EIP-AGRI Focus Group

Enhancing production and use of renewable energy on the farm

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Table of contents

1. Summary 3
List of abbreviations: 4
2. Introduction 5
Context 5
Purpose and scope 6
3. Brief description of the Focus Group work process 6
4. Results from the Focus Group 7
Introduction 7
Overcoming barriers and strengthening support factors for RETs 7
Key cross cutting areas 11
Mini-papers 15
5. Recommendations: Suggestion for Operational Groups and ideas for research needs from practice 19
Thematic area n.1: Bioenergy from forest/woody biomass 19
Thematic area n.2: Combined production of solar/wind energy at farm level with focus on solving storage problems 19
Thematic area n.3: Testing different configurations to produce biogas from agricultural by-products 20
Research needs in other thematic areas: 21
Annex A: List of members of the Focus Group 22
Annex B: list of relevant research projects 23

1. Summary

Many different forms of renewable energy are produced in rural areas, ranging from wind, solar and geothermal sources to different forms of bioenergy. Many small and medium scale installations provide opportunities for new cooperation in production, sales and distribution of renewable energy. They bring employment and economic development to rural regions, replace fossil fuels and contribute to energy security.
Many technologies are available to meet energy use on the farm for heating, cooling, traction and other energy functions. Besides bioenergy (used for heat, power, biogas, biofuels), solar (electricity and heat), wind and geothermal energy, technologies can also include heat recovery systems, e.g. from cooling systems and manure storage. Farmers can also combine different technologies simultaneously. In other settings, renewable energy produced on the farm can be delivered to power or gas grids. Both at the scale of the individual farm and the whole agricultural sector, there is a wide range of options and potential for renewable energy generation and deployment with a potentially major contribution to Europe's energy mix.

However, this large portfolio of options also creates complex questions, since the potential, performance and impacts of renewable energy technologies depend on natural conditions (climate, soils), size and type of farm, management techniques, degree of mechanisation, geographic location and socio-economic factors, such as investment and advice support for farmers, as well as the surrounding energy system and energy infrastructure.

An EIP-AGRI Focus Group with 20 experts from across the EU and with complementary disciplinary backgrounds addressed ways to enhance the production and use of energy at farm level and in rural areas, seeking best solutions and innovative approaches, including cooperation between farmers and other actors in rural areas.

The main question for this Focus Group was: how to enhance production and use of renewable energy on the farm?

The experts discussed opportunities and barriers for the different renewable energy technologies (RETs), synergies between various RETs and energy sources, trade-offs between land use for agricultural or energy production, and the possibility to develop collective selling approaches for renewable energy produced on the farm.

Further areas of work identified by the Focus Group experts and covered by mini-papers include: electromobility; combinations of and synergies between different renewable energy sources; agro-forest management and bioenergy; business models; societal aspects and maximisation of benefits for rural communities; integrated approaches for energy, food, feed and biobased products; biofuels; advising and equipping farmers.

Many successful examples of renewable energy use on farms exist, as highlighted by case studies from countries across the EU. These case studies show that there are a variety and combination of factors promoting successful implementation and use of renewable energy on farms. Economically viable business models are essential. Furthermore, success often depends on whether new technologies perform effectively and are easily accessible for farmers. Support, such as training and capacity building, investments, grants or subsidies, is an important enabling condition. However, technical, economic, societal and regulatory barriers often hamper further scale-up of renewable energy on farms. The Focus Group formulated a range of recommendations for further research and ideas for Operational Groups that can help address these barriers.

EIP-AGRI Operational Groups are innovation projects financed through the Rural Development Programmes. They could address challenges such as: how to combine the production and use of renewable energy options on farms with the flexible, sustainable and integrated production of food, feed and other biobased products, notably by valorising agricultural by-products. Other priorities for future research could be the production of bioenergy from woody biomass obtained through sound forest management and looking at options for the storage of solar or wind energy. Furthermore, research is also needed on business models that increase profitability of renewable energy production on farms and could potentially help overcome administrative and legal barriers.

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List of abbreviations:

2G: Second Generation
AES: Agro-Ecological Symbiosis
Ah: Amperehour
BM: Business Model
C: Carbon
CAP: Common Agricultural Policy
CO_2: Carbondioxide
CO_2-eq.: CO2 equivalent
CCS: Carbon Capture and Storage
CHP: Combined Heat and Power
EIP-AGRI: The European Innovation Partnership for Agricultural Productivity and Sustainability
EC: European Commission
EU: European Union
FI: Financial Instrument
ha: hectare
GHG's: Greenhouse Gases
ICT: Information and Communication Technology
FG: Focus Group
kWh: kiloWatthour
kWp: kilowatt peak
kWth: kilowatt thermal
m^2: square metre.
MW: MegaWatt
MWh: MegaWatthour
NW: North West
N: Nitrogen
PEF: PolyEthyleneFuranoat
PLA: PolyLactic Acid
PLC: Programmable Logic Controller
PV: PhotoVoltaic
RES: Renewable energy and energy efficiency systems
RETs: Renewable Energy Technologies
R&D: Research and Development
RDD&D: Research Development, Demonstration & Deployment
RED: Renewable Energy Directive
SRF: Short Rotation Forestry
SRWC: Short Rotation Willow Coppice
V: volt

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2. Introduction

Context

In the EU 2030 Energy Strategy (updated in the policy package "Clean energy for all Europeans") EU countries have agreed on a Framework for climate and energy, including EU-wide targets and policy objectives for the period between 2020 and 2030. The targets for 2030 include:

- a 40% cut in greenhouse gas emissions compared to 1990 levels
- at least a 32% share of renewable energy consumption
- at least 32.5% energy savings compared with the business-as-usual scenario.

The EU has set itself a long-term goal of reducing greenhouse gas emissions by 80-95%, when compared to 1990 levels, by 2050. The Energy Roadmap 2050 explores the transition of the energy system in ways that would be compatible with this greenhouse gas reductions target, while also increasing competitiveness and security of supply.

Given that in many regions agriculture represents the most important land use, the sector has a large technical and economic potential for delivering and using renewable energy. The sheer land surface involved allows the deployment of wind and solar energy parks. Moreover, the agricultural sector is an important provider of biomass, either through residues of crop and livestock production or through the production of dedicated crops for bioenergy, biofuels or feedstock for biomaterials.

Many different forms of renewable energy are produced in rural areas, ranging from wind, solar and geothermal sources to different forms of bioenergy. Many small and medium scale installations provide opportunities for new cooperation in production, selling and distribution of renewable energy. They bring employment and economic development to rural regions, replace fossil fuels and contribute to energy security.

Many technologies can provide energy on the farm for heating, cooling, traction and other energy needs. These include bioenergy (heat, power, biogas, biofuels), solar (electricity and heat) wind and geothermal energy. Heat recovery systems, e.g. from cooling systems and manure storage can also provide energy. Farmers can also combine different technologies simultaneously. Renewable energy produced on the farm can also be delivered to power or gas grids. Both at the scale of the individual farm and the whole agricultural sector, there is a wide range of options and potential for renewable energy generation and deployment with a potentially major contribution to Europe's energy mix.

With declining costs of key renewable energy technologies, the economic opportunities for farmers to engage in renewable energy production are increasing, and new business models are emerging on the market. Considering the EU targets for reducing GHG emissions and producing energy from renewable sources, scaling-up renewable energy in the agricultural sector is both an opportunity for famers and a societal priority.

However, this large portfolio of options also creates complex questions, because the potential, performance and impacts of renewable energy technologies depend on natural conditions (climate, soils), size and type of farm, management techniques, degree of mechanisation, geographical location and socio-economic factors, such as investment and advice support for farmers, as well as the surrounding energy system and energy infrastructure.

This complexity creates specific challenges for the individual farmer including the need for sound advice, investment support and risk management. Particularly for many farmers in Eastern Europe, there are additional challenges: land is highly fragmented, agricultural holdings are small, farmers generally have a lower investment capacity and there are often changes in policy incentives. However, it is clear that the production and use of renewable energy on farms in Europe is becoming an attractive opportunity to diversify farming activities and enhance the overall sustainability of agricultural practices, as well as to improve income for farmers in a situation of increasing economic pressure due to volatile market prices for agricultural products.

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Purpose and scope

How to enhance production and use of renewable energy on the farm was the main question dealt with by the Focus Group; they looked for good practices, solutions and innovative approaches, including cooperation between farmers and other actors in rural areas.

Furthermore, the Focus Group focused on the following specific tasks:

- Identify **main practical challenges and opportunities** posed by the production and use of renewable energy at farm level.
- Identify **main practical barriers** to sourcing of biomass feedstocks (forest biomass, agricultural biomass, solar, geothermal and wind), logistics & infrastructure (e.g. on farm biogas, grid connection, etc.) transformation to energy and distribution to farms and on farms as well as to public grids.
- Identify **best practices and tools** that can be applied at farm level to increase both the production and self-consumption of renewable energy in a cost-efficient manner, while ensuring that renewable energy sourcing meets applicable sustainability criteria.
- Examine the **trade-offs** between all types of on-farm energy production and alternative uses (food, feed, other non-food).
- Analyze **possible synergies** between use of various energy sources (agriculture, forest, solar, wind) and demand on farm level (constant and stable supply systems).
- Propose potential **innovative actions** to stimulate the knowledge and use of management practices and strategies for improving uptake of renewable energy and provide inspiration and ideas for Operational Groups and other innovative projects.
- Develop **collective selling approaches** for farm-produced energy, linked to economic opportunities for territorial developments and networking activities for dissemination of these approaches.
- Identify remaining **research, innovation, advisory and other needs** coming from farm level to improve the use as well as the production of renewable energy on farm holdings.

Provide **examples of practices and tools that are already applied**, including through better stakeholder involvement and synergies with other sectors such as tourism.

3. Brief description of the Focus Group work process

The Focus Group is composed of 20 experts (see annex) from across the EU with different disciplinary backgrounds in agriculture, science and advisory services, covering a wide range of experiences with different renewable energy production systems in the agricultural sector.

In autumn 2017, a discussion paper was drafted, outlining the scope of the Focus Group, identifying and listing the different questions and barriers related to renewable energy production on farms. In the first Focus Group meeting, which took place in Warsaw in November 2017, the experts discussed the findings of this paper and reflected on an inventory of priorities and actions that could be taken up at European and regional level. They defined topics for mini-papers on specific topics and problem areas that were considered of key importance for the scope of the Focus Group.

Various teams composed of expert group members drafted these mini-papers in the subsequent months. Furthermore, a range of case studies of renewable energy on the farms were identified and summarised by the Focus Group experts, thus providing additional information. Subsequently, a second meeting was organised in Milan 24-25 April 2018. The meeting included the presentation and discussion of the mini-papers and addressed the main recommendations and an action agenda based on the work done.

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4. Results from the Focus Group

Introduction

Given the large number of technical options and system solutions for renewable energy use on farms in combination with the different farm sizes and types (livestock, arable, etc.), settings (climatic, soil, infrastructure) and regions (policy, innovation system, culture), further growth of renewable energy use on farms is likely to take many forms and pathways. Positive trends and growth accelerators can be noted, such as decreasing cost of technology, gathering more experience and project development capacity, as well as an increase in financial opportunities for renewable energy in agriculture and forestry.

However, the development of larger scale use of bioenergy, wind energy and solar parks also increasingly requires supporting measures with respect to spatial planning, infrastructure, different business models and market organisation, trends that are not all under control from a farmers' perspective. Understanding the challenges and the opportunities from a bottom-up perspective requires further research and support. In particular, identifying, developing and implementing integrated approaches and good practices could help farmers adopt technologies that increase production of renewable energy in their farms.

Overcoming barriers and strengthening support factors for RETs

The Focus Group identified a list of supporting factors and also barriers for the development of renewable energy on farms. These factors can be grouped as follows:

Economic/financial

The relative competitiveness of renewable energy technologies (RETs), which are generally more expensive compared to the conventional alternatives (fossil fuels, grid electricity, etc), may require subsidies to make them economically attractive. Such incentives are subject to policy changes and therefore uncertain, whereas stability in prices (e.g. feed-in tariffs, which touches on regulatory issues) is essential to avoid significant risks for farmers who invest. Also, capital is essential for investment projects. Given the high importance of addressing financial risks and profitability for farmers, these aspects deserve special attention. Therefore, this reflection should also cover which options and organisational models may work best, and the potential for collective selling approaches should be considered.

Technical

Technical barriers touch upon: the complexity and the reliability of technologies, both in functioning and maintenance; deviations from projected performance due to specific local conditions; the capabilities and service of technology suppliers. Examples of complex technologies at farm level are mainly related to biomass use for energy, such as biogas, or systems integrating different components, like the combination of solar, heat pumps and cooling devices. Biogas systems often face fermentation problems and can be difficult to manage, requiring specific skills and expertise. On the other hand, technologies that have very good performance and require little maintenance are clearly an enabling factor. Solar energy and related batteries are not really complex to use. Problems with small-scale wind turbines may occur in case of unrealistic prognoses from wind turbine sellers and/or of selection of unsuitable sites.

Societal

RETs often have a visual impact on landscapes (larger solar energy installations, wind turbines, biomass production), and they may cause noise (wind energy, transport of biomass) or smell (biogas), or otherwise affect the environment. Societal barriers can therefore include resistance from local communities against farmers installing facilities that affect the landscape, cause odour problems or involve intense logistical operations. In contrast, society and local communities may also become beneficiaries of investments in renewable energy capacity, notably through additional jobs and diversified regional income.

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Regulatory

Obtaining permits to realize RET systems is often complex and time-consuming. Various regulations may conflict (especially with respect to spatial planning, ownership of land, etc.). Also, regulations regarding the sale of own-produced renewable electricity can have an influence on RET systems, notably their profitability. In contrast, many examples exist where regulations have led to successful development of RETs on farms, with financial incentives (and stability of such incentives) playing a key role. For example, good spatial planning and integration of RETs in landscapes, etc. can further facilitate their deployment.

Some barrier types (e.g. financial, technical) are relatively universal. On the other hand, some other generic barriers translate into several specific matters depending on the technology used and the farm type. Information material on practical on-farm experiences and tested solutions can provide guidance for farmers, technology suppliers and government bodies.

Barriers and support factors by renewable energy option

Each renewable energy option comes with specific issues with respect to finance, technical, societal, regulatory and competition for natural resources. Table 1 summarises key issues identified (both enabling and hampering factors) by the Focus Group experts for each main renewable energy technology option.

Table 1: Overview of the financial, technical, societal, regulatory, natural resource and other factors that enable or hamper the deployment of key renewable energy options on farms, identified by the Focus Group

	Economic/Financial	Technical	Societal	Regulatory	Competition for natural resources
Solar power	The price of electricity often fluctuates, therefore competitiveness of solar power farms is constantly under pressure. CO_2 price can provide a further incentive. Because large amounts of electricity are difficult to store, the amount of energy generated and fed into the grid must be carefully matched to the capacity to keep the system operating. While small amounts of photovoltaic power can be incorporated into the grid with few changes, the development of grid-monitoring technologies and	In areas with limited grid capacity, this may hamper further development of solar energy, although combinations of RETs can partly alleviate this issue. Farmers are often not aware of existing opportunities for improving the efficiency of energy use on their farm. By profiling the farm energy consumption and through dedicated benchmarking, significant gains in farm energy efficiency may be achieved.	Degree of local government support can play an important role in deterring or encouraging farmers to invest in solar energy production. It could be difficult to obtain social acceptance for large solar parks on (agricultural) land.	Grid balancing of supply and demand for energy is not adequately addressed in some countries. "Feed-in tariffs" could offer price certainty and stable long-term contracts that in turn help finance further renewable energy investments Sometimes the maximum capacity allowed is restricted.	Solar energy fields may compete with agricultural land, and they (can) have an impact on the landscape. Landscape impacts can occur.

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	more cost-effective electricity storage systems will be needed for larger-scale operations, thus increasing the overall costs. Availability of adequate financial instruments is important to promote investments by farmers.				
Solar heat	High costs for equipment and financing. Stable financial instruments and transparency are important.	Performance is seasonal. Generally, it is to be deployed in combination with other technologies and backup systems.			
Wind	Wind power must still compete with conventional generation sources on a cost basis. Even though the cost of wind power has decreased over the last decade, the technology still requires high initial investment and availability of adequate financial instruments for farmers and farmers` cooperatives is desirable. Stability of financial instruments, price certainty and stable long-term contracts are desirable	Electricity production by wind turbines is determined by the wind intensity, therefore it is impossible to accurately plan the energy output. The electricity supply system has to adapt to the wind energy production. However, efficient integration of wind energy into an existing power system requires an advanced management of the conventional power plant	There are concerns regarding the noise produced by the rotor blades as well as visual impacts on landscapes. These effects could affect the value of property, although stronger societal support is obtained with more collective approaches	Collaborative spatial planning is needed.	Land suitable for wind turbine installation may compete with alternative uses for the land, which may be more highly valued than electricity generation.
Biomass heat, power, fuels	Reduction of costs of equipment and financing is still needed, particularly for advanced biofuels (large scale needed).	Investment in biogas storage capacity is needed for situations where production of electricity is greater than consumption.	Social acceptance can be enhanced if benefits are demonstrated. Inclusive business models in regions	Stability in regulatory frameworks is needed. General framework for sustainability of bioenergy	Sustainability of increased feedstock production is a key issue, including how to avoid competition with food production.

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	Stable financial instruments and transparency are important. For biogas, support is needed for other services (e.g. manure treatment and recycling equipment). Regional scale business models are advisable (to obtain scale) Collective approaches could play an important role (CHP schemes, biogas, biofuels). Business models need to support multiple targets and achieve synergy with sustainable agriculture and land use goals.	Complex technology for advanced biofuels and biorefining. The viability of biogas production does not only depend on electricity production. Other possible outputs of the biogas plant, such as heat recovery, digestate as fertiliser or biogas purified into biomethane require multiple markets. It is complex to match seasonality of biomass supplies and energy demand. Hybrid renewable energy systems are promising (but complex). Pre-treatment technologies and costs need further development	can increase support. Landscape impacts require attention.	production and agriculture desirable.	Sometimes competition of imported biomass resources and vegetable oil. Insufficient knowledge on economic opportunities of biomass.
Geothermal heat		Low temperature heat pumps (sometimes in synergy with waste heat/cooling duty). Depending on regional conditions, geothermal heat could be a significant option (e.g. for glasshouse horticulture). Technology providers often lack knowledge to implement these options, e.g. on some specific technical issues (e.g. corrosive environment);	Lowering GHG emissions of agriculture and horticulture is a supporting factor. Less dependence on fossil fuels (e.g. natural gas).		

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Based on the inventory and Focus Group discussions, policy incentives stand out as an essential factor for the development of RETs, together with R&D efforts to further improve technologies and capacity building. Development of integrated solutions (e.g. systems combining renewable energy options with energy efficiency measures) and increased collaboration between the agricultural and the energy sector are also key areas that could yield positive results.

The overall view of the factors and actors identified by the Focus Group experts point to key priorities for Research, Development, Demonstration, and Deployment (RDD&D), policy and dissemination. Policies and incentives are needed to accelerate the use of renewable energy on farms, in combination with good collaboration between actors to address the various economic, technical and societal barriers identified.

Key cross cutting areas

To promote renewable energy production and use on farms and in the agricultural sector generally, the following topics need to be addressed: 1. collective energy selling approaches for farmers, 2. synergies between the use of various renewable energy sources and technologies, as well as efficiency and storage options at farm level and 3. trade-offs between land use for food/feed and biomass production for energy (and biobased economy applications). Furthermore, there are also renewable energy technology-specific characteristics with respect to financial, technical, societal, regulatory and natural resource issues. These themes are discussed in more detail below.

Collective selling approaches

Collective selling approaches are seen as an important mechanism to facilitate further production and deployment of renewable energy technologies on farms and in the agricultural sector. Economies of scale are important for most renewable energy options. Farmers working as a collective can achieve such economies of scale, but this requires good organisational models, contracts, knowledge, capital and clear and stable regulation. Collective approaches can also be driven by energy companies that work together with a group of farmers or with cooperatives. Although good examples of such approaches exist (also see the case studies in section 3.c), they are by no means common in the EU. Much can be learned from success stories but given the rapid developments in renewable energy technologies and the ambitious policy targets to strongly accelerate renewable energy production, the evolution and testing of collective approaches is becoming more important and urgent. Exchange of information on experiences and experiments in regions with limited or no experience can further facilitate this.

Case study "'Farmers' cooperative harvesting wood for combustion providing heat for buildings of the municipality" – Flanders- Belgium

European project Twecom helped set up a cooperative of 5 farmers and a heat producing facility. Research was carried out on the potential of wood from local hedgerows as a source of energy. For decades, most of the hedgerows in the municipality of Bocholt were no longer maintained and grew into a row of trees. The farmers` cooperative maintains and harvests the hedgerows and dries the wood chips. They are also responsible for the delivery of the wood chips to the storage and combustion site. The wood-fired boiler has a capacity of 250 kW. It is only fired with untreated prunings and chopped wood. It is expected that approximately 195 tonnes of wood chips will be consumed every year to meet the heat demand of the municipal buildings. The annual consumption of wood chips corresponds to the replacement of about 60,000 litres of fuel oil. This amount of wood chips is harvested by the farmers' cooperative from 4 kilometers of hedgerows. In Bocholt alone there are about 100 kilometers of hedgerows.

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Synergies between the use of various renewable energy sources and technologies, and demand on farm level

This report identified many examples of combined use of different renewable options on farms, as well as energy efficiency measures, storage options, etc. Depending on their specific agricultural management and natural conditions and resources, farms often have opportunities for smart combinations of energy technologies. Storage of electricity and the potential of electromobility are discussed in this report. But also, for heating and cooling (and heat storage) multiple options exist. An example is cooling of milk at dairy farms which can be combined with heat supply (in combination with a heat pump) to buildings and for hot water. When combining electricity generation with heating options, more opportunities to balance the produced energy arise, since surpluses of electricity can be used for heat production, which is generally easier to store. When using biomass to generate renewable energy, the farmer has more flexibility in adjusting energy production to the level of the demand, given that biomass is easy to store. Considerable cost reductions can be achieved through smart combinations, which can improve business cases and profitability for farmers, but such investments and equipment are also more complex (e.g. in combination with state of the art ICT controls). This sets new challenges for the agricultural sector, but also especially for technology suppliers and consultants working directly with farmers.

Another aspect that is important to consider is the transition of the European energy system at large. Renewable Energy Technology deployment in rural settings is part of a far larger energy system change and is affected by this (in terms of scale, infrastructure and competitiveness). For example, by 2050, RET in power generation may increase up to 80%. Furthermore, biomass is expected to play a major role in delivering renewable feedstocks for industry (as is seen for increasing production of bioplastics such as PolyLactic Acid or Biobased PolyEthyleneFuranoate, advanced biofuels (e.g. for aviation, shipping and freight transport) and negative emissions with biorefineries in combination with Carbon Capture Storage solutions. Another macro-trend to be considered is the application of advanced agricultural management and practices that lead to cleaner and more sustainable agriculture (including lowering of GHG emissions). Combined modernisation of agriculture (including livestock) in Europe can facilitate sustainable production of biomass for energy and materials, which can deliver a major contribution to the European energy mix. Given the central role for the agricultural sector for biobased options, this also deserves special attention.

Case study "Energy storage project on arable farm in the Netherlands"

The project "Energy Storage on the Farm" started in the Netherlands in 2016. The goal of this project was to create added value for solar energy produced in the farm. The idea was to temporarily store solar energy in a battery and sell the electricity when the prices are high, farmers would then be able to play on peaks in the electricity market. Four Dutch farmers bought a battery of 300 kWh. However, after two years it can be noted that the return on investment is too low compared to what was expected. This is mainly due to the low price of electricity in recent years, while batteries are still expensive. The technical lifetime of the battery is short thus significantly affecting the return on investment.

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Trade-offs: land use for agriculture or energy production

The agricultural sector has many links to climate change and its impacts, and is important for mitigation of GHG emissions. On the one hand, agriculture is highly exposed to climate change, as farming activities directly depend on climatic conditions. On the other hand, the agricultural sector itself contributes significantly to greenhouse gas emissions, due to fossil fuel use and agricultural practices that reduce the soil's capacity to store carbon and inputs such as fertilisers and agrochemicals that produce GHG emissions. Good agricultural practices can contribute to balancing the overall agricultural contribution to climate change. For example, precision farming techniques allow for reduced agricultural inputs as fertilisers and agrochemicals for pest control, while yields are increased, and soil fertility improved.

In many regions the agricultural sector uses most of the land, and for this reason it has a large potential for delivering and using renewable energy. The sheer land surface of farms means that there is room for wind and solar energy parks. Moreover, the agricultural sector is an important provider of biomass, either through residues of crop and livestock production, or by producing crops specifically for bioenergy, biofuels or feedstock for biomaterials. Biomass represents a large techno-economic renewable energy potential in Europe, but that potential strongly depends on the extent to which agriculture can improve efficiency and release land for biomass production while meeting food demand. If not, additional land use for biomass production can lead to indirect land use and carbon stock change, potentially off-setting (at least part of the) mitigated fossil fuel emissions that are avoided by using bioenergy, biofuels and biomaterials. It is important that future increases in biomass production are combined with increases in overall agricultural productivity and that increased biomass production originates from marginal lands or forests. There is a high potential to do this, especially in Central and Eastern Europe because agricultural productivity there is currently lower compared to North West Europe.

Case study "Integration of food production, processing, energy and the local market (Agro-ecological symbiosis)" – Southern Finland

One example of a "symbiotic production model" is the concept of Agro-ecological symbiosis (AES) which integrates primary production, food processing, energy and the local market demand and brings together competences and experiences from different areas (Fig. 1). AES is a food production model based on both 'industrial symbiosis' and 'industrial ecology'. Industrial symbiosis refers to an operation where partners are located in the same location. This proximity allows for local co-evolution and efficient use of waste biomass. Products are sold to respond to the local demand, but surplus may be sold elsewhere.

Combining food processing, crop production and energy production increases the overall sustainability of the local food system. Palopuro AES consists of three organic farms. The center of Palopuro AES is Knehtilä farm, an organic cereal farm (380 ha). Other farms include a neighbouring henhouse and a vegetable farm. The biogas plant will function as "the heart" of nutrient recycling in the system. Green manure leys, crop residues and manures will be used as a feedstock for biogas production, with recycling nutrients back into fields to enhance productivity in the form of digestate.

Biogas will be produced in a batch type dry digester (gross energy of approximately2800 MWh) from green manure leys and other fallows, horse manure and chicken manure. The investment will include two silos, which will be loaded with biomass every three months, an upgrade unit and a fueling station. The batch type process is more suitable for crop farms compared to a continuous process, because it requires less work to operate the biogas plant. The energy produced will be used at the farms (grain drying, bakery, heating, machinery) and the surplus will be sold for passenger cars.

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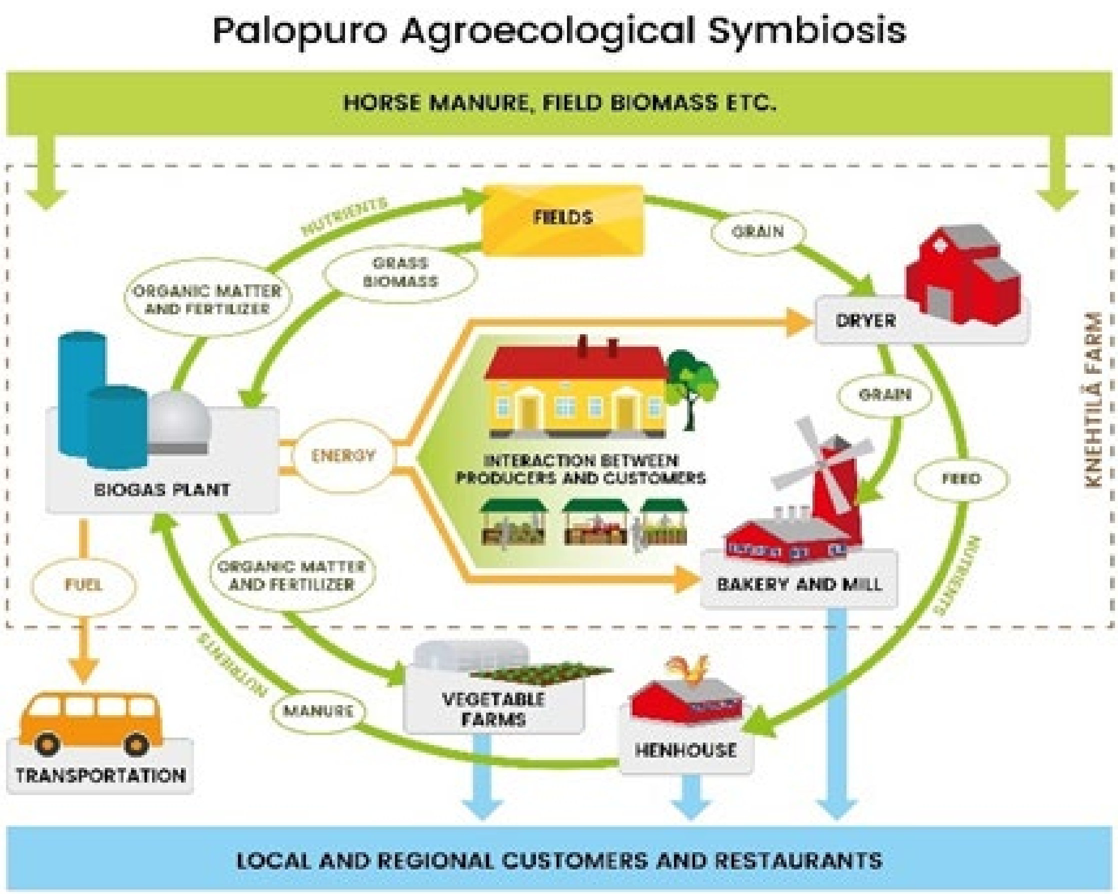

Figure 1: Agro Ecological Symbiosis (AES-)network project.

The model has several environmental benefits: (1) The energy produced converts the farms and food processing from energy consumers into energy producers; (2) the energy consumed at the farms is equal to approximately 1/3rd of the total energy produced; (3) Biogas production reduces climate emissions by 770 t CO2eqv. (4) Compared to the current situation, the risk for nutrient leaching is reduced because the grass biomass will be harvested instead of leaving it to decompose in the field before winter, which is the conventional practice.

The biogas plant is owned by the regional energy company (Nivos Ltd.), a technology provider (Metener ltd.), and Knehtilä and Lehtokumpu farms. The business model makes the investment feasible for farms. In addition to economic advantages, the energy company offers knowledge from the energy sector, which is often lacking. Also, the farmer is not responsible for marketing the biogas. The biogas plant started operations in January 2019.

The model is also planned to be replicated on a larger scale in the municipality of Mäntsälä and surrounding areas in Southern Finland. The on-going AES-network project (https://blogs.helsinki.fi/palopuronsymbioosi/aes-verkosto/) is examining the availability of biomass in this region that would not be competing with food production if used for biogas production. The project is also looking for farmers who are interested in participating in biogas production and investment plans will be made with those interested. There is a great potential in Finland for farm-scale biogas production based on biomass from agriculture.

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Mini-papers

The Focus Group experts compiled a selection of concise papers in which they explored the main issues that need to be addressed to facilitate the further production and use of renewable energy on farms. In this section, short summaries of the main findings and scope of the minipapers are presented.

Electro-mobility, as a means to lower fossil fuel use for farming machinery and transport operations, and use more (self-produced) renewable electricity on farms

Electro-mobility is a tool to make farm machinery more energy-efficient and less dependent on fossil fuels. It is also an important enabler for automation of farm work and precision farming which can lead to sustainable intensification. Electric vehicles can be used for on-farm machinery tasks, road transportation, including transport to fields and for ploughing, harvesting, sowing, etc. There are promising possibilities to replace diesel engines by electric ones. Many farming activities requiring power could be planned to coincide with the peaks and drops in energy production by the renewable technologies on the farm. This can enhance the utilisation rate of batteries in the vehicles for example, leading to potential new business cases and models. This will require fact-based decisions, using the analyses of a large amount of data, rather than experience-based decisions by a single farmer. Testing and commercialisation efforts are needed to facilitate this, as well as demonstrating such integrated concepts in different settings. Electro mobility also enables local production of electricity for powering farm machinery and has large benefits in minimising maintenance and maximising uptime for the machinery.

Farm-specific opportunities and technical challenges for combinations of intermittent energy sources with energy storage and smart grids, including energy efficiency measures

The paper discusses why the use of stationary batteries for electric energy storage can be interesting for farms that have their own renewable energy installation. Different applications are identified, including for example:

- increased on-farm consumption;
- storing excess renewable energy generated in periods of low electricity demand, peak shaving, off-grid operation, e.g. in case of a temporary power outage;
- offer flexibility to the wider energy system (including through aggregators) for supporting the grid and operate more directly in the energy market;
- the use of a battery can open better price opportunities
- use of renewable energy in mobile applications.

It is very important to understand energy production and consumption profiles when choosing and dimensioning renewable energy systems, as well as energy storage systems.
Declining battery costs offer increasing opportunities for farmers who opt for the combination of renewable energy production, such as wind or solar, and storing electricity in stationary batteries on their farm.
Stationary batteries to store renewable energy generated on the farm are becoming less expensive, but the price is still too high to only use them for on-farm consumption of the renewable energy generated on the farm. Ideally, farms could also provide energy to the grid, using batteries to avoid peaks on the grid and supplying energy during shortages instead. However currently, the system administration and high taxes may complicate this process.

To fully realise the potential of energy storage, regulatory actions are also needed: simplified and clear procedures for small-scale renewable energy projects, in consultation with grid managers and other actors in the local, regional and national energy system. The government and network regulators must encourage entrepreneurs who want to store energy (e.g. no energy tax on energy storage, nor extra costs charged by the network regulator).
Finally, much research is still needed on the use of battery systems on farms, especially on finding and defining interesting business models.

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Agro-forest management and use of residual biomass flows for renewable energy production; such systems can deliver multiple services and products

Forest management is normally not focused on by-products like biomass for energy. In Northern Europe, forest management is needed throughout the forest life cycle in order to produce proper quality wood for the forest industry. In Southern Europe, management actions also aim to protect forests against pests and forest fires, which have been more frequent during recent years. Furthermore, reforestation and integrating trees in agriculture to protect against erosion becomes more important the looser and the dryer the soil is. Woody by-products of forest management and biomass from agroforestry systems constitute potential income or cost reduction for farmers, if used as fuels to produce heat or electricity.

The traditional way of using wood as a bioenergy is by burning in low-temperature equipment such as wood stoves. This model is often used to heat living and working spaces with wood produced on or near the farm. Its main disadvantages are the inefficiency of handling and transporting such pieces of wood; and the absence of an efficient way to mechanically feed it into combustion equipment, thereby requiring periodic stoking by hand. The second model involves the conversion of wood into pellets, chips, or briquettes, at centralised facilities or with large on-farm equipment. This processed biomass can be easily transported, sold in bulk and fed into burners by machine. This model is widely used for combustion of wood at off-farm locations and for large on-farm equipment using automated, mechanical stoking. Pellets, chips, or briquettes, along with straw bales can also be used for heating greenhouses during the winter months when high temperatures are essential to ensure good product yield and quality. Pelletised wood can also be made from a wide variety of feedstocks such as forestry waste and waste from forest industries, other tree prunings, old pallets and fallen tree limbs.

It is difficult to achieve a profit at farm-level when using second generation fuels or wood bio-refinery methods (other than burning for heat and power). Farmers can cooperate to provide local heat producing facilities with waste wood from forests or buffer zones and to manage the facility together. The size of these facilities may be 0.5- 4 MW. Research has been carried out on pyrolysis of waste wood, but it needs to be done on a larger scale in order for this method to be profitable.

Business models and funding for the financial viability of renewable energy on farms, based on the financial possibilities and constraints of different farms and farmers

The introduction of renewable energy and energy efficiency systems (RES) on European farms on a mass scale depends on the availability of business models and financial instruments that suit the needs of farmers, but also the requirements of the technology and finance providers. In recent years across the EU, several different business models and financial instruments for on-farm RES have been introduced or tested with different levels of success, meaning that a valuable repertoire of experience is already available. Nevertheless, a comparative analysis of the different solutions and business models and financial instruments alternatives for on-farm RES is not so straightforward. Furthermore, carrying out such a comparative analysis may be quite challenging due to the complexity and cross-national variability among the different EU countries, and especially their administrative and regulatory RES frameworks. Three relevant promotions of on-farm RES that took place in recent years in Europe are analysed through a tailored methodology to classify and compare the different technological solutions, business models and financial instruments for on-farm RES. This methodology can be helpful for those stakeholders who are interested in promoting, investing, analysing or regulating on-farm RES including researchers, investors, public authorities and the farmers themselves. The analysis can help to identify several features that should be considered while designing on-farm RES promotion schemes. Among other best practices we have identified the need to ensure independent assessment, the creation of economies of scale, the convenience of focusing on mature technologies and assisting farmers during the planning process, installation and operation of on-farm RES.

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Societal aspects of renewable energy production and use on farms, including local stakeholder acceptance and encouraging policy actions

The aim of this mini-paper is to describe the most common social issues related to the implementation of renewable energy technologies (RET) on farm and at community level. It lists circumstances, dominant characteristics and effects on RET implementation of farms. It also identifies ways to improve these technologies and minimise possible negative environmental, economic and social impacts.

New tensions are emerging in rural areas regarding farming, ethics and production models that are challenged by new entrants, rural poverty (unemployment, refugees) and diversification (agro-tourism, biofuels). It is important to assess social aspects when integrating a new technology into farming. To do this, relations and interactions among farmers, communities, policy makers and advisers need to be analysed. The most common societal aspects of the RET implementation on farm and at community level are social acceptance, technology uncertainty, knowledge transmission and quality of life. These aspects are often inter-linked.

When local communities are involved and engaged in the process of developing renewable energy technologies, this may increase social acceptance. For most farmers, an expected positive return on investment would be the main reason for them to implement renewable energy technologies on their farm. Moreover, farmers who are already engaged in agri-environmental schemes are a good candidate for renewable energy production. To enhance production and use of renewable energy on the farm, it will be important to pay attention to solving potential conflicts and uncertainty. Finally, policy measures such as energy communities and rural programmes could improve attractiveness of RET applications on farms and increase the confidence of the local/farming communities to the whole endeavor.

Flexible symbiosis for energy, food, feed and other bio-based products; integrated approaches for energy, food, feed and biobased products, particularly more efficient and environmentally friendly farming, closing nutrient cycles, improved soil and water management, etc

Sustainable agricultural production systems aim to integrate production of food, feed, energy and other bio-based products. In a symbiotic model, two or more businesses collaborate to enhance resource efficiency and sustainability of agricultural production. This can be done at farm level, and also on a local scale in cooperation with communities, other farms and local food processing industries. This will create a synergy between agriculture and the rural energy system, contributing to stabilising farm income and security of energy supply. Many concepts fostering integration of agricultural production and energy supply are already in place or are expected to be in the near future. This integration can be addressed directly by farms or based on a broader co-operation of different stakeholders.

However, there is still a lack of awareness on the potential benefits and drawbacks of these concepts among farmers, consultants and decision-makers in municipalities, regions, governments and funding organisations. Therefore, there is a need to address (i) basic principles of agro-energy synergies, (ii) available options, as well as (iii) suggestions for research, demonstration and practical knowledge transfer in this specific field.

Farms consume a lot of energy, a large share of which is accumulated in biomass and organic residues such as wood residues, straw, and manure, which can be used to generate energy. Many technologies are available to exploit these organic resources. Additionally, non-biomass technologies like photovoltaics, solar heat systems, wind and geothermal energy may contribute to the farms` energy supply. These resources may be used to provide energy for the farm itself, but also to deliver a substantial contribution to rural decentralised energy systems. To coordinate agricultural production and energy issues, flexibility of energy production systems and energy consumption is necessary. The combination of agricultural processes with the energy supply on farm, at local or regional level, offers advantages for both sectors. The main challenges regarding the use of bio-resources for energy production are to avoid competing with food or feed production and install highly sustainable production systems. There are ways to combine crop production and energy provision which allow synergetic systems, such as biogas technologies, to be installed. A systems approach where the agricultural, energy and environmental sectors are considered as components of a single system, may significantly improve the economic, social, and environmental sustainability of bioenergy production. The implementation of agro-energy systems needs a thorough analysis of the specific local situation and the legal framework. The best practice presented above can provide inspiration.

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Biofuels: a wide range of technical options and value chains relying on land-based biomass for feedstock

This mini-paper evaluates biofuels with regard to their potential to enhance the use of renewable energy on (mobile machinery of) farms by taking a differentiated view on the origin and processing of raw materials of biofuels. In this perspective, the paper focuses on biofuels that can be produced and used in short cycle on the farm and that generally comply with wider sustainability criteria. In a wider context, use of biofuels based on local production provides an element of circular farming, which applies the principles of circular economy to agriculture. It aims to close loops of material and energy flows in order to make food production more sustainable, and includes the minimisation of external inputs, such as fossil energy, and the maximum use of outputs, e.g. by using manure as fertiliser. Hence, biofuels produced on the farm itself and used to cover the fuel needed for agricultural machinery can be an important element of circular farming.
Within a mix of different renewable energies, biofuels have the advantage of being a storable product with a high energy density, thus making them a valuable option in the transport and mobile machine sector. Biofuels can either be used directly in existing combustion engines, or after some modification of the engine. Biodiesel and pure plant oil are currently indicated to be the best available option. Other available options are bioethanol, hydrogenated vegetable oil and biogas, which are more difficult to realise at farm level.
Advanced biofuels (ABF) (produced from lignocellulosic biomass) have the advantage that they can be produced from other biomass than agricultural products or residues, e.g. from wood or algae. For this reason, their potential is much larger, and competition with food and fodder production can be avoided. Also, ABF have properties close to those of fossil fuels, thus requiring little or no adaptation of existing engines. This makes ABF a suitable option to replace fossil fuels in the transport sector in general. However, producing these advanced biofuels is more difficult on farms, as it requires larger industrial facilities compared to first generation biofuels: pure plant oil, biodiesel and biogas. Given that fuel production might be challenging for a single farm, farm cooperatives or local groups could establish regional structures for energy self-supply.

Advising and equipping famers, with for a focus on accessibility of good quality information on best practices, good implementation and effective dissemination that can reach the critical target groups

Before staring producing renewable energy on the farm, farmers routinely seek advice (formally and informally) from multiple sources before taking major decisions. This paper identifies best practices in advising and equipping farmers to take up renewable energy production. It covers farmers' decision-making regarding renewable energy production, the role of advice and the types of institutions and individuals who are currently providing advice. Public and private advisory services could play an important role in enabling farmers to take up renewable energy production on their farms. Overall, it is found that increased production of renewable energy on farms can be facilitated by:

- Segmentation: different farmers need different types of information and services
- Communication: It is important to use farmers' existing knowledge channels.
- Reducing barriers: Cooperatives can reduce the barriers to renewable energy production on small-scale farms. Large-scale farms find it easier to access advice, leverage financing and are more likely to take up renewable energy production.
- Reducing energy cost: Understanding the energy profile of their own farm, including the associated energy costs for each farming operation, could be a trigger to engaging farmers in production of renewable energy
- Targeting new/young farmers: New entrants or younger farmers might be more inclined to diversify their farm activities into renewable energy production and targeting them could potentially increase up-take.
- Enabling environmental action: Initiating renewable energy production may result from or lead to other forms of environmental action. Linking advice can benefit both aims.

5. Recommendations: Suggestion for Operational Groups and ideas for research needs from practice

This section wraps up the advice and recommendations of the Focus group with respect to the ideas for Operational Groups and priorities for further research.

Thematic area n.1: Bioenergy from forest/woody biomass

Ideas for OGs:

- Biomass production from short-rotation coppice: testing of novel techniques, innovative harvesting and conditioning machinery, etc.
- New forestry practices (testing varieties, growing techniques, etc.)
- Small-scale wood-based energy systems: testing various options for small-scale on-farm use of woody side streams for energy self-consumption.
- Producing charcoal/pellets on farm: Farmers or farmers' cooperatives can produce pellets, on the farm or in specific pelletising facilities, from waste wood and short rotation wood. Pellets can be used either on farm or sold on the market. Similarly, producing charcoal from waste wood and short rotation wood is a possibility. This could be sold for different purposes (barbeque, soil amendement, biofilter etc).
- Exploring technological options for mobile heating units (e.g for seasonal grain drying)
- Energy communities for district/industrial heating: With increasing decentralisation of energy generation, farmers are able to play a more important role in the energy system, enabling new business models and ownership structures of energy infrastructure to emerge. Many farms now have integrated renewable energy generation capacity, but benefits are higher when they work together with other farmers on larger scale installations. Such installations, which cannot be achieved at the level of a single farmer, have the potential to provide multiple benefits for the local population. The term 'renewable energy community' is often used to describe such developments, but it can cover a host of different projects. Some of these approaches could potentially be tested through Operational Groups.

Ideas for research needs:

- Screening existing solutions and developing best practices and implementation strategies for using woody biomass to produce renewable energy at farm or community level. This could be achieved through a thematic network.
- Decentralised sustainable wood gas production, especially targeting cost reduction of technology. Gasifying wood is still rare, but technologies exist that may be downsized and allow to use wood available on farm. The gas produced can be used to produce electricity or for heating purposes.

Thematic area n.2: Combined production of solar/wind energy at farm level with focus on solving storage problems

Ideas for OGs:

- Testing and assessing energy storage techniques and energy control systems for farm energy-intensive operations (heating, ventilation, lighting, feed preparation, etc.), for different farm types.

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Ideas for research needs:

- Identify and inventory opportunities and possible settings (configurations) for renewable energy production on-farm, and disseminate it to potential users in appropriate ways (e.g. thematic network or Coordination and Support Action)

- Developing energy storage solutions suitable for farms: Although stationary batteries are becoming more accessible, they are still far too expensive and often present problems with reliability and the high internal consumption of the inverters. Also, manufacturers of such batteries are not always familiar with the specific requirements of a farming business.

Thematic area n.3: Testing different configurations to produce biogas from agricultural by-products

Idea for OGs:

For individual contexts and configurations, enhance biogas production by adressing the following challenges:

- Appropriate pre-treatment of biomass for biogas or biomethane.

- Low-tech concepts for upgrading biogas into biomethane: there are many different biogas upgrading technologies available on the market. All of them share the same goal: to separate methane from carbon dioxide and other chemical components and to produce biomethane. Each technology has different properties, costs, efficiency rates and can be used for different types of biogas. The more accessible and low-tech these technologies, the more likely they can be taken-up by farmers.

- Combining biogas with small-scale ethanol production: by using the whole lignocellulosic material and producing several products (such as ethanol and biogas), a biorefinery could gain economic and environmental advantages, based on its minimal use of fossil energy sources and efficient utilization of process streams.

- Valorising biogas digestate as biofertiliser: anaerobic digestion in a biogas plant is a well proven process in which organic matter breaks down naturally in the absence of oxygen to produce two valuable products - biogas and digestate. Digestate is a valuable biofertilizer that can be used by farmers to offset the financial and the environmental costs associated with the use of mineral fertiliser.

Ideas for research needs:

- Screening and benchmarking biomass pre-treatment technologies: pre-treatment of biomass is essential to achieve high biogas yield in the anaerobic digestion process. A number of different pre-treatment techniques involving physical, chemical, and biological approaches have been investigated over the past few decades, but there is no systematic comparison of the performance of these pre-treatment methods for application on lignocellulosic biomass for biogas production.

- Feedstock for biogas production: the energy production potential of feedstock varies depending on the type, level of processing/pre-treatment and concentration of biodegradable material. Common feedstock sources include livestock manure, food-processing waste, and sewage sludge. To improve the efficiency of biogas production more knowledge is needed on alternative feedstock sources and best feedstock mixes.

- Flexibility of electricity production by biogas plants: The farmer can better adapt to fluctuations of energy demand by adopting various innovations. For example such innovations could include: faster digestion time of waste into biogas and better gas and heat storage systems., These innovations, if well integrated within the biogas plant operations could help the farmer sell more energy when demand is high and store the energy produced when demand is low.

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Research needs in other thematic areas:

- Development of engines and machinery enabling the use of energy from renewable sources, such as biogas powered tractor engines.
- Exploring innovative business models for farmers producing energy, including collective sales approaches that could potentially enhance profitability for smaller and medium farms.
- Improving the enabling environment for renewable energy production on-farm: assessing possible incentives as well as administrative and legal barriers for developing production of energy on the farm
- Improving the social acceptance of energy production in rural areas by addressing the wider concerns regarding impact on landscape and the environment (rural development policy topic)

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Annex A: List of members of the Focus Group

Name of the expert	Profession	Country
Chatziathanasiou Artemios	Advisor	Greece
Christou Myrsini	Researcher	Greece
De Jong Jan Reinier	Farmer	Netherlands
Dufour Mathieu	Advisor	France
Eckel Henning	Researcher	Germany
Fragoso Rita	Researcher	Portugal
Garau Contreras Laura	Advisor	Spain
Gołaszewski Janusz	Researcher	Poland
Grati Federico Maria	Industry	Georgia
Gysen Marleen	Advisor	Belgium
Hidalgo Dolores	Researcher	Spain
Kari Maarit	Advisor	Finland
Koppelmäki Kari	Researcher	Finland
Pickel Peter	Industry	Germany
Pombo Romero Julio	Researcher	Spain
Schaeken Tom	Advisor	Belgium
Segerborg Fick Ann	Researcher	Sweden
Sepp Mati	Researcher	Estonia
Sutherland Lee-Ann	Researcher	United Kingdom
Trettenero Anna	Farmer	Italy

Facilitation team

Faaij André	Coordinating expert	Netherlands
Didicescu Sergiu	Task manager	Romania
García Lamparte, Andrés M.	Backup	Spain

You can contact Focus Group members through the online EIP-AGRI Network.
Only registered users can access this area. If you already have an account, you can log in here
If you want to become part of the EIP-AGRI Network, please register to the website through this link

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Annex B: list of relevant research projects

Funding programme /organisation	Title	Description
H2020	AgriLink	improve the understanding of the impact of advice to farmers and how to maximize this impact. https://www6.inra.fr/agrilink/THE-PROJECT
H2020	RESFARM	Identify the needs and requirements for both farmers and investors in renewable energy systems (RES) technologies as well as the technical, legal and financial solutions available for them
FAO	Sustainable Forest Management (SFM) Toolbox	Platform of materials worldiwd which entails a website that covers forest management and use of forest products and interesting cases about innovative approaches in forest management
IRENA (International Renewable Energy Agency)	Project Navigator platform	Project which supports the successful development of woody biomass projects. It includes the new technical guidelines on Woody Biomass that describe in nine stages what is needed to plan, establish, operate, and decommission a bankable woody biomass project. It is free for users and needs registration
EU	(RHC-ETIP) **European Technology and Innovation Platform on Renewable Heating & Cooling**	Platform which brings together stakeholders from the biomass, geothermal, solar thermal and heat pump sectors – including the related industries such as district heating and cooling, thermal energy storage, and hybrid systems – to define a common strategy for increasing the use of renewable energy technologies for heating and cooling.
	AEBIOM European Biomass Association	European trade association open to national biomass associations and bioenergy companies active in Europe. AEBIOM was founded in 1990 and aims to promote biomass production and application throughout Europe. It is the umbrella organisation of the European Pellet Council (EPC), and the International Biomass Torrefaction Council (IBTC)
	SAVE	www.slimaansturenvanelektriciteit.be
	Energy Storage on the farm	http://www.dejongodoorn.nl/energieopslag/ http://julesenergy.nl/case/zonnepanelen/
LIFE	Helpsoil	Conservation Agriculture techniques along the Po Valley, northern Italy. Strength, weakness and sustainable solutions to improve environmental benefits. www.lifehelpsoil.eu
FP7	Recare	Information and guidance to prevent and remediate against soil degradation www.recare-project.eu
H2020	Soilcare	Selected promising soil-improving cropping systems across Europe are monitored with stakeholder involvement, and assessed jointly with scientists. Specific attention will be paid to adoption of soil-improving cropping systems and agronomic techniques within and beyond the study sites. http://www.soilcare-project.eu
H2020	Resfarm	Develops a framework to promote, operate and finance renewable energy systems on farms. www.resfarmproject.eu
EU Intelligent energy programme	BioEnergy Farm	Promotes micro-scale biogas installations for co-digestion manure and feed leftovers from the farm (includes feasibility studies; barriers regarding the legal and financial framework; guidance to policy makers). www.bioenergyfarm.eu
	Agroecological Symbiosis	http://blogs.helsinki.fi/agroecologicalsymbiosis/

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The European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) is one of five EIPs launched by the European Commission in a bid to promote rapid modernisation by stepping up innovation efforts.

The **EIP-AGRI** aims to catalyse the innovation process in the **agricultural and forestry sectors** by bringing **research and practice closer together** – in research and innovation projects as well as *through* the EIP-AGRI network.

EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI:

- ✓ the EU Research and Innovation framework, Horizon 2020,
- ✓ the EU Rural Development Policy.

An EIP AGRI Focus Group* is one of several different building blocks of the EIP-AGRI network, which is funded under the EU Rural Development policy. Working on a narrowly defined issue, Focus Groups temporarily bring together around 20 experts (such as farmers, advisers, researchers, up- and downstream businesses and NGOs) to map and develop solutions within their field.

The concrete objectives of a Focus Group are:

- ✓ to take stock of the state of art of practice and research in its field, listing problems and opportunities;
- ✓ to identify needs from practice and propose directions for further research;
- ✓ to propose priorities for innovative actions by suggesting potential projects for Operational Groups working under Rural Development or other project formats to test solutions and opportunities, including ways to disseminate the practical knowledge gathered.

Results are normally published in a report within 12-18 months of the launch of a given Focus Group.

Experts are selected based on an open call for interest. Each expert is appointed based on his or her personal knowledge and experience in the particular field and therefore does not represent an organisation or a Member State.

*More details on EIP-AGRI Focus Group aims and process are given in its charter on: http://ec.europa.eu/agriculture/eip/focus-groups/charter_en.pdf

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Join the EIP-AGRI network & register via www.eip-agri.eu

servicepoint@eip-agri.eu | +32 2 543 73 48 | Koning Albert II laan 15 | Conscience Building | 1210 Brussels | Belgium