Report on scientific papers of FEFTS (2nd update)

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Abstract

This document is a structured report in which the results of the Scientific Papers submitted in our survey are fully analysed. This report is the 2nd update report.
Regarding the FEFTS analysis, after the completion of the first batch of FEFTS registered though our survey (489 papers in total) and the initial screening process (6 papers were excluded), 483 Scientific Papers were selected to be further analysed. During the 2nd FEFTS collection process 256 new articles were added, through the AgEnergy Platform, and after a screening process 248 were selected to be further analyzed. As this is the 2nd updated report, during the 3rd FEFTS collection process another 257 new entries were submitted and after screening 247 were published in the platform. The total number of Scientific Papers on FEFTS published in the platform is 977. The whole consortium worked together in order to find articles that cover a wide range of FEFTS technologies. Records submitted are mostly about methodologies, procedures and policies on agriculture field practices and energy provision. Furthermore, Energy Efficient measures prevail over Clean Energy Supply and Soil Carbon Sequestration with most of the solutions being about efficient tools. From the complete Scientific Papers analysis, we conclude that the academic focus is shifted towards agriculture in order for the later to become more sustainable. The updated results presented here fall in line with results presented in numerous scientific researches about the agricultural energy consumption contributors. During the update of the results, no major changes occurred between the different categories due to the fact that our methodology was in line with the existing trends.
This report is organized in four chapters. The first chapter sets the base for the initial identification of FEFTS as well as the methodology used. The second chapter focuses on the conducted survey. Chapter three is the analysis of the results. The last chapter summarizes conclusions. This document is the updated report of D.2.3 as it contains the analysis done for all FEFTS that were gathered during the 3rd gathering process.

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1. Initial Identification

Following instructions provided in D2.1, the procedure was split into 3 phases. In Phase 1, all partners were asked by the WP leader (WIP) to look for and identify FEFTS providers in order to create the AgroFossilFree database. Specifically, for the purposes of this report each partner was asked to collect national derived scientific papers on FEFTS, whereas the international peer reviewed papers would be provided by the Task Leader (CERTH). Overall, during the 1st FEFTS collection process, 489 scientific papers were identified, by the end of September 2021 and after screening 483 of them were selected to be included in the AgEnergy Platform. A methodology for identifying the most relevant papers was created which all the partners followed. Furthermore, a video tutorial was created as an auxiliary tool, in order to help partners during the submission process.

For the evaluation of Scientific Papers, as well as all the other types of FEFTS categories, Rogers' method was utilized. This method comprises of 5 steps, which were adjusted to the purposes of this report. During step 1 the title of each paper had to be checked for relevance. Step 2 included reading the abstract for those papers with promising titles. For step 3 the full text had to be read. During step 4 the final decision about the relevance of the papers is made. It should be mentioned that during all previous stages if a Scientific Paper did not comply with the standards set then it was automatically excluded and the process moved to the next paper. The last step is the submission of the paper into the survey.

During the 2nd FEFTS collection process, 256 new Scientific Papers on FEFTS were added in the FEFTS repository, by the end of August 2022, and after screening 248 of them were selected to be included in the AgEnergy Platform. After the end of the 2nd FEFTS collection process, in total 746 Scientific Papers on FEFTS were gathered and 732 are to be published.

Following this, during the 3rd FEFTS collection process, 257 new Scientific Papers on FEFTS were added in the AgEnergy platform repository, by the end of August 2023, the screening process was completed and 247 of them were published in the AgEnergy platform. After the end of the 3rd FEFTS collection process, in total 1001 Scientific Papers on FEFTS were gathered thus completing the KPI for 1000 Scientific Papers in the repository. Furthermore, 977 of them were published in the AgEnergy Platform.

1.1. Sources' Definition of Scientific Papers on FEFTS and Search Limits

In order to find Scientific Papers related to FEFTS, a full-scale search was conducted in Scopus database. The basic criterion for data gathering was to find scientific papers of different rankings (not only top journals) from the last 10 years. In general, the search was aimed at finding articles related to energy technology or strategy that can (or could be) used by a farmer in his/her farm.

1.2. Search Queries Methodology

In order for the submission process of the papers to proceed smoothly and avoid the insertion of duplicates or irrelevant papers, the following methodology was developed.

1.2.1. Queries creation (Excel Methodology)

First of all, a guideline for the search of the Scientific Papers had to be created, so as all the partners involved would be able to find relevant material. In order to achieve this, a series of keywords was used to create queries for each FEFTS category based on the categorization

done in D2.1. It should be mentioned that these queries were indicative and partners were free to use their own queries.

The way in which the queries were created was the following: A pool of available papers had to be created in which with each addition of a new term the result would be better defined. In this way the majority of the queries contained the keyword “agriculture” and then based on each of the four big categories the corresponding keywords were used (i.e. Renewable Energy Sources category contained the keyword “energy”). It should be mentioned that some queries do not follow this procedure due to the fact that there were no available papers for these particular queries.

Also, we should point out that these queries search only for the keywords listed in them in the abstract of each paper and not in the whole document.

The following query is an example of one of the queries used for the search of Scientific Papers on FEFTS:

ABS (agriculture OR farming OR farmer) AND ABS (energy) AND ABS (solar OR photovoltaics) AND (PUBYEAR > 2010) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (LANGUAGE , "English"))

This particular query focuses on papers about solar energy and photovoltaics in agriculture which were published after 2010 (therefore in the period 2011-2021).

For the 2nd and 3rd FEFTS collection process, the queries were updated in order to include the latest articles from 2022 and 2023 respectively.

Annex A contains images of the online excel file that was created with all the queries used in our search as well as the link to the online spreadsheet which contains the full queries used.

1.2.2. Scopus methodology

After the creation of the queries the search of the Scientific Papers had to be done. Scopus[1] database was used for screening scientific peer reviewed international papers, while national databases were used by the consortium to look for research results related to FEFTS in the reference period 2011-2021 (For the 2nd and 3rd FEFTS collection process Scientific Papers from the year 2022 and 2023 were also added). The methodology listed in this section is the one followed by CERTH which was responsible for the submission of international scientific papers on FEFTS.

For each query an advanced search was performed in the Scopus website. During the first search, after the available results were shown and the first potential entry was found, the title and the abstract of the paper were read. If the aforementioned information describes a FEFTS technology then the whole paper had to be read. After that if the reader still thought that this paper was relevant to the technologies listed it was submitted to the “Survey for FEFTS inventory creation” Google form. Once the submission was completed, the reader created a list in the Scopus webpage, named FEFTS, in which this specific paper was saved. In doing so, a complete list with all the submitted papers was created and the submission of duplicates would be averted because once the next paper had to be submitted, the user would check whether this was already submitted by referring to the Scopus list with all the submitted papers.

[1] https://www.scopus.com/home.uri

As of January 2021, the AgEnergy Platform is ready and all the new submissions are directly done via the platform. The use of Google forms for the submission of new FEFTS is discontinued.

By using the aforementioned methodology, during the 1st collection process, 1390 Scientific Papers on FEFTS were found, using only the Level 2 categorization queries, out of which 483 were selected to be submitted in the survey. As mentioned above, the results of the queries were updated in order to include entries from the year 2022. As a result, 486 new Scientific Papers on FEFTS were found, for both Level 2 and 3 categorization queries. Following this, during the 3rd collection process the queries were updated in order to include entries from 2023. As a result, 300 new Scientific Papers on FEFTS were found. It should be mentioned that during the 3rd collection processes not all queries were updated as we were aiming on filling the categories of the platform that did not have or had little FEFTS.

2. Survey

Once the initial identification phase was completed, the papers had to be submitted in the Google forms survey. The structure of the conducted survey is defined in D2.1. The form consists of 4 basic sets of questions. The first section is about general information of the identified FEFTS such as the FEFTS name and category, as well as some basic information of the person registering the FEFTS, contact email and organization. The second section is about more detailed information on the scientific papers such as title, language, abstract, DOI link, year of publication, if it is open access or not and funding. The third section is about the FEFTS specification and the application field. The fourth section is the most important one as it consists of detailed information on the type of FEFTS that is being submitted. The three main categories to choose from are: Clean Energy Supply, Energy Efficiency Improvement and Soil Carbon Sequestration, followed by specific sub-categories. The last section is the general assessment of the FEFTS. In this section, the user has to answer some questions on the socioeconomic, environmental and general status of his/her FEFTS based on the available information.

After the completion of the AgEnergy platform, the Google forms survey was discontinued. Instead, users can now directly submit their FEFTS in the platform (https://platform.agrofossilfree.eu/en), afterwards they are screened by the dedicated committee in order to be made public. The structure of the submission form in the platform is similar to the Google forms survey.

It should be mentioned here that both the structure of the survey as well as the analysis of the FEFTS in Chapter 3 of this report, are based on the structure established on D2.1. A basic schematic of this structure is presented in Table 1.

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

FEFTS category	Level 1 sub-category	Level 2 sub-category
Energy User/Consumer	**Agricultural technology applications**	heating and cooling of buildings
		process heat/cold
		lighting
		agricultural field practices
		vehicles
		tools
		energy sales to external consumers
Clean Energy Supply	**Renewable Energy Sources**	solar

		wind
		hydro
		geothermal
		bioenergy
		free energy
	Energy types	heating
		cooling
		electricity
		mechanical energy
		chemical energy
	Energy Technologies	photovoltaics
		solar thermal
		windmills
		hydropower
		heat pumps
		geothermal
		solid biomass conversion
		biogas / biomethane production
		liquid biofuels production
	Energy Storages	heat storage
		electricity storage
		cold storage
		intermediate bioenergy carriers
Energy Efficiency Improvement	**Energy savings**	efficient buildings
		efficient vehicles
		efficient tools
		precision agriculture
		precision livestock farming
		conservation agriculture
Carbon sequestration	**Carbon sequestration**	soil organic cover
		tillage (Conservation Agriculture + CTF)
		nutrient management
		crop diversification
		soil and water conservation techniques
		fire management
		grassland management

Annex C contains the link to the AgEnergy platform, where each user can submit their FEFTS by registering an account.

2.1. Data Collection – Partners' Role

Regarding the identification of Scientific Papers on FEFTS, CERTH as the Task Leader, was responsible for the identification of international peer reviewed Scientific Papers on FEFTS, while the rest of the consortium was responsible for national derived Scientific Papers.

The consortium worked as a unified partnership with all beneficiaries contributing with their maximum effort. During the 1st collection process, we achieved 489 registered scientific papers out of 493 that was our target set our project's 2nd plenary meeting on May 25th 2021 (>99%), thanks to teamwork and the overall diverse contribution (Table 2).

During the 2nd FEFTS collection process, the internal goal of 253 new Scientific Papers set between the consortium was achieved with 256 new entries listed. Following this, during the 3rd FEFTS collection process, the specific KPI of 1000 Scientific Papers was achieved by adding 257 new papers leading to a total of 1001 Scientific Papers in the repository.

Given the KPI of 1700 FEFTS (of any type) for our repository until the end of the project, both the initial goals that had been set and the vivid reaction of all partners, led to the collection of more than the half FEFTS in total during the 1st collection process. Adding to this goal, after the end of the 2nd collection process more that 90% of the KPI is achieved. Following the good example set in the previous collection process, more than 2100 FEFTS were collected leading to the completion of the KPI goal by 124%.

Table 2. Targets for each category and total FEFTS collected by the end of September 2021 (1st collection process)

FEFTS TYPE	Partner	Target Set	Collected
Scientific Papers	CERTH All other partners	493 (aprrox. 500)	489
Research Projects	IUNG-PIB All other partners	100	107
Commercial Technologies	WIP All other partners	200	178
Training Material	WIP All other partners	36 (approx. 40)	37
Financing Mechanisms	AU CERTH All other partners	48 (approx. 50)	46
	Total	**877 (approx. 900)**	**857**

Table 3 shows the internal goal set between the consortium together with the number of FEFTS gathered for each FEFTS category.

Table 3. Targets for each category and total FEFTS collected during the 2nd collection process

	Scientific Papers	Commercial Technologies	Training Material	Financing Mechanisms	Research project	Total
Planned	252	233	65	80	50	680
Collected	256	258	63	60	61	698

As it was previously mentioned, by the end of August 2023 more than 2100 FEFTS were in the AgEnergy Platform, out of which 1959 were published. Table 4 shows the number of FEFTS collected and published per category for all three batches.

Table 4. Overview of FEFTS collection status

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

The whole identification and registration process was supported by an online thread for Task 2.2, which was created in Microsoft Teams platform to host Q&As regarding the Scientific Papers submissions, between the Task Leader and partners.

2.2. Screening of Scientific Papers on FEFTS

The screening process for the 1st collection process begun on October 2021, when our first internal milestone of submitted papers in the inventory (until the end of September 2021) had been achieved. In this way, the AgEnergy platform was filled with high quality and relevant innovative scientific papers about FEFTS. However, before that process was done, an initial screening took place in order to delete duplicate, malicious and incomplete entries. Incomplete entries were considered those lacking an exhaustive description and information, thus making their evaluation impossible. For these records, partners were asked to insert additional information. If not available, those entries were completely deleted from the inventory. This initial screening round was carried out for each FEFTS category by the corresponding Task Leader. In the case of Scientific Papers, CERTH was responsible for the procedure. It should be mentioned that a similar procedure was followed with the 2nd and 3rd FEFTS collection process which took place during October 2022 and August 2023 respectively.

In order for all the Task Leaders to complete the screening process, acceptance and exclusion criteria had to be set. To do so, frequent meetings between the Task Leaders were arranged (through Microsoft Teams platform), in order to discuss the matter and agree on the screening procedure.

During these meetings, it was decided that a FEFTS Quality Committee consisting of the Task Leaders of WP2 would be set for the aforementioned purpose. The main role of this Committee is the screening of all the FEFTS submitted to be presented in the platform. It should be mentioned that the FEFTS submitted from each Task Leader were already checked for their appropriateness to be uploaded in the inventory. After the AgEnergy Platform launching, the database is open for public entry so that interested stakeholders can import additional FEFTS. Their entries remain unpublished until they are validated by the Committee. By doing so, the accuracy and reliability of the platform's information regarding its relevance with the objectives of the AgroFossilFree project is guaranteed. The same methodology was also followed for the 2nd and 3rd FEFTS collection processes.

2.2.1. Acceptance Criteria

For the case of Scientific Papers, recent papers published after 2011 were selected having clear agricultural application potential, describing innovative energy saving or RES technologies and at the same time being relevant to the current EU state and needs. In general, the most appropriate papers are the ones which describe energy technologies or strategies

that can, or could, be used by a farmer in his/her farm (i.e. research results that are near to be put into practice including market-ready FEFTS solutions, FEFTS that are already on the market etc.). Any scientific paper that does not follow these criteria and does not clearly provide an alternative solution on the fossil fuel use in agriculture is excluded from the inventory.

2.3. Results of Screening of Scientific Papers on FEFTS

At the end of the first screening process 483 scientific papers were selected for the AgEnergy Platform. Continuing with the 2nd FEFTS collection process and their initial screening, another 248 new entries were added. Following this, the 3rd FEFTS collection process took place and another 257 new entries were added. At the time this report was being written, there were 1001 Scientific Papers on FEFTS in the AgEnergy Platform (including submitted and published entries). The majority of the papers submitted (based on the country of origin of the corresponding author) were from non-EU countries. In total, 658 papers (335 entries from 1st collection process, 166 entries from 2nd collection process and 157 entries from 3rd collection process) were from non-EU countries and the remaining 321 (148 entries from 1st collection process, 82 entries from 2nd collection process and 91 entries from 3rd collection process) were from the EU. Figure 1 shows in detail the updated breakdown of the collected papers. Regarding the country of origin, no major changes occurred in the percentages.

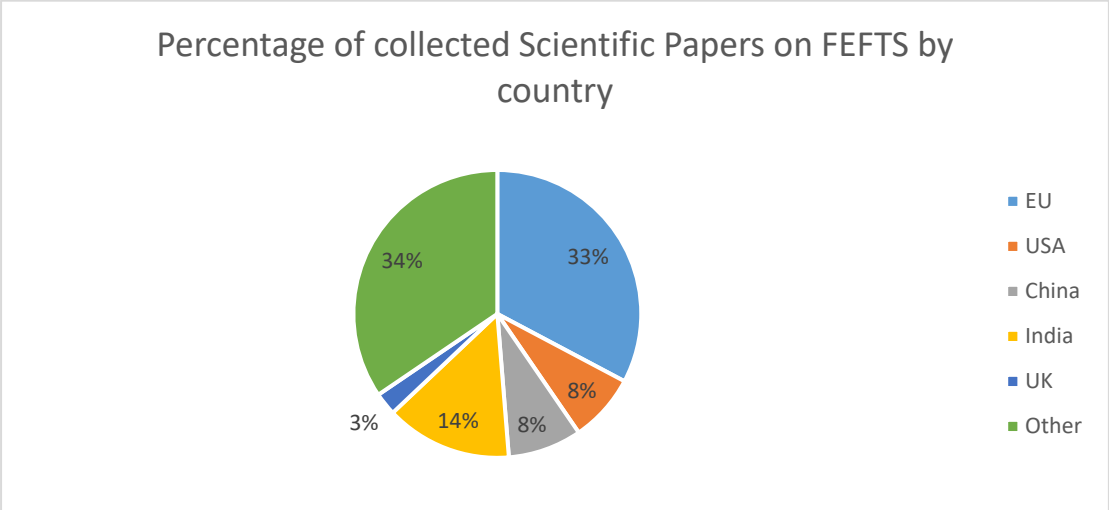


Figure 1. Percentage of collected Scientific Papers on FEFTS based on the country of origin of the corresponding author (updated graph containing all three collection processes)

From the graph below it is obvious that the majority of the papers submitted were written in the English language. It should be mentioned that the number of articles written in English does not only include international papers but some national derived articles which have chosen to be written in English, probably in order to reach a wider audience. Regarding the new entries that were added, no changes occurred as the majority of them were written in English. The entries from the 2nd collection process are represented in orange and the new entries from the 3rd collection process are added to the graph that was presented in the previous version of this document in grey. It should be mentioned that 1 Spanish entry from

the previous batch was deleted as it had broken links and also 1 entry in Danish was added during the 3rd collection process.

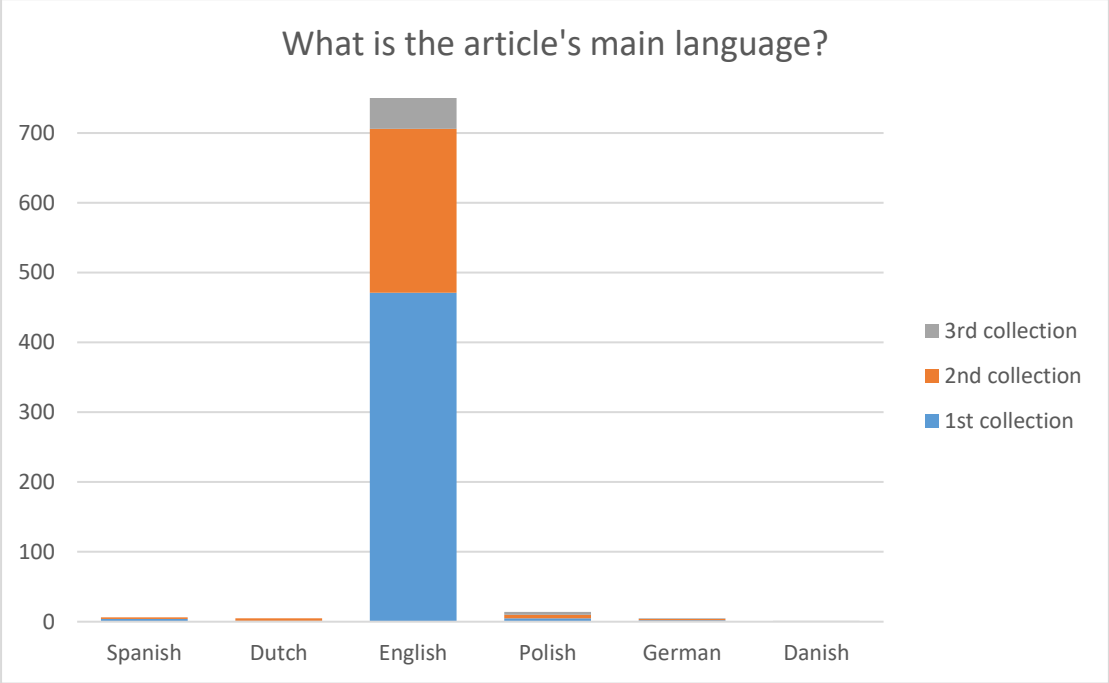


Figure 2. Classification the submitted Scientific Papers based on the language, results for all three collection processes

Regarding the accessibility of the Scientific Papers, from Figure 3 it can be seen that the papers distribution is divided with open access papers having a lead over closed access papers, this result is similar to the result from the 2nd collection process. It should be mentioned that, during the 1st collection process this was reversed, as closed access papers were in the lead.

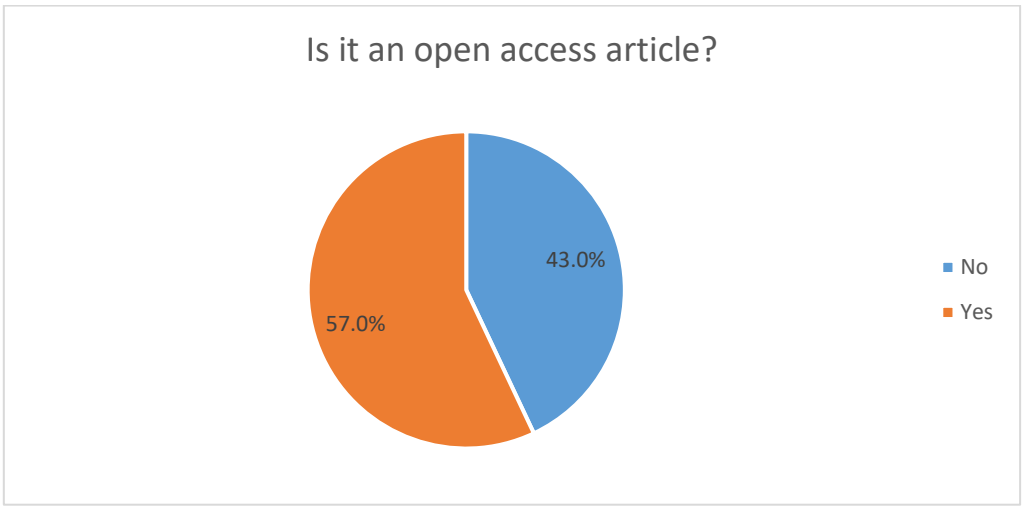


Figure 3. Classification of the submitted Scientific Papers based on accessibility (updated graph containing all three collection processes)

3. FEFTS Analysis

The greatest possible available variability of papers within the categories identified in D2.1 was achieved so that any emerging trends will be spotted and analysed. In this section, a more detailed analysis of the Scientific Papers that have been gathered so far is presented. As previously mentioned, the results are updated in order to include the entries from all three collection processes.

3.1 FEFTS specification and sector that applies

First of all, regarding the users of the FEFTS technologies, the majority of the papers submitted are dedicated to farmers and producers associations (Figure 4). This occurs due to the fact that one of the goals of AgroFossilFree is to find energy technologies or strategies that can (or could) be used by farmer.

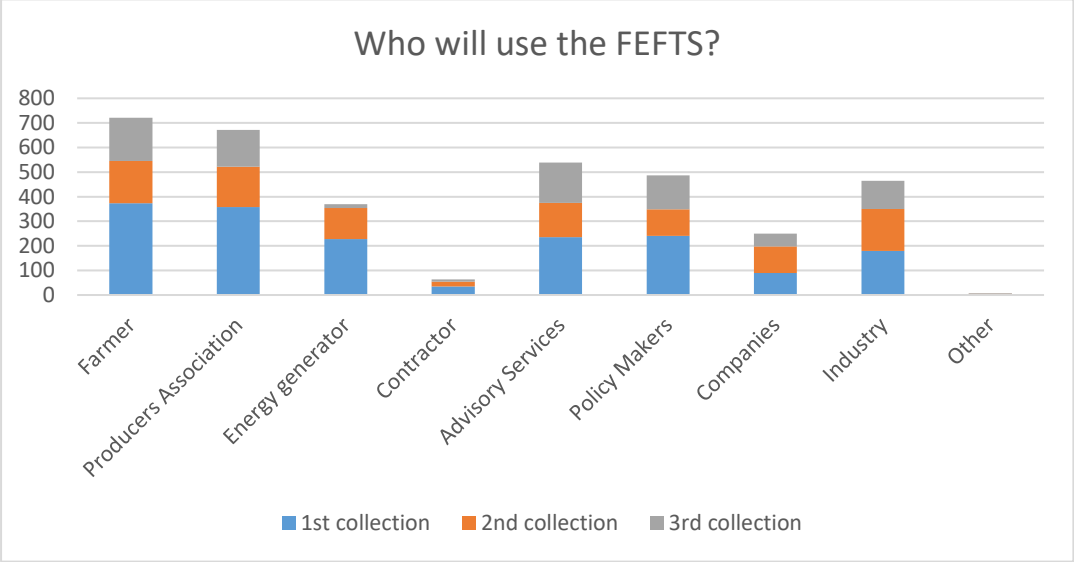


Figure 4. Classification of the submitted Scientific Papers based on the user (updated graph containing all three collection processes)

Policy makers and advisory services follow, as many Scientific Papers are about surveys conducted for the agricultural sector to create the appropriate frameworks and policies. Also, energy generators are within the main users of the papers identified as there are lots of entries regarding energy provision methodologies and industrial solutions. From the updated graph, it can be seen that no major changes occurred regarding the users of the FEFTS. The slight change that occurred during the 2nd collection process regarding the advisory services which became the third biggest category is still in place.

Most Scientific Papers tend to present and analyse methodologies and procedures more than ready-to-implement technologies. This is also depicted in our analysis as the majority of the papers submitted are about methodologies and procedures, whereas software, hardware and complete solutions are not much represented (Figure 5). It should be highlighted that during the 1st FEFTS collection process, if a FEFTS was about policies, frameworks or any other option that was not listed, the user could choose the option “Other” and write his/her answer. After the completion of the AgEnergy platform, for categorization and programming reasons, only

the option "Other" is available and no further categorization is requested. In Figure 5, the category "Other" includes the categories "Framework" and "Policies" which were listed in both previous versions of this document, as well any other types of solutions that occurred. This category continues from the 2nd collection process to be the 3rd biggest category as a significant portion of papers are about policies and frameworks, as it can be seen in the previous results of the FEFTS users. No major changes occurred during the 3rd collection process.

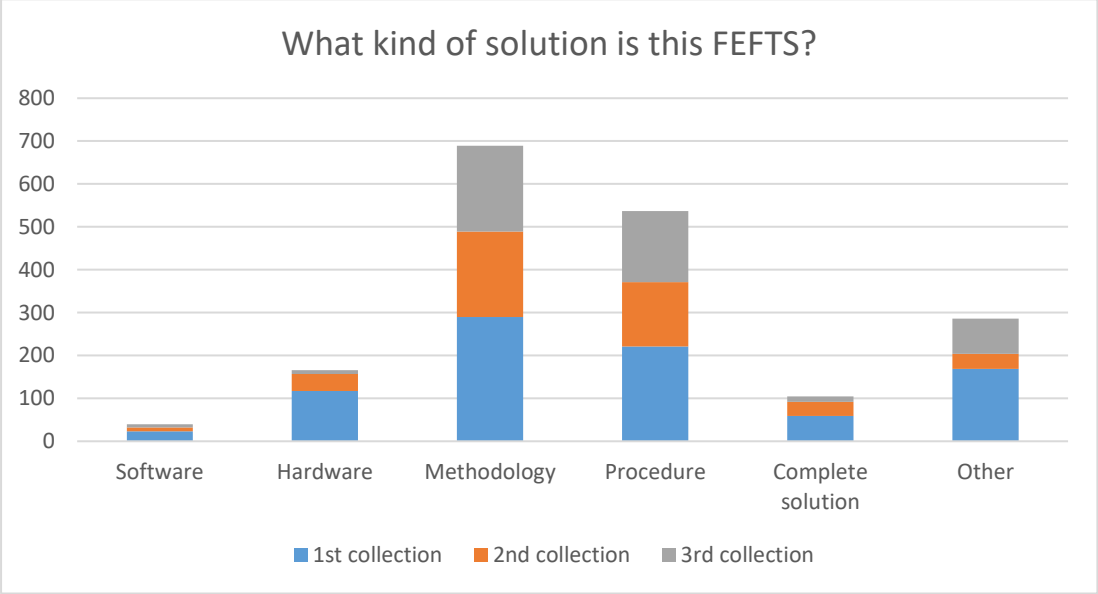


Figure 5. Classification of the submitted Scientific Papers based on the type of FEFTS (updated graph containing all three collection processes)

From the three basic categories of FEFTS application field (open field agriculture, livestock and greenhouse), most papers were dedicated to open field agriculture followed by greenhouses and livestock (Figure 6). However, it should be noted that Scientific Papers usually present solutions and methodologies that can be applicable to multiple sectors (that's why the results in Figure 6 do not sum up to the total number of submitted FEFTS). From Figure 6 it is evident that with the addition of the new FEFTS from the 3rd collection process, no changes occurred between the 3 basic categories.

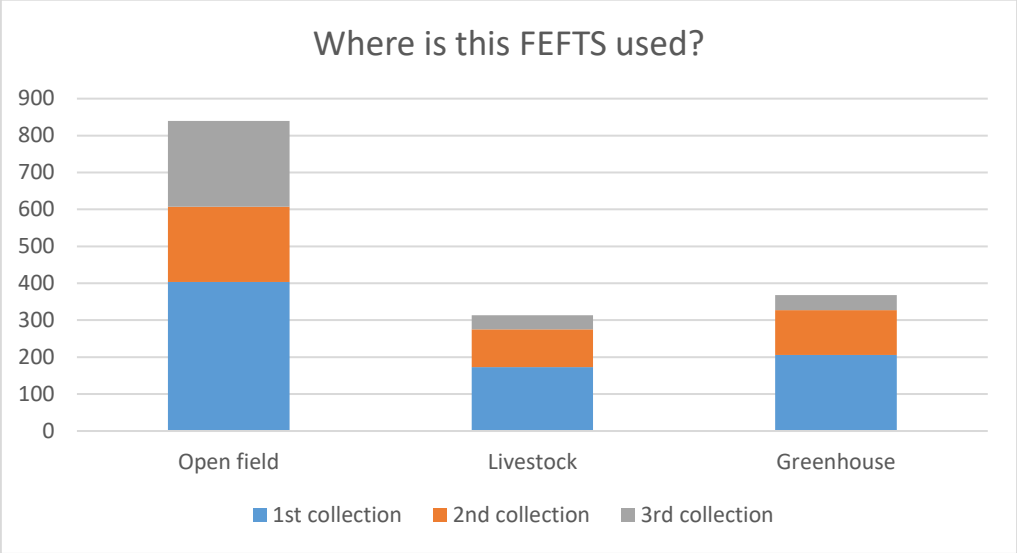


Figure 6. Classification of the Scientific Papers based on the application field (updated graph containing all three collection processes)

3.2. FEFTS application field

As it was mentioned before, Scientific Papers tend to analyse methodologies and procedures that can be applied to multiple sectors. This is evident from Figure 7, where it can be seen that the category multiple technology applications is the third biggest category (121 answers out of 483). It should be mentioned here that during the first months of the FEFTS submission to the database, if the user chose multiple technology applications for his/her FEFTS then the survey would lead him/her straight to the general assessment of the FEFTS part of the survey, excluding further categorisation. However, this idea was found to be problematic as a significant part of FEFTS was not categorized properly. This problem resulted in 82 out of the aforementioned 121 article entries being incompletely categorised. The remaining 39 papers were categorized properly by amending the survey so that if the category "multiple technology applications" was chosen then the user would be prompted to choose the type of FEFTS.

Once the AgEnergy platform was made publicly available, this problem was amended by letting users choose more than one agricultural applications. The option "Multiple Technology Applications" was removed and all the FEFTS were re-categorized using the new system. .

Regarding the agricultural application type, during the 1st FEFTS collection process, the majority of the answers was about agricultural field practices (140 answers out of 483) and energy provision (137 answers out of 483). This occurs due to the fact that the submitted papers were targeted on farmers' practices and how can they produce energy with easily adopted procedures. The remaining categories, even though they are important, when combined together constitute only the 18% of the total submissions.

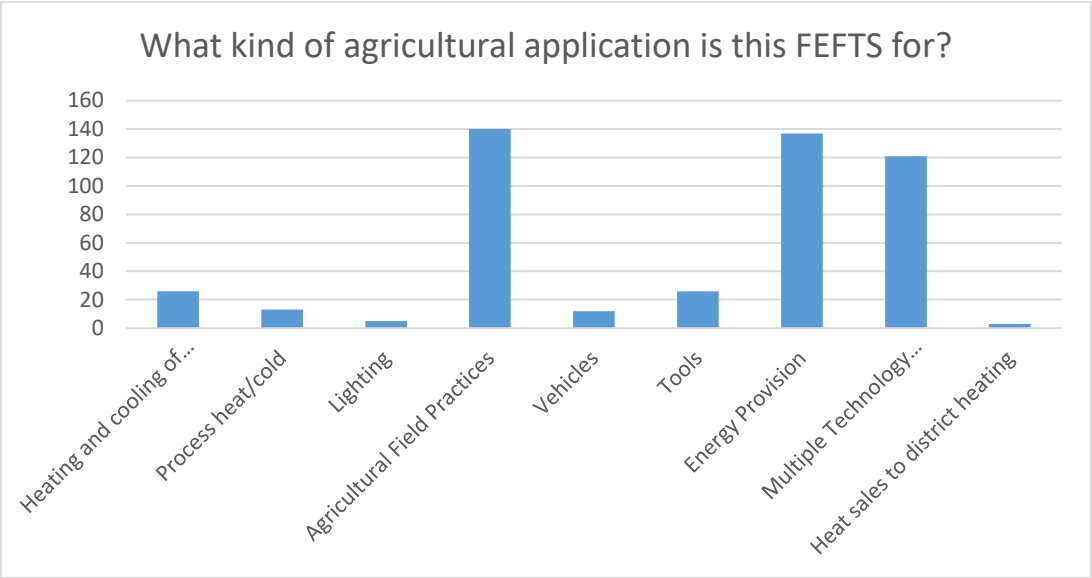


Figure 7. Classification of the Scientific Papers based on the agricultural application (1st collection process)

In Figure 8 the updated graph, containing the 3rd collection results, of the agricultural applications is presented. No major changes occurred between the categories with the most answers. Agricultural field practices and Energy provision remain the top categories. As mentioned before the category Multiple Technology applications no longer exists. Also, because the users can choose more than one category, the results do not sum up to the total number of Scientific Papers submitted.

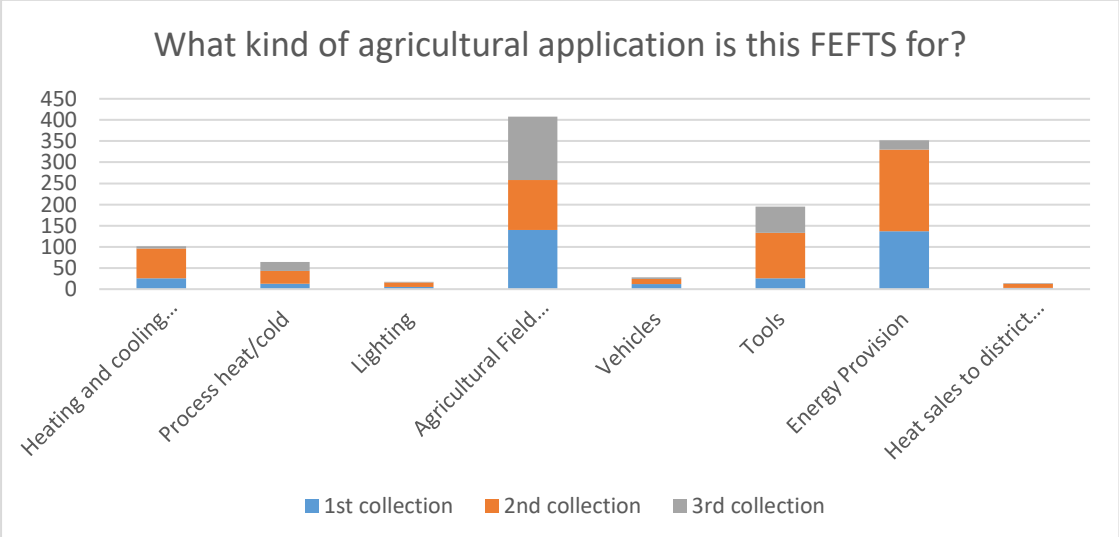


Figure 8. Classification of the Scientific Papers based on the agricultural application (updated graph containing all three collection processes)

From the analysis of the type of agricultural field practices it is observed that irrigation techniques still represent the majority of the submitted papers for this section with 32.4% (over 49.3% during the 1st collection process and 48.8% during the 2nd collection process),

followed by fertilizing (26.2%) (over 22.1% during the 1st collection process and 23.6% during the 2nd collection process) and tilling/ploughing techniques (18.9%) (over 20% during the 1st collection process and 14.7% during the 2nd collection process). These three categories are the most energy consuming in terms of indirect energy inputs and this is why there is great interest from the researchers on these topics. Thus, there is no trend change between all three collection processes, with the new FEFTS that were added. Figure 9 also includes entries that were listed as agricultural field practices however no more categorization could be done (Listed under the category "No further categorization").

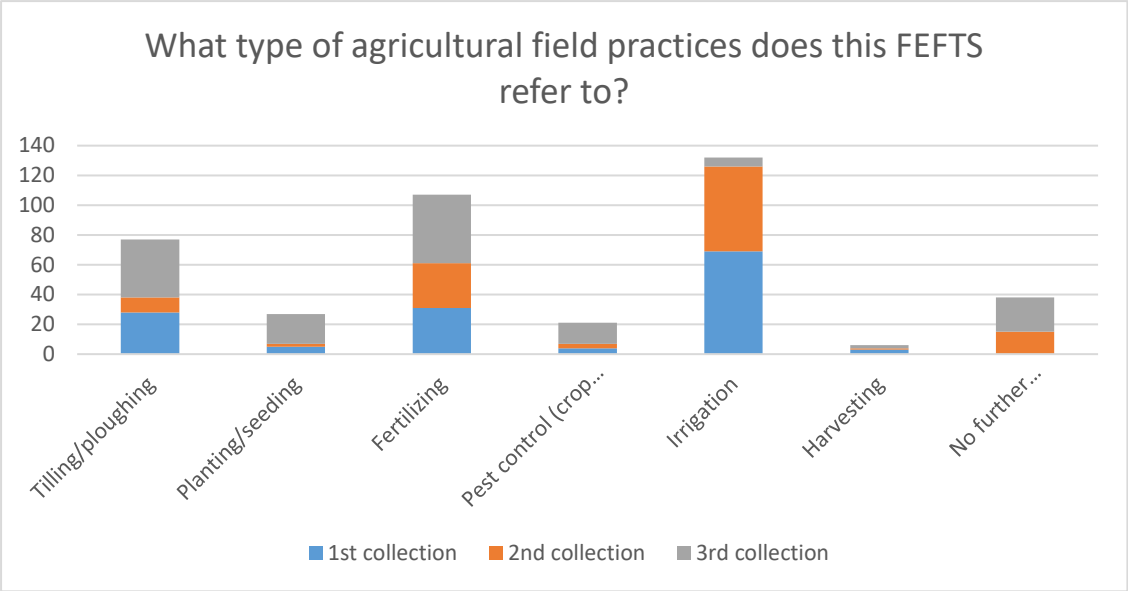


Figure 9. Classification of the submitted Scientific Papers based on the type of agricultural field practices (updated graph containing all three collection processes)

Regarding the energy provision section, most of the papers are about electricity feed-in applications. This occurs mainly because electricity feed-in of farms has attracted researchers to work on this subject as it is very important for farms to meet their needs or even make profit by producing electricity themselves. The second category of energy provision is biomass and this is because farmers are able to produce large amounts of energy by making good use of agricultural residues which they would have discarded either way. During the 2nd FEFTS collection no changes occurred in the ranking of the energy provision section. Also, there are 7 entries that were categorized as energy provision solutions but no further categorization took place. The trend remained unchanged during the 3rd collection process. Also, during the last collection process there were 2 entries that were categorized as energy provision but no further categorization was done. The results are presented in Figure 10.

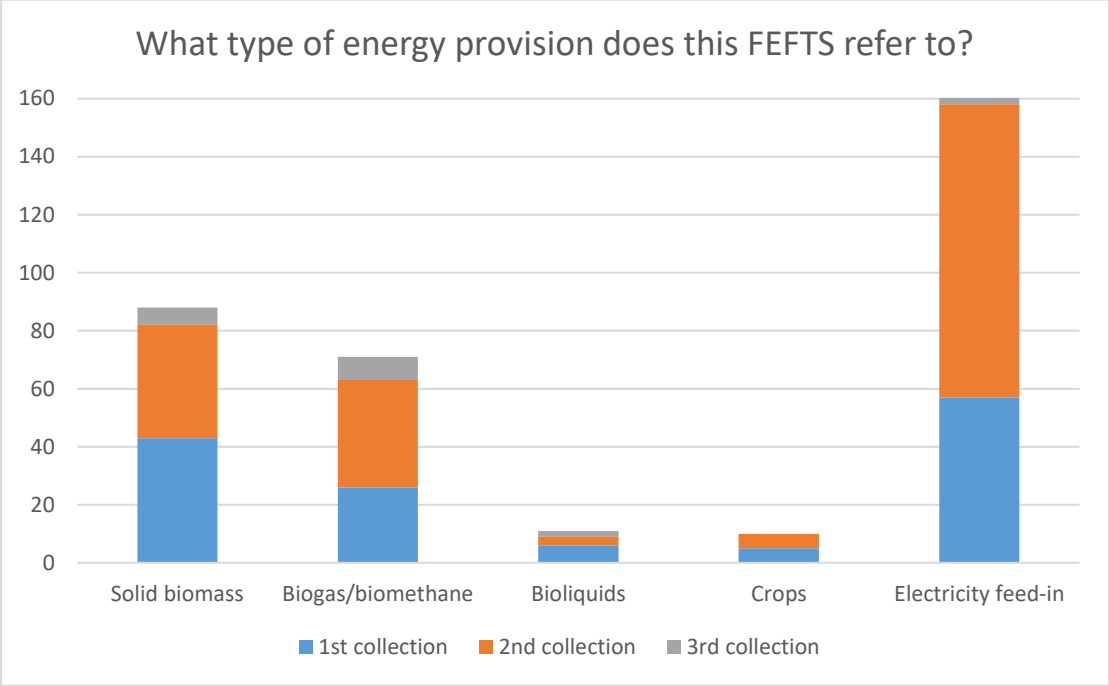


Figure 10. Classification of submitted Scientific Papers based on the energy provision type (updated graph containing all three collection processes)

3.3. FEFTS type

The questions regarding the FEFTS application field are followed by the questions on the FEFTS type. This section is the most important one, as it provides specific details on the submitted FEFTS. Initially, as it was mentioned in chapter 3.2, the results presented in this chapter did not include 82 entries which were not fully categorized when submitted. However, after the 1st screening procedure took place, these entries were corrected once submitted into the AgEnergy Platform and the analysis presented in this deliverable contains the analysis done from the 1st update together with the new FEFTS that were gathered during the 2nd collection process.

During the 1st and 2nd collection processes, Clean Energy Supply was the dominant category. This was correlated with the previously presented results, as energy provision and biomass production are practices falling into the Clean Energy Supply category. However, as it can be seen from Figure 11, during the 3rd collection process, the category Energy Efficiency Improvement became the dominant category, this occurred due to the fact that during the last collection process our goal was to fill all the categories of the platform that had few entries of FEFTS. The category of Clean Energy Supply had already lots of FEFTS and only few entries were added. This is evident also from Figure 10 were the analysis of energy provision type, where the categories follow under Clean Energy supply, shows a few FEFTS added per category.

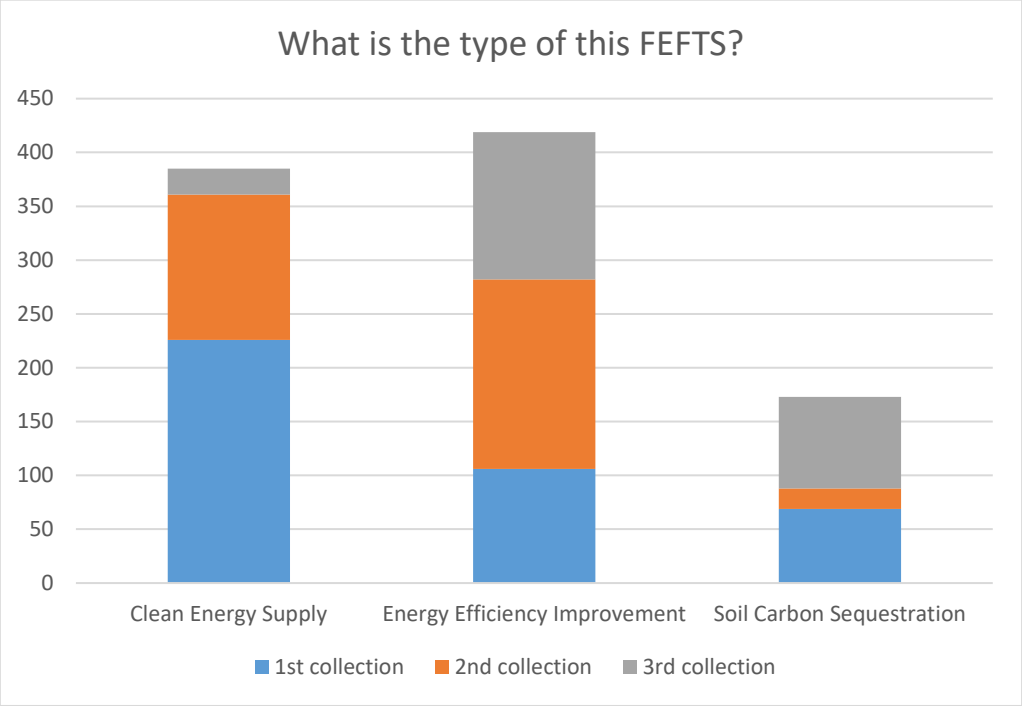


Figure 11. Classification of the submitted Scientific Papers based on the FEFTS type (updated graph containing all three collection processes)

3.3.1. Clean Energy Supply

In the Clean Energy Supply category, energy production systems and energy storage systems are included, with the first ones prevailing over the latter by 91.2 % (during the 1st collection process the percentage was 93.8% and during the 2nd collection process 92.8%).

During the 1st FEFTS collection process, regarding the Renewable Energy Sources, solar energy and biomass were the dominant categories, followed by wind, sewage treatment plant gases/biogases and geothermal energy (Figure 12). However, with the addition of the new Scientific Papers during the 2nd collection process, the analysis showed that there was an increasing interest in sewage treatment plant gas and biogases. In this category 20 new entries were added (35 FEFTS in total) thus surpassing the wind energy category (17 FEFTS in total).

During the 3rd collection process, 24 new FEFTS were added. No major changes occurred in the ranking (see Figure 12). It should be mentioned that between the aforementioned types of renewable energy sources also Aerothermal, Hydrothermal and Marine energy were included for all three collection processes. However, no available papers which mention these energy sources in agricultural practices were found.

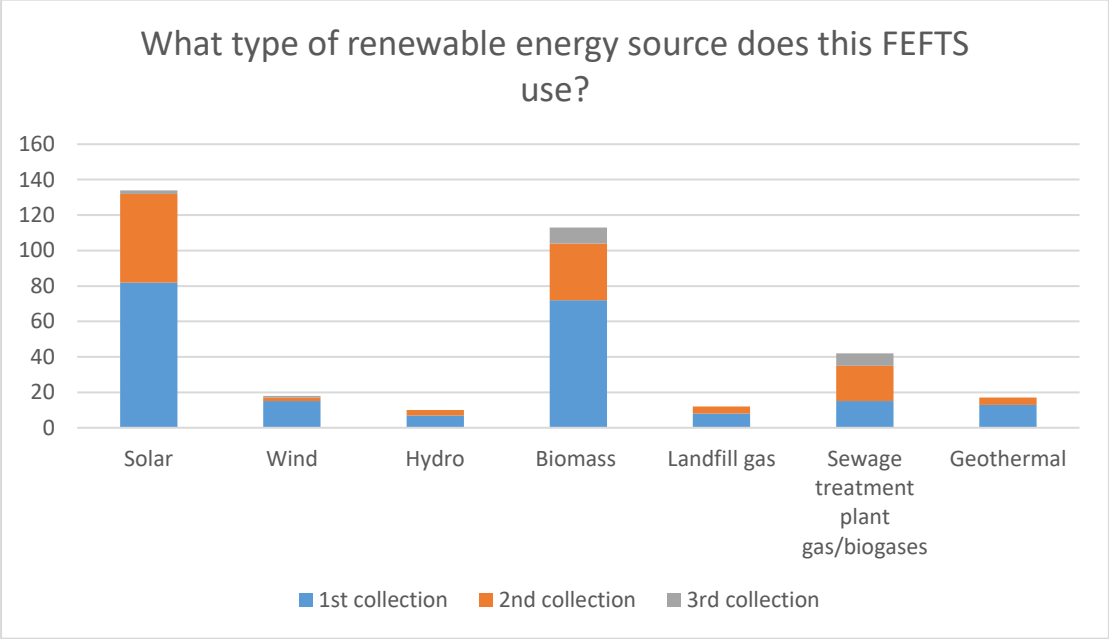


Figure 12. Classification of the submitted Scientific Papers based on the renewable energy sources type (updated graph containing all three collection processes)

By further analysing the category of Solar Energy we conclude that the majority of answers continues being about electricity production using photovoltaics, followed by heat production in solar thermal systems. Electricity production prevails over the other categories by 86% (during 1st FEFTS collection process it was 88%, during the 2nd FEFTS collection it was 85%) followed by heat production (13%) (13% -2nd collection process, 11% -1st collection process). Regarding the technology used, from the analysis it can be seen that photovoltaics lost 3% from the total results and solar thermal gain 2%, when compared to the 1st collection process. Between the 2nd and the 3rd collection process no changes occurred. The detailed results are presented in Figures 13 and 14.

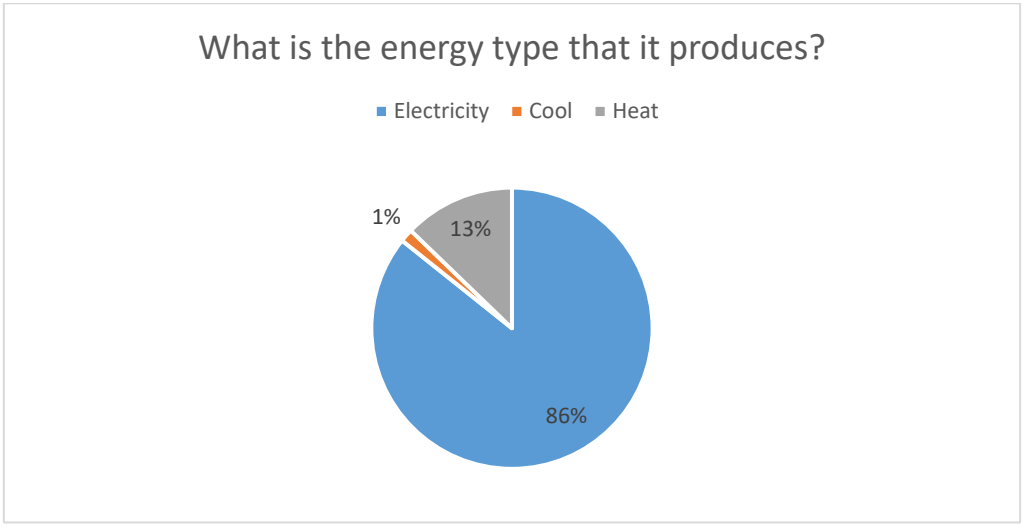


Figure 13. Classification of the submitted Scientific Papers about Solar Energy based on the energy type production (updated graph containing all three collection processes)

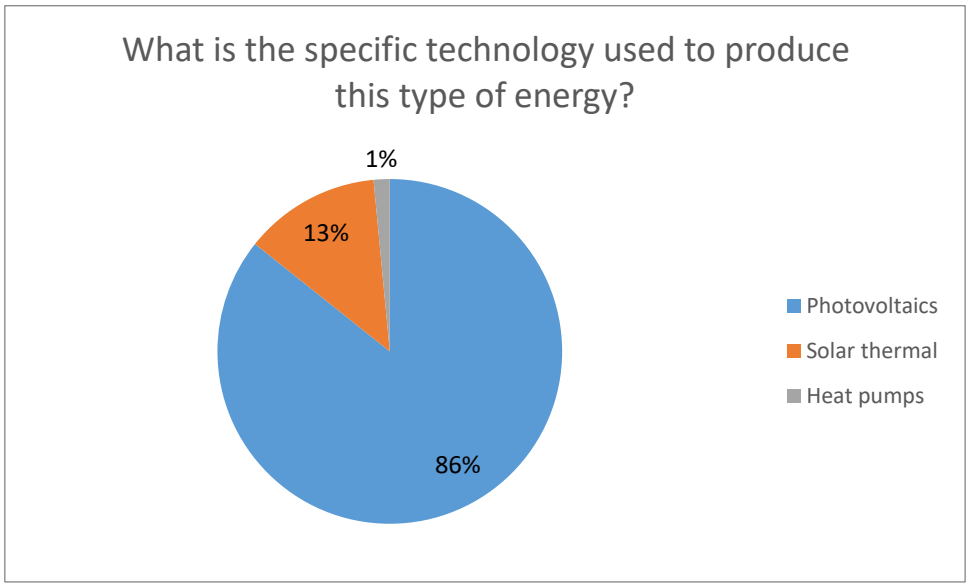


Figure 14. Classification of the submitted Scientific Papers on Solar energy based on the technology used to produce energy (updated graph containing all three collection processes)

Because the photovoltaic category gathered many answers, a thorough breakdown of the particular photovoltaic technologies used had to be done. Figure 15 presents the types of photovoltaic technologies used, with a vast majority being about PV-arrays and Agri-PV systems. It should be highlighted that in the previous report there were 4 FEFTS about PVs on tools and vehicles, however after the screening process 2 solutions were removed from that category. Despite this, no major changes occurred with the addition of the new FEFTS. During the 3rd collection procedure only 2 new FEFTS on photovoltaic technology were added, 1 for Agri-PV Systems and 1 finding application in multiple types, with their categories having 46 and 4 FEFTS respectively.

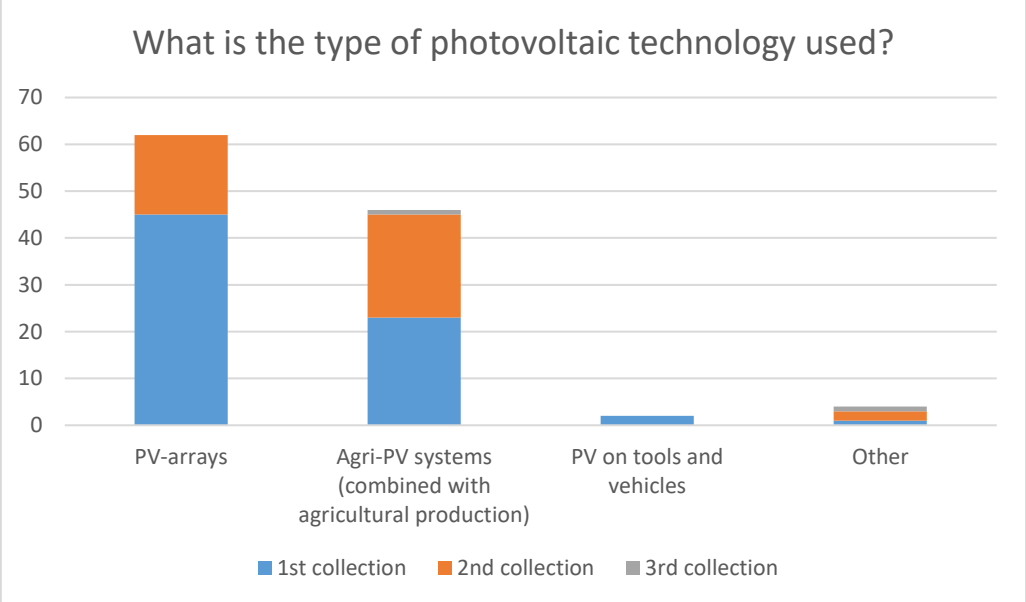


Figure 15. Classification of the submitted Scientific Papers on Solar Energy based on the photovoltaic technology type (updated graph containing all three collection processes)

As it was mentioned before, from Figure 12, besides Solar Energy also Biomass is a dominant Renewable Energy Source. By further analysing this category, we concluded that the majority of answers refers to agricultural residues utilization followed by energy crops, wood log and woodchips. As it can be seen from the graph, no major changes occurred with the addition of new FEFTS for all three collection processes.

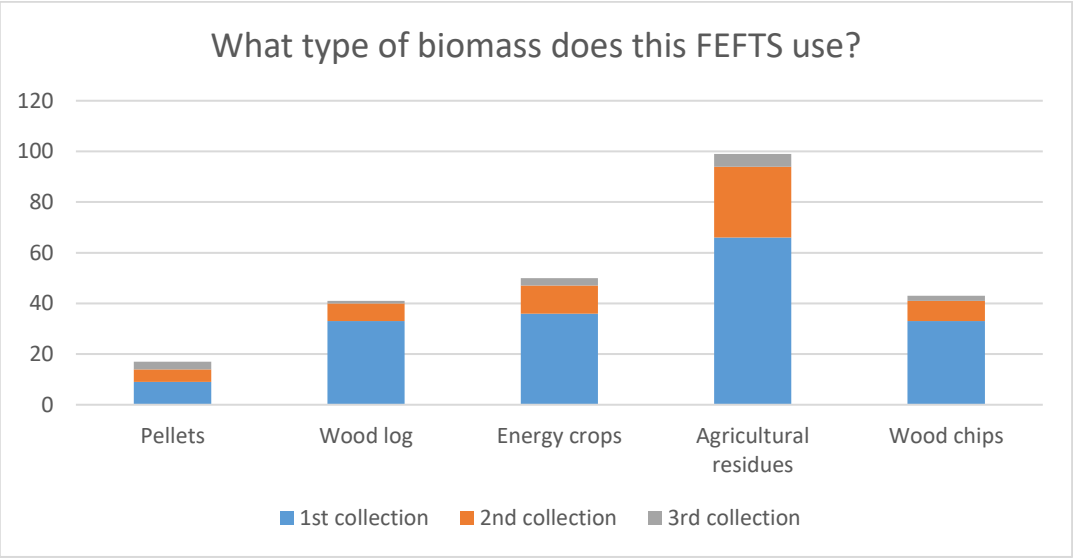


Figure 16. Classification of the submitted Scientific Papers on Biomass based on the biomass type (updated graph containing all three collection processes)

The types of biomass shown in Figure 16 are used for energy production, mostly chemical and then electricity (see Figure 17). When referring to chemical energy, we discuss biomass derived fuels such as solid, liquid and gaseous fuels. It should be mentioned that in the first version of this document, in this category there was also a solution that produced mechanical energy, however, this was corrected in the screening procedure. A slight change in the percentages occurred during the 3rd collection process, with electricity losing 2% that was split equally between the two remaining categories.

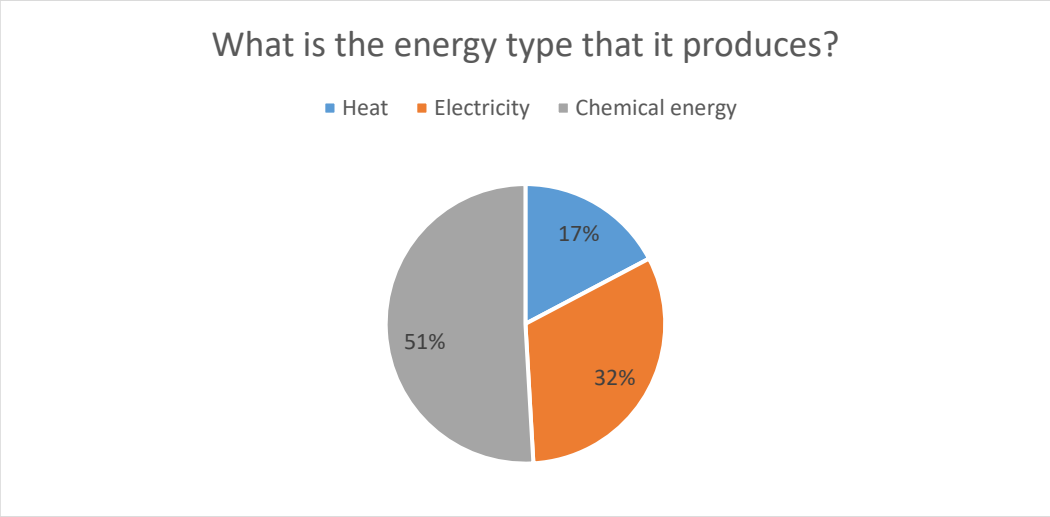


Figure 17. Classification of the submitted Scientific Papers on Biomass based on energy type (updated graph containing all three collection processes)

During the 1st collection process, for chemical energy production equal papers were dedicated to gaseous and solid fuels (14 each), and 8 papers are dedicated to liquid fuels. With the addition of new FEFTS, from the 2nd collection process, this categorization has changed as the majority of solutions are on gaseous fuels (23 in total), followed by solid fuels (18 in total) and liquid fuels (10 in total). During the 3rd collection process, 2 new entries were about gaseous fuels and 3 were not further categorized.

As shown in Figure 18, the technology used to produce chemical energy carriers is by far solid biomass conversion (65.2%) (69.4% during the 1st collection process, 65% -2nd collection) followed by biogas/biomethane production (23.2%) (19.4% during the 1st collection process, 23.3% -2nd collection) and liquid biofuels production (8%) (11.2% during the 1st collection process, 8.7% -2nd collection). It should be highlighted that with the addition of new FEFTS, during the 2nd collection process, heat pumps were also listed as a technology used to produce chemical energy carriers. These 3 FEFTS are hybrid solutions that combine a variety of technologies.

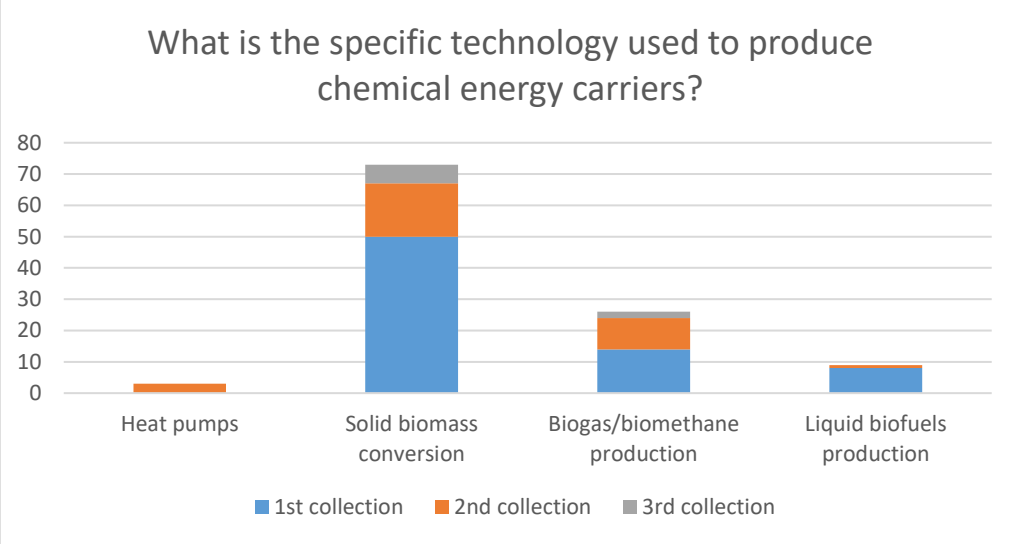


Figure 18. Classification of the submitted Scientific Papers on Biomass based on the specific technology used to produce chemical energy carriers (updated graph containing all three collection processes)

Regarding solid biomass conversion technologies, most of the papers submitted were not specific on the technology used such as boilers or gasifiers but were more interested on the positive impact the production and usage of biomass will have to the farmer and the environment as well. This occurred as well during the 2nd and 3rd FEFTS collection processes.

3.3.2. Energy Efficiency Improvement

Besides Clean Energy Supply, another important category is Energy Efficiency Improvement. It can be seen from Figure 11 that almost 43% (over 22% during the 1st collection process, 39% -2nd collection) of the submitted papers were on Energy Efficiency measures. During the previous update report, the analysis per category showed that most papers were focused on Efficient Tools, followed by Precision Agriculture, Efficient Buildings and Efficient Vehicles. However, during the 3rd collection process 137 new entries were added. The efficient tool category is still the dominant one followed by Conservation Agriculture and Precision

Agriculture. The Conservation Agriculture category became the 2nd biggest category as in the previous updates there weren't many entries on the topic which seems to be of interest to the researchers. The detailed results are presented in Figure 19. From this Figure it is evident that the majority of new FEFTS that were added described efficient tools (232 new entries and 419 in total).

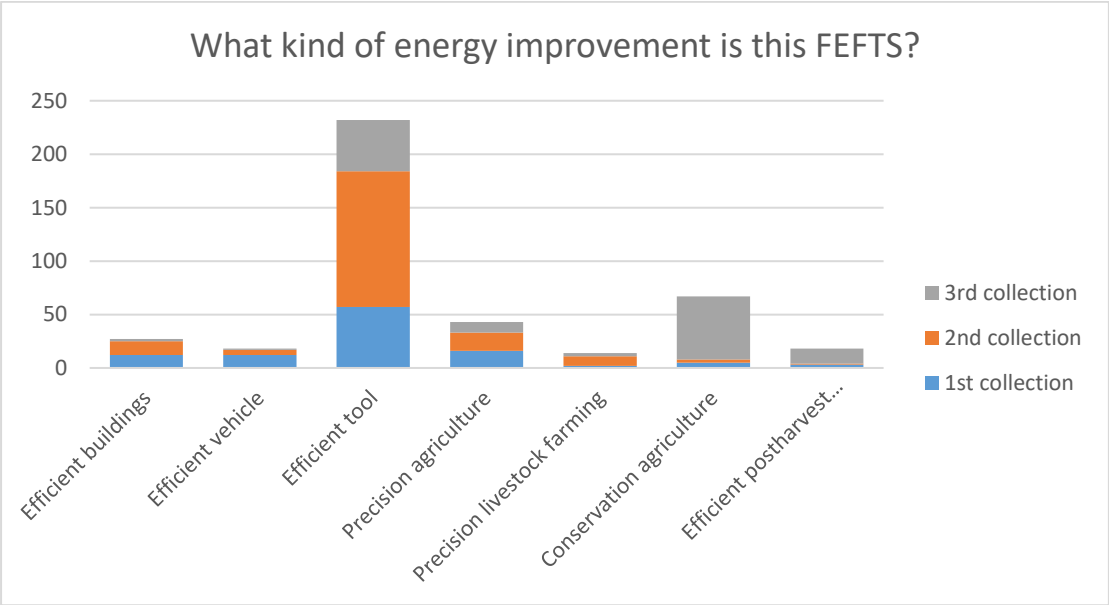


Figure 19. Classification of submitted Scientific Papers based on energy improvement type (updated graph containing all three collection processes)

Because the efficient tool category was the most dominant one, a detailed analysis of that category was done. Figure 20 presents the breakdown of the efficient tools used. It is evident that the category listed as "Other" has the majority of the answers. This occurs due to the fact that lots of Scientific Papers tend to present programs, algorithms and complete methodologies on how to make a known procedure more efficient. These solutions were thought of as tools but not in the traditional meaning but rather as a means to an end. The next most important efficient tools category is about irrigation efficient techniques followed by efficient dryers. During the 2nd and 3rd collection processes, we tried gathering FEFTS for the categories that were left blank from previous collection processes. In this case, new FEFTS were found for the refrigerators (1 during the 2nd collection process and 5 during the 3rd collection process). Whereas, articles dedicated to conveyors and milking machines have not been found.

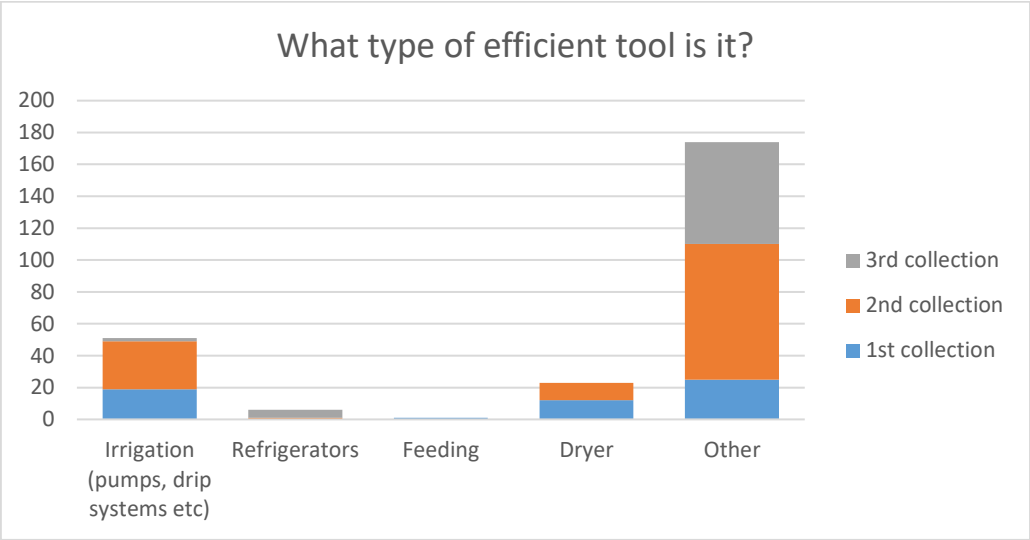


Figure 20. Classification of the submitted Scientific Papers based on the efficient tool type (updated graph containing all three collection processes)

3.3.3. Soil Carbon Sequestration

After Clean Energy Supply and Energy Efficiency Improvement the last category is Soil Carbon Sequestration (see Figure 11). Regarding this category, the majority of the studies submitted present strategies for soil carbon sequestration based on conservation agriculture and CTF methodologies. These methodologies include strategies like no or minimum till as well as well control traffic farming management tools. The reason why these technologies are of interest for researchers is that they can achieve maximum results while minimizing farmers' efforts. The next category is soil organic matter which consists of strategies that use compost and harvest residues as soil organic matter enhancements. It should be mentioned that during the 2nd collection process, the majority of new articles added were on soil and water conservation techniques (7 new FEFTS added, 11 in total). During the 3rd collection process, 33 new entries were dedicated to nutrient management practices thus making it the biggest category surpassing the tillage category (12 new entries). Also 23 new entries on Soil and Water Conservation techniques were added, making the category 3rd in ranking. Regarding the Fire Management category no FEFTS were found during the 3rd collection process. The updated results are presented in Figure 21.

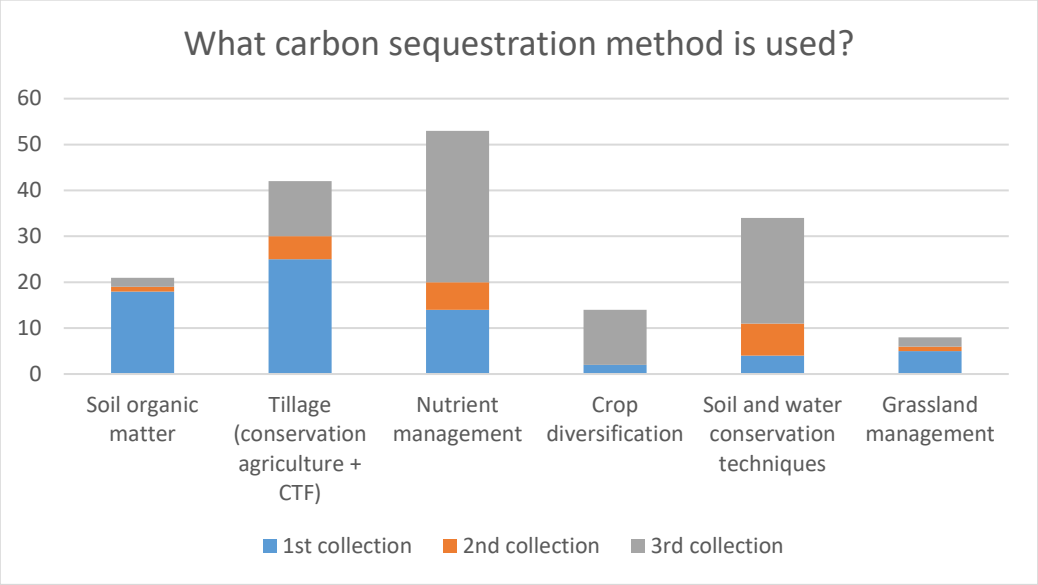


Figure 21. Classification of submitted Scientific Papers based on carbon sequestration method (updated graph containing all three collection processes)

3.4. Environmental Assessment Results

A significant part of the survey that should be analysed is the environmental assessment results, and more specifically the direct and indirect energy reduction achieved through the submitted FEFTS.

Regarding the direct fossil energy reduction (Figure 22) the majority of the papers is about electricity and fuel consumption of tools and equipment followed by building's electricity consumption. From the results we conclude that electricity is the biggest energy consumer in agriculture both in tools/equipment consumption and buildings' needs. Fuel consumption is the next category with lots of energy being consumed again in tools / equipment and tractors / vehicles. As it can be seen from the updated graph no changes occurred regarding the classification of the FEFTS.

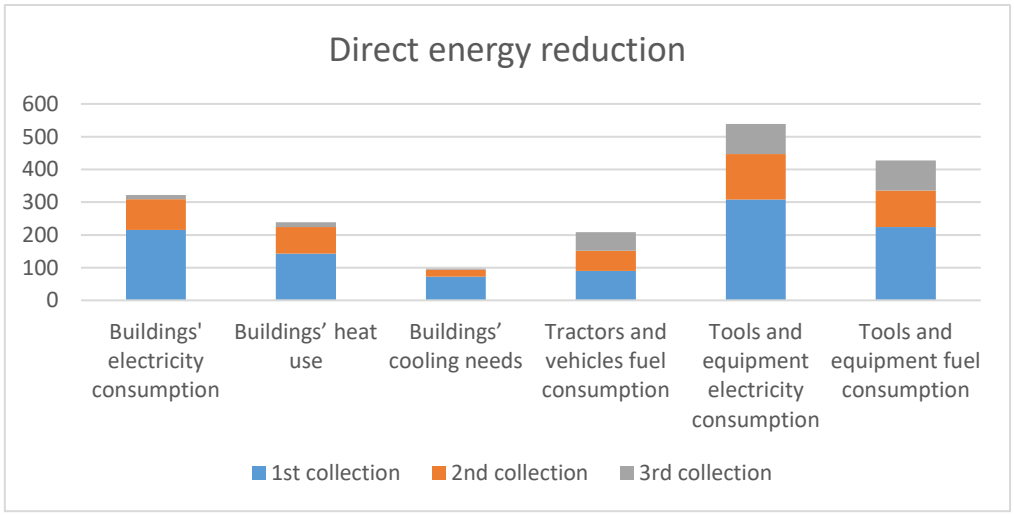


Figure 22. Classification of the Scientific Papers based on direct energy reduction (updated graph containing all three collection processes)

Regarding indirect energy reduction the results show that fertilizer reduction is the most important indirect energy input that should be reduced, followed by tillage reduction, manure and pesticide reduction (Figure 23). A minor change occurred during the 2nd FEFTS collection process were pesticide reduction became the third biggest category, surpassing tillage reduction by 2 FEFTS. During the 3rd collection process, pesticide reduction became the 2nd biggest category after fertilizer reduction. The results from all three collection processes were expected based on AgroFossilFree results of D1.1 that fertilizers count for the biggest indirect energy consumption input in agriculture. Thus, it is an important subject for researchers to analyse and try to find alternative ways for a more sustainable agriculture. Also, the next three categories, tillage, pesticide and manure reduction, together with fertilizer reduction constitute the four basic pillars of indirect energy inputs. The detailed results are presented in Figure 23.

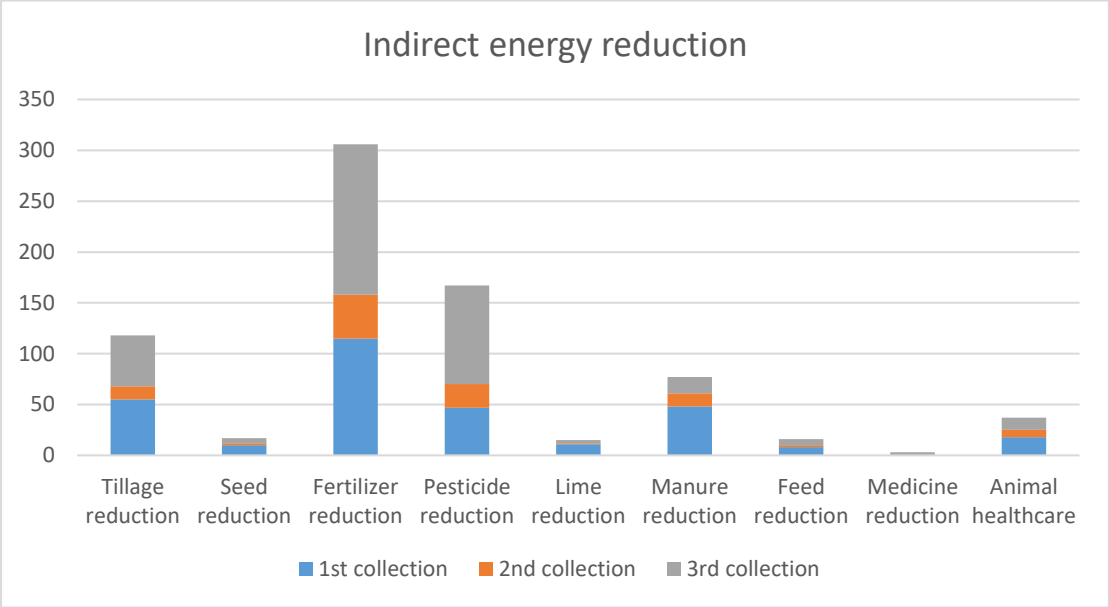


Figure 23. Classification of Scientific Papers based on indirect energy reduction (updated graph containing all three collection processes)

4. Conclusions

In the first phase of the project the initial identification of FEFTS providers and innovations was achieved in order to set the baseline for the launch of the AgEnergy Platform. During the second phase of the project the goal was to enrich the AgEnergy Platform in order for all the categories to include solutions.

After filling the survey for FEFTS and the initial screening process, 483 Scientific Papers were selected to serve as first inputs for the platform, for that corresponding category of FEFTS. The records cover a wide range of available FEFTS technologies, either ready or under development. After the end of the 2nd FEFTS collection, 248 new Scientific Papers on FEFTS were added. Following this, during the 3rd FEFTS collection process, 257 new Scientific Papers on FEFTS were added out of which 247 were made public.

In total AgEnergy Platform has 1001 Scientific Papers on FEFTS out of the 1000 which is the goal set in the GA. The final number of published Scientific Papers in the AgEnergy platform is 977. Summarizing the results from the 3rd collection process, records are submitted in 6 different languages and come from 87 different countries (58 Non-EU and 29 EU). The majority of the Scientific Papers submitted are about methodologies, procedures and policies on

agricultural field practices and energy provision. The basic receivers for these FEFTS solutions are farmers and their associations followed by advisory services, policy makers and industry. Furthermore, Energy Efficiency Improvement prevails over Clean Energy Supply and Soil Carbon Sequestration with most of the solutions being about efficient tools. Regarding direct energy consumption, electricity is the main contributor followed by fuel consumption for tools and vehicles. On the matter of indirect energy consumption, fertilizers are the leader followed by pesticide, tillage and manure, thus confirming numerous studies on that matter.

The overall results show us that research on FEFTS technologies is vivid and researchers are trying to produce results that would help in the de-fossilization of the agricultural sector. The scientific papers from all three collection processes were screened and uploaded to the AgEnergy Platform. All these solutions provide all interested stakeholders with valuable information and guidance of upcoming technologies and strategies towards a fossil-free EU agriculture.

It should be highlighted that with the update of this report, no major changes occurred in all the analysed categories. This is due to the fact that from the creation of the AgEnergy Platform repository, the methodology we followed was in line with the scientific trends. Our first entries consisted of a big sample that was divided according to the number of results each query had. This led to the majority of categories in the AgEnergy Platform to include solutions. During the second phase of the project this entries were enriched in order to include solutions for categories that were still empty. This procedure continued also for the 3rd FEFTS collection process.

In the first version of this report (D.2.2) a mock-up card showing how a FEFTS Scientific Paper would look once submitted to the AgEnergy Platform was presented. Figure 23 shows a first draft of the platform.

With the creation of the AgEnergy Platform all the FEFTS submitted during the all three collection processes were made public (after being screened). Figure 24 shows how a random Scientific Paper on FEFTS is presented in the platform.

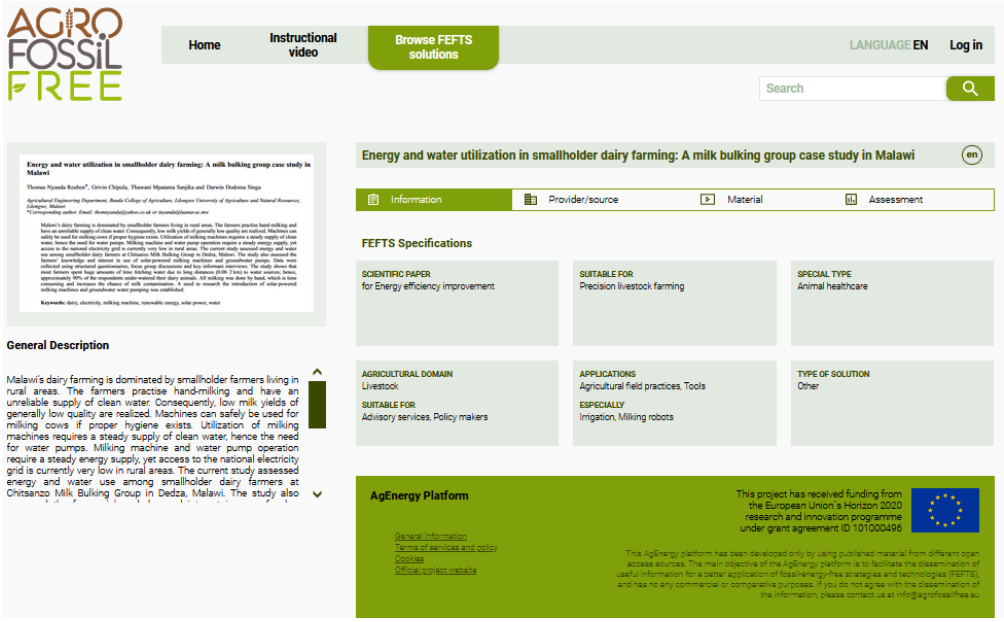


Figure 24. Example of a published Scientific Paper on the AgEnergy Platform

Furthermore, the KPI of 1700 FEFTS was over exceeded as the platform's repository has 2102 FEFTS entries from all three collection processes due to the partner's collaboration.

Annexes

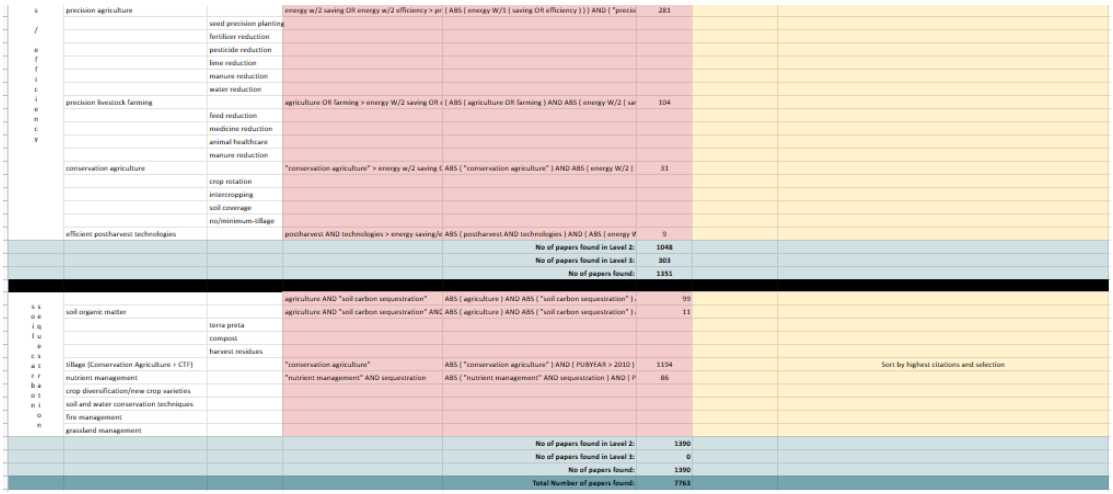
In this section the material used for the registration of the FEFTS is provided in order to support what has been described in the above chapters.

Annex A: Queries

The following pictures are indicative of the queries online spreadsheet that was created. Also, the link to the spreadsheet is available.

Level 1	Level 2	Level 3	Keywords	Scopus Query	No. of results	New (extra) results	Comments
Renewable Energy Sources	solar		agriculture > energy > solar OR photovoltaics	ABS (agriculture OR farming OR farmer) AND ABS (energy	824	199	
	wind		agriculture > energy > wind	ABS (agriculture AND energy AND wind) AND (PUBYEAR >	208	48	It contains more irrelevant paper results compared to the other queries
	hydro		agriculture > energy > hydro	ABS (agriculture AND energy AND hydro) AND (PUBYEAR :	49	16	It contains more irrelevant paper results compared to the other queries
		kinetic					
		potential					
	biomass		agriculture > energy > biomass	ABS (agriculture AND energy AND biomass) AND (PUBYEA	886	124	
		pellets	agriculture > energy > biomass > pellets	(ABS (agriculture AND energy AND biomass)) AND (pelle	78	31	
		woodchips	agriculture > energy > biomass > woodchips	(ABS (agriculture AND energy AND biomass)) AND (woodc	7	0	
		woodlog	agriculture > energy > biomass > "wood logs"	(ABS (agriculture AND energy AND biomass)) AND ("wood	3	0	
		energy crops	agriculture > biomass > energy W/2 crops	ABS (agriculture AND biomass) AND ABS (energy W/2 cro	117	3	
		agricultural residues	agriculture > energy > biomass > residues	ABS (agriculture AND energy AND biomass AND residues)	150	44	
	landfill gas		energy W/2 production > landfill gas OR LFG	ABS (energy W/2 production) AND ABS ("landfill gas" OR	46	6	
	sewage treatment plant gas and biogases		energy W/2 production AND sewage AND treatm	ABS (energy W/2 production) AND ABS (sewage AND trea	12	3	
	geothermal		energy w/2 production > geothermal > agricultu	ABS (energy W/2 production) AND ABS (geothermal) AN	41	6	
		solid/ground					
		fluids					
	aerothermal		aerothermal AND energy > agriculture OR green	ABS (aerothermal AND energy) AND ABS (agriculture OR (	2	1	Better expressed through heat pumps subcategory in Energy Generation Technologies (Level 1)
		ambient air					
	hydrothermal		agriculture > (hydrothermal OR "water bodies" C	ABS (agriculture) AND ABS (hydrothermal OR "water bodi	19	3	
		groundwater					
		water bodies					
	marine energy						N/A
		wave energy					
		tidal energy					
				No of papers found in Level 2:	2068	406	
				No of papers found in Level 3:	374		
				No of papers found:	2442	484	
							Energy Type (Level 1) papers are adequately expressed through the other categories
Energy type	heating		agriculture OR farming OR farmer > energy > hea	(ABS (agriculture OR farming OR farmer) AND ABS (energ	177	48	Test query about the heating
		heat for agri-processes				2nd batch ended here	
		buildings					
	cooling						
		cooling for agri-processes					
		buildings					
	electricity						
		AC					
		DC					
	mechanical energy						
		stationary applications					
		mobile applications					
	chemical energy						
		gaseous fuels					
		liquids fuels					
		solids fuels					
				No of papers found in Level 2:	0		
				No of papers found in Level 3:	177		
				No of papers found:	177		
Energy technologies	photovoltaics						Similar to the RES query about solar/photovoltaics
		PV-arrays					
		agro-PV systems					
		PV on tools and vehicles					
	solar thermal						Maybe "solar thermal" query and sorting by highest cited
		flat plate collectors					
		evacuated tube collectors					
		concentrated					
		thermosiphon systems					
		photovoltaic and thermal collectors (PVT)					
		ground mounted solar collectors					
	wind turbines						Similar to the RES query about wind
		small wind turbines (1-50 kW)					
		medium wind turbines (50-999 kW)					
		large wind turbines (<1 MW)					
		water wind pumps		ABS ("wind pump") AND (PUBYEAR > 2010) AND (LIMIT-	28		
	hydropower		hydropower > technologies > agriculture	ABS (hydropower AND technologies) AND ABS (agricultur	19		
		micro (1-10 kW)	micro w/1 hydropower > irrigation	ABS (micro W/1 hydropower) AND ABS (irrigation) AND (	12		
		mini (10-100 kW)	mini w/1 hydropower	ABS (mini W/1 hydropower) AND (PUBYEAR > 2010) AND	30		
		small (100-1000 kW)	small w/1 hydropower > irrigation	ABS (small W/1 hydropower) AND ABS (irrigation) AND (	23		
		run-of-the-river					
	heat pumps		"heat pump" > ("ground source" OR "water" OR	ABS ("heat pump") AND ABS ("ground source" OR "water	843		
		ground source heat pump					
		water heat pump (surface and ground water)					
		ambient air heat pump					
		other heat pumps					
	geothermal		heat AND pump > geothermal > (shallow OR dee	ABS (heat AND pump) AND ABS (geothermal) AND ABS (	55		
		shallow geothermal (until 400 m)					
		deep geothermal (deeper than 400 m)					
	solid biomass conversion						
		woodchip boilers	(woodchip OR woodlog OR pellet) W/1 boiler	ABS ((woodchip OR woodlog OR pellet) W/1 boiler) AND	161		Same query for woodlogs and pellets as well
		woodlog boilers					
		pellet boilers					
		woodchip gasifyers (CHP)		ABS (gasifier) AND ABS (pellet OR woodchip) AND (PUBY	196		
		pellet gasifyers (CHP)					
	biogas / biomethane production		("biogas production" OR "biomethane productio	ABS ("biogas production" OR "biomethane production") A	228		
		anaerobic digestion technologies					
		biomehtane upgrading technologies					
	liquid biofuels production		"liquid biofuels" W/2 production	ABS ("liquid biofuels" W/2 production) AND (PUBYEAR > :	137		
		oil presses					
		biodiesel plants					
		distilleries					
				No of papers found in Level 2:	192		
				No of papers found in Level 3:	1540		
				No of papers found:	1732		

Energy storage technologies			agriculture > ("energy storage" OR "heat storage	ABS (agriculture) AND ABS ("energy storage" OR "heat st	137		General query about the Energy Storage Technologies (Level 1)
	heat storage						
		buffer tanks					
		seasonal heat storage systems					
		latent heat storages (PCM)					
		thermo-chemical storages					
	electricity storage		agriculture> electricity storage OR batteries	ABS (agriculture) AND ABS ("electricity storage" OR batte	212		
		lithium-ion batteries					
		redox flow batteries					
		zinc-hybrid batteries					
		lead–acid batteries					
		hydrogen (subsystem)					
	cold storage						
		ice/slury storage systems					
		other cold storage systems					
	intermediate bioenergy carriers						
		pellets					
		wood chips					
		woodlog					
		torrefied biomass					
		charcoal					
		oils					
		other intermediate bioenergy carriers					
				No of papers found in Level 2:	349		
				No of papers found in Level 3:	0		
				No of papers found:	349		
				No of papers found for Clean Energy Production:	4700		
Agricultural technology applications	heating and cooling of agricultural buildings		heating OR cooling > agriculture > building	ABS ((heating OR cooling) AND building) AND ABS (agric	81		
		stables					
		greenhouses					
		farmer's buildings					
		cultivations (small scale construction, nylon)					
	process heat/cold						Included in the previous querry
		drying of commodities					
		pre-processing of agricultural goods					
		hygenisation					
		cold storages					
	lighting		natural OR artificial lighting > agriculture	ABS ((natural OR artificial) AND lighting) AND ABS (agric	76		Same results with query in line 170
		natural lighting					
		technical lighting					
	agricultural field practices		agricultural practices > tilling OR ploughing OR p	ABS ("agricultural practises") AND ABS (tilling OR ploughi	69		
		tilling/ploughing					
		planting/seeding					
		fertilizing					
		pest control (crop protection)					
		weed control					
		irrigation					
		harvesting					
	vehicles						
		electric agricultural mo	"electric tractor"	ABS ("electric tractor") AND (PUBYEAR > 2010) AND (LIM	35		
		hybrid agricultural mobile machinery					
		electric agricultural mo	electric tractor	ABS ("electric tractor") AND (PUBYEAR > 2010) AND (LIM	35		
		hybrid agricultural mobile machinery					
		biomethane agricultural mobile machinery					
		biodiesel agricultural mobile machinery					
		PPO agricultural mobile machinery					
		agricultural trailers and	interchangeable towed equipment (biodiesel/biogas or electricity driven)				
	productivity						Individual queries needed for each of these subcategories
		milking robots	milking robot OR machine OR system > agricultu	ABS ("milking robot" OR "milking machine" OR "milking sy	22		
		feeding robots	feeding robot OR machine OR system > agricultu	ABS ("feeding robot" OR "feeding machine" OR "feeding s	39		
		conveyors					
		mills/grinders					
		dryers					
	energy sales to external consumers						
		solid biomass					
		biogas/biomethane					
		bioliquids					
		crops					
		electricity feed-in					
		heat sales to DH					
				No of papers found in Level 2:	226		
				No of papers found in Level 3:	96		
				No of papers found:	322		
Energy saving KPIs / efficiency			agriculture > energy w/2 saving OR energy w/2 e	ABS (agriculture) AND ABS (energy W/2 saving) OR ABS (	576		General query about Energy Saving / Efficiency (Level 1)
	efficient buildings		agriculture > energy w/2 saving OR energy w/2 e	ABS (agriculture OR farming OR farmer) AND (ABS (energ	99		
		building wall insulation					
		roof insulation					
		cellar insulation					
		windows					
		building management systems					
		efficient lighting					
	efficient vehicles		agriculture > energy w/2 saving OR energy w/2 e	(ABS (agriculture) AND ABS (energy W/2 (saving OR effic	86		Probably we can keep Level 2 here
		maintenance (e.g. tyre pressure)					
		logistics/planning					
	efficient tools		agriculture > (energy W/2 (saving OR efficiency)	ABS (agriculture) AND ABS (energy W/2 (saving OR effici	143		
		irrigation (pumps, drip systems etc)					We can work on Level 3 here
		conveyors					-//-
		milking machines	milking robot OR machine OR system > agricultu	ABS ("milking robot" OR "milking machine" OR "milking sy	22		Same query with line 149
		refrigerators					We can work on Level 3 here
		feeding					-//-
	precision agriculture		energy w/2 saving OR energy w/2 efficiency > pr	(ABS (energy W/1 (saving OR efficiency))) AND ("precisi	281		
		seed precision planting					
		fertilizer reduction					
		pesticide reduction					
		lime reduction					
		manure reduction					
		water reduction					
	precision livestock farming		agriculture OR farming > energy W/2 saving OR e	(ABS (agriculture OR farming) AND ABS (energy W/2 (sa	104		
		feed reduction					



s / efficiency	precision agriculture		energy w/2 saving OR energy w/2 efficiency > pr	(ABS (energy W/1 (saving OR efficiency))) AND ("precisi	281		
		seed precision planting					
		fertilizer reduction					
		pesticide reduction					
		lime reduction					
		manure reduction					
		water reduction					
	precision livestock farming		agriculture OR farming > energy W/2 saving OR (	(ABS (agriculture OR farming) AND ABS (energy W/2 (sa	104		
		feed reduction					
		medicine reduction					
		animal healthcare					
		manure reduction					
	conservation agriculture		"conservation agriculture" > energy w/2 saving (	ABS ("conservation agriculture") AND ABS (energy W/2 (	31		
		crop rotation					
		intercropping					
		soil coverage					
		no/minimum-tillage					
	efficient postharvest technologies		postharvest AND technologies > energy saving/e	ABS (postharvest AND technologies) AND (ABS (energy W	9		
				No of papers found in Level 2:	1048		
				No of papers found in Level 3:	303		
				No of papers found:	1351		
soil sequestration			agriculture AND "soil carbon sequestration"	ABS (agriculture) AND ABS ("soil carbon sequestration") (	99		
	soil organic matter		agriculture AND "soil carbon sequestration" ANC	ABS (agriculture) AND ABS ("soil carbon sequestration") (	11		
		terra preta					
		compost					
		harvest residues					
	tillage (Conservation Agriculture + CTF)		"conservation agriculture"	ABS ("conservation agriculture") AND (PUBYEAR > 2010)	1194		Sort by highest citations and selection
	nutrient management		"nutrient management" AND sequestration	ABS ("nutrient management" AND sequestration) AND (P	86		
	crop diversification/new crop varieties						
	soil and water conservation techniques						
	fire management						
	grassland management						
				No of papers found in Level 2:	1390		
				No of papers found in Level 3:	0		
				No of papers found:	1390		
				Total Number of papers found:	7763		

The following link is the online spreadsheet that was created for the queries that were used in the Scopus search.

https://docs.google.com/spreadsheets/d/1kdl7ZSUUMnZ8jg7pSQurx2wf7sm7G9sYoxwnRDcawsI/edit#gid=0

Annex B: Papers retrieved from survey

The following link is the online spreadsheet which contains all the papers retrieved from the the all three FEFTS collection processes.

https://docs.google.com/spreadsheets/d/1pu-yQRCg1xHgXnSTXdjVwpn7soJp1BQTzs81jb1qe9M/edit?usp=sharing

Annex C: Scientific Papers Survey

As it was mentioned in the report, the use of the online survey has been discontinued. Instead all users can directly insert their FEFTS in the AgEnergy Platform. The following link is the AgEnergy platform were a user can submit his/her FEFTS by simply registering beforehand.

https://platform.agrofossilfree.eu/en