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Country Report – Germany

Stakeholder and Driver Analysis on Energy Efficiency in Agriculture

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1 Introduction

Until now energy efficiency in agriculture has received little attention, except for energy use in greenhouses. Nevertheless, energy use is considerable, especially when indirect energy use is taken into account. The project AGREE (AGRiculture and Energy Efficiency) has the objective of showing the potential of short term energy efficiency gains and the promising long term potential. Environmental effects of savings on direct and indirect energy use in agriculture are integrally considered, as energy use efficiency also implies reduction of greenhouse gas emissions. Because energy savings in agriculture depend highly on the agri-environment (climate), AGREE will bring together south-eastern, south-western, north-eastern and north-western agroproduction systems. Evidence from energy saving potential and corresponding environmental and economic effects on country level are brought to the transnational level to identify an agenda for transnational collaboration to increase the learning curve on energy use efficiency. AGREE will set up a stakeholder participation process for two reasons. The first is, that by doing so, stakeholders will be involved in the set-up of the agenda which will facilitate the implementation of the results.

Secondly, AGREE needs the opinions and views of stakeholders to produce an agenda that reflects the needs of and opportunities by practice. To ensure implementation, AGREE has created a link with a European network of researchers committed to adopt the issue. This network (ENGAGE) is closely associated with the European Society of Agricultural Engineers (EuAgEng). This link will facilitate the adoption process. To ensure that the results will create relevant and effective R&D programs, AGREE has established a close link with and involvement of the SCAR/KBBE Collaborative Working Group on Agriculture and Energy. This group is embedded in the Standing Committee on Agriculture and the KBBE-net and is thus perfectly positioned to translate the agenda, produced by AGREE, into commitment for effective R&D on energy efficiency. To this end, it is important that AGREE provides evidence of the added value of such research.

2 The state of Agriculture in Germany

German farmers utilized around 17 million hectares in 2007 (12 million hectares arable land, 5 million hectares grassland/pastures) which is more than 50 % of Germany's total landscape. The agricultural sector, including fishery and forestry, generates a gross value of 20 billion € in 2007, or 0.9 % of the total German gross value[1]. The number of employers slightly decreased in 2007 to 1.3 million. Taking up- and downstream economic areas into account, about 10 % of German employees are working in the sector.

The average size of a German farm increased from 36.3 hectares in 1999 to 45.3 hectares in 2007. Due to bad weather conditions, the German cereal harvest 2011 accounted for 41.5 million tons, which is around 6 % less than in 2010 and 9 % less than the long term average (2005/10). With 6.5 million hectares in 2011, cereal production is dominating the land use of arable land, followed by the production of maize for feed- and energetic usage (2.8 million

[1] DBV (2012): Status Report 2011/12.

hectares) and oilseeds with a land use of 1.4 million hectares. Recent studies showed that in 2011 around 1 million hectares of maize were used for energetic purpose, mainly in Biogas plants[2].

The introduction of the Renewable Energy Sources Act[3] in 2000 and the accompanying extension of bioenergy production had a great impact on the structure of agricultural production in Germany. The number of farms integrating biogas-plants increased from about 1,000 operating plants in the year 2000 to 7,215 in 2011. Raising demand for land and associated land use conflicts/competition is currently reflected by an ongoing controversial debate about the risks and opportunities of bioenergy production from agricultural resources.

Despite increasing prices for beef-meat and milk the number of cattle continuously decreases. The number of animals dropped by 2 % to 12.56 million in 2011. The number of milk cows stayed stable with around 4.2 million animals. The total carcass weight was accounted for 1.22 million tons, which is just a slight decrease of 0.8 % compared to 2010. With 26.7 million animals, the pork production stayed stable in 2011. 2.95 million chicken were hatched in German hatcheries in 2010 for the production of laying hens. Accordingly, a laying hen population of 38.5 million animals can be calculated, which is a good 5 per cent fewer than 2009. By projection, this equates to a potential egg production of 10.78 billion eggs.

Table 1 shows the total final energy consumption (FEC) and the FEC of the agricultural sector in Germany. With 0.4 % in 2000 and 0.3 % in 2010, the energy consumption of the agricultural sector only contributes to a very small amount to Germanys total FEC[4].

Table 1: Total Final Energy Consumption (FEC) and FEC of Agriculture (including Forestry) for the years 2000 and 2010 (PJ)

Total FEC in 2000	Total FEC in 2010	FEC Agriculture and Forestry in 2000	FEC Agriculture and Forestry in 2010	FEC Agriculture and Forestry in 2000 (%)	FEC Agriculture and Forestry in 2010 (%)	FEC Agriculture and Forestry in 2010 (%)
EU 27	46,930	48,287	1,180	1,049	2.5	2.2
Germany	9,173	9,101	39	32	0.4	0.3

Source: Eurostat (2012)

3 DESTEP analysis of macro factors

The DESTEP method is a useful tool for a systematic analysis of external factors. It gives a broad analysis of macro factors that may impinge upon an organization's business and operations. DESTEP stands for: demographic, economic, social, technological, ecological and political.

[2] DBFZ (2011): Nachhaltige Biogaserzeugung in Deutschland – Bewertung der Wirkung des EEG.
[3] Gesetz für den Vorrang Erneuerbarer Energien (Erneuerbare-Energien-Gesetz – EEG) sowie zur Änderung des Energiewirtschaftsgesetzes und des Mineralölsteuergesetzes, Bundesgesetzblatt Teil 1 13 (2000) 305-309.
[4] Energy use for fertilizer production was accounted for in the sector of industry

In the table, for each DESTEP factor a suggestion is given of an external topic (driver) that can influence the priorities for policies about energy efficiency in agriculture

Table 2: Factors related to energy efficiency in agriculture

External factor	Factor related to energy efficiency in Ag
Demographic and social	• Demographic change and impact on agricultural sector
Economic	• Energy market (price, supply)
Technological	• Technological developments
Ecological	• Environmental impact of agriculture • Climate change
Policy	• Legislation (CAP) • Funds

3.1 Demographic

The demographic change in Germany is characterized by a slightly declining population caused by low birth rate despite increased life expectancy and an increasing migration trend in recent years. In 2011 the population in Germany was slightly growing though to 81.8 million inhabitants, which was an increase of 0.1 % caused by increased net immigration, increased birth rate and reduced death rate[5]. Immigration results in a net increase in population between 100,000 and 200,000 persons according to the economic situation in Germany and other countries. The demographic change will result in dramatic change in the age structure of the populations, which are expected to affect all sectors of the economy and the social life in general. While in 2008 61 % of the population (ca. 50 million persons) was at the age between 20 and 65 and 20 % of the population was older than 65 years, in 2060 34 % of the population is projected to be older than 65 years. The working-age population (20 to 65 years) will shrink to 33 to 36 million persons as a function of net immigration (Federal State Office, 2009).

Also in the agricultural sector the demographic change has its impact. Today every second farmer in Germany is 45 years old or older[6]. For family farms it is getting more and more difficult to find successors for their farms BMELV (2009).

3.2 Economic

The German economy - the fifth largest economy in the world in PPP terms and Europe's largest - is a leading exporter of machinery, vehicles, chemicals, and household equipment and benefits from a highly skilled labour force. Agriculture in Germany is a small sector of the German economy. It has declined in importance during the 20th century and by 2007 amounted to only 0.9 per cent of the German total gross value. Although the number of farms has declined, production has actually increased through the achievements of the Green Revolution and more efficient production methods. In recent years the German agricultural sector was influenced by the extreme commodity price boom in the time between 2006 and 2008 and the distortions caused by the worldwide financial crisis.

[5] Statistisches Bundesamt: Einwohnerzahl Deutschlands im Jahr 2011 erstmals seit 2002 wieder gestiegen. Pressemitteilung vom 25. Juli 2012 – 255/12

[6] AgrarHeute 14.08.2012: Jeder zweite Landwirt älter als 45 Jahre. http://www.agrarheute.com/alter-landwirte

After extreme slumps in the year 2008, the prices for agricultural products are again rising. The farmers in Germany had to align themselves to the market earlier and more thoroughly than those in other EU countries and also take advantage of the demand on international markets. The German food industry makes every fourth euro on foreign markets. Following the economic slump in 2009 caused by the financial crisis, in 2010 German agricultural exports increased considerably once again and therefore are continuing their long-term growth. According to preliminary results, exports of goods from the agricultural and food industry rose by 4.5 billion euros to 51.8 billion euros (+ 9.6 %). The predominant share of exports goes to EU Member States. Third country exports (to states outside of the EU) were 19 % higher than in the previous year. With five million employees, this popular sector represents every eighth job in Germany and contributes strongly to value creation. The impact of the worldwide financial crisis on German agriculture clearly illustrates that agrarian production must increasingly be considered in its international context. This involves not only risks, but also immense opportunities that many farmers have already seized. The agricultural sector has also aligned itself successfully on the international market. Today, exports are a sturdy pillar for German producers, while Germany is also an important consumer on international agricultural markets.

3.3 Technological

3.3.1 General

With the technological development German agriculture has achieved a massive increase in productivity in the past decades. Depending on the constraints regarding availability of resources, technology acts differently. When land is the constraint, development of technology focusses towards the increasing land productivity through biological or chemical technology. On the other hand, if manpower is the constraint, technological development increases labour productivity through mechanical technology, which compensates for scarce labour. Moreover, agricultural technology is not only concerned with increased quantity but also with quality improvement. Unfortunately the technological development has not been a pure blessing, because it has also induced several environmental issues. Nevertheless struggling with those issues and finding solutions to new problems led to other technological research and development in the past, which must be continued in the future as well. However, in general technology has enabled Germany not only to produce more efficiently but also to become more environmentally compatible at the same time as compared to the past.

3.3.2 Precision-farming

Precision Farming refers to the use of information and technology to improve farming operations, which covers a broad spectrum in crop cultivation such as from automatic data acquisition over site-specific fertilization to optimized fleet management (Auernhammer et al., 2001). Precision farming makes use of Geographic Information Systems (GIS), Global Positioning Systems (GPS), remote sensing devices and controller or variable rate technologies, which inevitably increases the complexity of the management systems as well as the requirement of specific skills by the users and infrastructure for electronic communication. In spite of the great interest of researchers, precision farming technologies

are adopted very slowly by farmers in Germany (Jürgens et al., 2006). The identified reasons behind low adoption rates are high costs of adoption, uncertainty in returns due to adoption, and lack of demonstrated effects of the technologies on yields and input use (Khanna et al. 1999). Due to the high costs the economic profitability is a major determinant for the adoption. Therefore, performing economic analysis through case studies involving two farms in Germany Meyer-Aurich et al. (2008) concluded that this interest is crucial for an adoption of Precision Farming technologies, at least in the field of site-specific management. However, the adoption of this technology surely contributes in applying inputs more precisely and in minimizing inefficient nutrient losses.

3.3.3 Improved drying of products

Drying is one of the most energy-consuming and expensive process steps in the production of many agricultural products in Germany. With rising energy costs, the feasibility of production is affected significantly by the energy efficiency of drying. Sensible energy consumption during drying is achieved by implementing innovative processes, improved fluid dynamics and control engineering as well as by utilizing waste heat, heat pumps and renewable energy (Ziegler et al., 2012; Meyer-Aurich et al., 2012). The reduced energy consumption contributes significantly in reducing the production costs. Thus, the competitiveness of agriculture and related areas are strengthened and the employment in rural areas is preserved.

The design of many existing drying plants in Germany is not optimal from fluid dynamic and process technological points of view. Moreover, the plants are operated with outdated management techniques. Therefore, every farm that implements specific technical measures in their drying units profits from positive economic prospects in the medium-term. A potential saving in thermal energy of around 10-40 % is estimated depending on the drying facility. Thus, through energy-efficient drying a long term decrease in fossil fuel use is achieved and the environment is relieved by reduced CO_2 emissions.

3.3.4 Conservation tillage technique

Conservation tillage leads to reduced soil erosion, improves soil and water quality by adding organic matter as a result of decomposition of crop residue, conserves water by reducing evaporation at the soil surface and provides food and cover for wildlife. Most importantly it saves a substantial amount of energy and labour due to decreased number of tractors trips around the field and contributes to lower emission as well as air pollution. The problems regarding conservation tillage are fertilization, pest and weed control, residue management, as well as environmental problems with respect to higher chemical input. Germany possesses no comprehensive statistics on the distribution of conservation tillage, but presumably 20-25 % (about 2,375,000 ha) arable land is reported to be under conservation tillage (Frielinghaus et al., 2007).

3.3.5 Nanotechnology

Nanotechnology possesses a promising potential in the field of agriculture starting from health issues, delivery system to the field of packaging and logistics. It can also be implemented in form of tiny sensors and monitoring systems enabled by nanotechnology in the field of precision farming. However, the applications are more like outlooks in the future and not yet being practiced on large scale agriculture in Germany.

3.3.6 Genetically modified organisms

The cultivation of genetically modified organisms accounted for only about 3,100 hectares in Germany in 2008, a relatively small area, whereas agricultural genetic engineering has been on the rise in other European countries and is now on a large scale. For example, Federal Office for Consumer Protection and Food Safety (Bundesamt für Verbraucherschutz und Lebensmittelsicherheit (BVL), 2008) reported that the cultivated area of transgenic maize was 3,173 hectares, which accounted for 0.15% of total cultivation area for maize. Although genetic modification offers many tailor-made applications it also could threaten the bio-diversity and other ecological issues. Independent studies on the effects of transgenic cultures on beneficial organisms are still rare. A report on risk management of genetically modified organisms with focus on maize, potato and rapeseed has been performed by the Leibniz-Centre for Agricultural Landscape and Land Use Research (ZALF) e. V. Müncheberg (Frielinghaus et al., 2007).

3.4 Ecological

Germany can be characterized as a highly industrialized, densely populated country, with about 50 % of the acreage dedicated to agriculture, resulting in significant impacts on the environment. However, the structural change in the economy, rising prosperity and the development of a legal environmental policy framework has led to improvements in the environmental performance in most areas. The OECD[7] identified two key environmental concerns related to farming in Germany, which were water pollution and the interaction of farming with biodiversity. Even though water pollution declined since 1990 it still remains a concern. The reduction of agricultural nutrients over the last 20 years was mainly a result of the closure of many livestock operations in the New Länder following the reunification and greater efficiencies in the use of inorganic fertilizers. However, the nitrogen surplus applied to agricultural fields is still very high (2002-2004: 113 kg N/ha) [8].

Climate change is expected to have a yield increasing effect on agricultural crop production in Europe (Alcamo et al., 2007). Livestock production is expected to be impacted by climate change with increased temperature, which require higher cooling efforts in animal husbandry systems.

3.5 Political

3.5.1 International policies

The German agricultural sector is mainly influenced by EU and WTO regulations and frameworks. Agricultural policy changed fundamental since the early 1990s in the European Union (EU) and the WTO. Production incentives coupled to the product and unrelated to demand have been eliminated for most products. The new objectives are competitive enterprises, market economy-based, environmentally and ecologically compatible production as well as the relinquishment of price support and quantity controls in order to reduce dysfunctions on the global agricultural markets. Direct payments help to ease agricultural

[7] Environmental Performance of Agriculture in OECD Countries since 1990. Organisation for economic co-operation and development (OECD), 2008.
[8] http://dx.doi.org/10.1787/286348038765

holdings' adjustments to liberalized agricultural markets. Direct payments are an important element for stabilizing agricultural incomes. In Germany, they make up approximately 52 % of agricultural incomes on average. Direct payments are granted regardless of the type and extent of production by an agricultural holding. They increasingly also serve the aim of balancing out increased requirements in the areas of animal, environmental and consumer protection and as payment for preserving and maintaining the agricultural landscape.

3.5.2 National policies

The European legal framework now in force grants the Member States a number of options in their decision-making. Germany took advantage of this opportunity to carry out a forward-looking reform: direct payments are granted regardless of the type and extent of agricultural production. This so-called decoupling of direct payments in Germany will be completed by the year 2012.

Germany plays a proactive role in environmental policy within the EU and internationally (OECD, 2012). The Federal Government meets the growing energy requirement with an energy policy aimed not only at protecting the climate and safeguarding the supply, but also at an environmentally sound energy supply with affordable energy prices. With its 2010 Energy Concept the Federal Government has entered the age of regenerative energies. Against the background of the reactor accident in Fukushima (Japan), the Federal Government is working to accelerate the *energy turnabout*. By increasing energy efficiency, primary energy consumption in Germany will be reduced 50 % by 2050 compared to 2008. In this context the German Government has ratificated a regulation, which provides funds for research on energy systems to a sum of 2.24 milliard Euro in 2011[9]. Part of these funds were allocated to research on energy efficiency. A broad range of funding measures is therefore available from the Federal Ministry of Economics and Technology (BMWi) for research and development in the field of energy-efficient technologies. Even though in principle it was possible to fund research projects related to agriculture, the research funds allocated so far were targeted at other sectors (Rene Gail, personal communication). For the agricultural sector there have been several calls on energy efficiency research in agriculture[10,11] in 2006. Furthermore the *energy turnabout* means that conventional energy sources will gradually be replaced by renewable energies. Responsible development of bioenergy will also make a contribution to this. The development of bioenergy production can only be achieved using targeted measures to enhance the potential of biomass and by importing biomass. The introduction of the Renewable Energy Sources Act in 2000 and the accompanying extension of bioenergy production has a great impact on the structure of agricultural production in Germany. The number of biogas-plants rose from around 1 000 operating plants in the 2000 to 7 215 in 2011. Raising demand for land and associated land use conflicts/competition is currently

[9] Bekanntmachung über das Inkrafttreten des 6. Energieforschungsprogramms der Bundesregierung "Forschung für eine umweltschonende, zuverlässige und bezahlbare Energieversorgung" Bundesanzeiger 6.9.2011 (134), 3109-3110.

[10] Bekanntmachung einer Richtlinie über die Förderung von Innovationen zur Verbesserung der Energieeffizienz in der Land- und Ernährungswirtschaft im Rahmen des Programms zur Innovationsförderung (Bundesanzeiger vom 30.09.2006).

[11] Bekanntmachung einer Richtlinie über die Förderung innovativer Vorhaben zur Erhöhung der Energieeffizienz im Gartenbau im Rahmen des Programms zur Innovationsförderung (Bundesanzeiger vom 05.09.2006).

reflected by an on going controversial debate about the risks and opportunities of bioenergy production from agricultural resources.

Implementing the Energy Concept will be a balancing act. The development of bioenergy must be sustainable and efficient whilst the use of agricultural areas for the production of food and feed will have priority over other uses. The production of food and feed may neither be compromised in Germany nor in other countries.

3.6 Driver analysis

Based on the DESTEP analysis the importance of external factors on energy efficiency has been categorized according to their short and long run importance.

Table 3: Potential drivers and their importance on energy efficiency in agriculture

Driver		Importance	
		Short Run (< 3 years)	Long Run (> 5 years)
Demographic drivers	•Demographic change and impact on agricultural sector		minor
Economic drivers	•Energy market (price, supply)	medium	
Social drivers	•Farm structure •Level of education and research		minor
Technological drivers	•Technological developments		medium
Ecological drivers	•Environmental impact of agriculture •Climate change		medium
Political drivers	•Legislation (CAP) •Funds	major	

4 Stakeholder Analysis

Four main groups of stakeholders were identified which are expected to impact the adoption of energy efficiency measures in Germany: Farmers (including their organizations), governmental institutions, non-governmental institutions (NGOs), Industry and Consumers.

4.1 Potential impact and interest of farmers and farmer's organisations

Farmers have an intrinsic interest of energy saving in agriculture and thus are expected to adopt energy saving measures where ever possible. Farmers are very well aware of increasing energy prices and have in general a great interest in reducing their cost expenses for energy, especially fuel and heating/ drying. However, their interest to invest in energy saving technologies may be constrained by financial liquidity or alternative opportunities for capital investment. The current Renewable Energy Sources Act creates a great incentive for farmers in Germany to invest in renewable energy systems on farms (wind, solar, biogas), which may reduce the willingness to invest in energy efficiency measures unless they are regulated.

In specialized agricultural production systems, which target high price products, energy costs may be less important, because the realization of the desired product quality is essential to achieve the price. Farmers targeting at high quality products may therefore be more reluctant to implement energy saving measures at their farm.

Farmers' organizations in Germany do not address the issue of energy efficiency in agricultural production to a significant extent. Energy is rather seen as a product they are selling than as a means to produce[12] [13].

4.2 Potential impact and interest of industry as supplier of machines and agrochemicals

The primary interest of the industry is to sell machines and agrochemicals to the farmers. Therefore, the agrochemical industry has an intrinsic interest in selling more agrochemicals rather than less. Energy efficiency issues associated with the production of the products are important as far as they affect the energy use for the production of the chemical or machinery. Especially nitrogen fertilizer production is associated with high energy costs. The fertilizer industry is generally very aware of the energy costs associated with the production of fertilizer and is making efforts to reduce the energy input with more efficient production systems.

The industry of agricultural machineries needs to provide machines, which comply with the farmer's goals. Since fuel use is a more and more important issue for farmers, innovations in more efficient engines are also in the interest of the industry of agricultural machineries. With rising awareness of energy efficiency issues in the farmers' community it can be expected that industry suppliers communicate their energy consumption to the farmers and the public. A good example is the fertilizer industry which is communicating progress in energy efficiency associated with fertilizer production (IFA, 2009).

Suppliers of precision farming equipment may have an impact on using indirect energy in agriculture more efficient.

4.3 Potential impact and interest of governmental institutions

Besides the European, the national and federal governments are committed to improving energy efficiency in the economy as a whole and thus also to the agricultural sector. The focus of policies, however, is set more on other sectors than agriculture, such as industry, housing and transportation.

However, the energy efficiency in agriculture is getting more and more on the national agenda. For example the Federal Ministry of Agriculture is supporting several research projects on energy efficiency in agriculture[14]. The current Renewable Energy Sources Act

[12] Schievelbein, C.: Bauernhöfe statt Energiefabriken. Unabhängige Bauernstimme 10-2008. http://www.abl-ev.de/fileadmin/Dokumente/AbL_ev/M%C3%A4rkte/Bauernh%C3%B6fe_statt_Energiefabriken__BS_Okt._08.pdf

[13] http://www.bauernverband.de/energie

[14] Neufassung der Richtlinie für ein Bundesprogramm zur Steigerung der Energieeffizienz in der Landwirtschaft und im Gartenbau. Vom 24. Februar 2011. Bundsanzeiger 38, 960-963.

may have an effect on investment activities in energy efficiency measures, which need further attention.

The impact of extension and advisory services has to be evaluated differently across the federal states of Germany, since not all states have implemented a governmental extension service. Where it exists the extension service may have a substantial impact on the dissemination of innovations and funding programmes with the aim of energy efficiency.

4.4 Potential impact and interest of non-governmental institutions (NGOs)

NGOs can be assumed to have a moderate to great interest in energy efficiency improving measures unless targets of nature conservation are affected. Their impact can be strong has shown the debate on greenhouse gas emissions in agriculture.

4.5 Potential impact and interest of consumers/ food chain

Consumers have a great impact on energy efficiency in agriculture provided that the energy efficiency of the product is communicated through the value chain. At this stage it is not very likely to happen because other issues are more important right now.

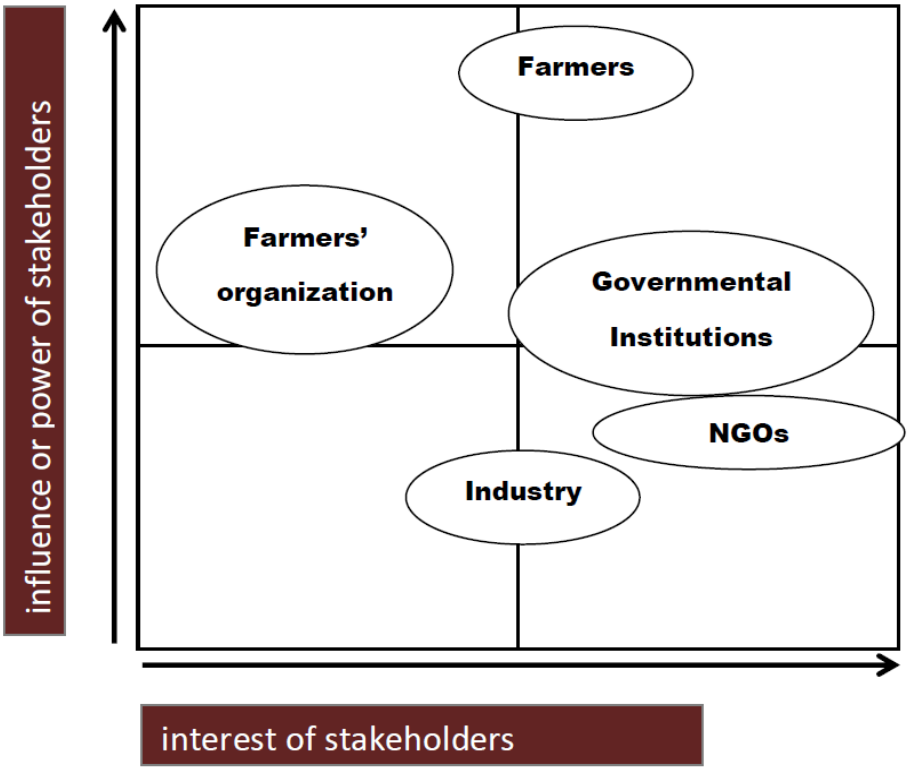

Figure 1: Power and interest of stakeholders in energy efficiency measures

5. Summary and Conclusions

Energy efficiency in agriculture is mainly driven by farmers, their goals and their business philosophy. This in turn is determined to a large extent by cost-price relationships and their impact on farmer's income and welfare. Education and access to information is important to

create an awareness of energy efficiency on farms. The economic and political environment was detected as main external drivers for energy efficiency in agriculture. Governmental institutions, NGO and industries have an impact over the market or the propagation of energy efficiency in general. Governmental institutions have a specific impact with research funding of energy efficient technologies in agriculture. There have been some funding lines especially from the Federal Ministry Food, Agriculture and Consumer Protection, resulting in increased awareness and diffusion of new efficient technologies. Official extension services may play a crucial role for promoting innovative technologies, which are energy efficient. However, not in all federal states governmental extension services are established. The lack of these extension services may be a bottleneck for the adoption of innovations.

The stakeholder analysis has shown, that energy efficiency in agriculture doesn't seem to be a very important issue for stakeholders involved. For example farmers' organizations surprisingly do not communicate energy efficiency in agriculture significantly. Also for NGOs energy efficiency is not one of the main topics which are addressed. More prominent is the communication of farmers as energy suppliers for renewable energy which is in the political discussion since the reforms in the agricultural sector in the 1990s. Apparently it is difficult to communicate the farmer as a user and supplier of energy and the appropriate ambition for energy efficiency.

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Appendix

Stakeholder	Main activities	Contact
Governemental institutions		
Federal Office for Agriculture and Food (BLE)	Energy efficiency and sustainable farming. Reducing CO2 emissions, expansion of organic farming	energieeffizienz@ble.de
Federal Ministry Food, Agriculture and Consumer Protection (BMELV)	Increase biomass and bioenergy use in rural areas. Investment support for energy conservation, efficiency, biomass or bioenergy use in agriculture	poststelle@bmelv.bund.de
Federal Ministry for Environment, Conservation and Nuclear Safety (BMU)	Increase energy efficiency in agriculture and horticulture. Rehabilitation of existing greenhouses, new EE greenhouses, combination with other funding	
Low Saxony Chamber of Agriculture (LWK)	Energy efficiency in agriculture. Electricity savings in the cooling milk and milking equipment, EE in the barn ventilation, reduced tillage, energy savings in tractor use	info@lwk-niedersachsen.de
Hessian Ministry of Environment, Energy, Agriculture and Consumer Protection (HMULV)	To reduce energy consumption and increase renewable energy. Greater use of renewable energy	alfred.roth@hmuelv.hessen.de
Energy Agency of North Rhine Westphalia	Energy savings in drying, barn ventilation, heat recovery, water heating, equipment maintenance, lighting and biogas using	jung@wipage.de
Bavarian State Research Centre for Horticulture and Wine Growing (LWG)	Saves fertilizers, pesticides, and labor costs, conserves soil and ground water	poststelle@lwg.bayern.de
The Rhineland-Palatinate Ministry of Economy, Climate, Energy and Regional Planning (MWKEL)	Increasing energy efficiency. Use of renewable energies	henkes@eor.de
Rhineland Palatinate Ministry for the Environment, Agriculture, Food, Wine and Forestry	Increase the energy efficiency of wastewater treatment facilities, the use of renewable energy sources	http://www.rlp.de/kontakt/
Agency of Renewable Resources (FNR)	Sustainable supply of raw materials and energy supply, environment protection through resources conservation. Strategies in the field of sustainable raw materials, energy utilization of biomass, use of lignin, energy crops, bioethanol from lignocellulose, solid bioenergy sources	info@fnr.de
L-Bank State Bank of Baden-Wuerttemberg	Investments to increase EE, reducing emissions, improving livestock production and quality in production, investment in	landwirtschaft@l-bank.de

	organic farming	
Funding Datebase of the Federal Ministry of Economics and Technology	EE and renewable energy, agriculture and rural development, environmental protection and nature conservation. Loans for in reducing energy consumption, reduction of emissions from the agriculture and food industry, enhance consumer protection	
Association for Technology and Structures in Agriculture (KTBL)	Providing technical and economic data on agricultural production processes, renewable energy, energy efficiency, greenhouse gas abatement and conserving energy and water resources	ktbl@ktbl.de
Die Landesbank Baden-Württemberg	Strengthening the competitiveness of enterprises through the efficient use of energy. Energy consulting in the cooling, heating, ventilation, feeding, tillage, fertilizer, fuel economy, use of renewable energies	vertrieb@lbbw-im.de
Industry		
Danone GmbH Germany	Energy efficiency and environmental protection. Cooling with ground water, packaging made from renewable resources, recycling, packaging design. Reduction of emission in livestock production systems	kontakt@danone.de
Netafim - Nutrigation	Reduce energy consumption, increase productivity and sustainability in agriculture. Prevent overexploitation of natural water resources and pollution of ground water, promotion of organic farming, low-pressure-irrigation systems	tbirgit.villain@netafim.de
Yara International ASA	Is constantly improving its products and production processes to increase energy efficiency and conserve the environment	ralf.peters@yara.com
The Industrial Association of Germany (IVA)	Plant protection, plant nutrition, pest management and biotechnology	koch-achelpoehler.iva@vci.de
Farmers		
German Farmer Association (DBV)	Reducing energy inputs, best practice, consulting	info@dbv.de
Non-governemental institutions		
The Nature Conservation Germany (NABU)	Energy efficiency, reduction of emissions. Use of renewable energy sources	Service@NABU.de
The Association for Environmental and Nature Conservation Germany	Biomass production, using biomass as electricity and heat supplier, use of waste materials such as manure	reinhild.benning@bund.net
Landwirtschaftliche Rentenbank	Increasing energy efficiency and reduce emissions in agriculture. Investments to increase EE, to reduce emissions, improve animal husbandry and product quality.	

Research Institute of Organic Agriculture (FiBL)	Organic farming (reduced tillage, more CO2 in the soil, more EE, reduced gas emissions)	info.deutschland@fibl.org
Private Institute for Sustainable Land Management GmbH (INL)	Resource efficiency, climate, water and soil protection. Energy intensity, nitrogen balance, phosphorus balance, potassium balance	info@nachhaltige-landbewirtschaftung.de
Lake Constance Foundation	Increasing EE in agriculture and climate protection Development and implementation of operational action plans for energy savings and greenhouse gas retention in pilot plants, improvement of existing energy saving program	thomas.schumacher@bodensee-stiftung.org
Working Group for Electricity Use in Agriculture (ALV)	Heat pumps- heating wit environmental warmth, own electricity, biomass- bonus for biogas plants	ael@ael-online.de
Efficiency Agency North Rhine-Westphalia (EFA)	Enhancement of resource efficiency. Improvement of production, saving material and energy, cost reduction	