



# Training and Advising FEFTS Material – 2<sup>nd</sup> Update

Del 2.13

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## Document Summary

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## Abstract

*This report provides an in-depth analysis of the FEFTS training materials available on the AgroFossilFree platform. A total of 131 materials were carefully curated and organized during the three collection batches. The primary objective was to select high-quality, relevant resources that offer valuable insights into sustainable agricultural practices. The majority of the selected materials consisted of manuals and e-learning courses, covering a wide array of topics related to fossil-energy-free practices. The majority of the materials were designed to cater to the needs of farmers involved in open-field agriculture, addressing the specific challenges they face in transitioning away from fossil fuels. A significant portion of the training materials was dedicated to renewable energy production, with solar photovoltaics emerging as a prominent choice for clean energy generation. Another crucial aspect covered in the materials was energy efficiency improvements, with a special emphasis on the use of efficient tools and equipment in farming practices. The availability of these well-curated training materials offers stakeholders, including farmers, agricultural communities, and policymakers, an invaluable resource to foster a successful transition away from fossil fuel dependence. By utilizing these materials, stakeholders can gain the knowledge and skills necessary to implement eco-friendly practices, thereby contributing to a greener and more sustainable future for the agricultural sector. This report is the updated version of D.2.12 and contains all the new Training Material FEFTS that were gathered during the 3<sup>rd</sup> collection process.*

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# 1. Introduction

## 1.1 Background Information

The instruments needed to address cleaner and more efficient energy production and usage in agriculture are referred to as Fossil-Energy-Free Technologies and Strategies (FEFTS). To categorize FEFTS, the energy user/consumer within farming processes must first be identified, this indicates the agricultural technology application for which the specific FEFTS is used and relates to the energy-related uses of agricultural technology. Then, FEFTS are classified based on whether they provide (i) Clean Energy that replaces fossil energy which is concerned with the sources, types, methods, and storage of energy utilized in agriculture; (ii) an Energy Efficiency Improvement in comparison to conventional technologies/practices which refers to the methods and tools used to improve energy efficiency in farming activities; (iii) Soil Carbon Sequestration, which is concerned with agricultural methods that can reduce the impact of fossil energy and associated GHG emissions by supporting improvements in the amount of carbon stored in soil. This is an auxiliary category as it is mainly a GHG compensation strategy rather than a fossil fuel reduction strategy. Table 1 lists all of the FEFTS categories and subcategories.

Table 1: FEFTS categories and level 1 and level 2 subcategories.

FEFTS category	Level 1 sub-category	Level 2 sub-category
<b>Energy User/Consumer</b>	<b>Agricultural technology applications</b>	heating and cooling of buildings
		process heat/cold
		lighting
		agricultural field practices
		vehicles
		tools
		energy sales to external consumers
<b>Clean Energy Supply</b>	<b>Renewable Energy Sources</b>	solar
		wind
		hydro
		geothermal
		bioenergy
		free energy
	<b>Energy types</b>	heating
		cooling
		electricity
		mechanical energy
		chemical energy
	<b>Energy Technologies</b>	photovoltaics
		solar thermal
		windmills
		hydropower
		heat pumps
		geothermal
		solid biomass conversion
		biogas / biomethane production
<b>Energy Storages</b>	liquid biofuels production	
	heat storage	
	electricity storage	

		cold storage
		intermediate bioenergy carriers
<b>Energy Efficiency Improvement</b>	<b>Energy savings</b>	efficient buildings
		efficient vehicles
		efficient tools
		precision agriculture
		precision livestock farming
		conservation agriculture
<b>Carbon sequestration</b>	<b>Carbon sequestration</b>	soil organic cover
		tillage (Conservation Agriculture + CTF)
		nutrient management
		crop diversification
		soil and water conservation techniques
		fire management
		grassland management

Practical procedures are addressed in the FEFTS level 2 sub-category (for details, see FEFTS level 3 sub-category from Deliverable 2.1, Table 4 to Table 10).

The primary goal of this deliverable is to present FEFTS training content and materials that the whole consortium together with external stakeholders have published on the AgEnergy platform according to the FEFTS categories listed above, as well as to provide an analysis based on the current status. The content presented in this report is updated to include the new training materials that were published during the third FEFTS collection process.

## 1.2 Methodology

WIP and partners conducted three phases to register FEFTS training materials for building a user-friendly AgroFossilFree (AFF) database.

In Phase 1 (Initial Identification), all AFF partners performed desk research to find relevant and applicable FEFTS training materials. The aim was to identify various publicly available solutions, hardware, software, methodologies, components, and procedures that reduce EU agriculture's reliance on fossil fuels. The research was based on a three-level classification with specific keywords/terms provided in Deliverable 2.1. The targeted sources were primarily from the FEFTS organization and institute and were beneficial to various stakeholders.

Phase 2 involved gathering and uploading all relevant FEFTS training materials through an online survey using Google Forms to create a training material repository. However, Google Forms were later discontinued, and users can now directly submit their FEFTS on the AgEnergy Platform.

In Phase 3, the survey results and metadata from earlier phases were reviewed to remove incorrect, duplicate, and incomplete entries (Data Aggregation). This step ensured data integrity and supported effective analysis in AFF's subsequent phases. The screening process for the third batch of FEFTS followed the same methodology as the two previous batches.

For quality assurance, the screening process for the first batch began before the platform's launch, ensuring high-quality and relevant FEFTS training materials in the AgEnergy platform. The screening process involved Task Leaders reviewing and verifying the entries, and a FEFTS Quality Committee was formed to screen all submissions continuously. This process allows the platform to have accurate, reliable, and relevant information that aligns with AFF's objectives.

### 1.3 Survey

The survey structure is detailed in Deliverable 2.1, with four main groups of questions (see Annex).

1. The first component captures general information about the recognized FEFTS training material, the registering individual's details, and their affiliated organization.
2. The second section provides more specific details about the FEFTS training resources and the organization.
3. The third part focuses on the FEFTS specification, including relevant agricultural domains, keywords, and application field.
4. The most crucial component is the fourth, where users choose from three categories: clean energy supply, energy efficiency improvement, and soil carbon sequestration, each with sub-categories.

Additionally, there is a review process for the FEFTS training materials, covering socioeconomic, environmental, and general aspects.

Both the survey structure and the FEFTS analysis in Chapter 3 are based on the framework developed in Deliverable 2.1. Note that Google Forms are no longer used for the survey; instead, partners directly submit their FEFTS on the AgEnergy platform, following the same structure as the previous Google forms survey.

## 2. FEFTS collection outcomes

### 2.1 Data Collection – Partner's Role

By the end of August 2023, 2102 FEFTS were collected in total, of which 1959 FEFTS were published on the AgEnergy platform after the FEFTS quality check screening process. Among these, 131 Training Material were published. Table 2 shows the number of FEFTS collected and published per category for the three batches.

*Table 2. Overview of FEFTS collection status*

	Scientific Papers	Commercial Technologies	Training Material	Financing Mechanisms	Research project	Total
<b>Target</b>	1000	600			100	1700
<b>Collected</b>	1001	601	149	150	200	2102
<b>Published</b>	977	542	131	129	180	1959

The entire identification and registration process was supported by an online thread in Microsoft Teams platform which served as a helpdesk for questions about FEFTS training materials registration.

### 2.2 Acceptance and exclusion criteria

For the case of FEFTS training material, each individual registration had to have clear agricultural application potential, represent innovative energy saving techniques or represent clean energy supply (production or storage) technologies. In general, the most appropriate training materials have strong educational features supporting FEFTS adoption. In terms of the exclusion criteria, entries that did not support reductions in fossil fuel use in agriculture were ruled invalid. Invalid registrations from

all three collection periods were excluded and are not part of the analysis.

### 2.3 Clarification of this report and its analysis

This report is the final update of D2.11 and differs from the previous reports (D2.11 and 1st update report - D2.12) in terms of the final number of FEFTS presented. The screening process for all FEFTS has been completed, and only qualified ones have been published on the website, allowing for a clearer overview. Besides the additional number of FEFTS that have been added, some FEFTS were rejected after the previous reports' completion, as they were found to have issues upon reevaluation (e.g., websites taken down, broken links, or incomplete entries), thus the difference between the numbers. The AgEnergy platform is continuously monitored to address incomplete entries or broken links, ensuring that only the best FEFTS are published and maintained on the platform.

## 3. FEFTS Analysis

### 3.1 General information about the collected FEFTS

In this section, information about the types of published training materials is shown in Figure 1, and the languages of them are presented in Figure 2.

As shown in Figure 1, most of the training material refers to e-learning, accounting for 46 entries and manuals with 41 entries. Training materials related to Leaflet/Brochure (25) account for the third largest number of entries followed by Website (22). There is one entry for a drawing type FEFT which was added during the second registration period. On the other hand, there is one entry for serious games in the third batch. Most new entries were made in the biggest categories while there were 1 to 6 new entries for case studies, presentations, webinars and videos/photographs. The analysis shows e-learning courses and manuals remain the most common types of published training materials, together accounting for over 50% of entries. Compared to the initial materials collected, the share of websites decreased while serious games emerged as a new published material type.

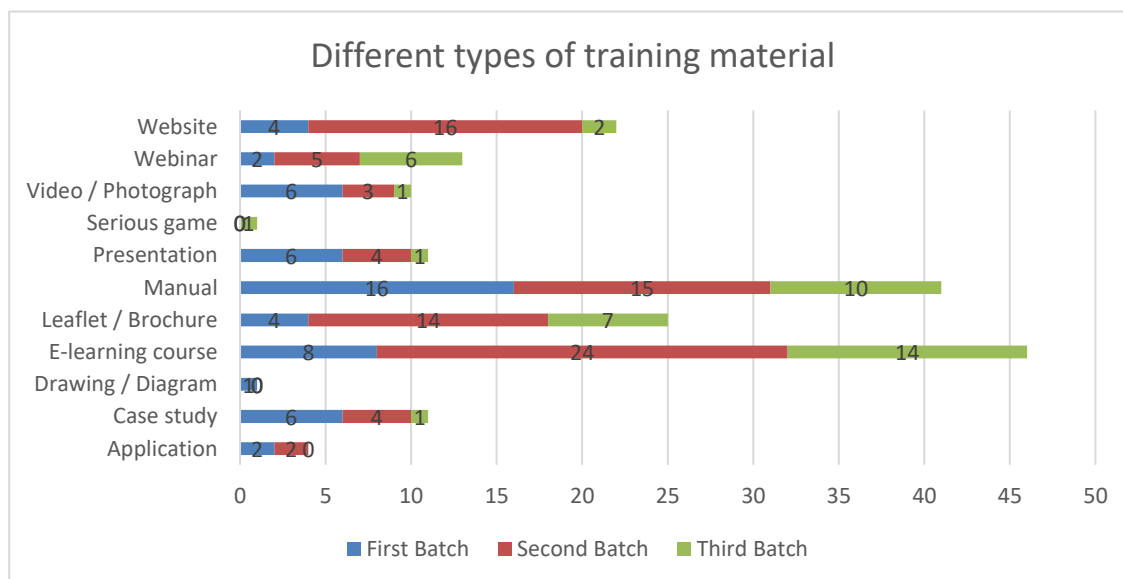


Figure 1: Different types of training material from all three collection processes

Regarding the language distribution of the training materials during the first batch (33 in total published), 39% were in English, 24% in German, 15% in Polish, 6% in Greek, 6% Danish (Figure 2). For the second batch (59 published), English and German still account for more than 54 % of the language



distribution while Dutch accounts for 5%, Greek accounts for 7%, Polish and Danish almost 10% each.

For the third batch, 22 out of 39 training materials are published under English (56%). The rest of the training materials are mainly in German (4). Other languages, such as Dutch, Italian and Polish, have 2 published each. The rest is Spanish with 1 published.

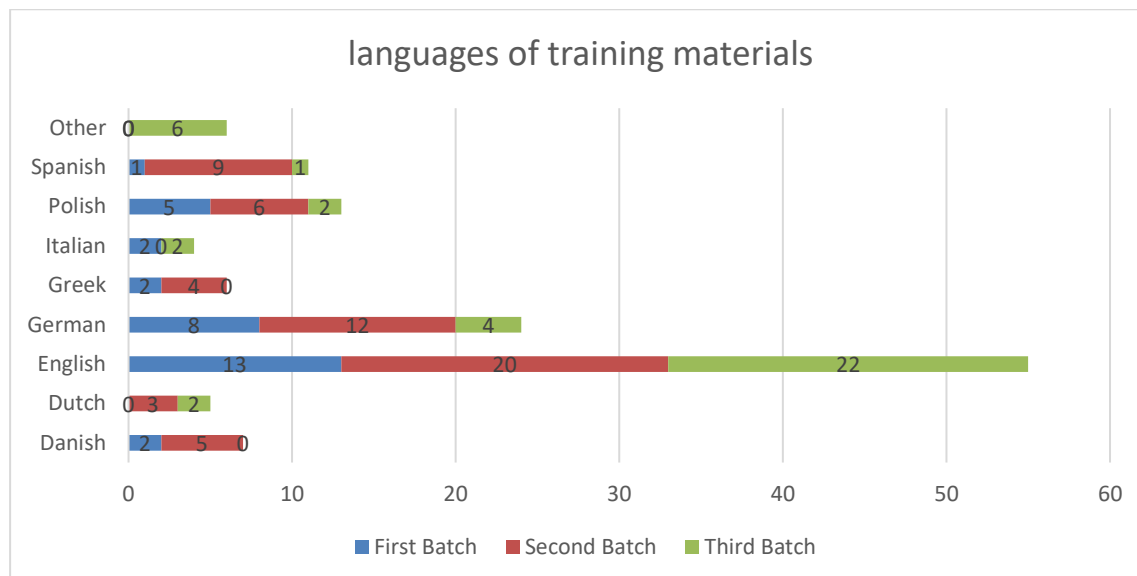


Figure 2. Different languages of training materials from all three collection processes

### 3.2 FEFTS specifications and applied sector

The vast majority of the training materials registered are relevant to multiple user groups. Overall, for the three batches in total, the most important user group for the collected training materials are farmers with 125 out of 131 (95%) training materials directly intended for them (Figure 3). This is followed by advisory services with 94, producer associations with 84, policy makers with 63, companies with 57, energy generators with 46, industry with 42 and contractors with 33 relevant training materials. Other user groups account for 28 training materials.

Figures 1 and 3 illustrate that the collected training materials are mostly aimed at farmers, with the goal of improving and assisting farmers in reducing their reliance on fossil fuels primarily through the distribution of manuals and the provision of online courses. This is particularly important as it is crucial that reductions in fossil fuel dependence are adopted and driven by farmers themselves. The original languages of these training materials are mostly in English and German, which are relevant to a large proportion of the EU's population. It is important to note that the material presented in the AgEnergy Platform has been translated and is available in 8 languages and languages should not be a hurdle in the adoption of FEFTS and that the use of online translators and other services can improve accessibility further. It is also significant that producer associations and advisory services are the second largest user groups for these training materials as they are important connectors between industrial FEFTS technologies and therefore deal with and combine information from a plethora of training resources.

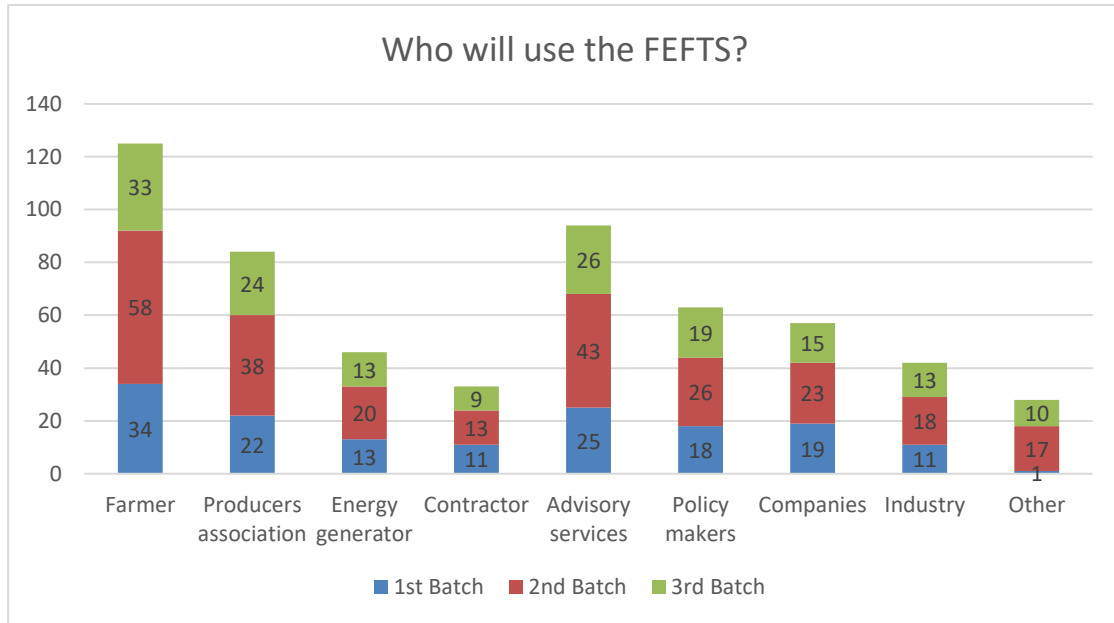


Figure 3. User groups for which the training materials are intended from all three collection processes

Figure 4 demonstrates the registered FEFTS training materials' solution type. This figure illustrates that in three batches, the largest number of FEFTS training materials referred to methodologies (66), followed by complete solutions (24), procedure (21), software (18) and hardware (7). 34 training materials were labelled as 'other' which refers to handbooks, guidelines, and advice. During the third collection period mainly methodology, other, and complete solutions training material FEFTS were added. No major changes occurred in the ranking during the third batch.

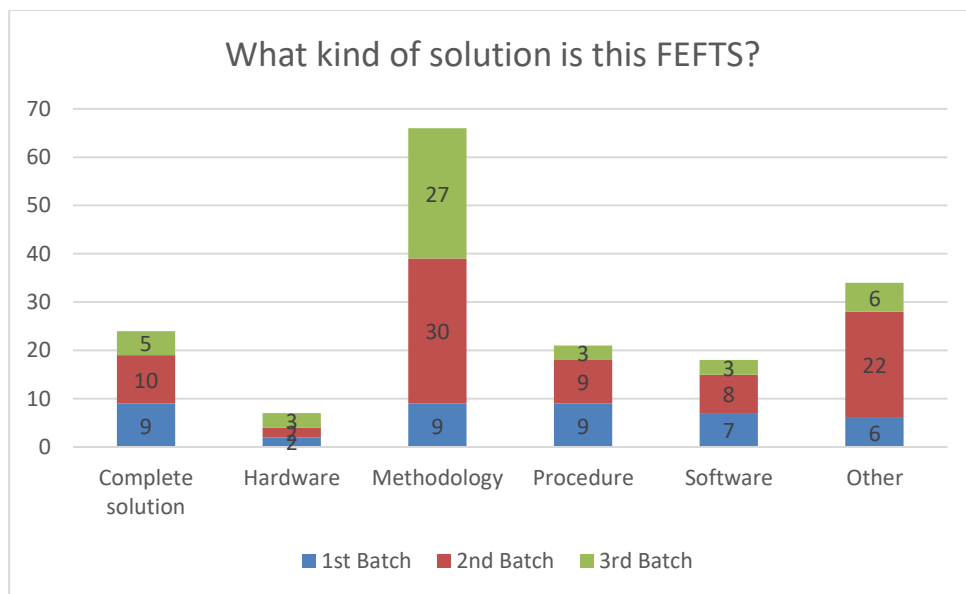


Figure 4. The type of collected FEFTS training material from all three collection processes

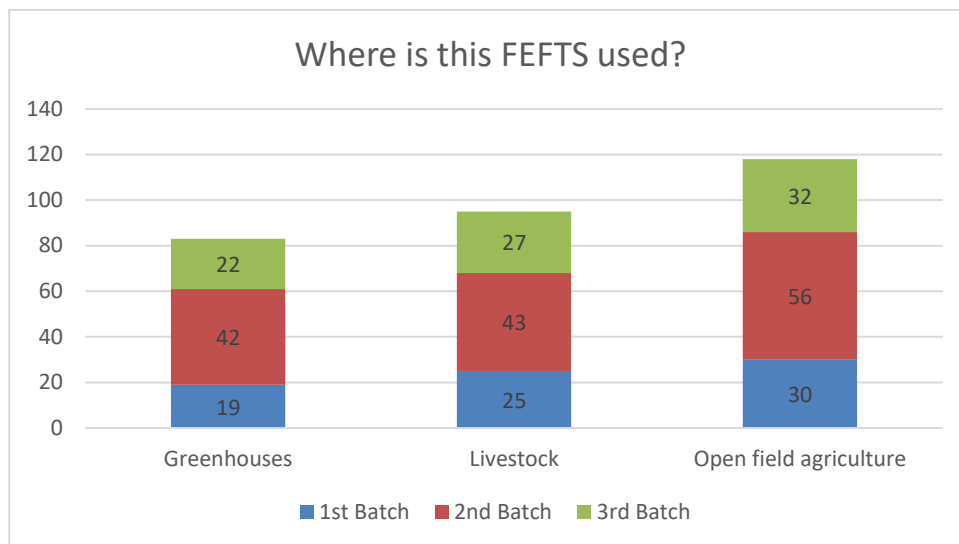


Figure 5. The agricultural domain of the collected FEFTS training materials from all three collection processes

Regarding the categorization of these training materials according to agricultural domains (open field agriculture, livestock, and greenhouse), in Figure 5, our analysis indicates that in the three batches’ published training materials, 118 are relevant to open-field agriculture, 95 to livestock, and 83 to greenhouses. Similar to the initial collected materials, open-field agriculture remains the top domain for published materials. However, the share of livestock materials decreased while greenhouse increased slightly, reducing the gap between them.

### 3.3 FEFTS application field

In Figure 6 the types of agricultural application of the published training materials for the three collection periods are presented. This figure shows that, during the first collection period, most of the training materials (18) are for energy provision, followed by other (13) and agricultural field practices (10), tools (6), heat sales to district heating (3), heating and cooling of agricultural constructions (3), vehicles (2) and process heat / cold (1). During the second collection process, energy provision and agricultural field practices are the main training material available with 23 and 33 entries respectively. Next are heating and cooling of agricultural constructions (15), tools (15), vehicles (13), process heat / cold (7), heat sales to district heating (2), and lighting with two entries.

For the third batch, energy provision has the most published training FEFTS (20), followed by agricultural field practices (15). Heating and cooling of agricultural constructions category has 5 FEFTS published, while heat sales to district heating and process heat / cold each have 4 published each. Lighting and tools both have 3 FEFTS published, and the rest are under vehicles (2) and other (2). Energy provision remains the top application field in the published materials, increasing its share to over 30% of entries. However, agricultural field practices saw the largest growth, tripling its share of materials compared to the first batch.

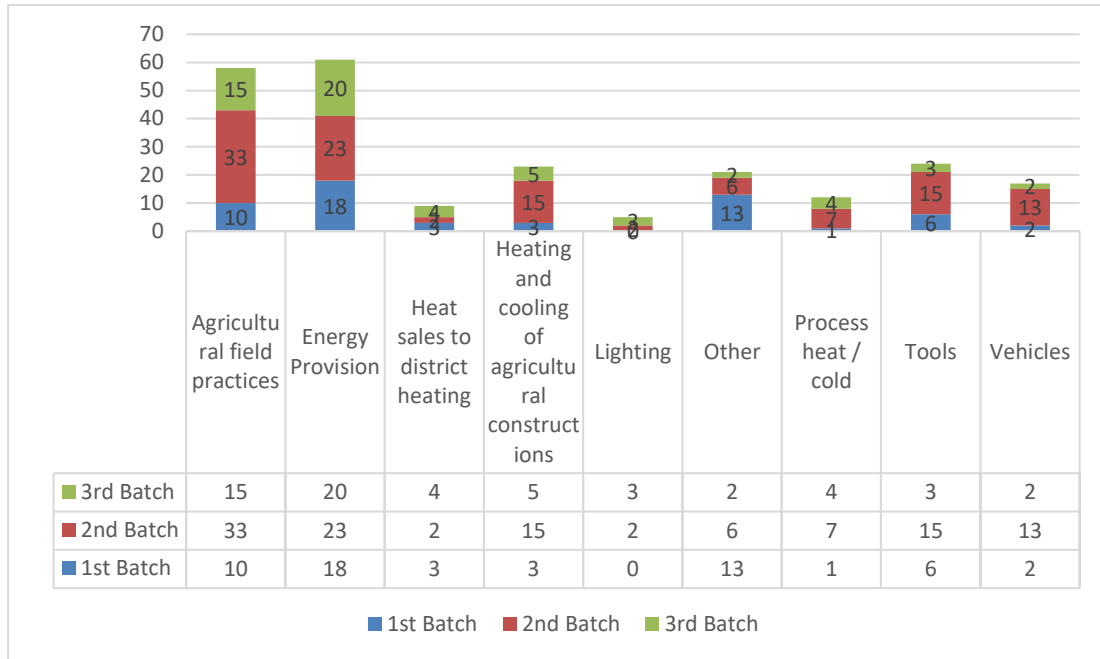


Figure 6. Types of agricultural application of collected FEFTS training materials from all three collection processes

As already mentioned and illustrated in Figure 6, FEFTS training materials tend to belong (in terms of where they can be applied) to multiple sectors. It is important to note however, that during the first months of the FEFTS registration process, if the user chose ‘multiple technology applications’ then the survey would skip the categorization in ‘relevant application fields.’ This was found to be problematic, as it caused part of the training material FEFTS (Task 2.11) not to be categorized adequately. To address this issue and provide the best possible categorization, the Google Forms survey was modified such that if multiple technological applications were selected, the user would be requested to select the most applicable type for this FEFTS (clean energy supply or energy efficiency improvement or soil carbon sequestration). As a result of this modification entries that were categorized prior to this modification are not included in section 3.3. The majority of the FEFTS collected have been correctly allocated to their dedicated categories. Therefore, some entries from the second batch were corrected during the screening procedure.

Figure 7 shows the distribution of the published training material per FEFTS category. During the first batch, among the solutions, 11 were for energy efficiency, 15 for clean energy production and 7 for soil carbon sequestration. The numbers after the second collection are: 18 for clean energy supply, 34 for energy efficiency improvement and 8 for soil carbon sequestration. For the third batch, 9 were for energy efficiency, 22 for clean energy production and 8 for soil carbon sequestration.

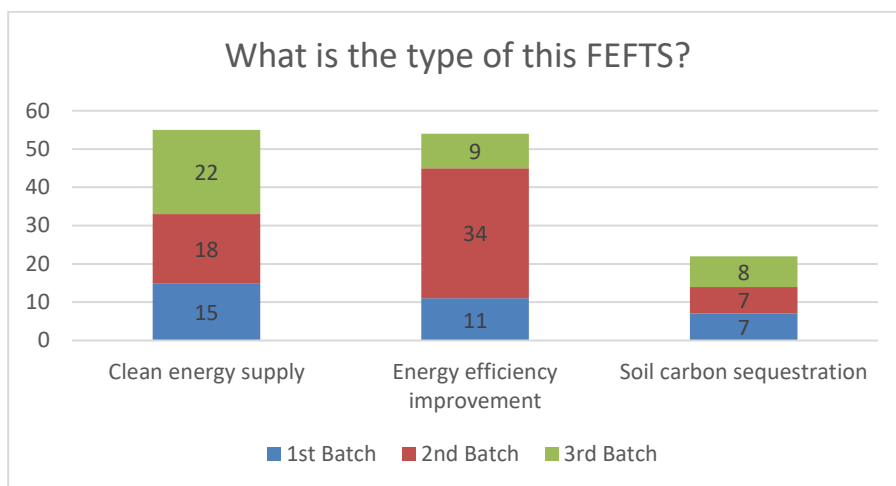


Figure 7. Type of the training material per FEFTS category from all three collection processes

### 3.3.1 Clean Energy supply

In this section the analysis of the Clean Energy Supply FEFTS is presented. Figure 8 shows that most of the training materials refer to solar and biomass systems as well as other technologies. Sewage treatment plant gas and biogas accounts for 4 entries, wind for 2 and geothermal training material for 2. Solar and biomass systems totally dominate the published renewable energy materials, accounting for over 80% of entries in this category. Wind, hydro, and geothermal sources continue to be rarely referenced.

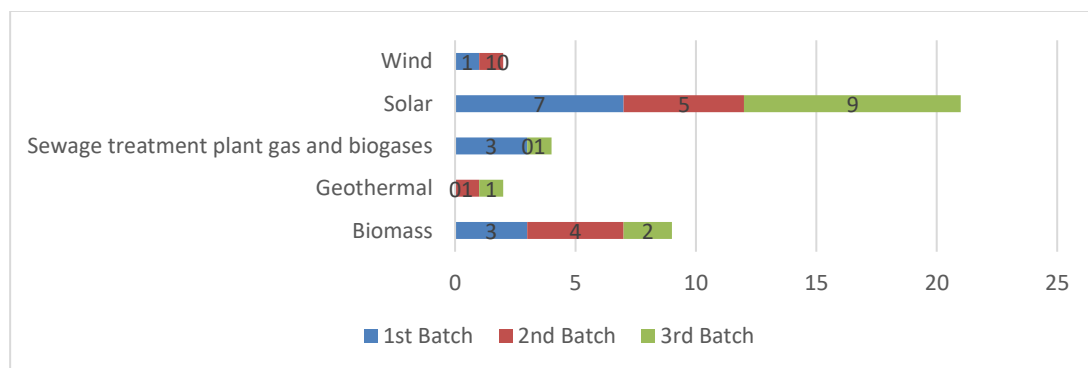


Figure 8. The renewable energy sources of Energy production system from all three collection processes

Regarding the specific technologies (Figure 9) for energy production system, aligning with the prevalence of solar sources, photovoltaics (18) makes up over 50% of the specific production technologies referenced. Biogas/biomethane production (5) and solid biomass conversion (5), became the second most published technology. Training materials relevant to solar thermal (3), heat pumps (1), geothermal (2), and wind turbines (2) were also published.

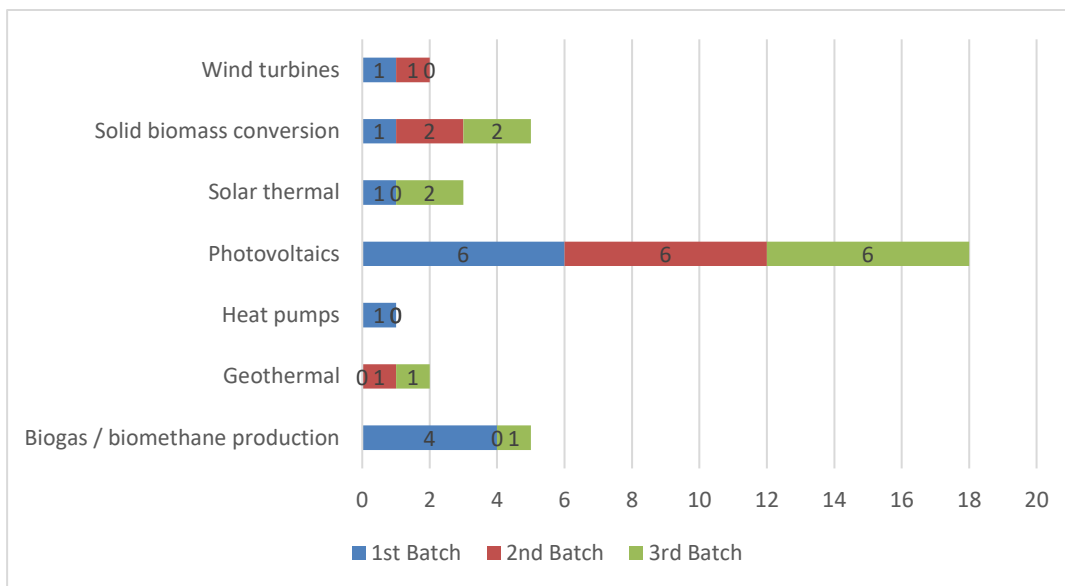


Figure 9. Specific technologies for Energy production systems from all three collection processes

Among the photovoltaic training materials published, most of them refer to PV-arrays (Figure 10), with a total number of 10 (90%). It should be mentioned that only in the first batch Agri-pv systems were published.

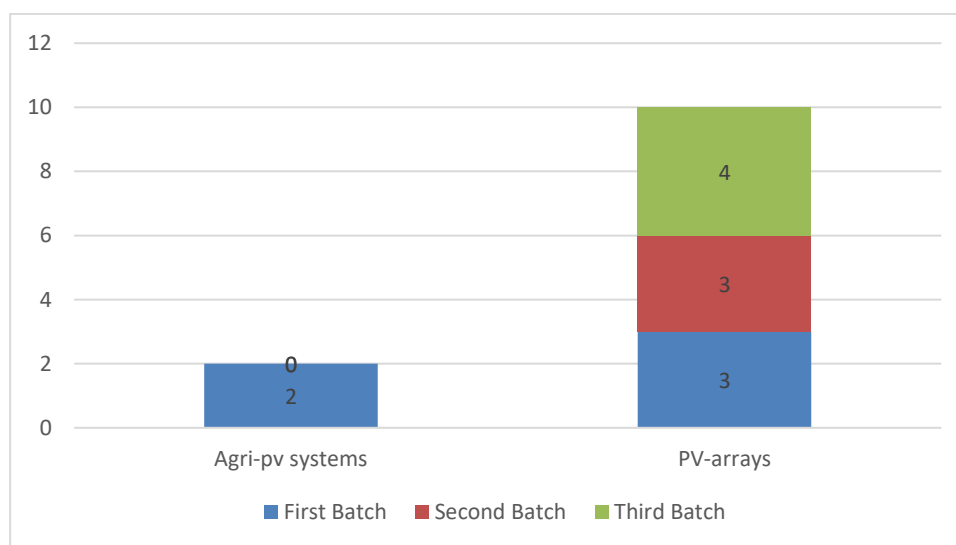


Figure 10. The published training material of the photovoltaic technology type from all three collection processes

### 3.3.2 Energy Efficiency Improvement

Figure 11 illustrates the type of energy improvement efficiency each training material refers to. This figure shows that most training materials refer to efficient tools (17), followed by precision agriculture (13), efficient buildings (4), conservation agriculture (2), efficient vehicles (2) and precision livestock farming (2). Efficient vehicles and not further specified categories are new and had no entries during the first round of collection.

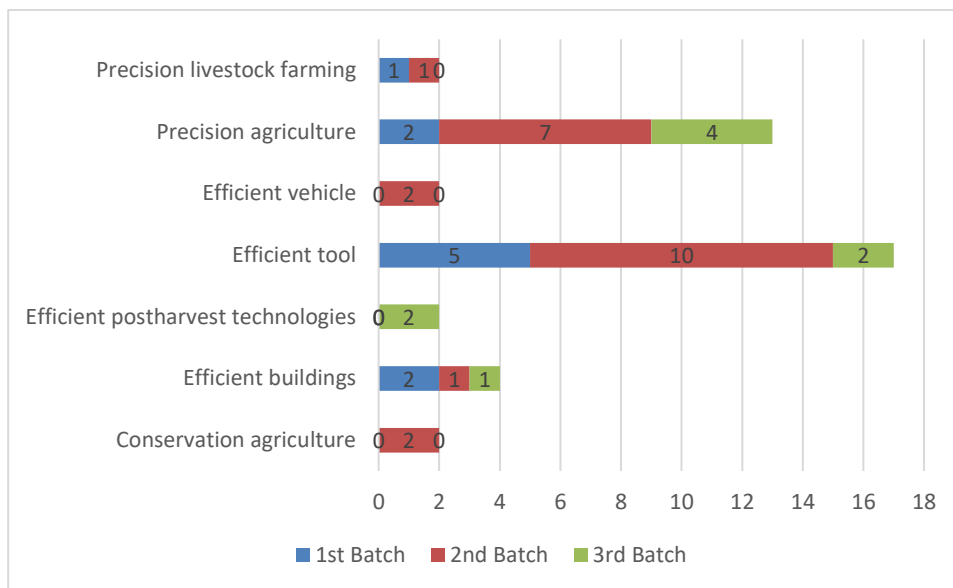


Figure 11. The published training materials of the energy improvement type from all three collection processes

### 3.3.3 Soil carbon sequestration

Figure 12 shows the distribution of techniques for soil carbon sequestration. Tillage is still the biggest category with now 10 publications. Soil and water conservation techniques gained 3 more entries and now have 5 in total. Soil organic matter has 2 FEFTS, nutrient management 2 and grass management 2 which were also published after the three collection periods.

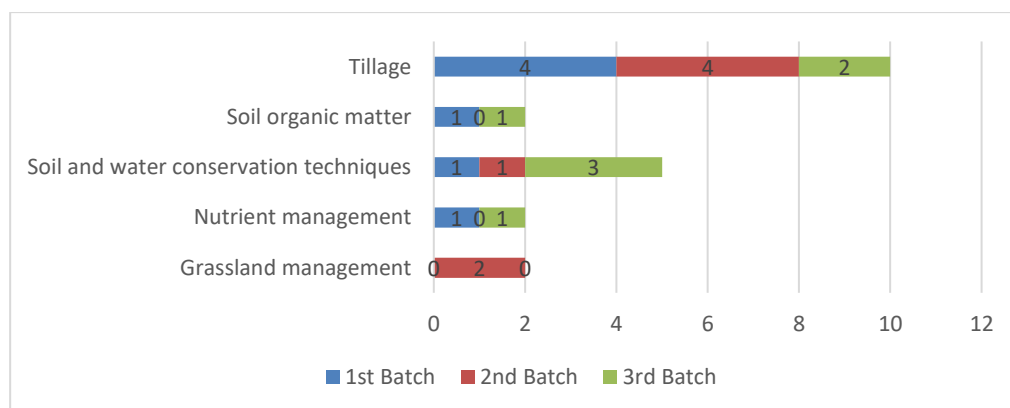


Figure 12. The materials published based on carbon sequestration method from all three collection processes

## 4. Conclusion

This report conducted a comprehensive analysis of 131 published training material FEFTS on the AgroFossilFree platform, spanning across three collection batches. Rigorous screening procedures were employed to eliminate any incorrect, duplicate, or incomplete entries, ensuring that only top-quality and relevant materials were included in the analysis.

Key insights from the analysis revealed the following:

1. **Accessible Training Formats:** E-learning courses and manuals accounted for over 50% of the

published entries, providing easily accessible and user-friendly formats for stakeholders seeking to enhance their knowledge in sustainable agricultural practices.

2. **Targeting Farmers:** The primary user group for these materials was farmers, with a remarkable 95% of the resources tailored specifically to address their needs and drive the adoption of eco-friendly practices. The materials were available in various languages, with English and German being the most common choices.
3. **Dominance of Open-Field Agriculture:** While open-field agriculture remained the leading domain, the gap between this sector and livestock and greenhouses narrowed, indicating a growing focus on sustainable practices in diverse agricultural settings.
4. **Emphasis on Solar Photovoltaics and Efficient Tools:** The most referenced technologies for renewable energy production and efficiency improvements were solar photovoltaics and efficient tools, underlining their importance in transitioning away from fossil fuel dependency.
5. **Assurance of High-Quality Materials:** The collection and screening methodology employed in this analysis ensured that the published FEETS training materials were of the highest quality, providing stakeholders with reliable resources to support their efforts in reducing fossil fuel usage.

Overall, the compiled FEETS training materials form a valuable inventory that will undoubtedly enhance stakeholder knowledge and understanding of how to minimize fossil fuel usage in the agricultural sector. By empowering farmers and other stakeholders with the necessary information and skills, we can collectively work towards a greener, more sustainable future, safeguarding the environment for generations to come. These efforts will play a crucial role in mitigating climate change and ensuring a thriving and resilient agricultural industry.



## Annexes

### Annex 1: Training Material retrieved from survey

The following link is the online spreadsheet which contains all the training materials retrieved from all three collection processes until August 2023.

<https://docs.google.com/spreadsheets/d/1pu-yQRCg1xHgXnSTXdjVwPn7soJp1BQTzs81jb1qe9M/edit?usp=sharing>

### Annex 2: Training Material Survey

As it was mentioned in the document the usage of the Google Forms survey was discontinued. Instead, partners can now access directly the AgEnergy Platform and submit their FEFTS by simply creating a free account firstly. The following link is the AgEnergy Platform link.

<https://platform.agrofossilfree.eu/en>