LIFE Project Number

LIFE15 ENV/GR/000257

LIFE PROJECT NAME or Acronym

LIFE-F4F (Food for Feed)

Annex Data

Action:	B3 Initiating, Operating and Optimising the F4F System
Partner:	ALL PARTNERS
Deliverable:	B3.4 Data, results and feed produced, during the optimum operational period

Table of contents

Contents

1. Introduction - 2nd and optimum operational period

This is the third operational period for the F4F project. The first period was the **initial operational period** of the project, which carried out from June, 2018 till October, 2018. The second period was the **1st full scale operational period**, following the initial operational period, after the implementation of some optimizations that carried out between these two periods. This period carried out from May, 2019 till October, 2019. The third and final period for the F4F project was the **2nd optimum operational period**, which finally carried out from the end of June, 2020 till mid of December, 2020.

For this last operational period, there was a delay in the project's start up. Due to concerns around the corona virus (COVID-19), and in accordance to the health guidance from the Greek National Public Health Organization, World Health Organization, and other health authorities, strict measures have been taken all over the world from March, 2020. For this reason it was not possible the operation of the pilot unit to take place on time. Within these difficult circumstances that occurred the months from March and up to now, all partners from the project LIFE15 ENV/GR/000257, encounter difficulties mainly concerning the programming and the startup of the last, 2nd and optimum operational period of the F4F pilot unit, which was to start on 4th of May. The project confronted some delays, as it was not clear up to then how the touristic period in Greece will evolve. For this reasons, partners had requested to be allowed to use alternative raw materials, such as vegetable waste, flour and rice residues from supermarkets, in combination with the collected food waste from the cooperative hotels. This request has been approved by EC and for this reason a relevant cooperation with XALKIADAKIS SA begun.

Officially, the start up of the 2nd optimum operational period of the F4F pilot unit was on June, 22. Hotels, a restaurant and supermarket XALKIADAKIS supported the F4F project for this period, so as project to achieve the quantitative and qualitative indicators and in parallel to carry out experiments with other waste (without animal by-products), something which had already been requested by partners from AUA and FUB the previous period. Partners decided to cease collaboration with city hotels as the quantities from these hotels were very few and new seasonal hotels in Ammoudara have been added in the project. A restaurant also participated with the F4F project and the restaurant from the ARMY in Heraklion also took participation for a short period.

The main objective of this period, with the operational systems tested and improved in the years before, the personnel experienced and familiar will all systems, year 3, was the final and most organized and productive operation period. Taking into consideration all the problems encountered due to the COVID pandemic, all partners tried their best so as to be able to respond to all the project's needs. Even though all components not only were operating in full scale, but also in a completely commercial way, however, there were difficulties in the completion of some actions, mainly the dissemination ones.

The collection system and the operation of the pilot unit during this period was carried out by ESDAK's relevant contractor with the support of HMU. The operation during this period follows the data and results of the initial operational period but also data of the feed evaluation actions (B4 and B5).

In Table 1 below the branch stores of Xalkiadakis and the new cooperated hotels and other food waste sources are presented.

Table 1. Cooperative hotels, branch stores of Xalkiadakis and other sources

A/A	Collaborated Units
1	SM LEVINOU – THERISSOU - XALKIADAKIS
2	SM GIOFYRO - XALKIADAKIS
3	SM OULAF PALME - XALKIADAKIS
4	SM HRAKLH - XALKIADAKIS
5	SM PARALIAKH - XALKIADAKIS
6	SM ST JOHN - XALKIADAKIS
7	SM KNOSSOU - XALKIADAKIS
8	SM IEROLOHITON - XALKIADAKIS
9	SM KOKKINI - XALKIADAKIS
10	SM CHERSSONISSOS - XALKIADAKIS
11	SM MALIA - XALKIADAKIS
12	HOTEL Creta Maris
13	RESTAURANTS
14	SM GAZI - XALKIADAKIS
15	HOTEL Apollonia
16	HOTEL St Marina
17	HOTEL Candia Maris
18	HOTEL Agapi Beach
19	ARMY RESTAURANT
20	FRUITS
21	GREENHOUSE VEGETABLE WASTE

This 2nd optimum operational period of the project was finally concluded as foreseen, overcoming the main problems occurred during the COVID pandemic period. In the following paragraphs of the present report, data and results that occurred during this final operational period of the project and Photo gallery are being presented.

2. Optimum Operational Mode

Beyond all proposed optimization actions that took place in the pilot unit during the 1st full scale operational period, partners, in order to better operate the pilot unit, indicate some extra optimizations, mainly in the pretreatment unit. these specific "corrective" activities during collection and operation of the pilot unit took place (hand sorting, pulverizing, as well as solar drying), in order to deliver the quality needed for each group of animals targeted (pets and productive animals, as pigs and poultry), as proposed by partners and all these extra corrective actions concluded during this last operational period.

More specifically, these optimizations are the following:

1. Timers in all the equipment so as to be able to measure energy consumption
2. Replacement of the motor of the pulverizer, from 4HP to 20 HP so as to be able to better and faster respond to a full load without problems and without overheating.
3. Decreased the mess of the sieve of the pulverizer, which means that we increased the holes' diameter of the sieve from 4mm to 10mm.
4. Increased the height of the delimiter of the conveyor belt, from 10cm to 15cm so as not to block the flow of materials on to the belt. Now with the updated motor of the pulverizer it is much easier the raw material treatment.

5. In the solar drying turners, a protective cover has been added to the turners so as the pulverized material into the drying halls not to be dispelled out of the tanks

After these three years of operation in the F4F pilot unit, we would say that as a new proposed addition in the pretreatment unit could be the use of a conveyor belt an automatic weighing system.

3. Data, results and feed produced during the optimum operational period.

3.1. Description

The official optimum operational period started on 20th of June, 2020 and concluded on 16th of December, 2020. Within all this period, more than 250tn of food waste have been collected from hotels, Supermarkets and other sources and managed into the F4F pilot unit. The purity of this product, was really very high. It has been estimated that the final treated product into the pilot unit was more than 245tn and after hand sorting, shredding, pulverizing and solar drying, the final dried product was more than 50tn of feed. The initial moisture of the food waste was about 75-85% (average 80%) and the moisture of the final product was about 10-12%.

During this period, two different batches occurred in the pilot unit. The first batch was the food waste from hotels and restaurants, without meat. This drying carried out in the solar drying tank with the vertical turner. The second batch was the vegetable waste from supermarkets and the drying of this carried out in the tank with the horizontal turner. Samples for these two different materials have been sent for analyses to all partners. The vegetable waste has not been used in trials, only the final product from food waste without meet has been send to partners not only for analyses but also for trials by FUB and AUA.

In the following Table 1, the samples sent for analyses to each partner are presented.

Table 2. Sample from the final product sent to all partners for analyses with relevant coding. This product was used in animal trials

Sample	**Food waste without meat**
Code	15(3)_(05/11)_FW_WM_FINAL

Samples coding:	
X(Y)_(a/b)_c:	**X** … is the number of sampling from the pilot unit startup (1 = 1st sample, 2 = 2nd sample, etc.)
X**(Y)**_(a/b)_c:	**(Y)** …is the operational period of the project
X(Y)_ (**a/b**)_c:	**(a/b)** … the date of sampling (a = day, b=month)
X(Y)_ (a/b)_**FW**:	**FW** … Food Waste
X(Y)_ (a/b)_FW**_(WM)**:	**WM** … without meat

3.2. Collected waste during this period

Data from the collected quantities during this 2nd optimum operational period of the F4F project are presented per month and per collaborated unit in the following diagrams.

3.2.1. June 2020

Table 3. Quantitative data of collected waste – June, 2020

Supermarkets XALKIADAKIS & HOTELS					
Data per collaborated unit - June, 2020			20/6-27/6	29-30/6/2020	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	399,50	148,70	548,20
	2	SM GIOFYRO	150,00	66,70	216,70
	3	SM OULAF PALME	374,00	197,00	571,00
	4	SM HRAKLH	347,40	81,60	429,00
	5	SM PARALIAKH	313,10	87,50	400,60
	6	SM ST JOHN	332,90	101,00	433,90
	7	SM KNOSSOU	232,80	0,00	232,80
	8	SM IEROLOHITON	229,00	0,00	229,00
ROUTE 1 - GREEN LINE	9	SM KOKKINI	595,20	128,00	723,20
	10	SM CHERSSONISSOS	597,70	137,00	734,70
	11	SM MALIA	557,00	147,00	704,00
	12	HOTEL Creta Maris	0,00	0,00	0,00
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	0,00	0,00	0,00
	14	SM GAZI	212,10	91,50	303,60
	15	HOTEL Apollonia	0,00	0,00	0,00
	16	HOTEL St Marina	0,00	0,00	0,00
	17	HOTEL Candia Maris	0,00	0,00	0,00
	18	HOTEL Agapi Beach	0,00	0,00	0,00
	19	ARMY	0,00	0,00	0,00
	20	GRAPES			
	21	GREENHOUSE VEGETABLE WASTE			
Total			4.340,70	1.186,00	5.527

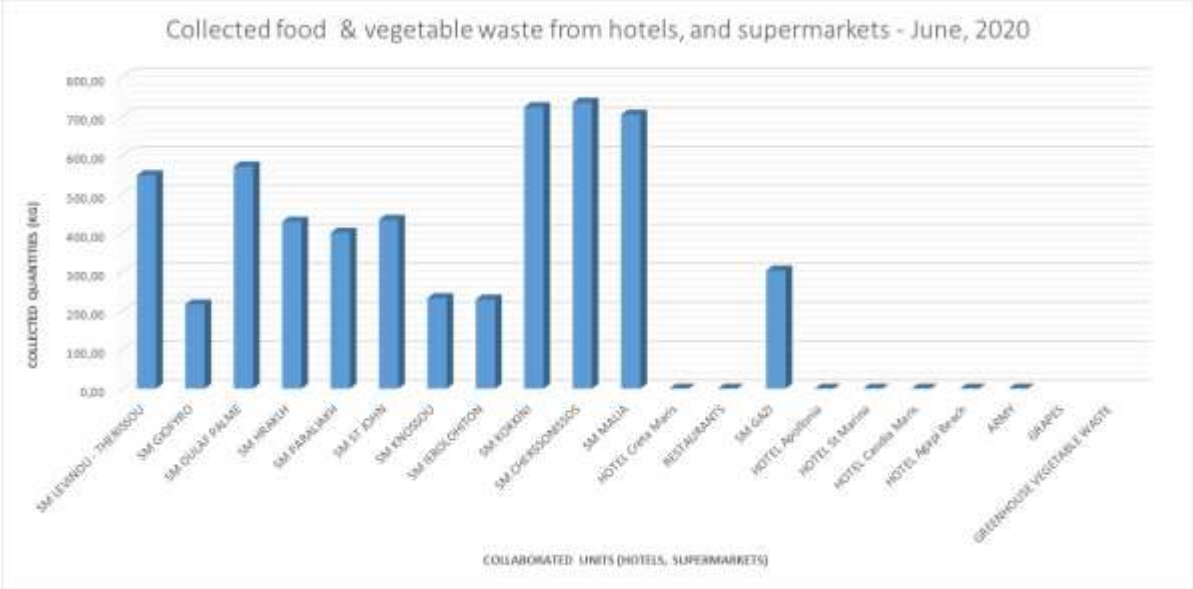


Diagram 1. The total collected food & vegetable waste during June 2020

3.2.2. July 2020

Table 4. Quantitative data of collected waste – July, 2020

Supermarkets XALKIADAKIS & HOTELS								
Data per collaborated unit - July, 2020			1-4/7/20	6-11/7/20	13-18/7/20	20-25/7/20	27-31/7/20	TOTAL
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	324,00	248,00	448,70	476,30	315,30	1.812,30
	2	SM GIOFYRO	195,00	202,20	390,70	261,00	216,20	1.265,10
	3	SM OULAF PALME	490,00	613,10	815,90	878,50	731,50	3.529,00
	4	SM HRAKLH	253,30	394,30	432,40	686,80	274,00	2.040,80
	5	SM PARALIAKH	128,00	336,10	373,30	335,60	247,20	1.420,20
	6	SM ST JOHN	294,00	551,20	425,90	629,40	763,70	2.664,20
	7	SM KNOSSOU	56,60	50,20	255,10	180,00	175,00	716,90
	8	SM IEROLOHITON	217,20	90,10	245,00	179,40	520,30	1.252,00
ROUTE 1 - GREEN LINE	9	SM KOKKINI	211,00	757,30	690,10	750,30	815,00	3.223,70
	10	SM CHERSSONISSOS	246,00	637,10	950,60	883,60	953,40	3.670,70
	11	SM MALIA	291,00	602,00	830,60	831,50	886,30	3.441,40
	12	HOTEL Creta Maris	305,00	1.267,80	1.707,70	2.278,30	1.743,00	7.301,80
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	0,00	0,00	0,00	0,00	0,00	0,00
	14	SM GAZI	238,10	358,70	577,30	404,90	209,50	1.788,50
	15	HOTEL Apollonia	109,00	502,20	458,00	373,20	263,60	1.706,00
	16	HOTEL St Marina	0,00	0,00	0,00	40,00	294,20	334,20
	17	HOTEL Candia Maris	0,00	0,00	0,00	0,00	465,90	465,90
	18	HOTEL Agapi Beach	0,00	0,00	0,00	128,00	152,40	280,40
	19	ARMY	0,00	0,00	0,00	0,00	0,00	0,00
	20	GRAPES						
	21	GREENHOUSE VEGETABLE WASTE						

Diagram 2. The total collected food & vegetable waste during July 2020

3.2.3. August 2020

Table 5. Quantitative data of collected waste – August, 2020

Supermarkets XALKIADAKIS & HOTELS							
Data per collaborated unit - August, 2020			1-8/8/2020	10-15/8/2020	17-22/8/2020	24-31/8/2020	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	660,60	340,10	413,60	442,00	1.856,30
	2	SM GIOFYRO	91,80	0,00	0,00	0,00	91,80
	3	SM OULAF PALME	844,20	347,50	393,60	419,90	2.005,20
	4	SM HRAKLH	939,00	300,90	289,90	339,10	1.868,90
	5	SM PARALIAKH	0,00	0,00	0,00	0,00	0,00
	6	SM ST JOHN	821,50	381,60	502,70	426,30	2.132,10
	7	SM KNOSSOU	303,10	349,00	439,40	562,40	1.653,90
	8	SM IEROLOHITON	410,10	346,00	681,10	568,10	2.005,30
ROUTE 1 - GREEN LINE	9	SM KOKKINI	1.125,50	550,80	649,10	933,90	3.259,30
	10	SM CHERSSONISSOS	1.116,80	537,00	766,70	1.042,40	3.462,90
	11	SM MALIA	1.115,30	711,00	1.103,40	1.280,40	4.210,10
	12	HOTEL Creta Maris	2.212,80	932,50	1.136,50	1.848,10	6.129,90
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	0,00	0,00	0,00	0,00	0,00
	14	SM GAZI	388,90	237,10	286,50	207,50	1.120,00
	15	HOTEL Apollonia	330,00	305,50	376,00	466,00	1.477,50
	16	HOTEL St Marina	276,00	372,00	710,50	974,50	2.333,00
	17	HOTEL Candia Maris	907,20	390,10	741,50	793,50	2.832,30
	18	HOTEL Agapi Beach	256,30	298,50	389,00	412,00	1.355,80
	19	ARMY	0,00	0,00	0,00	0,00	0,00
	20	GRAPES					
	21	GREENHOUSE VEGETABLE WASTE					
Total			11.799,10	6.399,60	8.879,50	10.716,10	37.794,30

Diagram 3. The total collected food & vegetable waste during August 2020

3.2.4. September 2020

Table 6. Quantitative data of collected waste – September, 2020

Supermarkets XALKIADAKIS & HOTELS								
Data per collaborated unit - September, 2020			1-5/9/2020	7-12/9/2020	14-19/9/2020	21-26/9/2020	28-30/9/2020	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	444,60	456,50	483,70	99,00	239,60	1.723,40
	2	SM GIOFYRO	279,00	419,00	181,00	133,40	139,60	1.152,00
	3	SM OULAF PALME	334,00	802,70	507,30	429,10	325,60	2.398,70
	4	SM HRAKLH	380,00	524,20	274,10	440,90	313,40	1.932,60
	5	SM PARALIAKH	272,00	574,20	253,20	159,30	205,10	1.463,80
	6	SM ST JOHN	319,00	746,40	416,40	370,40	340,70	2.192,90
	7	SM KNOSSOU	357,00	137,00	133,10	175,00	69,10	871,20
	8	SM IEROLOHITON	350,00	339,00	450,40	326,70	79,80	1.545,90
ROUTE 1 - GREEN LINE	9	SM KOKKINI	655,00	752,20	907,70	450,00	288,30	3.053,20
	10	SM CHERSSONISSOS	640,00	854,10	755,50	644,90	269,70	3.164,20
	11	SM MALIA	665,00	564,00	814,30	673,40	245,20	2.961,90
	12	HOTEL Creta Maris	1.563,10	1.432,10	999,70	914,00	352,30	5.261,20
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	0,00	0,00	0,00	69,00	330,60	399,60
	14	SM GAZI	229,00	217,30	204,60	308,10	224,20	1.183,20
	15	HOTEL Apollonia	539,20	365,20	260,20	79,10	65,20	1.308,90
	16	HOTEL St Marina	762,70	737,20	531,60	530,80	253,30	2.815,60
	17	HOTEL Candia Maris	622,50	529,00	489,10	326,20	271,20	2.238,00
	18	HOTEL Agapi Beach	291,50	315,90	387,30	158,20	124,90	1.277,80
	19	ARMY	0,00	0,00	0,00	0,00	0,00	0,00
	20	GRAPES						
	21	GREENHOUSE VEGETABLE WASTE						
Total			8.703,60	9.766,00	8.049,20	6.287,50	4.137,80	36.944,10

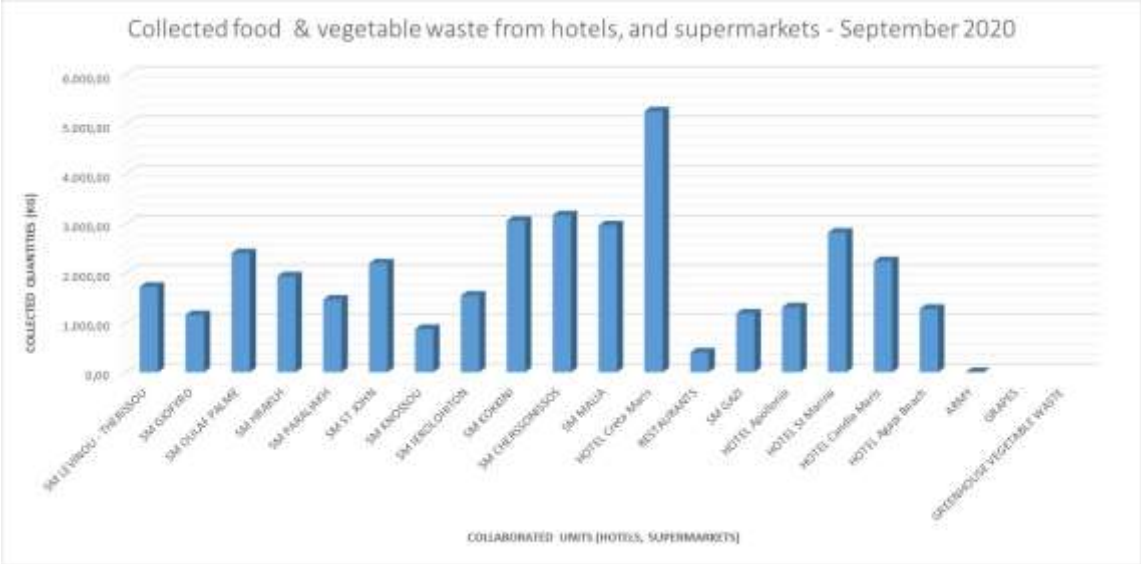


Diagram 4. The total collected food & vegetable waste during September 2020

3.2.5. October 2020

Table 7. Quantitative data of collected waste – October, 2020

Supermarkets XALKIADAKIS & HOTELS								
Data per collaborated unit - October, 2020			1-3/10/2020	5-10/10/2020	12-17/10/2020	19-24/10/2020	26-31/10/2020	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	368,40	372,30	571,00	654,00	525,00	2.490,70
	2	SM GIOFYRO	343,00	322,20	419,00	398,00	327,00	1.809,20
	3	SM OULAF PALME	334,00	402,30	524,00	753,00	726,00	2.739,30
	4	SM HRAKLH	386,00	447,20	661,00	867,00	700,90	3.062,10
	5	SM PARALIAKH	346,00	294,50	446,60	488,00	350,00	1.925,10
	6	SM ST JOHN	385,00	505,00	545,00	715,00	648,30	2.798,30
	7	SM KNOSSOU	218,00	375,00	505,00	494,00	430,00	2.022,00
	8	SM IEROLOHITON	366,00	367,90	512,70	362,30	706,70	2.315,60
ROUTE 1 - GREEN LINE	9	SM KOKKINI	380,00	1.325,60	1.222,00	1.014,00	1.071,00	5.012,60
	10	SM CHERSSONISSOS	335,00	1.215,00	1.213,00	1.271,00	1.215,00	5.249,00
	11	SM MALIA	452,00	1.321,00	1.329,50	1.427,90	1.490,00	6.020,40
	12	HOTEL Creta Maris	1.387,80	2.079,40	2.027,10	1.999,20	2.033,10	9.526,60
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	239,40	1.120,20	711,20	293,50	393,20	2.757,50
	14	SM GAZI	120,50	341,00	525,70	348,10	0,00	1.335,30
	15	HOTEL Apollonia	0,00	329,20	397,20	395,60	363,00	1.485,00
	16	HOTEL St Marina	153,10	724,80	266,00	0,00	0,00	1.143,90
	17	HOTEL Candia Maris	120,00	460,70	505,40	481,30	441,60	2.009,00
	18	HOTEL Agapi Beach	110,00	527,10	433,00	342,90	314,50	1.727,50
	19	ARMY	0,00	0,00	0,00	0,00	123,70	123,70
	20	GRAPES						
	21	GREENHOUSE VEGETABLE WASTE						
Total			6.044,20	12.530,40	12.814,40	12.304,80	11.859,00	55.552,80

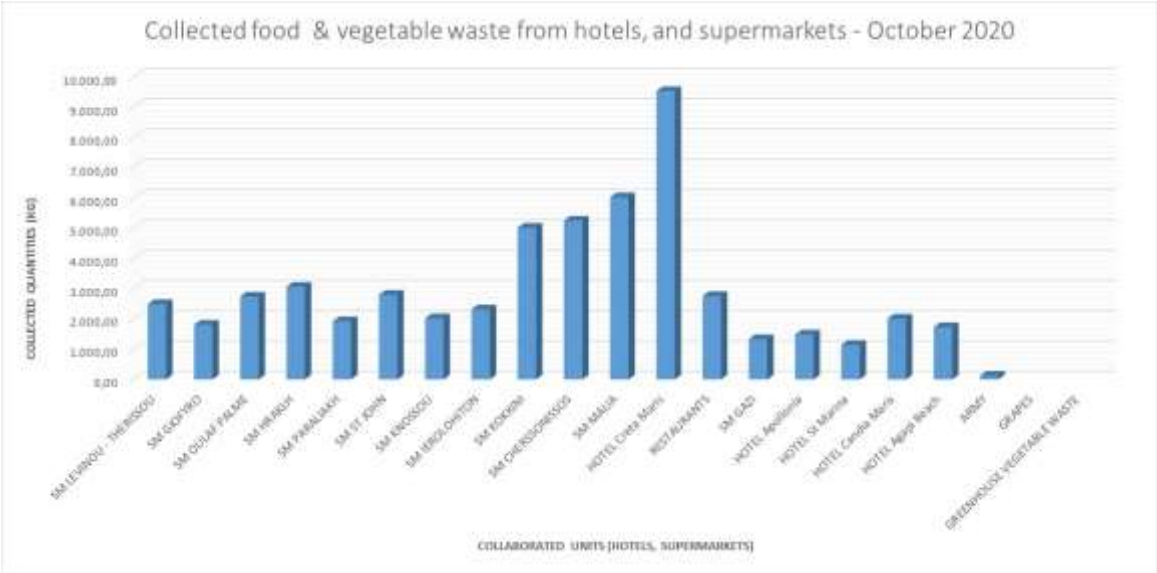


Diagram 5. The total collected food & vegetable waste during October 2020

3.2.6. November 2020

Table 8. Quantitative data of collected waste – November, 2020

Supermarkets XALKIADAKIS & HOTELS							
Data per collaborated unit - November 2020			2-7/11/2020	9-14/11/2020	16-21/11/2020	23-30/11/2020	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	203,60	238,00	200,00	258,00	899,60
	2	SM GIOFYRO	0,00	0,00	0,00	0,00	0,00
	3	SM OULAF PALME	164,80	228,00	313,00	272,00	977,80
	4	SM HRAKLH	248,00	293,00	333,00	291,00	1.165,00
	5	SM PARALIAKH	306,00	300,00	267,00	165,00	1.038,00
	6	SM ST JOHN	274,00	262,00	380,00	270,00	1.186,00
	7	SM KNOSSOU	251,00	160,00	196,00	198,00	805,00
	8	SM IEROLOHITON	223,10	242,00	153,00	409,40	1.027,50
ROUTE 1 - GREEN LINE	9	SM KOKKINI	400,00	579,00	547,00	529,00	2.055,00
	10	SM CHERSSONISSOS	472,00	552,00	527,00	612,00	2.163,00
	11	SM MALIA	500,00	596,00	663,40	725,40	2.484,80
	12	HOTEL Creta Maris	567,50	265,50	0,00	0,00	833,00
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	739,30	0,00	0,00	0,00	739,30
	14	SM GAZI	381,00	0,00	72,60	0,00	453,60
	15	HOTEL Apollonia	135,00	0,00	0,00	0,00	135,00
	16	HOTEL St Marina	0,00	0,00	0,00	0,00	0,00
	17	HOTEL Candia Maris	410,00	510,00	0,00	0,00	920,00
	18	HOTEL Agapi Beach	0,00	0,00	0,00	0,00	0,00
	19	ARMY	3.373,00	3.956,60	4.040,00	3.997,30	15.366,90
	20	GRAPES	4.070,00	4.060,00	4.000,00	6.000,00	18.130,00
	21	GREENHOUSE VEGETABLE WASTE	0,00	0,00	0,00	0,00	0,00
Total			12.718,30	12.242,10	11.692,00	13.727,10	50.379,50

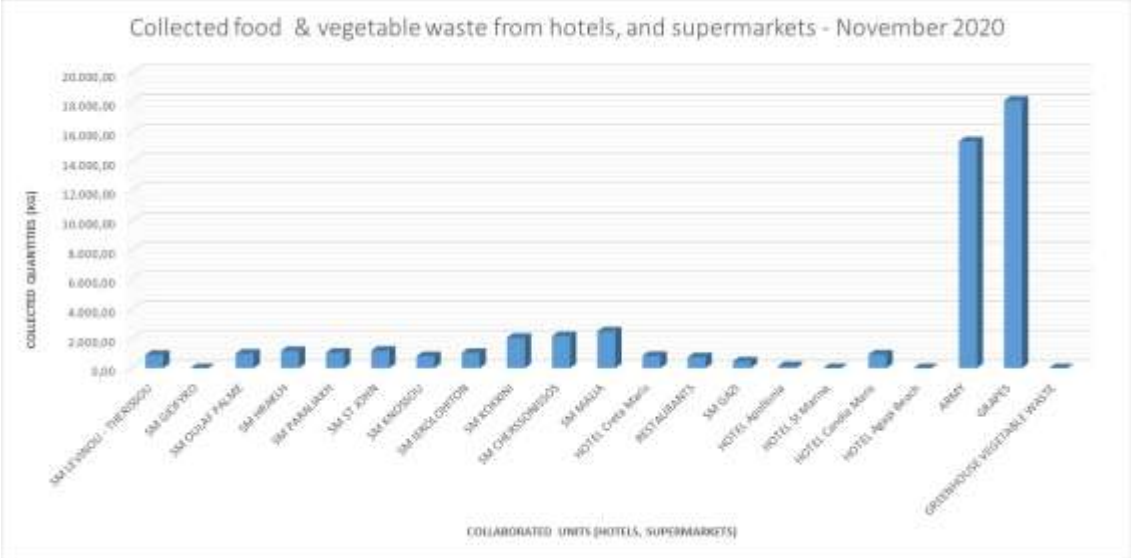


Diagram 6. The total collected food & vegetable waste during November 2020

3.2.7. December 2020

Table 9. Quantitative data of collected waste – December, 2020

Supermarkets XALKIADAKIS & HOTELS						
Data per collaborated unit - December 2020			1-5/12/2020	7-12/12/2020	14-16/12/2020	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	223,00	213,00	133,00	569,00
	2	SM GIOFYRO	0,00	0,00	0,00	0,00
	3	SM OULAF PALME	233,00	268,00	121,00	622,00
	4	SM HRAKLH	335,00	219,00	136,00	690,00
	5	SM PARALIAKH	327,00	277,00	101,00	705,00
	6	SM ST JOHN	330,00	263,00	196,00	789,00
	7	SM KNOSSOU	210,00	238,00	155,00	603,00
	8	SM IEROLOHITON	152,10	203,90	73,40	429,40
ROUTE 1 - GREEN LINE	9	SM KOKKINI	168,00	466,00	504,00	1.138,00
	10	SM CHERSSONISSOS	168,00	491,00	553,00	1.212,00
	11	SM MALIA	77,70	464,10	618,70	1.160,50
	12	HOTEL Creta Maris	0,00	0,00	0,00	0,00
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	0,00	0,00	0,00	0,00
	14	SM GAZI	0,00	0,00	0,00	0,00
	15	HOTEL Apollonia	0,00	0,00	0,00	0,00
	16	HOTEL St Marina	0,00	0,00	0,00	0,00
	17	HOTEL Candia Maris	0,00	0,00	0,00	0,00
	18	HOTEL Agapi Beach	0,00	0,00	0,00	0,00
	19	ARMY	2.569,70	4.833,40	3.597,50	11.000,60
	20	GRAPES	1.315,60	0,00	0,00	1.315,60
	21	GREENHOUSE VEGETABLE WASTE	4.560,00	4.390,00	0,00	8.950,00
Total			10.669,10	12.326,40	6.188,60	29.184,10

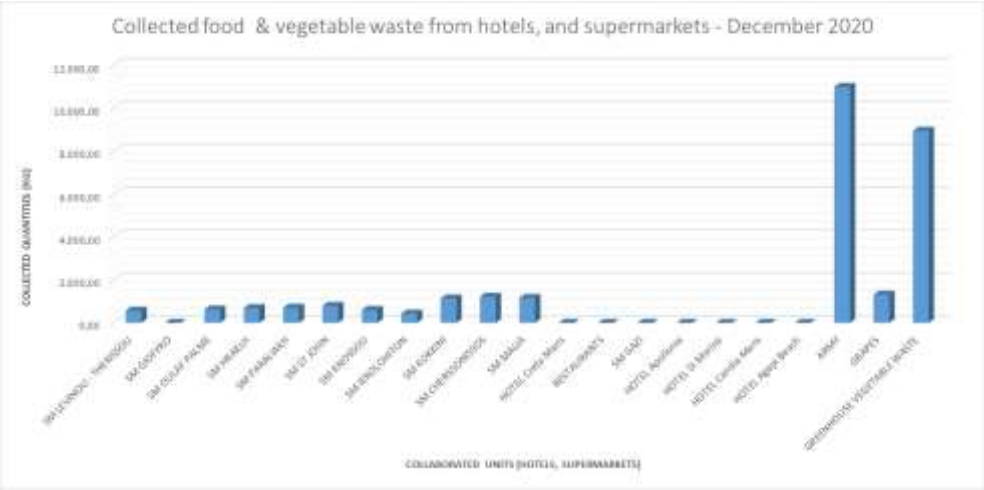


Diagram 7. The total collected food & vegetable waste during December 2020

3.2.8. Total 2020

Table 10. Quantitative data of collected waste – Total, 2020

Supermarkets XALKIADAKIS & HOTELS										
Total Data per collaborated unit 2020			June	July	August	September	October	November	December	Total
Route	A/A	Collaborated Units	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Collected Food waste weight	Total per unit
ROUTE 1 - RED LINE	1	SM LEVINOU - THERISSOU	548,20	1.812,30	1.856,30	1.723,40	2.490,70	899,60	569,00	9.899,50
	2	SM GIOFYRO	216,70	1.265,10	91,80	1.152,00	1.809,20	0,00	0,00	4.534,80
	3	SM OULAF PALME	571,00	3.529,00	2.005,20	2.398,70	2.739,30	977,80	622,00	12.843,00
	4	SM HRAKLH	429,00	2.040,80	1.868,90	1.932,60	3.062,10	1.165,00	690,00	11.188,40
	5	SM PARALIAKH	400,60	1.420,20	0,00	1.463,80	1.925,10	1.038,00	705,00	6.952,70
	6	SM ST JOHN	433,90	2.664,20	2.132,10	2.192,90	2.798,30	1.186,00	789,00	12.196,40
	7	SM KNOSSOU	232,80	716,90	1.653,90	871,20	2.022,00	805,00	603,00	6.904,80
	8	SM IEROLOHITON	229,00	1.252,00	2.005,30	1.545,90	2.315,60	1.027,50	429,40	8.804,70
ROUTE 1 - GREEN LINE	9	SM KOKKINI	723,20	3.223,70	3.259,30	3.053,20	5.012,60	2.055,00	1.138,00	18.465,00
	10	SM CHERSSONISSOS	734,70	3.670,70	3.462,90	3.164,20	5.249,00	2.163,00	1.212,00	19.656,50
	11	SM MALIA	704,00	3.441,40	4.210,10	2.961,90	6.020,40	2.484,80	1.160,50	20.983,10
	12	HOTEL Creta Maris	0,00	7.301,80	6.129,90	5.261,20	9.526,60	833,00	0,00	29.052,50
ROUTE 1 - YELLOW LINE	13	RESTAURANTS	0,00	0,00	0,00	399,60	2.757,50	739,30	0,00	3.896,40
	14	SM GAZI	303,60	1.788,50	1.120,00	1.183,20	1.335,30	453,60	0,00	6.184,20
	15	HOTEL Apollonia	0,00	1.706,00	1.477,50	1.308,90	1.485,00	135,00	0,00	6.112,40
	16	HOTEL St Marina	0,00	334,20	2.333,00	2.815,60	1.143,90	0,00	0,00	6.626,70
	17	HOTEL Candia Maris	0,00	465,90	2.832,30	2.238,00	2.009,00	920,00	0,00	8.465,20
	18	HOTEL Agapi Beach	0,00	280,40	1.355,80	1.277,80	1.727,50	0,00	0,00	4.641,50
	19	ARMY	0,00	0,00	0,00	0,00	123,70	15.366,90	11.000,60	26.491,20
	20	GRAPES						18.130,00	1.315,60	19.445,60
	21	GREENHOUSE VEGETABLE WASTE						0,00	8.950,00	8.950,00
Total			5.526,70	36.913,10	37.794,30	36.944,10	55.552,80	50.379,50	29.184,10	252.294,60

During this last operational period of the LIFE-F4F project, about 250tn of food and vegetable waste have been collected by collaborated units, such as hotels, restaurants and supermarkets and treated in the pilot unit. Material of the produced product has been send to all partners for analyses and for trials in animals as a component to their diets. Results of these analyses are presented by AUA in deliverables of action B4 and by FUB in deliverables of action B5, respectively.

In the following diagrams, the total collected quantity per collaborated with the F4F unit is presenting for the hole 2nd optimum operational period and per unit per month.

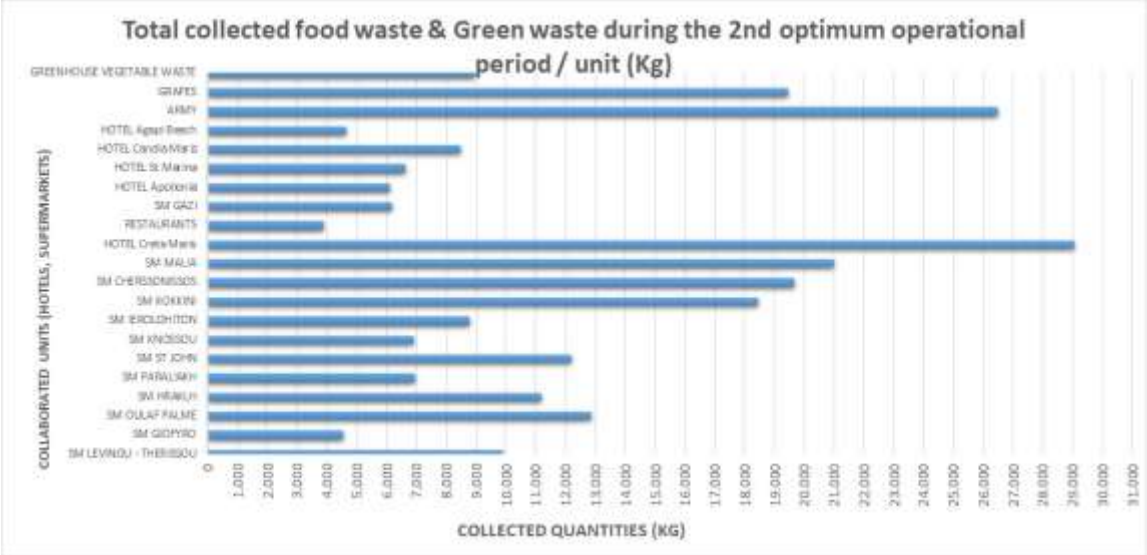


Diagram 8. Total collected food waste from hotels and green waste from SM during 20/6/2020 – 16/12/2020 per unit

Diagram 9. Collected food waste from hotels and green waste from SM during 20/6/2020 – 16/12/2020 per unit and per month

3.3. Solar drying

The line of direction of the solar drying procedure during the operation of the pilot unit is presented in the present paragraph. More specifically, we could say that, the feeding period of each solar tank was for about 15 days. Within these days, about 111-12m^3 of treated, pulverized raw material was transferred into the solar drying tank. The height of the raw material was about 15cm and taking into account that the average moisture was between 75-85%, less than five (5) days were needed during the months July and August and less than ten (10) days were needed for the months May, October and November. For the months June and September about six (6) days were needed in order the final product's moisture to be below 12%.

An average of the drying rate during the reference period is presented on the following tables, concerning the two types of turners, the horizontal and the vertical one.

The solar drying in the tank with the horizontal turner

Table 11. Average drying rate in the solar drying pilot unit for the months July / August, 2020 – Horizontal turner

Drying (days)	1st day	3rd day	5th day	6th day
Moisture (%)	79%	32%	11%	6,5%

Table 12. Average drying rate in the solar drying pilot unit for the months June / September, 2020 – Horizontal turner

Drying (days)	1st day	3rd day	5th day	6th day
Moisture (%)	78%	38%	16%	11%

Table 13. Average drying rate in the solar drying pilot unit for the months May / October / November, 2020 – Horizontal turner

Drying (days)	1st day	3rd day	6th day	8th day	10th day	12th day
Moisture (%)	77%	58%	33%	20%	11%	7%

The solar drying in the tank with the vertical turner

Table 14. Average drying rate in the solar drying pilot unit for the months July / August, 2020 – Vertical turner

Drying (days)	1st day	3rd day	5th day	7th day
Moisture (%)	76%	45%	29%	11%

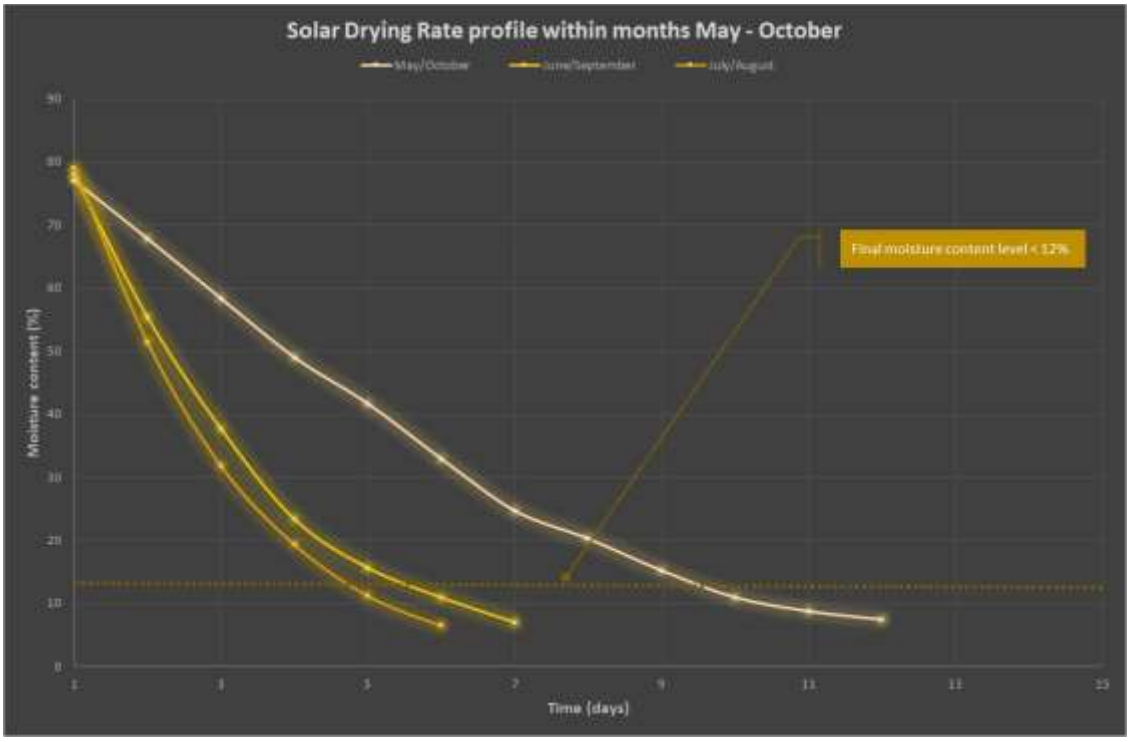
Table 15. Average drying rate in the solar drying pilot unit for the months June / September, 2020 – Vertical turner

Drying (days)	1st day	3rd day	5th day	7th day	9th day
Moisture (%)	79%	51%	33%	21%	9%

Table 16. Average drying rate in the solar drying pilot unit for the months May / October / November, 2020 – Vertical turner

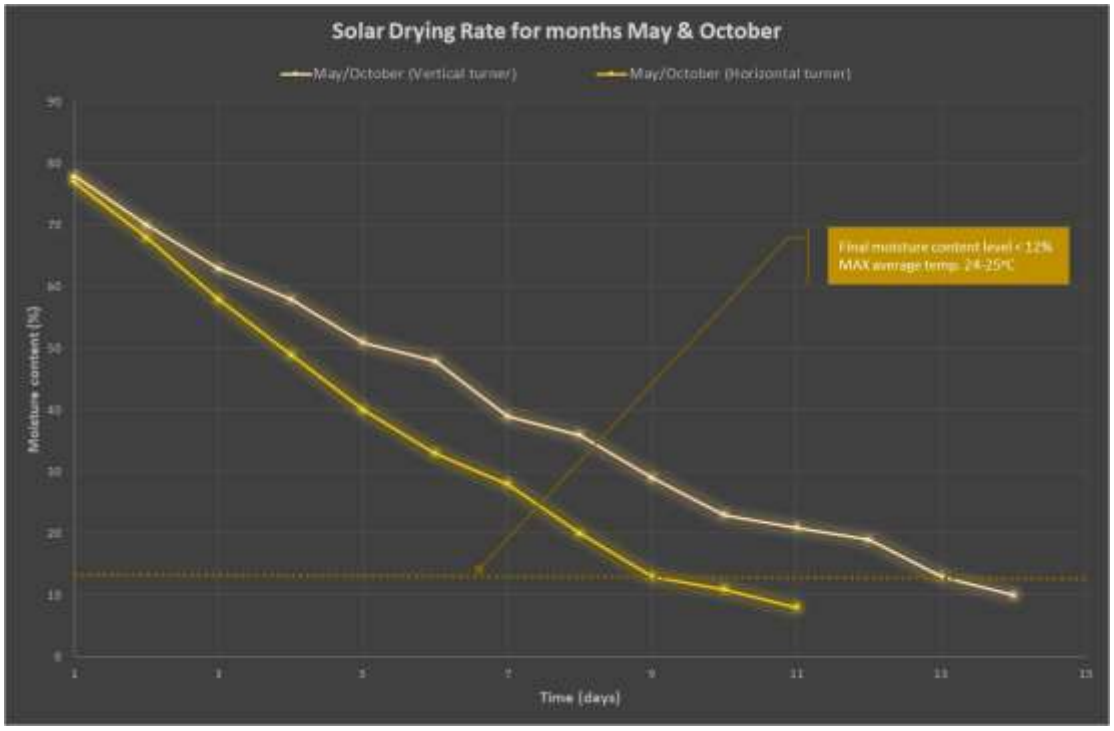
Drying (days)	1st day	3rd day	6th day	8th day	10th day	12th day	14th day
Moisture (%)	78%	63%	48%	36	23%	19%	10%

During all trials that carried out in the F4F pilot unit within the three operational periods, the following results occurred concerning the solar drying rate profiles have been occurred.



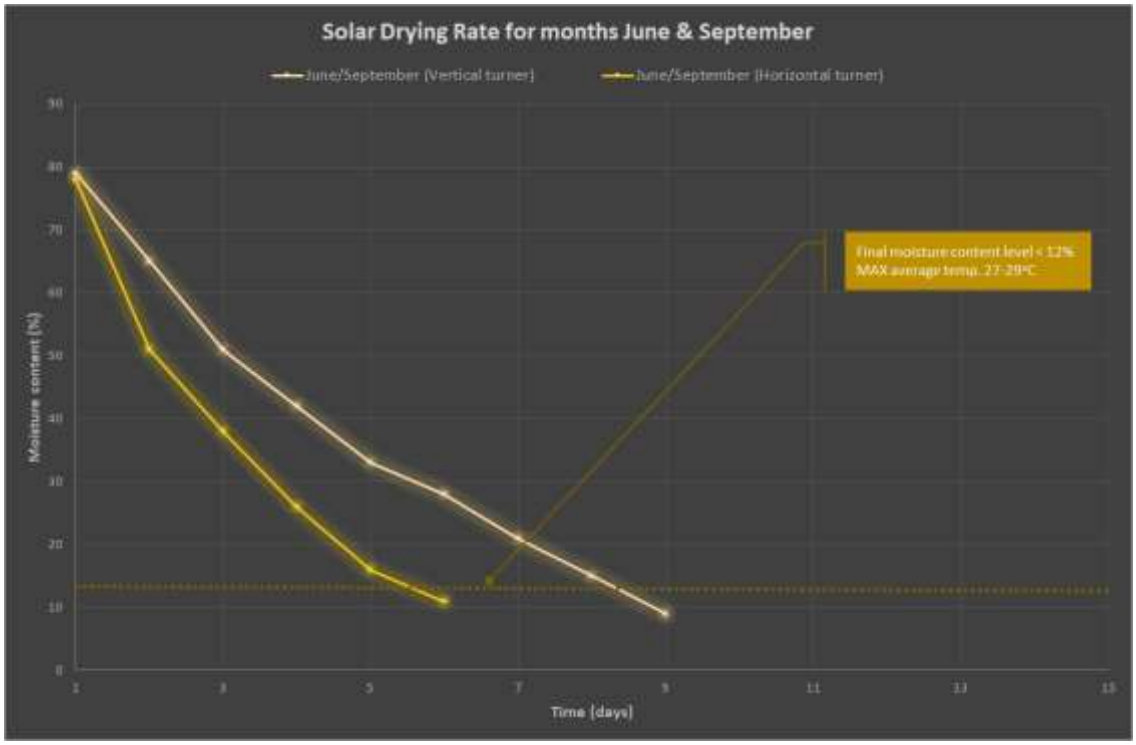
Graph 1. Solar drying rate profile within the months May - October

In the following graph it is presented the comparison of the drying rate of the two different drying turners used in the F4F project for the months May and October, where the max average temperature was 24 – 25ºC.



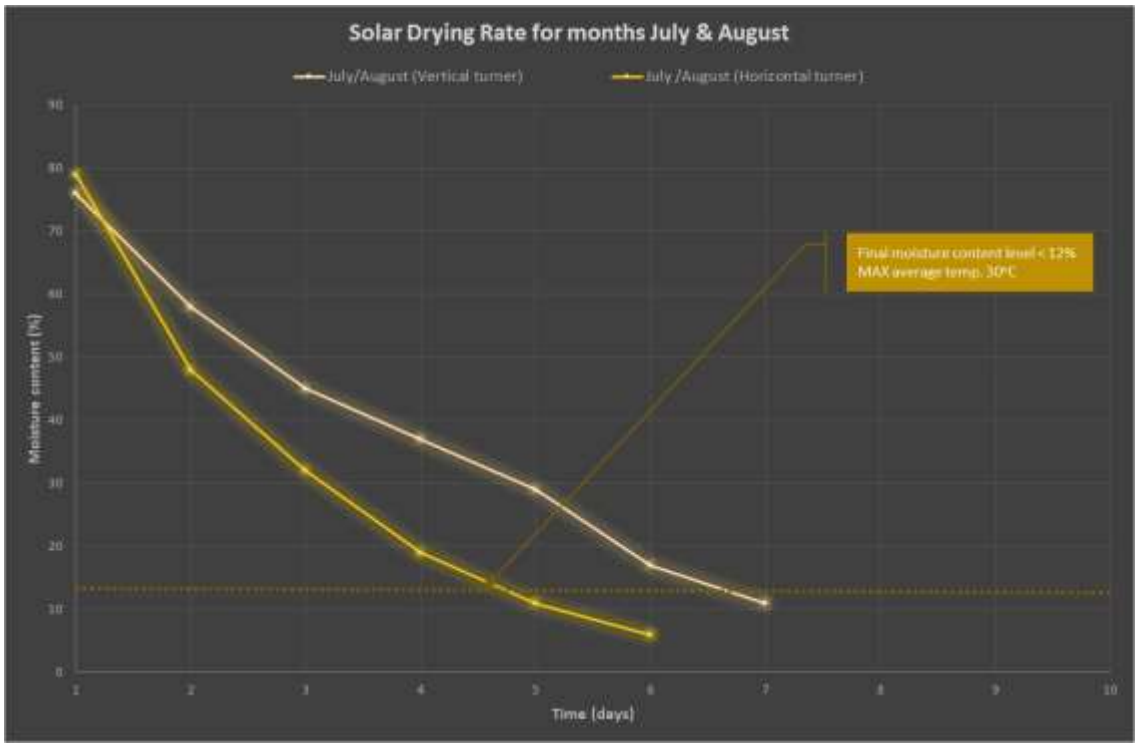
Graph 2. Solar drying rate profile for the months May & October

In the following graph it is presented the comparison of the drying rate of the two different drying turners used in the F4F project for the months June and September, where the max average temperature was 27 – 29ºC.



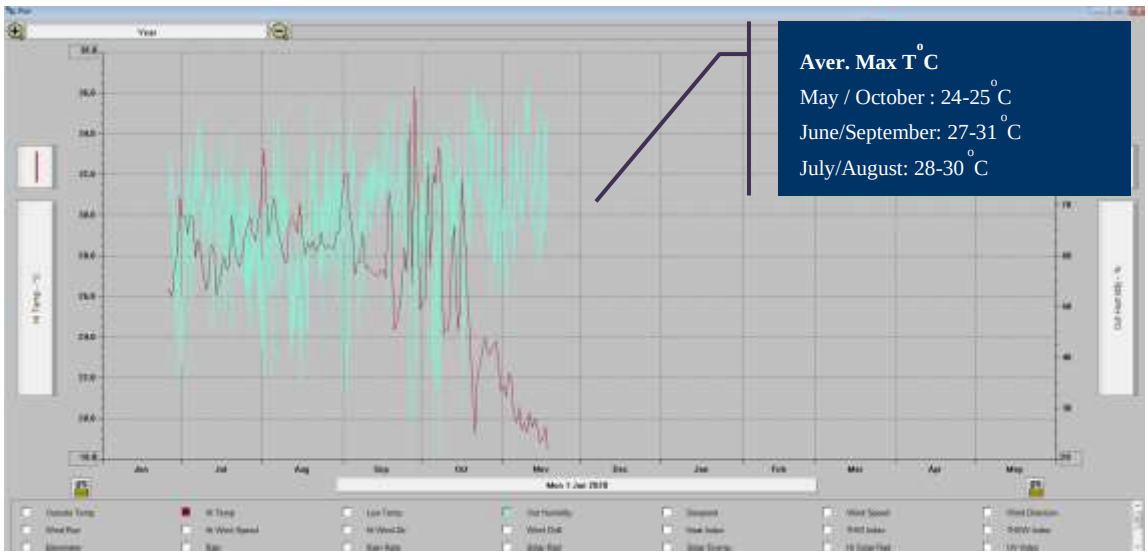
Graph 3. Solar drying rate profile for the months June & September

In the following graph it is presented the comparison of the drying rate of the two different drying turners used in the F4F project for the months July and August, where the max average temperature was about 30°C.

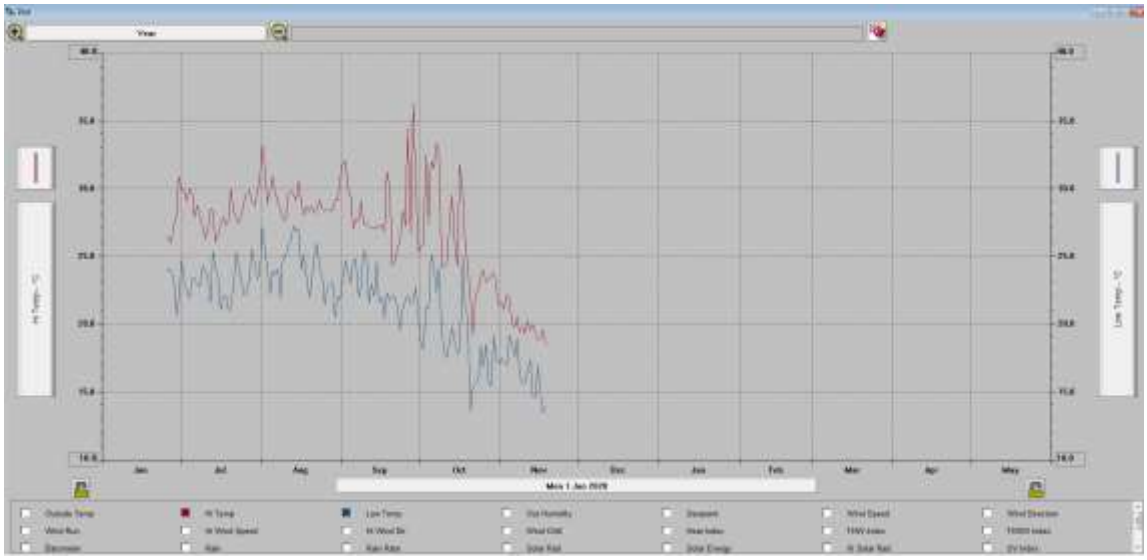


Graph 4. Solar drying rate profile for the months July & August

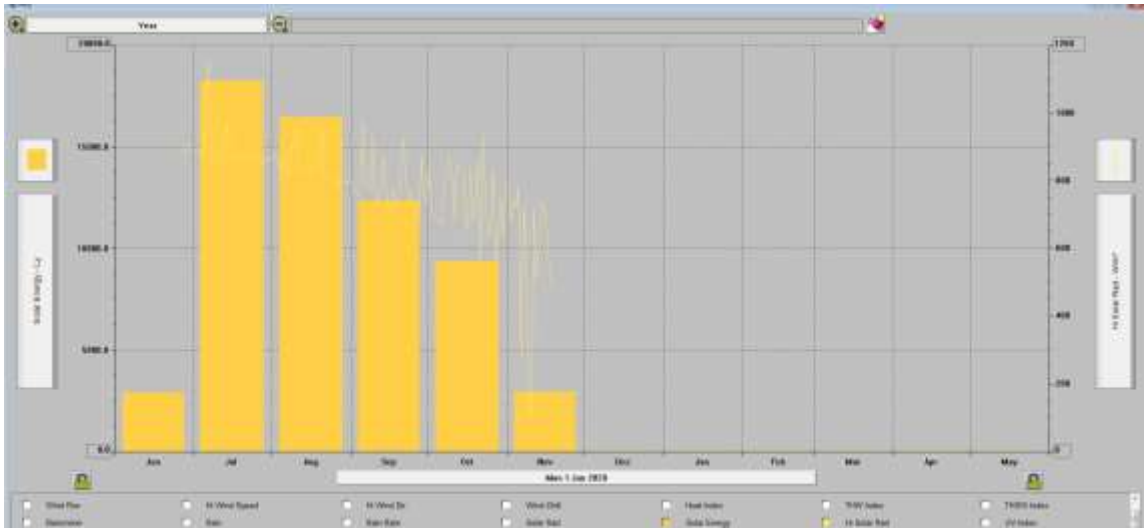
In the Graphs below, the relevant profile of the maximum average outside temperature °C (red line) and the humidity (%) (green line) of this period is presenting. Moreover, there are graphs with the wind speed, solar energy, solar radiation, rain, UV dose, Barometer, etc., referring to the same period.



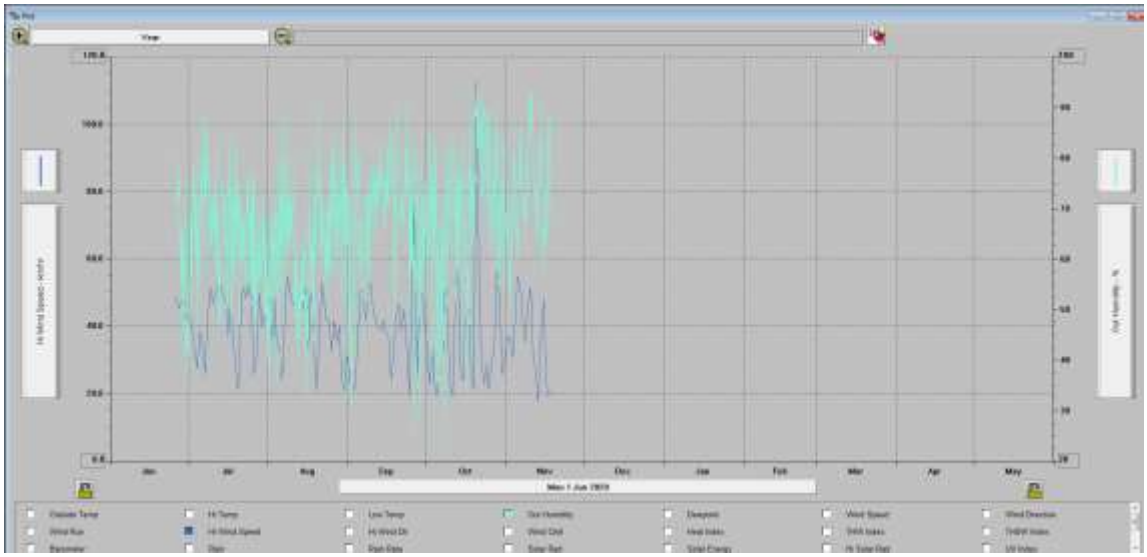
Graph 5. Maximum average of the outside temperature & the humidity from last days of June till mid of November, 2020.



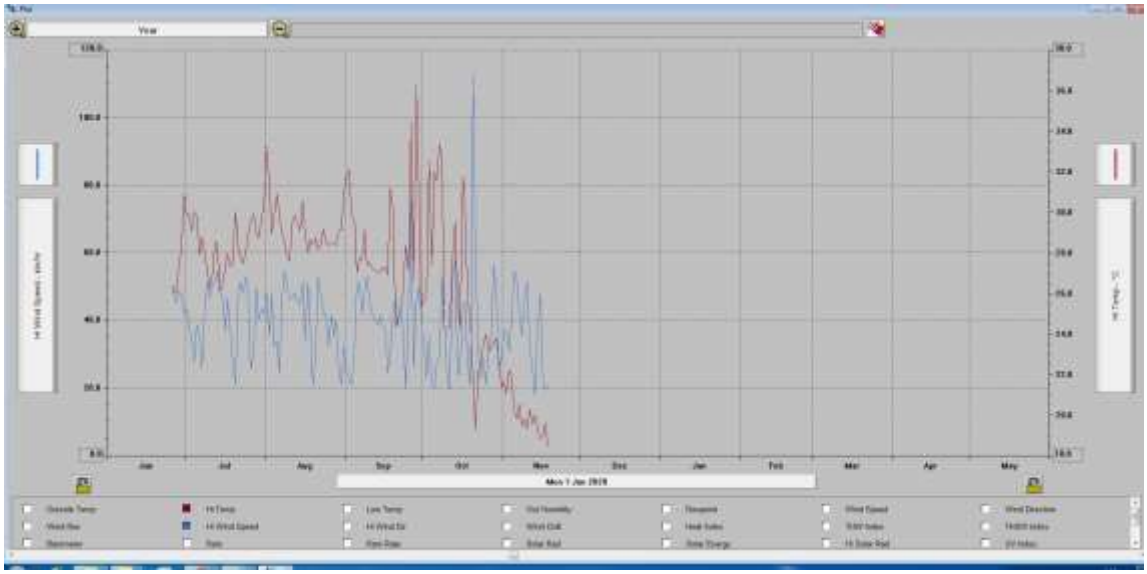
Graph 6. Hi and low temperature from last days of June till mid of November, 2020.



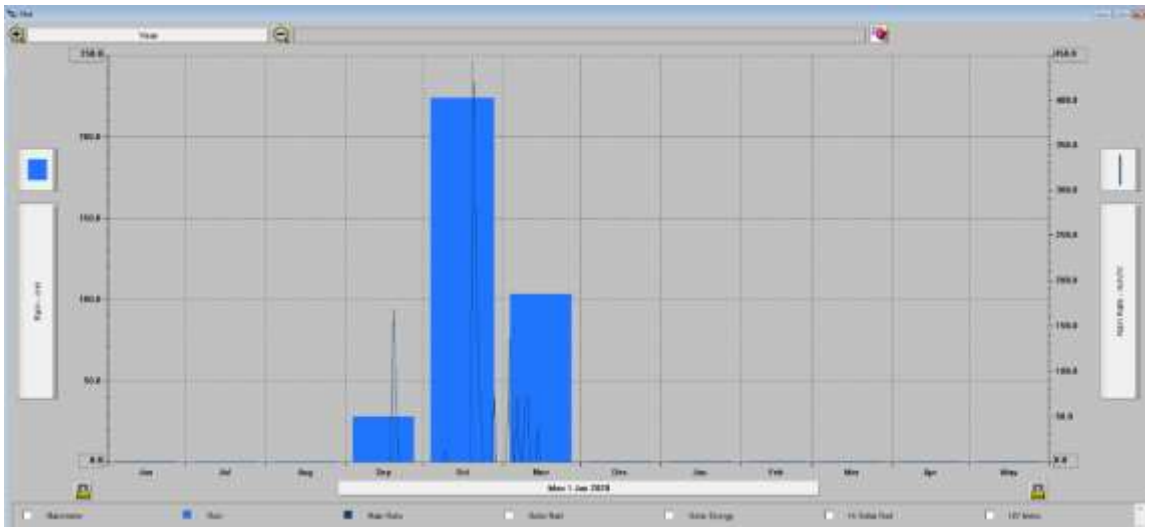
Graph 7. Solar energy and hi solar radiation from last days of June till mid of November, 2020.



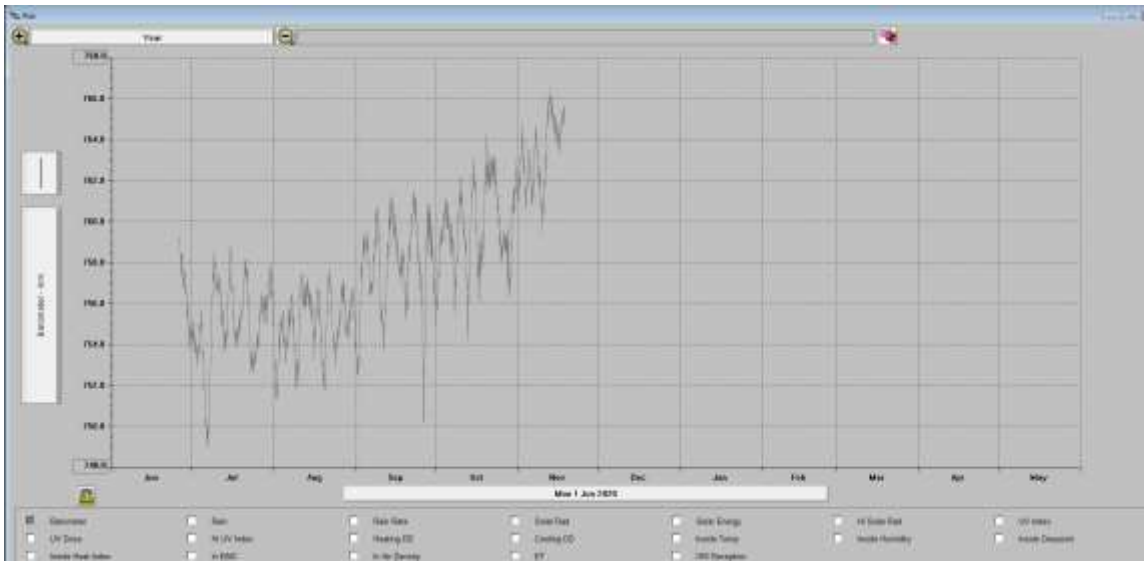
Graph 8. Hi wind speed and outside humidity from last days of June till mid of November, 2020.



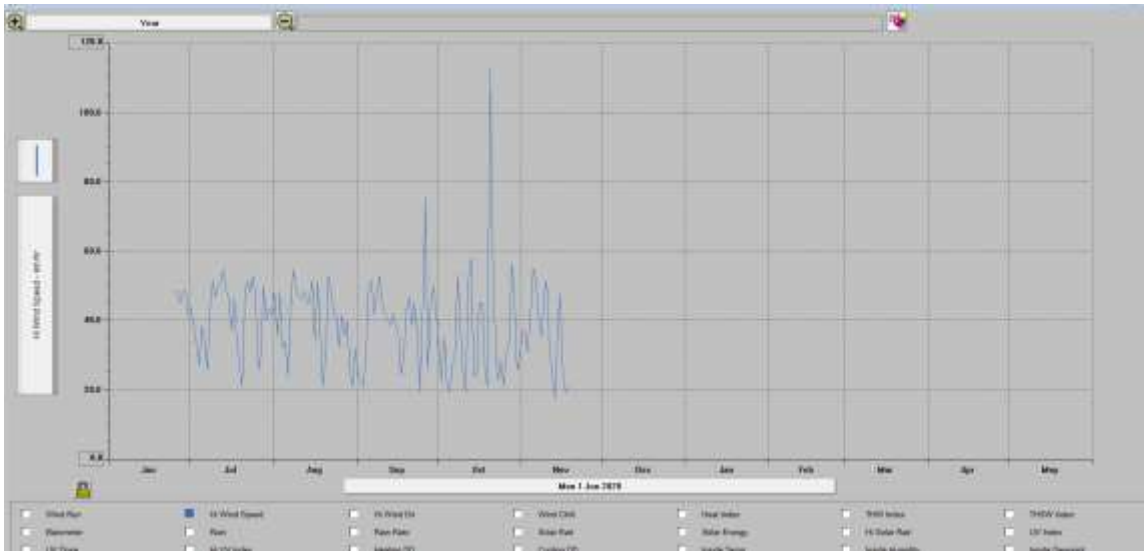
Graph 9. Hi wind speed and hi temperature from last days of June till mid of November, 2020.



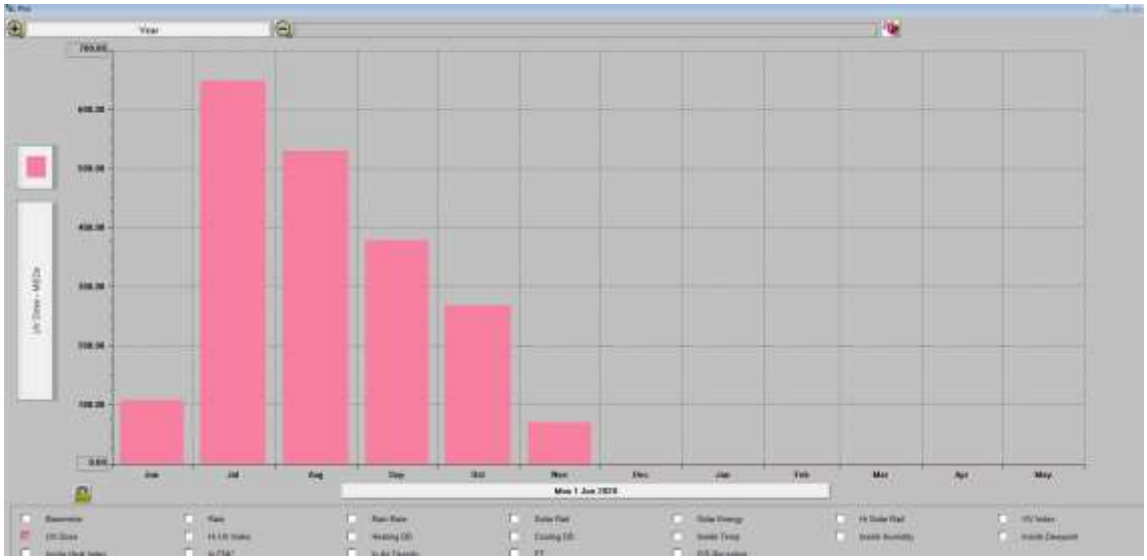
Graph 10. Rain and rain rate from last days of June till mid of November, 2020.



Graph 11. The barometer from last days of June till mid of November, 2020.



Graph 12. Hi wind speed from last days of June till mid of November, 2020.



Graph 13. UV dose from last days of June till mid of November, 2020.

3.4. Produced Feed

3.4.1. General characteristics from the F4F products

From the pilot unit, within the three operational periods, different products have been produced and some of them were used as ingredients in animal feed. These products came from the following raw materials:

- Hotels' food waste (only from kitchens) - PRODUCT A
- Hotels' food waste (only from kitchens) without meat (any meat was removed) – PRODUCT B
- Hotels' food waste (only from kitchens) without meat (any meat was removed) mixed with supermarkets vegetable waste – PRODUCT C
- Supermarkets' vegetable waste – PRODUCT D

However, in small scale, a thermal drying experiment carried out by HMU, where only slaughterhouse by-products were dried (PRODUCT E), in order the nutritional value of this product to be estimated and to be compared with all other products.

In the following Table, all these analyses are presented in total, to be able to compare their nutrition value.

Table 17. Average analyses per product from the F4F pilot unit

Analyses	**PRODUCT E**	**PRODUCT A**	**PRODUCT B**	**PRODUCT C**	**PRODUCT D**
Dry matter (%) / Moisture (%)	/ (3,6%)	88,83 (11,0)	88,66 (11,5)	85,63 (14,5)	92,12 (8,0)
Ash (%)	9,4	5,94	6,49	12,14	15,94
crude protein (%)	45,6	23,66	21,30	17,59	16,68
ether extract (%)	33,5	21,47	16,78	14,75	3,59
crude fibre (%)	0,7	3,16	5,96	8,62	20,46
Fructose		0.1	-	-	-
Glucose		3.1	-	-	-
Sucrose		0.2	-	-	-
Maltose		<0.1	-	-	-
Starch		26.8	-	-	-
Metabolic Energy MJ/ Kg for poultry		13,5	-	-	-
Metabolic Energy MJ/ Kg for pigs		15,5	-	-	-
Net Milk Production Energy MJ/ Kg		8,3	-	-	-

Analyses	**PRODUCT E**	**PRODUCT A**	**PRODUCT B**	**PRODUCT C**	**PRODUCT D**
Digestive Energy MJ/ Kg		17,0	-	-	-
Ca	2,61	0,63	0,94	ND	
P	1,40	0,38	0,41	ND	
K	0,48	0,93	1,18	ND	
Mg	0,1	0,09	0,11	ND	
Na	0,99	0,90	1,04	ND	
Asp		0,35	ND	0,43	
Thr		0,78	ND	0,56	
Ser		0,89	ND	0,70	
Glu		3,15	ND	1,90	
Gly		0,98	ND	0,62	
Ala		1,18	ND	1,47	
Val		1,26	ND	1,21	
Ile		0,77	ND	0,49	
Leu		1,32	ND	0,98	
Tyr		0,58	ND	0,37	
Phe		0,81	ND	0,54	
His		0,42	ND	0,21	
Lys		1,02	ND	0,70	
Arg		0,87	ND	0,40	
Pro		1,16	ND	0,72	
Met		0,35	ND	0,27	
Cystine		0,29	ND	0,20	
Taurine		0,52	ND	0,08	
Aflatoxin B1 (µg/Kg)	<RL (RL=0,1)	<RL (RL=0,2)			
Aflatoxin B2 (µg/Kg)	<RL (RL=0,1)	<RL (RL=0,1)			
Aflatoxin G1 (µg/Kg)		<RL (RL=0,2)			
Aflatoxin G2 (µg/Kg)	<RL (RL=0,1)	<RL (RL=0,1)			
Aflatoxins B1, B2, G1, G2 (µg/Kg)	<0,6 (RL=0,4)	<0,6 (RL=0,4)			

The evaluation of the produced dry feed from the F4F project includes some general and some more specific comments.

3.4.2. General comments for the F4F products

A number of different products has been come out from the whole procedure, with each one of them having different chemical and nutritional characteristics. Those products include feed with animal origin lefts (e.g. dairy products, meat), feed without meat lefts, feed with only plant origin lefts (vegetable waste from super markets), etc. with different chemical composition. Furthermore, there is a potential to produce dry feed from poultry slaughterhouses by-products or from super-markets, using the dry-off procedure of the project F4F.

All the above products have significant importance and value as animal feeds, despite their variable content in energy, protein, aminoacids, minerals, vitamins, and rest nutrients. In addition, it should be taken into account that:

- ✓ Among the 'classical' feeds like cereals (corn, barley, wheat, etc), legume seeds (vetch, peas, beans, etc), oil seeds (soya, cotton, sunflower, etc), agro-industrial by-products (wheat bran, maize gluten meal, soybean meal, cotton seed meal, etc.), fishmeal, meat and bone meal, etc., there are significant differences in their chemical composition, nutritional and dietary value, but all of them are used in animal diets formulation in different percentages according to their particular properties, nutritional characteristics, animal's requirements, and their economic value (market price in euros / Kg dry matter).
- ✓ As the world population numbers are increased, the need for food in the coming years will also be increased (Food Security), and all sources of feeds will be requested for animal feeding and animal origin food production.
- ✓ The last few months there is a dramatic increase world wise in feed (and consequently in food) prices, leading to a new World Food Price Crisis with negative effects on social, political, and economic aspects.

Considering all the above, and on top of them the fact that the food waste lefts from Hotels and restaurants are quite safe from hygiene point of view, if they have been preserved in the right way as it is suggested, and their chemical compositional analysis, it is concluded that this final dry feed produced is safe, of relatively high nutritional quality, proper to be used as a simple ingredient, like any other feed, in animal diets. As all the other feeds, each individual product has its own nutritive value, related to initial food waste lefts composition, and thus it can be used as simple ingredient, combined with other ingredients too, in diets of productive animals (like pigs, poultry, fur animals) and pets (dogs, cats). The inclusion percentage of each such product, will depend on its chemical composition, animal species, productive (physiological) stage of the animal (related to its nutritional requirements), available quantities, and the market price of the other available feeds. Thus, there is a certain market for all these products for sure, as the feed industry is always looking for 'alternative' feeds at a beneficial price.

For their market value (commercial price), apart from the nutritional one, the environmental benefits from their use should be taken into account, and their contribution to circular economy as well.

3.4.3. Specific comments for the F4F products

Each product coming from different batch has different chemical composition and nutritional value which is closely related to food waste lefts composition. In general terms, products with animal origin lefts (meat, dairy products), have relatively high protein and energy content and due to that their nutritional value is high with a relatively good aminoacid profile. Products without meat are of lower nutritional value, and products from only plant origin lefts have even much lower nutritional value and poor aminoacid profile. However, all these kinds of products can be used in animal feeding, with their inclusion percentage to be dependent on animal species (animal's digestive physiology and its nutritional requirements), and the rest available feeds with their cost (market price) with which can be combined to formulate a balanced and a low-cost diet for a specific case. Apparently, the inclusion or not of such a product will depend primarily on its economic evaluation, which is based on energy, protein, and other nutrients content, and on the other feeds market price in comparison (project's produced feed vs. corn, soybean meal, wheat bran, aminoacids, minerals, etc.).

In conclusion, there is not a problem of deviation of these different products from the quality standards required for feeding, at least productive animals like pigs and poultry, whose diets are formulated with feeds of plant and/or animal origin feeds, according to the existing, at present, legislation. Other feeds, like the poultry slaughterhouse by-products or plant origin lefts from super markets, can also be combined with other feeds, and between them, in diets for poultry, according to relevant legislation. The inclusion percentage of each of them in each diet will depend again on the diet needed to be formulated and the feed(s)' chemical, nutritional and economic value. In addition to those, it should be mentioned that any diet is supplemented with the 'missing' nutrients (e.g. aminoacids, minerals, vitamins) in order to be balanced and to meet the animal's requirements.

4. Annex I – Photo Galery

Photos from the start up and the operation of the pilot unit during the reference period are presented in this paragraph of the present report.

4.1. Start up of the 2nd optimum operational period


FOOD
4
FEED

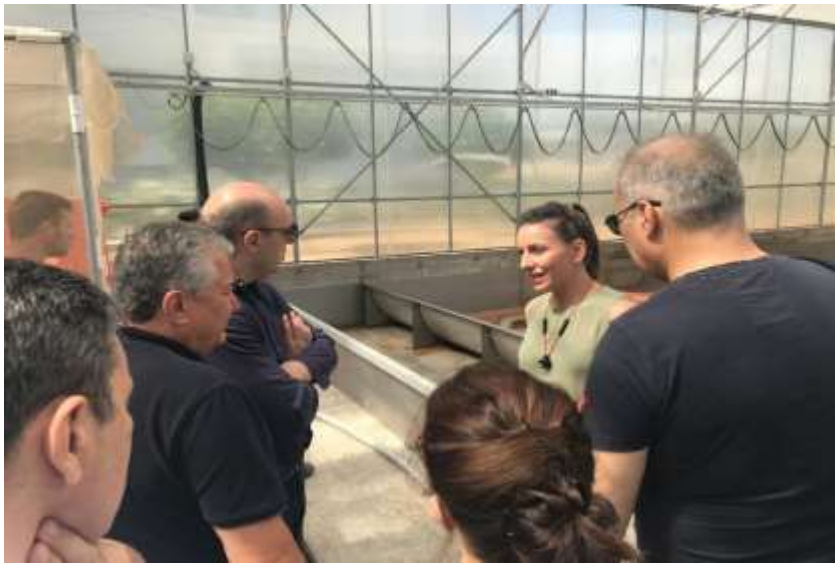


Photo 1. During the visit in the pilot unit for the official start up of the 2nd optimum operational period

4.2. During the 2nd optimum operational period





Photo 2. Photos from the pilot unit during the 2nd optimum full scale operational period

4.3. The final product of the 2nd optimum operational period


SHOT ON REDMI 7
AI DUAL CAMERA

Photo 3. The final product of the 2nd optimum full scale operational period that has been send to partners for animal trials