The LIFE Food for Feed Project – An Innovative Process for Transforming Hotel's Food Waste into Animal Feed

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Abstract

Food wastage is an issue of concern for businesses in the hospitality and food service sectors. In Greece it is estimated that approximately 100,000 tonnes of food waste are disposed every year from the hospitality sector alone. More specifically, it is estimated that 75% of hotels' environmental impacts are directly associated with excessive consumption [1]. In order to tackle them, hospitality sector has to develop and adopt "green practices" in three areas, namely: energy saving, water conservation, and waste management [2] [3]. Public awareness on environmental issues is increasing worldwide and the environmental profile of businesses such as a hotel or restaurant is becoming a progressively important part of its overall reputation.

The paper presents the innovative LIFE project "Food for Feed: An Innovative Process for Transforming Hotels' Food Wastes into Animal Feed (LIFE F4F)". The project aims to develop an integrated feed production from catering waste (kitchen and dining room), catering facilities, mainly hotels and restaurants, which already implement the system of sorting at the source or would like to implement in the near future. The core element to the process of LIFE F4F is the pasteurization of food residues through a modified and enhanced solar drying process. Prior to solar drying, the collection process with refrigerated vehicles, the hand sorting and the shredding of the food residues are taking place. Apart from evaluating the collection / pasteurization process, the projects' objective is to assess the quality of the produced feed, both in livestock (chickens and pigs) and pets (dogs).

Keywords: Food waste, hospitality sector, LIFE project

Introduction

Food production is a main driver of environmental pressure in terms of land use, water consumption and greenhouse gas emissions and food waste. It contributes largely to loss of resources and inefficiency in the food chain [4]. Improper management of food waste creates human health and environment problems. It is noticeable that food loss and waste causes 8% of global Greenhouse Gases emissions and consumes 30% of all water used by agriculture [5]. According to the United Nations Food and Agriculture Organisation, almost one third of food (i.e. approximately 1.3 billion tonnes per year) produced all over the world for human consumption is spoiled or wasted. Waste prevention has been the paramount objective of both national and EU waste management policies for many years. However, limited progress has been made so far in transforming this objective into practical action [6]. Neither the Community nor the national targets set in the past have been satisfactorily met, in Greece and generally in the Mediterranean region of the EU. Moreover, prevention measures are seldom considered as part of waste management and less effort goes into waste prevention than into its recycling and recovery, which are placed lower in the waste hierarchy [5] [7].

Food wastage is an issue of concern for businesses in the hospitality and food service sectors. Generally, hotels, although individually, do not create huge amount of wastes or consume huge amount of resources, as a group, can cause substantial impact on the environment [2] [8]. In Greece it is estimated that exceeds 100,000 tonnes of food waste are disposed every year from the hospitality sector alone.

Environmental improvement is an increasingly crucial factor for businesses to stay competitive and manage their supply chain risks. Increasing resource scarcity; rising raw material, transport and utility costs; and pressure from legislation, customers and society to reduce environmental damage, are combining to drive businesses to improve their performance and become more sustainable. Hotels and restaurants which incorporate environmental considerations into their business operations will benefit from better corporate image which helps distinguish them in the marketplace as forward - Looking and responsible service providers who are sensitive to environmental issues.

For countries like Greece, it is clear that without successful long-term waste prevention activities, achieving notable behaviour change in the way people buy and use food, the treatment capacity required to handle food waste will need to increase by more than a factor of two as waste volumes continue to grow. In simple terms more money will be required and fewer results will be achieved.

The island of Crete is one of the greatest tourist resorts and one of the most popular holiday destinations in Greece. Furthermore, Crete is a combination of urban, mountainous, rural and purely tourist regions. Heraklion, geographically located in the centre of Crete, is the megalopolis of Crete. The island's tourism infrastructure caters to all tastes, including a very wide range of accommodation; the island's facilities take in large luxury hotels with their complete facilities, swimming pools, sports and recreation, smaller family-owned apartments, camping facilities and others.

The study presents an innovative, project “Food for Feed: An Innovative Process for Transforming Hotels’ Food Waste into Animal Feed (F4F)”. The F4F process aims in producing from food wastes, a valuable, high quality product that can be directly reused in a productive way, returning, as a final outcome, the primary component, which is food. In simple terms it represents a complete cycle, where food is devalued in food wastes though human consumption / handling, further degraded by mixing with all different sources of food wastes (cooked, spoiled, uncooked etc), which is upgraded though a very simple low cost, low energy process, into animal feed and by its utilization is further upgraded into food. The innovative character of the process can be supported by the fact that it has not been applied yet, anywhere in the planet and this will be further presented in the State of the Art section.

Methodology

The project methodology includes the combination of F4F partners' expertise on food waste management and the existing food waste management practices within the hospitality sector, in order to formulate an effective source separated food waste collection system and estimate, in accuracy, its full-scale implementation cost. Ultimately, the abovementioned system will be the platform for the prompt implementation of the project. Successful implementation of the F4F project aims at evaluating an innovative, simple technology and low emissions process that allows the safe transformation of source separated food wastes, mainly from hotels (and generally from the hospitality industry and restaurants), into animal feed, utilizing an altered solar drying process.

The pilot plant will be able to produce 40 to 50 tonnes of dried animal feed annually. The core element to the process of F4F is the pasteurization of food residues through a modified and enhanced solar drying process. Prior to solar drying, the collection process with refrigerated vehicles, the hand sorting and the shredding of the food residues are taking place. Apart from evaluating the collection/ pasteurization process, the projects’ objective is to assess the quality of the produced feed, both in livestock (chickens and pigs) and pets (dogs).

Figure 1. Collection bins for food residues.

In summary, the F4F process addresses all of the aforementioned issues, since:

- ✓ Supports the implementation of source separation schemes for food wastes.
- ✓ It is an excellent example of circular economy, where the wastes of one process, becomes the raw material for another one.
- ✓ It's a recycling and reuse process, since food wastes are reused to produce again food (meat).
- ✓ It's a low energy/ carbon emission process, since solar power is used (directly and indirectly) to treat the wastes and the possible transformation of used vegetable oils.

It is estimated that there are more than 150 hospitality facilities compatible with F4F requirements, within the area of interest. Regarding hotels, is estimated that more than 10,000 rooms in 5-star and 4-star hotels, are available. That makes easy to locate the hotels (2-3 will be needed), which will be willing to participate, and at the same time operating a reliable source separation scheme. Four hotels were selected for participating in the project. The hotels' selection was based on their rating, their food waste system (separated collection of food residues) and the total number of beds that should be about 2,000. On a daily basis, these hotels will generate 1.5-2.0 metric tonnes of source separated food residues.

Results and Discussion

Preliminary results of bench scale experiments, where small amounts of food residues were used, easily sorted by hand, and manually operating drying system, the results were exceptional, including the quality of end product.

All efforts in the F4F project, aims in delivering a process that allows the safe, from every aspect, economically viable and environmentally beneficiary, transformation of hotels' food wastes (and the hospitality industry in general) into animal feed, which can be utilized by the relevant animal breeding / husbandry and pet industry. As a result, the optimum expected result would be a (at least one) full scale industrial unit, implementing the F4F process.

The main objective of the F4F project remains the replicability and transferability of the process. This is the most important activity that will ensure that results and lessons of the project will be actively disseminated after its end. And this is a work that will take place *during* the project, by a professional team, leaving behind all the needed data towards a full-scale unit, anywhere in the globe, directly or indirectly linked with the F4F team.

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