discussion about the environmental benefits of using maize in biogas production, and criticism that the maize takes up room for food production in a time where the food demand and the prices for food are high.	
			General focus on both the environmental and economic benefits of agro-environmental technologies	All	Germany has focus on job creation within the agro-environmental sector, and uses this opportunity to increase regional and rural output, thus creating jobs in these regions. This is a part of the *National Renewable Energy Action Plan* from 2009. According to the Sector Study survey, economic feasibility is priority number one, and the environmental benefits are second.	
			Political and public consensus on the future of the transport sector	Biogas	No dominant technology, but like the other EU countries, Germany has signed the "*Directive on the Promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the German transport sector was 5%.	
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	Results from the survey indicate that there is political understanding in Germany to reduce the environment impacts of agricultural production.	

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			Indicator	Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All	Germany is a part of the EU River Basin Management Plans 2009-2015, which has been adopted as a part of the Water Framework Directive. According to the Sector Study survey, the EU legislation is fully implemented in the German legislation.	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	Germany has no restrictions for becoming a farm owner, but there are several related restrictions; among them a certificate to apply pesticides. There are also restriction within areas of machine handling and "safety at work", which is controlled on a national level.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	The *Ordinance on Fertilization* includes regulations concerning storage facilities, equipment and best available techniques.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There is an official P-norm balance; 20 kg per hectare as average during the last 6 years.	
			Official manure standards and norms	All	Yes, in the German regulation on fertilizer use there are standards for each animal concerning N. P are also included in the calculation. According to the survey, these standards are fully implemented and used in the German agricultural sector.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	The grid operator must buy electricity from renewable sources preferentially and without delay, transmit and distribute it, according to *The Renewable Energy Sources Act.*	
			Smell regulations	Biogas	Germany is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it comply with two emission ceilings (VOC's and SO_2) Germany expect to exceed the NO_x ceiling with less than 10% and more than 10% when it comes to the NH_3 ceiling.	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Germany is committed to ensure high quality drinking water through the EU *Council Directive 98/83/EC of 3 November 1998*.	
		Barrier	Monopoly on electricity production and distribution	Biogas	There are four companies with more than 5% share of generation capacity, and the share of the 3 biggest companies is around 85%(2007). The German electricity market must be considered to be open and not suffering from monopolistic market conditions.	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All	The Sector Study shows that there are some policy obstructions and lack of cooperation between some stakeholders. Especially when it comes to cooperation between the people with very different backgrounds and when it comes to the political enforcement.	
			Frequent policy changes in the country	All	According to the German Sector Study survey, the German and European legislation is too complex and with contradicting legal acts. Furthermore, the current subsidy scheme ends in a few years, which makes future investments more risky. Although these issues hinder technology diffusions, there is a tradition to make broad decisions in the environmental law making.	
			Outdated legislations in the country	All		

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	There are high subsidies towards biogas production from energy crop and animal manure, but no investment support schemes. There are no subsidies promoting SCIEN drainage or separation technologies. Despite lack of grants, farmers are investing in some separation technologies.	
			A legislative demand for fertilizer plans and accounts.	All	According to the *Ordinance on Fertilizaing*, fertilizer balances must be prepared and fertilizers must be applied according to the plant requirements. The regulations include *best available techniques*.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is between 15-25 Euro cent per kWh depending on capacity of the plant, the use of energy crops/manure and heat utilization. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries, so the German subsidy situation must be considered to be beneficial towards the dissemination of biogas.	
			Removal of taxes on electricity from biogas production.	Biogas		
		Barrier	Normal taxation on cars running on biogas	Biogas	Electric vehicles are exempt from the annual circulation tax for a period of five years from the date of their first registration, but there is no tax exemption on hybrid cars. The circulation tax is based on CO_2 emission, and consists of a base tax and a CO_2 tax. There is planned a ten years exemption from all vehicle tax for electro cars, depending on the age. Second generation biofuels, biogas and pure bio ethanol are granted a digressive tax incentive until 2015. Currently, there is no tax levied on these fuels.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	Despite the cooperation problems between the stakeholders, described earlier, the regulative enforcement in Germany can be considered to be fairly good, according to the Sector Study survey.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	According to the survey, the process gaining building permits is fairly easy and does not suffer from bureaucracy.	

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			Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	Many consultants help farmers to make their investment decisions in the biogas sector, and according to the survey investors have access to reliable economic calculi and data.	
			Low interest rates relative to Baltic Compass country average	All	The interest rate in Germany is low; 1.25% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	The Germen inflation is low compared to other countries; 1.6% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Germany has, like many other countries experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Germany was in index 110 (2008) Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of the farmland has risen from 2004-2008.	
		Barrier	Low market prices for electricity	Biogas	Within implementing the purchasing power, the German electricity is expensive, especially for households: Household: 22,9 EUR/100 kWh. (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 11,3 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. Baltic Compass country average	All	The corruption rate in Germany is low, relatively compared to other countries: 7.9 vs. Baltic Compass country average: 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	According to the Sector Study survey, the banking sector is a major obstacle when it comes to promotion and dissemination of renewable energy, including biogas.	
		Barrier				

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			Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively	Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Germany score 2.8 on the availability of venture capital and 2.8 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for the countries is 2.7 and 2.7 respectively. This indicates that German entrepreneurs have average access to loans and venture capital compared to the other Baltic Compass countries.	
			High government and private R&D expenditures relative to GDP.	All	The overall R&D expenditure is high in Germany: Corporate investment in R&D *(% of GDP*) is 1.7% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP*): 0.7% (Baltic Compass countries: 0.6%, EU25: 0.6%). According to the German Sector Study survey, there are R&D funds available for innovation within biogas. There is no public support to innovation within drainage or separation technologies.	
			Lower company tax for SME, relative to bigger companies.	All		
			A overall positive entrepreneurial climate making innovation possible	All	Germany shows an average score on the entrepreneurial activity index, but the country's score on the entrepreneurial climate index is slightly above the EU25 average. From a competitiveness point of view, Germany scores a 5th place worldwide when it comes to innovation and sophistication factor, with a 5.51 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
		Barrier				
	Subjectively	Enabler				
		Barrier	Low NGO support and influence	All	The German NGOs have a say and an influence on the political scene, according to the Sector Study survey.	

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Indicator			Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The northern part of Germany is flat just like Poland and Denmark. This makes SCIEN Drainage technology more relevant.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
			Poor baseline information	All		
		Barrier	Low number of local contractors with drainage system experience	SCIEN Drainage	According to the survey, the local German contractors possess the capabilities to build and maintain biogas plants, separation equipment and SCIEN drainage technologies.	
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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			Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 43% decline in the number of holdings from 1990 and 2007, and a significant increase (52%) in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Germany.	
		Barrier	National decrease in livestock production	Biogas, Separation	The livestock production was in index 105 in 2009 (Index 100: 1999-2001), and has risen every year since 1992.	
			Relative high taxations on farming and agricultural businesses	All	There is no special and direct tax on farming, only the corporate tax which is 15% (nominal), and 14% local profit rate. Furthermore, the German VAT is 19%. The real estate tax depends on the type and the value of the property. The tax consists of a basic rate (0.6% for agricultural real-estate) and an additional fee determined by the local municipality.	
	Subjectively	Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	The livestock density is high in Germany, which favours biogas technology and production; 1.06 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70.	
		Barrier	Lack of cooperation between farmers	SCIEN Drainage, biogas	According to the survey, the stakeholders are working well together within the framework and the investment conditions.	
			A low risk willingness among farmers to try out new products and solutions will help promote	All	Results from the German sector study survey shows that the German farmers are willing to invest time and money in biogas production. Furthermore, the farmers are interested in new technologies and eager to seek new knowledge.	

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		Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS – Objectively – Enabler		A high demand for natural gas, relative to other energy sources.	Biogas	22% of the energy consumption comes from gas, in which 80-90% is imported (2008), so the demand for biogas is to be considered high. According to the survey, there is a market for upgraded biogas in Germany.	
		Many biogas plants	Separation	2011 outlook: 6800 biogas plants corresponding to the production of 2559 MW, so biogas is widely used in Germany.	
		A widely expanded and up to date drain system	SCIEN Drainage		
		High broadband connectivity in the country	All	Around 82% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010). The broadband connectivity must be considered to be high, which makes the access to knowledge and information about agro-environmental technologies easy.	
	Barrier				
Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	The district heating system only corresponds to around 1/8 of the heating in Germany. But the electricity grid is considered stable and reliable by the German survey respondents.	
	Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	The German agricultural sector is making use of high tech equipment in the daily work, according to the survey.	
		Lack of access to the different technologies and competences	All		
		Bad management of biogas plants	Biogas		

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Sector Study: Latvia

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Latvia. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

			Indicator	Technology	Current situation	Status
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	According to national plans 40% of energy should come from RES by 2020. But in relation to this, no renewable electricity will be based on biogas and only 3.5% of the renewable heat and cooling will be produced from biogas. Separation and SCIEN Drainage technologies are not mentioned as a part of the solution to fulfil these goals.	
			A strategy of agro-environmental technology development	All	According to the results from the Sector Study survey, there is a lack of support for innovation and technology development within the agro-environmental sector.	
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas	Public acceptance is sometimes problematic to get, and the public awareness about the possibilities of biogas production is also very low according to the Sector Study.	
			General focus on both the environmental and economic benefits of agro-environmental technologies	All	*The National Renewable Energy Action Plan* divides the job creation into two different types: Direct and indirect job creation due to the use of different renewable technologies in Latvia, and calculates the social economic effects of more extensive use of RES.	
			Political and public consensus on the future of the transport sector	Biogas	No dominant technology, but like the other EU countries, Latvia have signed the "*Directive on the Promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Latvian transport sector was 0%.	
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	According to the Sector Study survey, there is a political understanding in Latvia to reduce the environmental impacts originating from agricultural production.	

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Indicator			Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All	*The Water Framework Directive and Environmental Policy Strategy 2009-2015* is a national environmental plan. Furthermore, Latvia has adapted the River Basin Management Plan 2009-2015. It is unknown how these plans are implemented.	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	There are no specific education requirements to become a farmer, only a few certifications related to if safety is needed.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	Manure spreading during the wintertime is illegal in the "vulnerable zones" and farms situation within these areas are obliged to have a minimum of 6 months capacity for manure and 7 for slurry. There is no legislation on storage and handling in areas not categorized as vulnerable areas, only a *Code of Good Practice* recommendation where handling and storage is mentioned.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There are no official P-norms, only recommended norms.	
			Official manure standards and norms	All	No norm is implemented, but an official manure standard has been under development since 2008. Still not approved by authorities.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	RES has equal access to the grid, as for all other producers. But the legislation does not favour those using RE electricity. Establishing connection to the electricity grid is a very time consuming, expensive and bureaucratic procedure, and there is no official connection rules published.	
			Smell regulations	Biogas	Latvia is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it complies with all four ceilings (NO_x, VOC's, SO_2 and NH_3).	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Latvia is committed to ensure high quality drinking water through the *EU Council Directive 98/83/EC of 3 November 1998*.	
		Barrier	Monopoly on electricity production and distribution	Biogas	The market is open and companies and private people can choose from several electricity suppliers. But the market price is regulated, and well below EU average. The market for distribution is dominated by one company, the 100% Latvergo state monopoly owned distribution network. In contrast to the Nordic Countries, where the consumer can switch at a moment's notice, the current advance notification process in Latvia last for 3 months. There is only one company with more than 5% share of generation capacity, and the share of the 3 biggest companies is around 93% (2007).	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All	There is a gap between potential biogas producers and biogas project developers and investors. Especially the cooperation between different farmers can be problematic. The sector study indicates a need for an intermediate body between these.	
			Frequent policy changes in the country	All	According to the Sector Study survey results from Latvia, there is a tradition for broad political agreements, which initially lead to less frequent policy changes in the country.	
			Outdated legislations in the country	All		

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		Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	New biogas investments can receive 40% support under the *Rural Development Program*. It is unknown if this will continue. The electricity and heat prices are too low, which together with the expensive technology make investments in biogas production unfeasible. According to the survey, the grant, soft credits and subsidies do not make up a significant economic support for biogas investments in Latvia.	
			A legislative demand for fertilizer plans and accounts.	All	There is no legislative requirement to use fertilizer plans, but a *Code of Good Practice* in relations to the management of fertilizer is adapted.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is estimated to be around 15 Euro cents per kWh. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries.	
			Removal of taxes on electricity from biogas production.	Biogas	The absence of realization of long-term policy in the Cabinet of Ministers' level contradicts with the already accepted long-term policy programs. Therefore the amount of feed in tariff (one of the highest in EU) so far had no great impact on the promotion of biogas electricity production increase in Latvia.	
		Barrier	Normal taxation on cars running on biogas	Biogas	The tax is based on CO_2 emission and weight, but there is no special tax exemption on hybrid cars. There are duty reliefs on biofuels and mineral oil/biofuels blends.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	According to the survey, the regulative enforcement is making sure that the agro environmental legislation is met.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	Existing legislation in Latvia determines that before being able to receive a building permit it is necessary to organize a public discussion. And public support in Latvia can be difficult to get, according to the survey. Permitting procedures for biogas projects are inconsistent, involving numerous levels and departments, as well as time- and resource intensive.	

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			Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	There are farmer associations and other agencies, but they do not possess the knowledge or the competencies to proper advice the farmers in agro-environmental investments. But there is a lack of statistical data, mainly on biogas plant potential.	
			Low interest rates relative to Baltic Compass country average	All	The interest rate in Latvia is above the average rate in the other countries, which makes investments more expensive. The rate is 3.5% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	There is a low inflation in Latvia: 1.3% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Latvia has, like many other countries experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Latvia was in index 157(2008). Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of the farmland has risen from 2004-2008.	
		Barrier	Low market prices for electricity	Biogas	The prices for electricity are below average compared to other markets. Household: 10,5 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 8,9 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. EU25 average	All	There is a fair rate of corruption in Latvia: Index 4. 3 vs. EU25: 6.0.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	Difficult to assess, but according to the survey there is a predominantly negative attitude towards agro-environmental technologies in the Latvian banking sector.	
		Barrier				

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		Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively – Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Latvia score 2.2 on the availability of venture capital and 2.0 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for the countries is 2.7 and 2.7 respectively. This shows that Latvian entrepreneurs have more difficulties in gaining access to loans and venture capital than other countries, which contributes to less innovation, also within the agro-environmental sector.	
	Objectively – Enabler	High government and private R&D expenditures relative to GDP.	All	The investments in R&D, including the agro-environmental sector are low compared to other Baltic Compass countries; Corporate investment in R&D *(% of GDP)*: 0.2% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.4% (Baltic Compass countries: 0.6%, EU25: 0.6%).	
	Objectively – Enabler	Lower company tax for SME, relative to bigger companies.	All	The company tax is the same for all companies, 15%.	
	Objectively – Enabler	A overall positive entrepreneurial climate making innovation possible	All	Latvia's score on the entrepreneurial activity index is among the highest in the EU25. This positive result for the entrepreneurial activity index is, however, not repeated for the entrepreneurial climate index: Latvia scores below the EU25 average. From a competitiveness point of view, Latvia scores a 77th place worldwide when it comes to innovation and sophistication factor, with a 3.37 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
	Objectively – Barrier				
	Subjectively – Enabler				
	Subjectively – Barrier	Low NGO support and influence	All	According to the Sector Study survey, the NGOs have a say in the Latvian legislation process.	

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		Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS – Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
		Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The highest point in Latvia is only 312 meters, so it is possible to conclude that the country is flat.	
	Barrier	No educational requirements for farmers	All	There are no education requirements to become a farmer, only a few requirements concerning work security, plant protection, chemicals application and transport of dangerous substances.	
		A functional transportation system and reliable and accessible gas supply lines	Biogas	According to the survey, biogas for transport is in the early stages, although there are experiences with natural gas in the transportation sector. There is a lack of long term policies, lack of gas stations, appropriated vehicles and public awareness in Latvia. But there is biofuel production in Latvia, and currently 14 plants are built.	
PRACTICAL CONDITIONS – Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
	Barrier	Poor baseline information	All	There is a general lack of information on which to base various agro-environmental investment decisions upon. Furthermore, there is a need for more information about the benefit of separation technologies.	
		Low number of local contractors with drainage system experience	SCIEN Drainage	Due to public support to maintenance and improvements, and despite of general financial struggles, there are two or three specialized companies functioning in each district. Whether or not they are able to build and maintain SCIEN drainage is unknown.	
		Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas	A lot of natural gas is imported from Russia, which could make it difficult to introduce alternative energy solutions. The electricity plants are built to use gas, which makes it difficult to use alternative energy sources.	

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		Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively – Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 15% decline in the number of holdings from 2003 and 2007, and a 35% increase in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Latvia.	
	Objectively – Barrier	National decrease in livestock production	Biogas	The livestock production rise to index 126 this year (Index 100: 1999-2001), but compared to index 274 in 1992, the production has declined throughout the last twenty years.	
	Objectively – Barrier	Relative high taxations on farming and agricultural businesses	All	There is no special taxation on farming in Latvia. The VAT is 21% with a reduced rate at 10%, and tax on real estate is 1.5% progressing depending on the value of the estate (up to +0.3%) In addition to this, there is a tax on natural resources, depending on the type and the amount. This includes products that are dangerous to the environment. The company tax in Latvia is 15%.	
	Subjectively – Enabler	High livestock density	Biogas	Generally the location of small animal farms is so wide dispersed that it is difficult to develop centralized biogas plants, which are economically feasible. Livestock density per ha in Latvia: 0.28 (EU27: 0.78).	
	Subjectively – Barrier	Lack of cooperation between farmers	SCIEN Drainage		
	Subjectively – Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All	Farmers are conservative and do not want to change their management habits, being suspicious and not willing to take a risk in new investments. Furthermore, the Sector Study survey results indicate that Latvian farmers are less eager and interested in new technologies.	

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	30% of the energy consumption comes from gas, in which 80-90% is imported (2008). 30% of the energy production comes from Russian oil or natural gas. Nonetheless, the result of the Sector Study survey shows that there is no market for upgraded biogas.	
			Many biogas plants	Separation	There are 12 new biogas plants; half of them based on livestock manure or energy crops. Many new plants are under construction. 48 plants are under construction or in some other stage.	
			A widely expanded and up to date drain system	SCIEN Drainage	The area drained produces 80% of all vegetables in Latvia. Around 1.6 million ha (around 67% of total agricultural land) is drained, mainly by subsurface drains.	
			High broadband connectivity in the country	All	Around 68% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010).	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	The concept of district heating is widespread in Latvia. More than 70% of heat is produced in district heating systems. In addition to this, the Sector Study survey indicates that the electricity grid is neither stable nor reliable.	
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	The Sector Study survey results indicate that the Latvian farmers predominantly do not use computers and high tech products in their daily work.	
			Lack of access to the different technologies and competences	All	There is access to foreign biogas technologies, but there is a major lack of competences in almost all biogas related management situations, from investment to everyday management. It is the same with SCIEN drainage and to a high degree also separation technologies.	
			Bad management of biogas plants	Biogas	There are no technology providers in Latvia, and there is a local need for biogas experts with knowledge on biogas production.	

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Sector Study: Lithuania

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Lithuania. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

		Indicator	Technology	Current situation	Status
STRATEGIES	Objectively – Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	According to the environmental plans, around 23% of energy should come from RES by 2020; 14% of the renewable electricity will be based on biogas. Additionally, 4.8% of the renewable heat and cooling will be based on biogas. According to the Sector Study survey, there are no environmental targets that can be reached by applying SCIEN drainage technologies. According to the Lithuanian respondents, there are no biogas demonstration plants. The only experimental plant is situated in Kaunas at the Lithuanian Agro Academy.	
		A strategy of agro-environmental technology development	All	According to the Sector Study survey, the focus in Lithuania is mainly on the implementation of the strategies and making sure that farmers comply with the manure treatment requirements. The development of new manure treatment methods is therefore less important.	
	Objectively – Barrier				
	Subjectively – Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas		
		General focus on both the environmental and economic benefits of agro-environmental technologies	All	Job creation and innovation is hardly mentioned in the *Lithuanian National Renewable Energy Action Plan*. In general it is difficult to speculate if both the economic and the environmental benefits are taken into account when planning. The survey indicates that there is a lack of political support towards the dissemination of biogas and separation in the country. Furthermore, there is too much attention set on modernization than environmental issues in the Lithuanian legislation process.	
		Political and public consensus on the future of the transport sector	Biogas	No dominant technology, but like the other EU countries, Lithuania has signed the *"Directive on the promotion of the use of biofuels and other renewable fuels for transport"* which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Lithuanian transport sector was 3%.	
	Subjectively – Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All		

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Indicator			Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All	Lithuania is a part of the *River Basin Management Plans 2009-2015*, which has been adopted as a part of the *Water Framework Directive.* But according to the Sector Study survey, additional work is needed to fully implement and correspond to the EU regulations.	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	If you want to become a farmer you have to have an education in the field of agriculture or to pass the training on farming. To get EU funding, this certificate is needed.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	The storage capacity allows for 8 months storing. 10 months if the storage containers are located in the coastal zone.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There are plans to introduce a maximum of 40 kg P per hectare, but there is no official P-norm yet.	
			Official manure standards and norms	All	No official manure standards have been established in the legislation. Only scientific data is established.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	The *Lithuanian National Renewable Energy Action Plan* describes several measures to enable and ease the connection to the electricity grid. These measures are already started. Technical conditions concerning the connection of biogas supply systems to the natural gas grid are under development.	
			Smell regulations	Biogas	Lithuania is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it complies with all four ceilings (NO_x, VOC's, SO_2 and NH_3).	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Lithuania is committed to ensure high quality drinking water through the *EU Council Directive 98/83/EC of 3 November 1998.*	
		Barrier	Monopoly on electricity production and distribution	Biogas	Around 10% of the market is open, mainly for large companies. But due to lack of a clear and understandable market organization, free competition is hindered. Various producers of electricity are able to participate on the energy market, which is administrated by Lithuanian Põhivõrk. There are three companies with more than 5% share of generation capacity, and the share of the 3 biggest companies is 84%. The market must be considered closed, and therefore to some degree monopolistic.	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All	The Sector Study survey indicates a lack of cooperation between the different stakeholders.	
			Frequent policy changes in the country	All		
			Outdated legislations in the country	All	According to the Sector Study survey, the Lithuanian environmental legislation is not updated, resulting in less stimulation of the agro-environmental technologies like biogas, separation and SCIEN drainage.	

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	For biogas plants, it is possible to receive up to 65% of the investments cost with an upper limit of 200.000 Euro. The Sector Study survey indicates a lack of (financial) support from the Lithuanian government, towards the dissemination of biogas and separation.	
			A legislative demand for fertilizer plans and accounts.	All	Only large-scale farms are obligated to establish fertilization plans, which is subject to consultations.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is 9 Euro cents per kWh, and equal to all renewable sources. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries. The subsidy for biogas production is low in Lithuania.	
			Removal of taxes and tariffs on electricity from biogas production.	Biogas		
		Barrier	Normal taxation on cars running on biogas	Biogas	VAT is the only tax on tax on cars in Lithuania, but there is no VAT exemption on any cars using biofuels. Concerning consumption of biofuels, legal persons who submit documents certifying the consumption of biofuels will be exempted from pollution tax.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	Result of the Sector Study survey indicates that the regulative enforcement is quite strong, and that all farmers are fully controlled.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	The Sector Study survey shows that the process receiving environmental permits for biogas plants is considered far from easy.	

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Indicator			Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All		
			Low interest rates relative to Baltic Compass country average	All	The interest rate is low in Lithuania: 2% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	Also the inflation must be considered to be low: 2.5% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Lithuania has, like many other countries experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Lithuania was in index 190 (2008). Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of the farmland has risen from 2004-2008.	
		Barrier	Low market prices for electricity	Biogas	The prices for electricity (without taken purchase power into account) are relative low compared to other markets. Household: 9,3 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 7,9 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. Baltic Compass country average	All	The corruption is fairly high, compared to other countries: Factor 5 vs. Baltic Compass country average: 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All		
		Barrier				

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			Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively	Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Lithuania score 2.2 on the availability of venture capital and 2.2 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for these countries are 2.7 and 2.7 respectively. This shows that Lithuanian entrepreneurs have less access to loans and venture capital than other countries, which is damaging for innovation.	☹
			High government and private R&D expenditures relative to GDP.	All	The investments in R&D are among the lowest compared to other Baltic Compass countries. Corporate investment in R&D *(% of GDP)*: 0.2% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.4% (Baltic Compass countries: 0.6%, EU25: 0.6%).	☹
			Lower company tax for SME, relative to bigger companies.	All		
			A overall positive entrepreneurial climate making innovation possible	All	The slightly below-average score for Lithuania on the entrepreneurial activity index corresponds with its relatively low score on the entrepreneurial climate index: Lithuania scores below average on almost all of the indicators linked to the latter index. From a competitiveness point of view, Lithuania scores a 48th place worldwide when it comes to innovation and sophistication factor, with a 3.79 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	☹
		Barrier				
	Subjectively	Enabler				
		Barrier	Low NGO support and influence	All		

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			Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The topography of Lithuania is characterized by alternating regions of highlands and lowlands, but the primary feature is a low-lying central plain. The highest point is 292 meter, which altogether makes Lithuania a flat country suitable for draining.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
		Barrier	Poor baseline information	All	According to the Lithuanian Sector Study survey, only big farms are interested in biogas, and have the possibilities to get information about the technology. Although that large farmers and businesses know about biogas, more information about the environmental issues is needed, especially in the rural areas. There are Lithuanian companies offering agro-environmental technologies like biogas, separation and SCIEN drainage, but the economic calculus are considered less reliable.	
			Low number of local contractors with drainage system experience	SCIEN Drainage	The general competences to build and maintain agro-environmental technologies are present in Lithuania, according to the Sector Study survey.	
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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		Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively – Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 6% decline in the number of holdings from 2003 and 2007, and a 35% increase in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Lithuania. According to the Sector Study survey, many small farms are capable of managing their manure according to legislation but do not have the financial power to invest in biogas.	
	Objectively – Barrier	National decrease in livestock production	Biogas, Separation	The livestock production rise to index 118 in 2010 (Index 100: 1999-2001), but compared to index 192 in 1992, the production has declined throughout the last twenty years.	
		Relative high taxations on farming and agricultural businesses	All	There is no extraordinary tax on agriculture in Lithuania, and the corporate income tax is only 15%. The VAT is 21% with reduced rates (5% and 9%). There is a 9% VAT on heat. The real estate tax is 1.5 percent of the nominal value of the land.	
	Subjectively – Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	The Lithuanian livestock density makes biogas investment less economic viable: 0.39 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70.	
	Subjectively – Barrier	Lack of cooperation between farmers	SCIEN Drainage		
		A low risk willingness among farmers to try out new products and solutions will help promote	All	According to the Sector Study survey, the Lithuanian farmers are interested in new technologies, and consider biogas and separation as the technology of the future. But farmers cannot make investments without financial support.	

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	28% of the energy consumption comes from gas, in which 90-100% is imported (2008). In relation to this, the survey indicates that there is a market for upgraded biogas.	
			Many biogas plants	Separation	Currently, there are 3 biogas plants in Lithuania, with a total of 2.1 MW capacity. Only 0.3 MW is based on pig manure.	
			A widely expanded and up to date drain system	SCIEN Drainage	It is calculated that drainage systems have been installed on 90% of the area needing drainage, which is estimated at almost 3.4 million ha, corresponding to around 87% of the cultivable area. The construction of new drainage systems has been suspended, but efforts are being made to maintain earlier installed drainage systems in a proper condition. The survey shows that these investments are only in regular drainage systems, and not SCIEN drainage.	
			High broadband connectivity in the country	All	Around 62% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010). So the dissemination of knowledge through the Internet is more difficult than in other Baltic Compass countries.	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	According to the Lithuanian sector study survey, the central heating system is well developed in bigger cities, while the villages and the rural areas have a more decentralized heating structure.	
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	The Sector Study survey shows that computers are only used in some of the bigger farms.	
			Lack of access to the different technologies and competences	All		
			Bad management of biogas plants	Biogas		

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Sector Study: Poland

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Poland. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

			Indicator	Technology	Current situation	Status
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	The 2020 target for RE supply is 15% of the total energy consumption (currently around 7%). Of the 15%, around 8.2% of the RE will come from biogas (around 35.6 PJ) compared to the current 1.3%. Furthermore, the survey shows that Poland does not use SCIEN drainage, although the technologies are known. Biogas and separation technologies are well known and used in Poland, and is a part of the toolbox put in use to reach environmental targets.	
			A strategy of agro-environmental technology development	All		
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas		
			General focus on both the environmental and economic benefits of agro-environmental technologies	All	Poland visions RES as a natural way to create jobs in rural areas, according to the *Polish National Renewable Energy Action Plan*, and calculates the expected job creation derived from the implementation of the plan.	
			Political and public consensus on the future of the transport sector	Biogas	No dominant technology, but like the other EU countries, Poland has signed the "*Directive on the promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Polish transport sector was 3%.	
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	According to the Sector Study survey, there is a political understanding in Poland to reduce the environmental impacts of agricultural production. Furthermore, the survey shows that there is a predominantly tradition for broad political agreements.	

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		Indicator	Technology	Current situation	Status
LEGISLATION	Objectively Enabler	National water environmental plan	All	Poland is a part of the *River Basin Management Plans 2009-2015*, which has been adopted as a part of the *Water Framework Directive.* The directive is a part of the *Polish Water Law Act.* The implementation of the EU regulations in the Polish legislations is among the respondents considered to be well implemented, but still ongoing and never ending.	
		A national requirement demanding people to have a minimum of educational before becoming farmers	All	If you want to get the certificate of the farmer, you need to have education in the field of agriculture or pass the training on farming. Age 50 and up: No training is needed. A certificate is needed, in order to receive EU funding.	
		A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	Education requirements are stated in Polish legislation. Every fertilizer user is required to have an appropriate certificate. The minimum level of capacity for storing is 4 months and 6 months in the Nitrate Vulnerable Zones.	
		Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There are no official phosphorus fertilizer norms.	
		Official manure standards and norms	All	No, fertilizer plans for IPPC installations should be based on *Code of Good Agricultural Practice*, which is only obligatory. In this code, some general information and requirements are available.	
		Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	Producers of renewable electricity have a priority in the services of transmission or distribution of electricity. However, in order to obtain the access to the grid, the producer has to meet various requirements. Conditions for connection are published by gas transmission and distribution system operators.	
		Smell regulations	Biogas	Poland is committed to the *EU National Emission Ceiling Directive*, and the latest report shows that it complies with all four ceilings (NO_x, VOC's, SO_2 and NH_3).	
		A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Poland is committed to ensure high quality drinking water through the *EU Council Directive 98/83/EC of 3 November 1998*.	
	Barrier	Monopoly on electricity production and distribution	Biogas	There are five companies with more than 5% share of generation capacity, and the share of the 3 biggest companies is around 50% (2007).	
	Subjectively Enabler				
	Barrier	Policy obstructions: Clashes between different stakeholders	All		
		Frequent policy changes in the country	All		
		Outdated legislations in the country	All		

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	It is possible to receive grants from different national investment funds for biogas plants investments. These subsidies etc. are in general considered adequate to promote the three technologies in Poland.	
			A legislative demand for fertilizer plans and accounts.	All	Owners of IIPC-farms in Poland are obliged to dispose 70% of produced manure on their fields in accordance with fertilization plans, which have been approved by the Regional Agricultural Station. Unfortunately, the plans do not contain detailed fertilization programs nor are they taken into account when issuing integrated permits.	
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is 15 Euro cents per kWh consisting of a raw price and red/green certificates. The average is 11.86 Euro cents per kWh among the European Baltic Compass countries, which makes the Polish tariff among the highest in the Baltic Compass countries.	
			Removal of taxes on electricity from biogas production.	Biogas		
		Barrier	Normal taxation on cars running on biogas	Biogas	Biofuels are almost fully exempted (95%) from excise tax, but the registration tax depends on cylinder capacity and does not include a direct environmental related element. Biogas, hydrogen and bio-hydrogen are exempted from excise tax.	
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	All	According to the Sector Study, the Polish regulative enforcement is making sure that the agro-environmental legislation is met.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	The result from the Polish Sector Study questionnaire indicates that the different application processes does not suffer from bureaucracy.	
			Lack of cooperation between stakeholders makes the decision process difficult.	All	Based on the results from the Sector Study, different stakeholders within environmental legislation have established a formal and effective cooperation.	

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			Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	According to the Polish Sector Study survey, the Polish have access to information about new technologies. But the same survey indicates that the farmers are not interested in the new technologies.	
			Low interest rates relative to Baltic Compass country average	All	The Polish interest rate is high: 4.25% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	The inflation is low compared to other Baltic Compass countries: 2.8% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Poland has, like many other countries, experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Poland was in index 205 (2008). Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of Poland farmland has risen from 2004-2008.	
		Barrier	Low market prices for electricity	Biogas	The electricity is average compared to the mean price among the Baltic Compass EU countries: Household: 12,9 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 9,3 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. Baltic Compass country average	All	The corruption in Poland is higher than the perception average of the other countries in the Sector study: 5.3 vs. Baltic Compass country average: 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All		
		Barrier				

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		Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively – Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Poland score 2.7 on the availability of venture capital and 2.9 on the ease of access to loans. Compared to the other Baltic Compass EU countries (without Belarus), this is above average. The average score for the other countries is 2.7 and 2.7 respectively. This shows that Polish entrepreneurs have an average access to loans and venture capital compared to the other countries.	
		High government and private R&D expenditures relative to GDP.	All	Investments in R&D are low compared to other countries in the Sector Study: Corporate investment in R&D *(% of GDP)*: 0.2% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.3% (Baltic Compass countries: 0.6%, EU25: 06%).	
		Lower company tax for SME, relative to bigger companies.	All		
		A overall positive entrepreneurial climate making innovation possible	All	Poland has an average score on the entrepreneurial activity index. However, it scores below the EU25 average on all four indicators of the entrepreneurial climate index – Poland has an Entrepreneurial climate score, which places the country in the bottom six Member States in the EU25. From a competitiveness point of view, Poland scores a 50th place worldwide when it comes to innovation and sophistication factor, with a 3.76 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
		Barrier			
	Subjectively – Enabler				
		Barrier	Low NGO support and influence	All	According to the Polish survey, the environmental NGOs in Poland have a say in the national legislation process.	

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			Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	In Poland, 75.4% of the land is less than 200 meters above sea level, which makes Poland a relative flat country although there are mountains in the southern part. The northern part of Poland, the part placed next to the Baltic Sea, is also flat which makes a large part of Poland suitable of draining.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
		Barrier	Poor baseline information	All		
			Low number of local contractors with drainage system experience	SCIEN Drainage		
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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		Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS – Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 10% increase in the number of holdings from 2003 and 2007, but a 32% increase in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Poland. According to the Sector Study survey, the average farm is only 8 ha, which makes biogas economically unattractive.	
	Barrier	National decrease in livestock production	Biogas, Separation	The livestock production rising to index 110 (Index 100: 1999-2001), but compared to index 106 in 1992, the production have declined slightly only to increase again.	
	Barrier	Relative high taxations on farming and agricultural businesses	All	There is a special social security contribution tax for farmers; The owner of the farm is obliged to pay quarterly contribution that is equal to 30% of the basic farmer's pension for each person covered by the pension insurance. Furthermore the VAT in Poland is 22% with reduced rate at 3%, 7% and 0%. The real estate tax is determined by the local authorities, with a maximum rate determined by the state. The corporate tax in Poland is 19%.	
AGRICULTURAL CONDITIONS – Subjectively	Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	The livestock density is on an average level compared to the other countries in the Sector Study: 0.72 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70.	
	Barrier	Lack of cooperation between farmers	SCIEN Drainage		
	Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All		

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	13% of the energy consumption comes from gas, in which 70-80% is imported (2008). In relation to this, the results from the survey indicate that there is a market for upgraded biogas in Poland.	
			Many biogas plants	Separation	There are only 7 agricultural based biogas plants, and 5 of these are owned by the same company. It is estimated that in 2010 approximately 300 potential biogas projects are in the planning and evaluation phase.	
			A widely expanded and up to date drain system	SCIEN Drainage		
			High broadband connectivity in the country	All	Around 62% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010).	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	According to the Polish Sector Study survey, the district heating system is well established. In addition to this, the Polish electricity grid is considered to be stable and reliable.	
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage		
			Lack of access to the different technologies and competences	All		
			Bad management of biogas plants	Biogas		

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Sector Study: Russia

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Russia. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

			Indicator	Technology	Current situation	Status
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	According to the Sector Study survey, Russia has no environmental goals that biogas is expected to contribute to meet. Only SCIEN drainage is considered to be a part of the solution and method to reach environmental goals. Although separation is not considered to be a part of the solution, it is considered a promising technology for the big farms in Russia.	
			A strategy of agro-environmental technology development	All	The Russian legislation is only now being developed and coordinated with the EU legislation.	
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas		
			General focus on both the environmental and economic benefits of agro-environmental technologies	All		
			Political and public consensus on the future of the transport sector	Biogas		
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	According to the survey, there is a political understanding to reduce the environmental aspects of the agricultural production. Whether or not there is a standstill is difficult to assess, but environmental issues is not on top of the list of priorities. In relation to this, there is not a tradition for broad political consensus.	

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Indicator				Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All		
			A national requirement demanding people to have a minimum of educational before becoming farmers	All		
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	There is no required storage capacity, and there is no regulation permitting farmers to spread manure during wintertime, although it is illegal to spread on flooded, frozen or snow covered ground.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement		
			Official manure standards and norms	All	According to the result from the survey, official manure standards are implemented and used in the Russian agricultural sector.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas		
			Smell regulations	Biogas		
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement		
		Barrier	Monopoly on electricity production and distribution	Biogas		
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All		
			Frequent policy changes in the country	All		
			Outdated legislations in the country	All		

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			Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promote and contribute to the diffusion of agro-environmental technologies	All	According to the Russian survey, especially the construction of biogas plants is considered to be too expensive. In relation to grants, credits and subsidies, there are no financial grants or subsidies in Russia, which does not help the dissemination of biogas or separation technologies. But such programs are underway.	
			A legislative demand for fertilizer plans and accounts.	All		
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	There are no subsidies for renewable electricity in Russia.	
			Removal of taxes on electricity from biogas production.	Biogas		
		Barrier	Normal taxation on cars running on biogas	Biogas		
	Subjectively	Enabler				
		Barrier	Lack of regulative enforcement	Biogas	According to the Russian Sector Study survey, the enforcement is quite strict in some areas. Furthermore, penalties for breaking the environmental law will be bigger in the future.	
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	Results from the survey show that the process of receiving permits for biogas plants in Russia does suffer from some bureaucracy.	

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			Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	According to the survey, farmer unions are considered to be among the most enlightened when it comes to new technologies. Farmers are able to gain access to information on new technologies through regional meetings, exhibitions and web sites provided by these unions and representatives from technical universities.	
			Low interest rates relative to Baltic Compass country average	All	The interest rate is high, which makes investments in Russia more expensive than in other countries. 8.25% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	The inflation is high in Russia: 9.6% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Russia has, like many other countries experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage		
		Barrier	Low market prices for electricity	Biogas		
			High corruption vs. Baltic Compass country average	All	The corruption is high in Russia: 2.1 vs. Baltic Compass country average: 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	Environmental issues have not first (nor second) priority for the farms and banks. Mainly due to the long payback time.	
		Barrier				

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		Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT – Objectively	Enabler	High availability of venture capital and easy access to loans for entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Russia score 3.3 on the availability of venture capital and 3.0 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for these countries are 2.7 and 2.7 respectively. This shows that Russian entrepreneurs have more difficulties gaining access to loans and venture capital than other countries.	
	Enabler	High government and private R&D expenditures relative to GDP.	All	Especially the corporate investment in R&D is low, while the government invests more in R&D: Corporate investment in R&D *(% of GDP)*: 0.3% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.7% (Baltic Compass countries: 0.6%, EU25: 0.6%).	
	Enabler	Lower company tax for SME, relative to bigger companies.	All		
	Enabler	A overall positive entrepreneurial climate making innovation possible	All	From a competitiveness point of view, Russia scores a 80th place worldwide when it comes to innovation and sophistication factor, with a 3.36 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
	Barrier				
Subjectively	Enabler				
	Barrier	Low NGO support and influence	All		

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			Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas		
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The very western part of Russia has a flat topography, which makes SCIEN draining a useful tool for cultivation of the soil.	
		Barrier				
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage		
		Barrier	Poor baseline information	All	According to the survey, the baseline information about the three technologies is very poor. Russian investors and farmers need more information (and financial incentives) in order to invest. Also examples of best practice and successful implementations are needed.	
			Low number of local contractors with drainage system experience	SCIEN Drainage	The survey indicates that local contractors and construction companies have the abilities and experience to build and maintain biogas plants, separation equipment and drainage technologies.	
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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			Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All		
		Barrier	National decrease in livestock production	Biogas, Separation	The livestock production risen to index 118 in 2009 (Index 100: 1999-2001), but compared to index 147 in 1992, the production has declined and only rise slightly throughout the last twenty years.	
		Barrier	Relative high taxations on farming and agricultural businesses	All		
	Subjectively	Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas		
		Barrier	Lack of cooperation between farmers	SCIEN Drainage	Results from the Russian survey indicate that the different players in the agricultural sector are willing to cooperate and also do investments together.	
		Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All		

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			Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	According to the survey there is no market for upgraded biogas, which can be explained by means of the production of natural gas in Russia.	
			Many biogas plants	Separation		
			A widely expanded and up to date drain system	SCIEN Drainage	The drainage system in the Leningrad part of Russia was constructed in the seventies and eighties. Furthermore, the survey also indicates that more than half of the arable land is drained in the Leningrad region.	
			High broadband connectivity in the country	All	Around 43% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010).	
		Barrier				
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	The electricity grid is considered stable and reliable.	
		Barrier	Little use of high tech products and services, incl. computers, etc.	SCIEN Drainage	All bigger farms have computers and use them in their daily work.	
			Lack of access to the different technologies and competences	All	According to the Sector Study survey, additional information, dissemination and demonstration projects are needed in relation to all three technologies. Even though the information is not assessable, the agricultural sector is interested in new technologies.	
			Bad management of biogas plants	Biogas		

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Sector Study: Sweden

In this analysis, economic aspects, environmental aspects, and social aspects are considered and form the basis for identifying enablers and barriers for diffusion and use of biogas, separation, SCIEN Drainage technologies and phosphor measurements in Sweden. Once again, it is not meant as an instruction - merely as inspiration. Once identified, the general barriers and enablers can then be filled in for the specific technologies under the relevant categories in the tables below.

Some textboxes are empty, indicating that the information was not accessible, neither through desk study nor through the Sector Study.

			Indicator	Technology	Current situation	Status
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	50% of energy should come from RES by 2020; only 0.1% of the renewable electricity will be based on biogas. Additionally, only 0.1% of the renewable heat and cooling will be based on biogas. But according to the Swedish Sector Study survey, Sweden has environmental goals that both separation and SCIEN drainage will be able to contribute to meet.	
			A strategy of agro-environmental technology development	All		
		Barrier				
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas		
			General focus on both the environmental and economic benefits of agro-environmental technologies	All	The *National Renewable Action Plan* mentions the expected number of job created, but do not calculate the effects.	
			Political and public consensus on the future of the transport sector	Biogas	There is no dominant technology, but like the other EU countries, Sweden has signed the "*Directive on the promotion of the use of biofuels and other renewable fuels for transport*" which aimed to replace 5.45% of all transport fossil fuel by the end of 2010. This target was recommended to be raised to 10% by 2020. In 2008 the biofuel share in the Swedish transport sector was 4%.	
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	According to the survey, the Swedish government possesses the will to implement the EU legislation and acknowledges the importance of reducing the environmental impacts of agricultural production.	

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			Indicator	Technology	Current situation	Status
LEGISLATION	Objectively	Enabler	National water environmental plan	All	Sweden is a part of the *River Basin Management Plans 2009-2015*, which has been adopted as a part of the *Water Framework Directive*. The survey indicates that the general EU legislation, including the Water Framework Directive is fully implemented in the Swedish legislation.	
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	Previously there were training requirements for buying a farm, but this requirement does not exist anymore.	
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	There are only optional courses teaching farmers how to handle manure. The required manure storage capacity varies from 6 to 10 months depending on the location and which livestock type the manure comes from.	
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	There is an official P-norm; 22 kg P per hectare.	
			Official manure standards and norms	Separation, biogas	Yes, regulations for max number of livestock for complying with the limit of 22 kg P per hectare. According to the survey, it is illegal for Swedish farmers to exceed the P norms, which is why separation is considered an "illegal" technology in terms of legislation, and therefore not relevant. Furthermore, the manure standards are considered to be fully implemented in Sweden.	
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	The Swedish electricity legislation treats all electricity producers equally and all producers have, in accordance with the revisions of Chapter 3 Sections 6-7 of *Ellagen* (the Swedish Electricity Act), the right to connect their facilities to the transmission or distribution grid. According to Naturgaslagen (the Natural Gas Act), tariffs and inter alia for the transfer and storage of natural gas must be reasonable, objective and non-discriminatory. Technical provisions on grid connection and connection tariffs for biogas are not being published.	
			Smell regulations	Biogas	Sweden is committed to the EU National Emission Ceiling Directive, and the latest report shows that it complies with three ceilings (VOC's, SO_2 and NH_3) and anticipates exceeding this by less than 10% in the NO_x ceiling.	
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	Like other EU member countries, Sweden is obligated to comply with the Drinking Water Directive. This includes regularly observations and implementation of pollution standards. Unknown status on the implementation of this law.	
		Barrier	Monopoly on electricity production and distribution	Biogas	There are three companies with more than 5% share of generation capacity, and the share of the 3 biggest companies is around 78% (2007).	
	Subjectively	Enabler				
		Barrier	Policy obstructions: Clashes between different stakeholders	All		
			Frequent policy changes in the country	All		
			Outdated legislations in the country	All		

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		Indicator	Technology	Current situation	Status
FRAMEWORK CONDITIONS	Objectively – Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	SCIEN Drainage: It is possible to apply for Rural Development Program funds, but according to Sector Study survey, implementation of the support scheme still needs to be carried out on farm level. Furthermore, the survey indicates a need for more different subsidy/grant schemes in order to promote biogas and separation technologies. The current investment grant is up to 30% (50% in the northern part of Sweden) But all in all, the public economic support schemes towards investments in agro environmental technologies in Sweden are considered to be too low.	
	Objectively – Enabler	A legislative demand for fertilizer plans and accounts.	All	All farms must have established fertilization plans, which is by law considered and treated as public information. In addition to this, soil analysis is required every 4 and 8 year.	
	Objectively – Barrier	A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	The feed in tariff is 8 Euro cents per kWh, which compose of mainly two parameters: Spot price and electricity certificates. The average is 11.86 Euro cent per kWh among the European Baltic Compass countries, so the tariff most be considered to be low.	
	Objectively – Barrier	Removal of taxes on electricity from biogas production.	Biogas		
	Objectively – Barrier	Normal taxation on cars running on biogas	Biogas	Electric vehicles with an energy consumption of 37 kWh per 100 km or less and hybrid vehicles with CO_2 emissions of 120 g/km or less are exempt from the annual circulation tax the first five years. Furthermore, there is a taxation reduction on the cars, up to 40% compared to comparable petrol or diesel cars and up to SEK 16000 per year. The taxes of ownership are based on CO_2 emission. All alternative vehicle fuels are eligible for tax rebate of vehicle fuel taxes, including a CO_2 tax and tax on the energy content of the fuel. Biogas and ethanol receive a 100 % tax rebate.	
	Subjectively – Enabler				
	Subjectively – Barrier	Lack of regulative enforcement	Biogas	According to the Sector Study survey, the regulative enforcement in Sweden is making sure that the agro-environmental legislation is met.	
	Subjectively – Barrier	Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	Results from the Sector Study survey indicates that the process of getting environmental permit for biogas plants suffer to some extent due to red tape and bureaucracy.	

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			Indicator	Technology	Current situation	Status
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	According to the Sector Study survey, investment information including information about support schemes and technological possibilities are available for farmers and other stakeholders.	
			Low interest rates relative to Baltic Compass country average	All	The interest rate is low in Sweden: 1.75% compared to a 2.75% average across 9 Baltic Compass countries (without Belarus).	
			Low inflation vs. Baltic Compass country average	All	The inflation is also low: 1.6% 12 months average from 4/10-4/11. Baltic Compass country average: 3.6%.	
			Further increase in fossil fuels prices	Biogas	Sweden has, like many other countries experienced a rise in fuel prices. This is expected to continue.	
			Increase in prices for farmland (average land rent)	SCIEN Drainage	By using FADN figures on rent paid for land and buildings (willingness to pay) it is possible to estimate the increase or decrease in the value of farmland. Compared to 2004 (index 100), the market value for farm land and buildings in Sweden was in index 136 (2008). Although the numbers does not include 2009-2011 when the financial crisis reached its peak, and a decrease in the price of farmland most likely affected the rent paid, this indicates that the value of the farmland has risen from 2004-2008. This makes investments in the land more economically attractive.	
		Barrier	Low market prices for electricity	Biogas	The price for electricity is high, especially for private consumers: Household: 16,5 EUR/100 kWh (Baltic Compass EU country average: 13,8 EUR/100 kWh) Industry: 6,9 EUR/100 kWh (Baltic Compass EU country average: 8 EUR/100 kWh).	
			High corruption vs. Baltic Compass country average	All	The corruption is low in Sweden: Factor 9.2 vs. Baltic Compass country average factor 6.1.	
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	According to the Sector Study survey, the Swedish farmers have low profit and short payoff time. The investments requires a short payback time, something which is not always possible by investing in the three technologies.	
		Barrier				

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		Indicator	Technology	Current situation	Status
INNOVATION ENVIRONMENT	Objectively – Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	On a scale from 1 to 7, where 1 is "very difficult" and 7 is "very easy" Sweden score 4.0 on the availability of venture capital and 4.2 on the ease of access to loans. Compared to the other Baltic Compass countries (without Belarus), this is above average. The average score for the countries is 2.7 and 2.7 respectively. This shows that Swedish entrepreneurs have better access to loans and venture capital than other countries, which in the end will contribute to more innovation, also within the agro-environmental sector.	
		High government and private R&D expenditures relative to GDP.	All	The R&D expenditures are high in Sweden: Corporate investment in R&D *(% of GDP)*: 2.5% (Baltic Compass countries: 1%, EU25: 1.1%) Governmental investment in R&D *(% of GDP)*: 0.9% (Baltic Compass countries: 0.6%, EU25: 0.6%).	
		Lower company tax for SME, relative to bigger companies.	All		
		A overall positive entrepreneurial climate making innovation possible	All	Sweden's score on the entrepreneurial activity index is the highest in the EU25 – the country scores better than average on all dimensions of entrepreneurial activity. Not surprisingly, Sweden also has a higher than average score on each of the indicators of the entrepreneurial climate index. From a competitiveness point of view, Sweden scores a 3 place worldwide when it comes to innovation and sophistication factor, with a 5.67 score. The average score among the 9 Baltic Compass countries, excluding Belarus is 4.42.	
	Subjectively – Enabler				
	Barrier	Low NGO support and influence	All	Swedish NGOs are always a part of the debate and allowed to make statements, but they are not involved in the legislation process.	

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		Indicator	Technology	Current situation	Status
PRACTICAL CONDITIONS	Objectively – Enabler	A map of suitable sites for biogas plants	Biogas		
		Ongoing pilot projects	All	According to the Sector Study survey, there are ongoing biogas pilot projects, but more are needed and it would be beneficial if they were more spread out in a larger geographic area. Pilot projects are supported by the state.	
		Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	The topography varies a lot from the mountainous north, the central lowland and the rich soil to the south. Draining can be considered an important tool in some areas of Sweden.	
	Objectively – Barrier				
	Subjectively – Enabler	Large areas of wetlands	SCIEN Drainage	According to the Sector Study survey, there are constructed wetlands and controlled drainage technologies being used in Sweden. Controlled drainage is funded under the Rural Development Program, but is not implemented at farm level.	
	Subjectively – Barrier	Poor baseline information	All	The Sector Study survey indicates that more information is needed, especially about the bottlenecks concerning investments in biogas plants. Furthermore, more information about the benefits and environmental impact of SCIEN Drainage is needed.	
		Low number of local contractors with drainage system experience	SCIEN Drainage	The survey indicates that local contractors possess the capabilities to construct different drainage technologies, but when it comes to building biogas plants, local contractors must seek expertise among companies on a national level.	
		Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas		

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		Indicator	Technology	Current situation	Status
AGRICULTURAL CONDITIONS	Objectively – Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	With a 18% decline in the number of holdings from 1990 and 2007, and a decline (3,6%) in the number of holdings bigger than 50 hectare, it is possible to conclude that there is a clear tendency that the farms become bigger and bigger in Sweden. According to the Sector Study survey, the farms' size and the infrastructure (distances between plants) make up a large barrier for economies of scale. Economies of scale are also a barrier for dissemination of separation technologies.	
	Objectively – Barrier	National decrease in livestock production	Biogas, Separation	The livestock production was in index 93 in 2009 (Index 100: 1999-2001), so the production has declined throughout the last ten years.	
	Objectively – Barrier	Relative high taxations on farming and agricultural businesses	All	The Swedish tax system includes a lot of different taxes and duties. The VAT is 25% with a reduced rate of 6% and a foodstuff VAT on 12%. The tax on real estate is 0.5% for industrial property and 1% for commercial property. The corporate income tax in Sweden is 26.30%. There is no special duty or tax on farming in Sweden.	
	Subjectively – Enabler	High livestock density (country compared to Baltic Compass country average)	Biogas	Generally low animal density: 0.57 units per hectare of utilized farmland, compared to Baltic Compass country average at 0.70.	
	Subjectively – Barrier	Lack of cooperation between farmers	SCIEN Drainage, biogas		
	Subjectively – Barrier	A low risk willingness among farmers to try out new products and solutions will help promote	All	According to the Sector Study survey, the whole agricultural sector needs to be upgraded to some extent. Furthermore, the sector should be more eager to seek and implement new knowledge. The sector is interested in new technologies, but due to the high risk involved in investing in these technologies, farmers are often reluctant to choose another solution.	

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		Indicator	Technology	Current situation	Status
TECHNICAL CONDITIONS – Objectively – Enabler		A high demand for natural gas, relative to other energy sources.	Biogas	2% of the energy consumption comes from gas, in which almost 100% is imported (2008). According to the Sector Study survey, there is a demand for upgraded biogas, but this differs depending on where you are in Sweden. In addition to this, the gas grid is only for high-end gas, which functions as a major barrier.	
		Many biogas plants	Separation	There are a total of 230 biogas plants; 136 of the plants are municipal sewage treatment plants. Biogas technology can be considered to be a well known technology in Sweden, which favours the use of separation equipment.	
		A widely expanded and up to date drain system	SCIEN Drainage		
		High broadband connectivity in the country	All	Around 90% of all households have access to the Internet, compared to Baltic Compass average at 69% (2010).	
	Barrier				
Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	According to the Sector Study survey, the Swedish district heating system is well established. The electricity cables are not dogged into the ground, and therefore the grid is vulnerable towards storms etc. But an overall estimation is that the electricity grid is stable and reliable.	
	Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	The survey indicates that use of IT and high tech products are widely used in Sweden.	
		Lack of access to the different technologies and competences	All		
		Bad management of biogas plants	Biogas		

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Sector Study: Sources and literature

In the ten different Sector Studies economic aspects, environmental aspects, and social aspects have been taken into consideration. The current situation in each country have been clarified by an intensive desk study and by creating a questionnaire which was send out to members of the Baltic Compass mailing list. The result from the questionnaires, which was both quantitative and open ended question, is included in the sector study; each time it is referred to as the "Sector Study survey". Out of the 350 possible respondents, 39 answers were received. All countries except from Russia are represented. The questionnaire can be seen in the appendix.

			Indicator	Technology	Literature
STRATEGIES	Objectively	Enabler	Clear and measureable environmental and economic goals and targets that agro-environmental technologies are expected to contribute to meet	All	EU Countries: "*National Renewable Action Plans, European Commission 2009.*"
			A strategy of agro-environmental technology development	All	Sector Study results
		Barrier			
	Subjectively	Enabler	Public acceptance, and local ownership of agro-environmental technologies in the country	Biogas	Sector Study results
			General focus on both the environmental and economic benefits of agro-environmental technologies	All	EU Countries: "*National Renewable Action Plans, European Commission 2009.*"
			Political and public consensus on the future of the transport sector	Biogas	EU Countries: "*Eurostat Pocketbook - Energy, Transport and Environmental Indicators 2010.*" and Sector Study results
		Barrier	General political standstill or hesitation to make political decisions within the agro-environmental area	All	Sector Study results

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			Indicator	Technology	Literature
LEGISLATION	Objectively	Enabler	National water environmental plan	All	EU countries: "*European Commission of Environment (Water Framework Directive)"*
			A national requirement demanding people to have a minimum of educational before becoming farmers	All	EU countries: "*Foged, Henning Lyngsø. 2010. Cost effective phosphorus management measures to reduce leaching from intensive rearing of livestock*" Published by Baltic Sea 2020.
			A legislation demand for manure storage capacity and handling	Biogas, Separation, P-measurement	EU countries: *"Foged, Henning Lyngsø. 2010. Cost effective phosphorus management measures to reduce leaching from intensive rearing of livestock*" Published by Baltic Sea 2020. "*Balcere et. Al: Report on industrial swine and cattle farming in the Baltic Sea Catchment Area*", published by Coalition Clean Baltic. Russia and Belarus:
			Written national P and N regulation (Kg/year/hectare)	Biogas, Separation, P-Measurement	EU countries: "*Foged, Henning Lyngsø. 2010. Cost effective phosphorus management measures to reduce leaching from intensive rearing of livestock*" Published by Baltic Sea 2020.
			Official manure standards and norms	All	EU Countries: *"Foged, Henning Lyngsø. 2010. Cost-effective phosphorus management measures to reduce leaching from intensive rearing of livestock"* Published by Baltic Sea 2020.
			Policies that make it possible for farmers to connect to energy grid and supply it with electricity and heat from biogas	Biogas	EU Countries: "*National Renewable Action Plans, European Commission 2009."*
			Smell regulations	Biogas	EU Countries: *"NEC Directive status report 2009"* European Environment Agency 2010.
			A law ensuring a high quality of drinking water	SCIEN Drainage, P-measurement	EU Countries: *"Act. Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption*" European Commission
		Barrier	Monopoly on electricity production and distribution	Biogas	EU Countries: "*Roadmap towards a Competitive European Energy Market*" World Energy Council 2010
	Subjectively	Enabler			
		Barrier	Policy obstructions: Clashes between different stakeholders	All	Sector Study results
			Frequent policy changes in the country	All	Sector Study results
			Outdated legislations in the country	All	Sector Study results

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			Indicator	Technology	Literature
FRAMEWORK CONDITIONS	Objectively	Enabler	Existing subsidies promoting and contributes to the diffusion of agro-environmental technologies	All	EU Countries: *"Frandsen, T. W Rodhe, L, Baky, A., Edström, M.,Sipilä, I., K., Petersen, S.L., Tybirk, K. , 2011. Best Available Technologies for pig Manure Biogas Plants in the Baltic Sea Region. Published by Baltic Sea 2020, Stockholm. 159 pp."* In addition to this: Europe's Energy portal, http://www.energy.eu/
			A legislative demand for fertilizer plans and accounts.	All	EU Countries: *"Balcere et. Al: Report on industrial swine and cattle farming in the Baltic Sea Catchment Area"*, published by Coalition Clean Baltic.
			A political guaranteed minimum price for electricity produced from biomass, compared to Baltic Compass country average	Biogas	EU Countries: *"Frandsen, T. W Rodhe, L, Baky, A., Edström, M.,Sipilä, I., K., Petersen, S.L., Tybirk, K. , 2011. Best Available Technologies for pig Manure Biogas Plants in the Baltic Sea Region. Published by Baltic Sea 2020, Stockholm. 159 pp."*
			Removal of taxes on electricity from biogas production	Biogas	Sector Study results
		Barrier	Normal taxation on cars running on biogas	Biogas	EU countries: Clean Vehicle Europe homepage: www.cleanvehicle.eu
	Subjectively	Enabler			
		Barrier	Lack of regulative enforcement	Biogas	Sector Study results
			Bureaucracy and red tape: Complicated and expensive application processes for grants and permits	All	Sector Study results

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			Indicator	Technology	Literature
INVESTMENT ENVIRONMENT	Objectively	Enabler	A central agency where farmers can receive advice concerning possible agro-environmental investments	All	Sector Study results
			Low interest rates relative to Baltic Compass country average	All	All countries: *www.tradingeconomics.com. (Average calculated without Belarus due to high interest rate. (16%)*
			Low inflation vs. Baltic Compass average	All	EU Countries: *Eurostat: www.ec.europa.eu/eurostat* Belarus: *www.trade.ec.europa.eu* Russia: *www.inflation.eu*
			Further increase in fossil fuels prices	Biogas	General considerations and common knowledge
			Increase in prices for farmland (average land rent)	SCIEN Drainage	EU Countries: *Farm Accountancy Data Network* and own calculations.
		Barrier	Low market prices for electricity	Biogas	EU Countries: *"Eurostat Pocketbook - Energy, Transport and Environmental Indicators 2010.".*
			High corruption (EU25 average)	All	Transparency International: *www.transparency.org*
	Subjectively	Enabler	Positive equity for farmers increases the creditworthiness, making it easier to get favourable loans.	All	Sector Study results and common knowledge
		Barrier			

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			Indicator	Technology	Literature
INNOVATION ENVIRONMENT	Objectively	Enabler	High availability of venture capital and easy access to loans for Entrepreneurs	All	*"The Global Competitiveness Report 2010-2011"* World Economic Forum
			High government and private R&D expenditures relative to GDP.	All	The Atlantic Century: Innovation Performance Index 2009.
			Lower company tax for SME, relative to bigger companies.	All	EU Countries: *European Commission: "Taxes in Europe" – www.ec.europa.eu/taxation_customs*
			A overall positive entrepreneurial climate making innovation possible	All	EU Countries: *European Commission: Entrepreneurship Survey of the EU25, 2008* and *"The Global Competitiveness Report 2010-2011"* World Economic Forum Russia: *"The Global Competitiveness Report 2010-2011"* World Economic Forum
		Barrier			
	Subjectively	Enabler			
		Barrier	Low NGO support and influence	All	Sector study results

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			Indicator	Technology	Literature
PRACTICAL CONDITIONS	Objectively	Enabler	A map of suitable sites for biogas plants	Biogas	
			Flat topography makes an effective drainage system more relevant for the optimization of the agricultural industry.	SCIEN Drainage	www.nationsencyclopedia.com
		Barrier			
	Subjectively	Enabler	Large areas of wetlands	SCIEN Drainage	
		Barrier	Poor baseline information	All	Sector study results
			Low number of local contractors with drainage system experience	SCIEN Drainage	Sector study results
			Strong fossil oil and gas lobbies hinder the introduction of biogas to the energy market.	Biogas	Sector study results and common knowledge

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			Indicator	Technology	Literature
AGRICULTURAL CONDITIONS	Objectively	Enabler	A clear tendency in the agricultural business that the farms become bigger and bigger.	All	EU Countries: *Eurostat: www.ec.europa.eu/eurostat - calculations based on data*
		Barrier	National decrease in livestock production	Biogas, Separation	*The World Bank: www.worldbank.org/*
			Relative high taxations on farming and agricultural businesses	All	EU Countries: *European Commission: "Taxes in Europe" – www.ec.europa.eu/taxation_customs*
	Subjectively	Enabler	High livestock density	Biogas	EU Countries: *Eurostat: www.ec.europa.eu/eurostat - calculations based on data* Russia: no data. Belarus: no data
		Barrier	Lack of cooperation between farmers	SCIEN Drainage	Sector study results
			A low risk willingness among farmers to try out new products and solutions will help promote	All	Sector study results

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			Indicator	Technology	Literature
TECHNICAL CONDITIONS	Objectively	Enabler	A high demand for natural gas, relative to other energy sources.	Biogas	EU Countries: *European Energy Commission – country facts sheets 2011*
			Many biogas plants	Separation	Finland, Germany, Sweden: *iea Energy Technology Network* Denmark: *Danish Biogas Association* Estonia, Lithuania, Latvia: *"Foged, Henning Lyngsø & Louise Krogh Johnson (editors) 2010. Market Description – The Environmental Technology and Bioenergy Sector in The Baltic's. Published by Agro Business Park A7S, Tjele. 47 pages"* Poland: *"Foged, Henning Lyngsø & Louise Krogh Johnson (editors) 2010. Market Description – The Environmental Technology and Bioenergy Sector in Poland. Published by Agro Business Park A7S, Tjele. 47 pages"*
			A widely expanded and up to date drain system	SCIEN Drainage	Sector study results
			High broadband connectivity in the country	All	*International Telecommunication Union - http://www.itu.int/ITU-D/ict/statistics/*
		Barrier			
	Subjectively	Enabler	A functional district heating system and a natural gas grid with biogas filling stations	Biogas	Results from the Sector Study Survey.
		Barrier	Little use of high tech products and services, incl. computers etc	SCIEN Drainage	Sector study results
			Lack of access to the different technologies and competences	All	Sector study results
			Bad management of biogas plants	Biogas	Sector study results

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Annex A: Sector study questionnaire

Introduction

In the February 2011 version of the Baltic Compass Newsletter, prioritized and innovative technologies were introduced:

- Biogas production from manure
- Livestock manure separation
- SCIEN Drainage technologies (sustainable, controlled, intelligent, environmental friendly and nutrient loss mitigating)

The motivation for the choice of these technologies can be seen in a section of the newsletter. Please see below.

For more detailed information on the motivation behind the choice of the three technologies, please read:

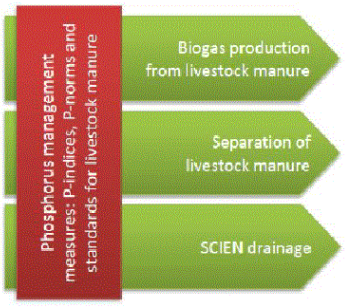
Foged, Henning Lyngsø. 2010, Best Available Technologies for Manure Treatment - for Intensive Rearing of Pigs in Baltic Sea Region EU Member States

Remember that your answers and comments will be treated with confidentiality.

Innovative technologies deserving a wider dissemination

By Henning Lyngsø Foged, Agro Business Park, Denmark

One of our tasks in balticCOMPASS work package 4 is to prepare and conduct a Sector Study on legal, technological and economic framework and barriers for selected and prioritised agro-environmental technologies. The selection has now been made on the technologies which we will deal with:



Just to mention some of the motivations behind this selection: Biogas production was selected due to its documented ability to enable a high bio-availability of the nitrogen in the manure, separation due to its enabling of balanced fertilising of the fields among multiple benefits, and SCIEN drainage because of the large risk for loos of plant nutrients with drain water from conventionally drained fields. Phosphorus management measures are behind laying driving incitement for deployment of those technologies, as well as important pre-conditions for managing them.

These technologies have been estimated to be the most promising in relation to the purpose of the entire balticCOMPASS project. The study will be based on literature reviews, combined with additional information collection from relevant professionals and institutions. The result of the analysis will be presented to decision makers with focus on how the technologies may be used to reach policy targets and which legal barriers need to be removed in order to give farmers the necessary incentives to invest in them.

Q1:

Contact information

This information can be relevant if further clarifications are needed.

Name:

Email-address:

Q2:

Country in which your organisation is located

Biogas production from manure

Chosen due to effects on the:

- reduction of N leaching, while in the same time having other positive effects, here under,

- reduction of smell and nuisances from storing and spreading of manure,

118 - reduction of greenhouse gas emissions,

- contribution to renewable energy production, and - sanitation of the livestock manure (destroying weed seeds and disease agents)

Picture: Farm scale biogas plant

Q3:

Do you have any comments on the dissemination of biogas in your country?

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Livestock manure separation technologies are prioritised because they contribute to ensure a balanced fertilisation on own agricultural lands and export of the P rich fibre fraction to regions where it can be used in an environmentally safe way:

- via use of the fibre fraction of pre-separation of slurry boost the economy in biogas production on slurry, by increasing the dry matter content of the digested substrate up to 12.5%;

- via the fibre fraction be a smart way to produce bedding material for livestock;

Picture: Manure separator

Q4

Do you have any comments on the dissemination of separation technologies in your country?

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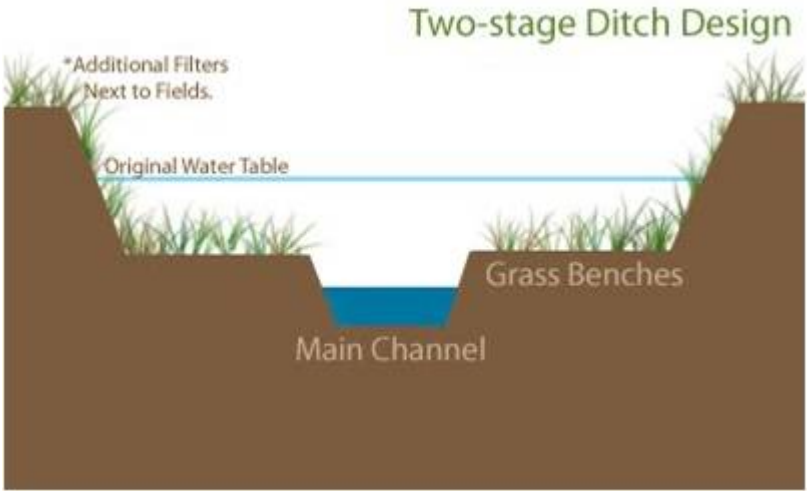
SCIEN (sustainable, controlled, intelligent, environmental friendly and nutrient loss mitigating) drainage technologies could prevent loss of up to 77,000 tons N and 15,000 ton P annually in the Baltic Sea Region. The technologies comprise:

– On/off drainage
– Controlled drainage
– Algae production on drain water
– (Constructed) wetlands
– 2-stage ditch system
– Drain filters
– etc.

120 Note that the optimal combination of the SCIEN drainage technologies may differ from country to country.

Picture: Advanced ditch design



Q5

Do you have any comments on the dissemination of SCIEN drainage technologies in your country?

Q6

Strategy Parameters:

Definition:
'Strategies' refers to declared governmental strategies and political goals, often based on expert commissions, that gives an indication of the direction in which legislation is likely to be headed in the future. Please relate to the following statements concerning "Strategy indicators"

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
My country has environmental goals that biogas is expected to contribute to meet					
My country has environmental goals that separation is expected to contribute to meet					
My country has environmental goals that SCIEN drainage technologies are expected to contribute to meet					
There is political understanding in my country to reduce the environmental impacts of agricultural production					
There is a national strategy for increased biogas production in my country					

Q7

Please describe, in a few words the situation in your country concerning the strategy parameters

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Q8

Legislation Parameters:

Definition:
Legislation refers to the governing laws in the individual countries; primarily within the field of agroenvironment. It involves EU legislation as well as national legislation and the interconnection of the two with regards to implementation. Please relate to the following statements concerning "Legislation indicators" parameters

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	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The EU legislation (Water Framework Directive, The IPPC Directive and Nitrates Directive) is fully implemented in the national legislation in my country					
There is a tradition for broad political consensus in your country when it comes to agro-environmental law making					
The environmental NGOs in your country have a say in the national legislation process					

Q9

Please describe, in a few words the situation in your country concerning legislation

Q10

Framework conditions Parameters:

Definition:
'Framework conditions' refer to the administrative enforcement on basis of the laws. An example is financial incentives in the form of grants and subsidies and how these are distributed in order to give incentives for developing certain projects or making certain investments. Another example is the efficiency of the control with legal provisions.
Please relate to the following statements concerning "Framework Condition" parameters

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The regulative enforcement in the country is making sure that the agro-environmental legislation is met					
The process receiving environmental permit for biogas plant is easy, and does not suffer from bureaucracy					
Grants and soft credits to reduce investment cost promotes biogas production from manure in your country					
National subsidies to reduce operational costs promotes biogas production from manure in your country					
Subsidies, loans or grants helps promoting manure separation technologies in your country					
Subsidies, loans or grants helps promoting SCIEN drainage technologies in your country					
Different stakeholders (Environmental Protection Agency, Plant Directorate etc.)involved in					

enforcement of agro-environmental legislation have established formal and effective cooperation					
Official manure standards (nutrient measurements from various livestock) are implemented and used in the agricultural sector in my country					

Q11

Please describe, in a few words the situation in your country concerning the framework conditions

Q12

Investment environment Parameters:

Definition:
Investment Environment: Meant to contain the conditions for making investments in the given country; accessibility to investment capital, interest rate levels, inflation rates, technology prices compared to salary level, etc. Please relate to the following statements concerning "Investment Environment" parameters.

Agro environmental technologies: Biogas production from manure, Livestock manure separation and SCIEN Drainage technologies

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Investors and their consultants are well informed about the possibilities in agro-environmental technologies, and have access to data that makes them capable of making reliable investment calculus					
There is adequate economic support to farmers willing to invest in agro-environmental technologies					
Farmers are willing to invest in					

biogas, separation technologies and SCIEN Drainage technologies					
There is a predominantly positive opinion in the banking sector towards investments in agro-environmental technologies					

Q13

Please describe, in a few words the situation in your country concerning the investment environment

Q14

Innovation Environment Parameters:

Definition:
With 'innovation environment' we refer to the conditions for starting up new businesses and activities. This might be help for growth via incubators, support opportunities, policies for entrepreneurship, and accessibility to advisory services. Please relate to the following statements concerning "Innovation Environment" parameters.

Agro environmental technologies: Biogas production from manure, Livestock manure separation and SCIEN Drainage technologies

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The government in my country supports innovation within the agro-environmental technology sector					
The government support agro-environmental pilot projects in my country					
There is a cluster in my country, supporting innovation and dissemination of agro-environmental technologies					
There is a general willingness to invest in foreign biogas/separation/drainage					

technologies					

Q15

Please describe, in a few words the situation in your country concerning the innovation environment

Q16

Practical Parameters:

Definition:
Encompasses basically all conditions that are of practical significance to the use of a specific technology, such as climate, infrastructure, etc. Please relate to the following statements concerning "Practical" parameters.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
There is a stable and reliable electricity grid in my country					
There is a market for upgraded biogas in my country					
Local contractors and construction companies possesses the capabilities to build and maintain biogas plants, separation equipment and/or SCIEN drainage technologies					

Q17

Please describe, in a few words the situation in your country concerning the practical parameters

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Q18

Agricultural Condition Parameters:

Definition:
Agricultural Conditions Refers to the general conditions which the agriculture in the country of interest offers. Specifically it might be livestock density, crop production, soil type, topography, climate, etc. Please relate to the following statements concerning "Agricultural Condition" parameters.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Different players in the agricultural sector are willing to cooperate and do investments together					
The agricultural sector is interested in new technologies and eager to seek new knowledge					
The agricultural sector knows how to manage manure					
The current financial situation makes biogas production from manure interesting from a investment point of view					

Q19

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Please describe, in a few words the situation in your country concerning the agricultural conditions

Q20

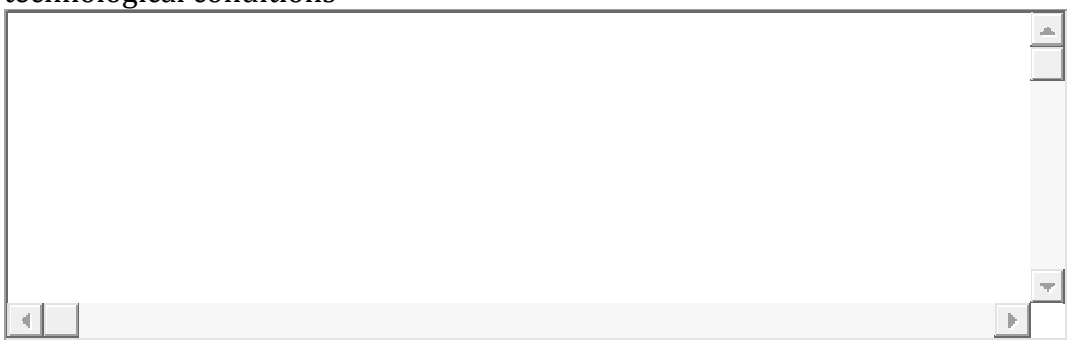
Technological conditions Parameters:

Definition:
'Technological conditions' is defined as the presence of existing structures and/or technologies that affects the possibility to introduce new technologies. Please relate to the following statements concerning "Technological conditions" parameters.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The district heating system in your country is well established					
The agricultural sector uses computers and high tech products in their daily work					
Farmers have access to information on new technologies through farmers union etc.					

Q21

Please describe, in a few words the situation in your country concerning the technological conditions



Thank you for participating in our survey. The results will be presented as a part of the Sector Study, and will be published later on Baltic Compass homepage .

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Baltic Compass

Baltic COMPASS promotes sustainable agriculture in the Baltic Sea region. The region's 90 million inhabitants anticipate both high quality food produced in the region and a healthy environment, including a cleaner Baltic Sea. Baltic Compass looks for innovative solutions needed for the future of the region and its agriculture, environment and business.

Baltic Compass has a wide approach to the agri-environmental challenges, covering agricultural best practices, investment support and technologies, water assessment and scenarios, and policy and governance issues.

Baltic Compass is financed by the European Union as a strategic project for its support to investments and policy adaptation. The 22 partners represent national authorities, interest organizations, scientific institutes and innovation centres from the Baltic Sea Region countries. Baltic Compass is a three year project running until December 2012.

Questions and comments:

Project officer Claus Mortensen
Agro Business Park
CM@agropark.dk
Phone:+4540144393

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