EIP-AGRI Focus Group - 28

"Enhancing production and use of renewable energy on the farm"

Minipaper: "Advising and equipping farmers"

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1. Introduction

In this paper, we identify best practices in advising and equipping farmers to undertake renewable energy production. To do so, we first describe general processes of farmer decision-making regarding on energy production, and current understanding of the role of advice in agricultural knowledge systems. We then consider the types of institutions and individuals who are currently providing advice to farmers on renewable energy production and identify best practices from experts in the field. We conclude with a list of research needs.

2. Motivation

European farming is one of the main factors of climate change, generating more than 10% of greenhouse gas emissions[1]. This is a direct result of an energy model primarily based on fossil fuel, which provides more than 70% of the total needs of the agricultural sector. Thus, a fundamental change is necessary in the way that farms both consume and produce energy, including an increase in the production of renewable energy. In order to increase renewable energy production on farms, more farmers need to decide to produce renewable energy. However, this is not a decision made in isolation – farmers routinely seek advice (formally and informally) from multiple sources before making major decisions. Over the past decade, a new actors have begun providing advice to farmers; at the same time, existing Farm Advisory Services (FAS) have (in some cases) developed specialised capability to provide advice.

3. Background – farmer decision-making and AKIS

There is a substantial academic literature on farm business decision-making. A subset of this literature relates to farm diversification, and within that, to renewable energy production. In general, farmers who are younger, better educated, owner-operators and operators of large land-bases are more likely to diversify (Villamil et al., 2008; Tranter et al., 2011; Tate et al., 2012, Frantal and Prousek, 2016; Sutherland et al., 2016). Diversification in general tends to be undertaken by smaller farms as a 'survival' strategy, but by larger farms as an 'accumulation strategy' (i.e. to accumulate wealth) (Evans and Ilbery, 1993; Meert et al.,

[1] Statistic included in the European Commission Document "EU Agriculture and Climate Change" (undated) available at: https://ec.europa.eu/agriculture/sites/agriculture/files/climate-change/factsheet_en.pdf

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2005; Lopez et al., 2011). Diversification may also be influenced by personal interest, and the skillsets and labour availability of household members.

In specific relation to renewable energy production, some types of renewable energy are more popular than others: wind energy is by far the largest resource for on-farm production of renewable electricity in Europe, followed by biomass[2]. However, this varies by country. For example, solar energy production is most popular among UK farmers, followed by wind (Bailey et al.,2008; Tate et al., 2012; Mbzibain et al., 2013), reflecting the relative ease of installing solar panels. Solar and wind are also passive options: once installed, labour investment is minimal. In contrast, anaerobic digesters involve a substantial 'hassle factor'. Much of the up-take literature focuses on biomass and bioenergy crop production (e.g. Mola-Yudego and Pelkonen, 2008; Villamil et al., 2008; Clancy et al., 2012; Huttunen, 2012). While some farmers view biomass as simply another crop (to be selected on the basis of profitability), others express concerns about use of 'food production land' for 'energy production'. Attitudinal research suggests that improving farm profits is a primary motivator for on-farm renewable energy production (Tranter et al., 2011) but that this is not solely about immediate profit: Sutherland and Holstead found that Scottish farmers' investment in wind energy production reflected a desire to 'future proof' the farm (in terms of providing for future successors and enabling self-provisioning of electricity in future). This was confirmed by ISP providers in Belgium (see Section 4). Start-up costs, tenure and planning restrictions are key barriers (Tate et al., 2012; Sutherland and Holstead, 2014).

Engaging in renewable energy production typically involves a major change in farmer decision-making. Sutherland et al. (2012) developed a model for understanding farmer decision-making, which is currently being used in the H2020 AgriLink[3] project to better understand the times at which advice can have the greatest impact. In essence, the model demonstrates that (most of the time) farms maintain a steady trajectory. This is economically efficient, making best use of existing resources (including infrastructure, labour, skills and cultural capital). During this time period, farmers make small, incremental changes. They may take in new information (e.g. attending farming events), but they process this information passively. However, following trigger events (e.g. recognising the need to integrate a

[2] European Parliament, 2016. 'At a glance – renewable energy in EU agriculture'. http://www.europarl.europa.eu/RegData/etudes/ATAG/2016/593546/EPRS_ATA(2016)593546_EN.pdf
[3] https://www6.inra.fr/agrilink/THE-PROJECT

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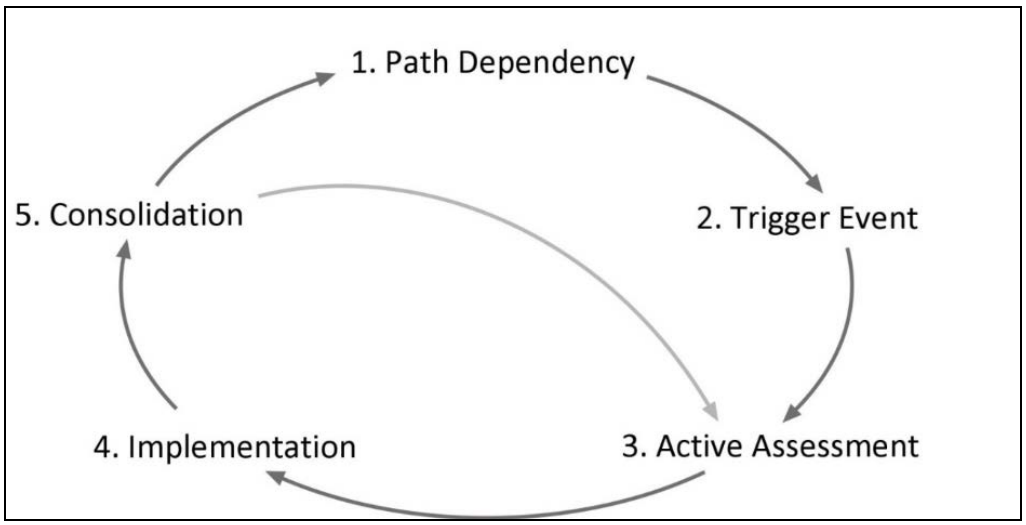
successor into the business, or that the farm is unprofitable), farmers start to actively consider their options. At this stage they are more likely to seek advice from a farm advisor (e.g. including equipment suppliers, banker, accountant). They then make a decision and implement it, continuing the process of active learning until the new activity becomes consolidated into their business. The new activity is then part of the path dependency (Fig. 1).

The relevance of this model for advising farmers is that **many farmers may passively absorb information about renewable energy production for several years before a trigger event occurs. Advisors have a much greater role once farmers have decided to actively consider renewable energy production. Clear evidence of the rewards of engaging in renewable energy production can act as a trigger event.**

Figure 1: The 'Triggering Change' Model of Farm Decision-Making



Source: Sutherland et al., 2012

There are a range of different information providers to farmers. Farmers frequently identify 'other farmers' as their most common source of information (Garforth et al, 2003). Sutherland et al. (2017) found that these informal sources of information are particularly important for small-scale farmers, who may not have the funding available to pay for formal agricultural advice. In terms of formal advice, 'free' information on new technologies is often readily available from equipment suppliers. However, these suppliers have a financial interest in selling their product. Publically funded Farm Advisory Services (FAS) may also provide

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information to farmers, but these are not equally available throughout Europe (e.g. Mediterranean countries like Portugal, Italy and Greece have quite limited FAS). In their Scottish study, Sutherland and Holstead (2014) found that early advice was provided largely by technology suppliers. However, as renewable energy production on farms became more common, the pioneering farmers became active information providers, in some cases starting their own consultancies, which combined their personal experience with other technical and legal knowledge (i.e. peer-to-peer learning became important). It was also at this later stage that the FAS developed specific expertise in renewable energy production advice, and farming organisations started organising information days (to visit renewable energy installations).

4. Best Practices

This section summarises best practices from two advisory organisations and H2020 RESFARM.

4.1 Energy advice by Innovatiesteunpunt (Belgium)

Innovatiesteunpunt (Innovation Support Center for Agricultural and Rural Development 'ISP'), is a Flanders-based organisation which aims to inform and inspire farmers about new challenges and opportunities and to support them to develop and implement concrete projects. Energy is one of the topics. Farmers often seek advice because their energy bills are running high and they appreciate the **independent advice** the energy consultants of ISP offers. Numerous information moments the energy consultants give all over the region of Flanders and publications in the magazines of Boerenbond, the largest farmers' organisation in Flanders represent opportunities to 'trigger' engagement. The funding for this advice comes mainly from regional local government-subsidized projects, aimed at stimulating the implementation of renewable energy production, often in the context of the Covenant of Mayors or other climate commitments.

ISP advisors have learned that farmers are most easily enrolled in producing renewable energy, when they have first been engaged in self-assessment of their own energy consumption. The energy consultants of ISP follow a self-developed 6-step plan when advising and supporting farmers: 1) know your farm (how much energy is needed, when and what power level?); 2) the energy bill (how to optimise it?); 3) which energy saving measures apply to the farm?; 4) which sustainable production techniques apply to the farm?; 5) smart use of self-produced renewable energy; 6) collaboration on energy production.

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Because the region of Flanders has two systems for self-produced electricity (a net-metering system for production installations up to 10 kVA and a self-consumption system for larger installations), **it is very important for farmers to understand the (detailed) energy demand profile of the farm**. The energy consultants have developed calculation tools to optimise the selection and the dimensioning of renewable energy techniques. For example, they have a database with and energy demand profiles in case there are no detailed figures available from the farm itself (per type of agricultural sector) and production profiles (e.g. PV profiles for different orientations and angles of inclination, wind profiles for different wind speeds). Moreover, measures for demand side management (load management as well as energy storage) are taken into account when establishing dimensions.

4.2 Experience of Triskalia advisory service (Brittany, France)

Since 2012, Triskalia, and specially Capinov (one of the cooperative subsidiaries) have developed an advisory service which aims at providing advice and information (technical, legal and economic knowledge) to farmers who want to diversify their activities in renewable energy production (particularly biogas). Participants are mainly members of the cooperative.

When farmers first contact the advisory service dedicated to biogas projects, they are at the beginning of their decision-making process. At this time, they already have some information about anaerobic digestion, usually either from professional agricultural journals or from suppliers. They want to verify that a biogas project is technically and economically viable on their farm. Their motivations are primarily to improve farm profit, but also to improve fertilisation practices and enable farm succession.

A sociological survey of the 10000 members of the cooperative identified four farmer profiles:

- the “family” profile: the farmer is firstly concerned by his everyday life balance, he belongs a small-scale farm, he is looking for advice because he needs expert guidance.
- the “sustainable” profile: the farmer usually belongs a small-scale, low intensity farm and he aims at making his agricultural practices and system environmental friendly.
- the “project” profile: the farmer usually belongs a large farm and he needs to develop news projects to feel efficient and to keep motivated in his daily job. He periodically considers his business strategy and adapts it to the market and legal conditions. He is looking for advisory services and is ready to pay for it. He is pretty faithful to his cooperative and he is looking for a trusting long-term relationship with advisors.

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- the “liberal” profile: the farmer has a large farm, he is following an accumulation strategy to make his activities more profitable. He is always listening to the market and, most of the time, he is not faithful to one agricultural organisation. He is looking for advice to make his strategic decisions; he will pay the fair price (but not more).

In order to fit with the needs of this different “profiles” of farmers, the biogas team of Capinov propose multiple steps:

- “Metha DIAG”: a first meeting which aims at giving to the farmer some general information about the regulatory framework, and anaerobic digestion characteristics. This meeting should help the farmer answer the following question: is my farm appropriated to a biogas project?
- “Metha OPTI”: a detailed study that gathers all the project components: organic wastes description, equipments size, biogas and digestate use, economic simulation, regulatory issues, existing incentives or subsidies.

During this step, the adviser may meet other advisers of the farmer to adapt the biogas project to the local context and farm production system (e.g. technicians in charge of crops, cattle feeding or new stall designing). This method helps the farmer define the best system. At the end of this step, the farmer can present his project to some banking services to verify if his project could meet the financing requirements.

Figure 2: Chronological overview of all the advising steps

4.3 RESFARM: Creating a pool of investment-ready on-farm RES projects in Southern Europe (Spain, Italy, Greece)

H2020 RESFARM was formed to identify the needs and requirements of both the farmers and the investors in Renewable Energy Systems (RES) technologies, as well as the technical, legal and financial solutions available for them. Farmers´cooperatives and associations are responsible in many cases for pooling production and the purchase of inputs in order to

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increase the barganing capacity and to improve prices and qualities. Using these structures as an instrument to disseminate RES technologies and to jointly develop projects underpins RESFARM's strategy. It was particularly relevant to obtaining low-cost, long term financing.

An international survey and expert dialogue were carried out. This resulted in reports, platforms and materials containing specific guidelines for on-farm promotions. A large scale dissemination campaign was established. Firstly, the campaign provided accurate information to the farmers regarding the potential of their farms to produce sustainable energy, including individual assessment and preliminary planning of suitable on-farm RES. The campaign also identified a pool of projects suitable to be jointly promoted and financed. The result was the creation of a network of more than 100 assessors in the different countries, trained in the most suitable RES solutions for farming and in the use of a web-platform created to support their work and to record those projects suited for pooling. This produced pool of projects suitable to be jointly promoted, including more than 35 MW of renewable capacity. This pool will mobilize more than €50 million in investments.

Effective dissemination involved using farmers' normal communication channels (e.g. specialized press and websites, fairs, exhibitions and the associations´ networks). In parallel, a financing platform was established in order to attract interest from investors, technology providers and public authorities. The campaign reached more than 50,000 farmers in the last three months of 2017, including individual assessments for more than 4,500 farmers and prelimminary planning for over 2,000 on-farm RES. **The experience of RESFARM showed the huge potential of on-farm RES and the interest of the farmers, but also the need to stablish a base of knowledge and support using existing channels that are trusted by farmers, especially their associative organizations and cooperatives.**

5. Conclusions

Public and private advisory services play an important role in enabling farmers to take up renewable energy production on their farms. Increased production can be facilitated by:

a) Segmentation: different farmers need different types of information and services
b) Communication: It is important to use farmers' existing knowledge channels.
c) Reducing barriers: Cooperatives can reduce the barriers to renewable energy production on small-scale farms. Large-scale farms find it easier to access to advice, leverage financing and are more likely to take up renewable energy production.

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d) Reducing energy consumption: Is a key trigger to engaging farmers in production
e) Targeting farmers with successors, or who are considering succession, should increase up-take.
f) Enabling environmental action: Initiating renewable energy production may result from or lead to other forms of environmental action. Linking advice can benefit both aims.

6. Potential Operational Groups

Operational Groups (OG) could usefully test conclusions b, d, e, f, to develop actions in specific contexts. For example, advisory services could work with farmer collaboratives to develop specific advice and implementation activities for small-scale farms. The ISP practice of working with farmers to first assess and reduce their own energy needs, and then engage in energy production, could be pursued in other countries, through OG that develop energy profiling, and then progress through the six-step process identified in Section 4. Advisory services could develop profiling to assist farmers adding successors to the business.

7. Research Needs

The academic literature on this topic is primarily from northern Europe. More research is needed to assess the advice available, and how farmers are accessing and responding to this advice, across the range of European countries. The preparedness of different types of advisory services (e.g. publicly funded, fee for service) to offer advice on renewable energy production appears variable. Access to advice appears uneven, with larger farms best placed to pay for and receive independent advice. Best practices have been identified in the cases identified; it is likely that these approaches could be usefully transferred across Europe.

Potential research questions:

- What is the relationship between awareness of on-farm energy consumption, and renewable energy production? How does renewable energy production relate to other environmental actions (i.e. and therefore produce 'win-win' opportunities)?

- What is the role of advisors in 'triggering' the decision to produce renewable energy on-farm? Where should FAS (state-funded) advisory services be targeted to best facilitate

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up-take of on-farm renewable energy production? How can advisors best be equipped to provide advice to farmers?

- What types of advice are needed at different stages in adoption (e.g. prior to adoption, during active assessment). What is the availability of quality advice on different types of renewable energy production to different types of farmer, in different European regions?
- Do some types of support differentially benefit different types of farmer (e.g. are supports primarily beneficial to large-scale farms in intensive regions? Is advice primarily available to large-scale farms? How can barriers to renewable energy production be addressed (e.g. through co-operatives)?
- What is the role of renewable energy production in long-term business and succession strategies of farmers?

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