



# Sustainable Restaurant

Life Cycle Assessment & Carbon Footprint  
Study for Greening the Food Services



The Sustainable Diner:  
A Key Ingredient for  
Sustainable Tourism



# Life Cycle Assessment & Carbon Footprint Study for Greening the Food Services

## Introduction

**A**ccording to Food and Agriculture Organization (2019), **food waste reaches 1.3 billion tonnes every year equivalent to USD 1 trillion in economic costs.** In Metro Manila alone, 2,175 tons of food scraps end up in trash bins daily (PIDS, 2017). **The food sector also accounts for 30% of world's total energy consumption and 22% of total greenhouse gas (GHG) emissions** (FAO, 2011).

Nowadays, a growing number of restaurants and alike are incorporating SCP practices both at the front and back end of their operation as concerns over environmental impacts and reduction of our world's natural resources become important to consumers (Hollis, 2018). However, as of 2018, there is no baseline information and clear guidance yet for the food service sector in the Philippines to reduce their environmental impacts and carbon footprint. The food service industry's inappropriate processes and violations put forth the country's natural resources in jeopardy. In 2019, the Laguna Lake Development Authority (LLDA) issued cease and desist orders to food establishments for discharging water wastes into the water bodies, specifically in Manila Bay (CNN Philippines, 2019).

The **Life Cycle Assessment** for casual restaurants of The Sustainable Diner project is a **pioneer research** in the Philippines in the project's pilot cities: *Cebu City, Tagaytay City* and *Quezon City*. **Carbon footprint** of the top ordered dishes of six partner restaurants were also calculated to measure its contribution to climate change. The results of the LCA study of the restaurant and carbon footprint of the dishes were used as important considerations to substantiate the ecolabelling criteria of the National Ecolabelling Programme - Green Choice Philippines (NELP-GCP) for food services.

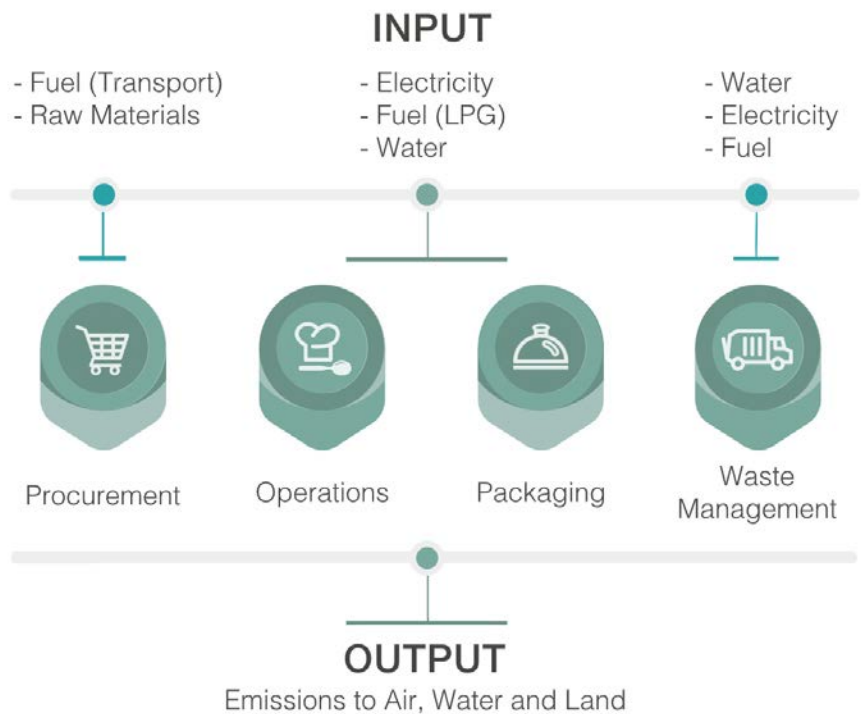
To obtain the data necessary for LCA, a survey questionnaire for casual restaurants was prepared in consideration with the scope and boundaries of the study. The data were then verified and used for analysis using SimaPro, a commercial LCA software that was used to determine the life cycle impacts of the restaurant operation and monitor the sustainability performance data of a company's products and services.

# About the Study

## Life Cycle Assessment

**(LCA)** is assessing the environmental impacts associated with a product or service on a cradle-to-grave basis and identifying opportunities for improvements. For the purpose of this study, the stages covered are limited to the following:

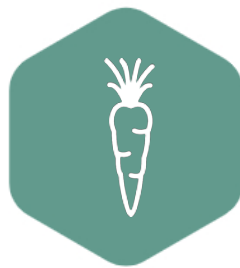
1) procurement, 2) food storage and preparation, 3) food service and operational support, and 4) waste management (*in-house up to transport to landfill*). Above is the study framework for food services to conduct the Life Cycle Assessment.



**Food Service industry** encompasses all of the activities, services, and business functions involved in preparing and serving food to people eating away from home. The Sustainable Diner project of WWF-Philippines funded by International Climate Initiative (IKI) commissioned Philippine Center for Environmental Protection and Sustainable Development, Inc. (PCEPSDI) to conduct the Life Cycle Assessment (LCA) study on partner restaurants to define the industry's impacts and environmental priorities.



Life Cycle Assessment Study was conducted among six (6) Sustainable Diner Partner restaurants in Cebu City, Tagaytay City and Quezon City from February 2018 to March 2019.



The study highlights related environment impacts on the operational support of the food service establishment as well as the carbon footprint of their most ordered dishes.

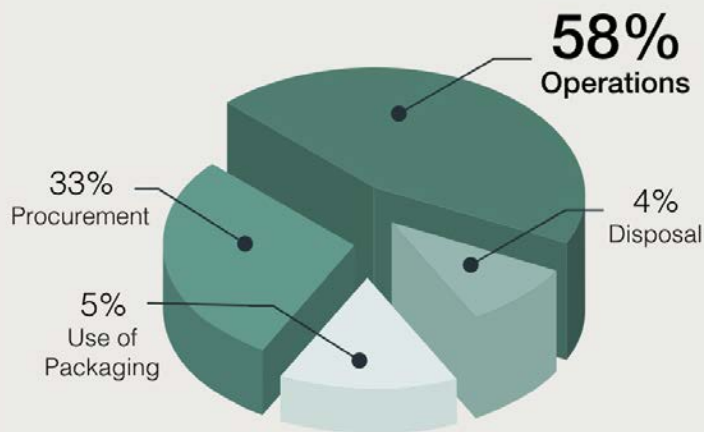
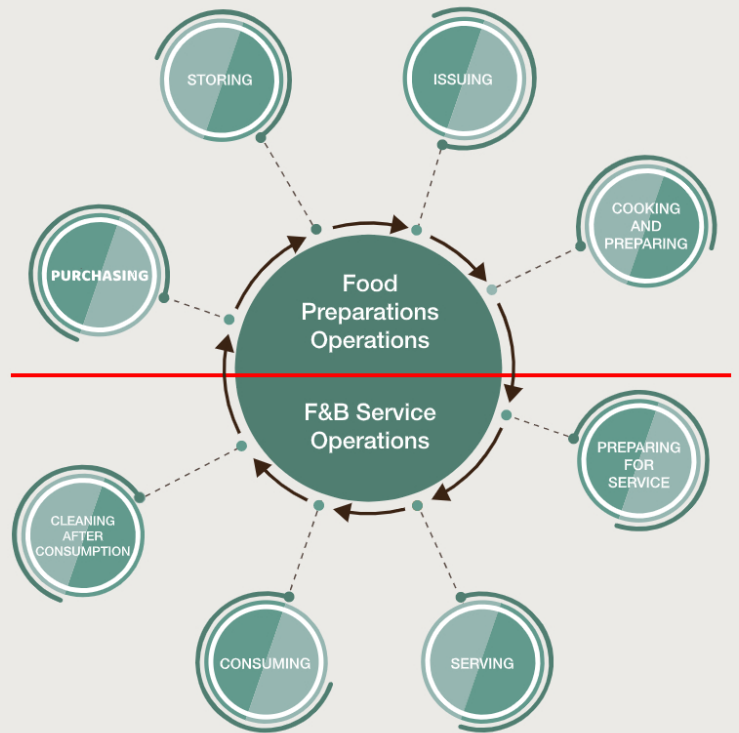


The results of the Life Cycle Assessment were used to develop recommendations for the food service sector's sustainability initiatives.

# Impacts of Food Service Processes to Global Warming

**Life Cycle Assessment** or LCA study assessed the impacts of the food service establishments' processes on global warming.

**Global Warming Potential (GWP)\*** is defined as the cumulative radioactive forcing, both direct and indirect effects, over a specified time horizon resulting from the emission of a unit mass of gas related to some reference gas [CO<sub>2</sub>: (IPCC 1996)].



The results of the analysis showed that the “food service operations” (58%) has the highest contribution to global warming, followed by the “procurement” process (33%).

There are several aspects of food service operations and procurement that contribute to global warming. They include food storage, lighting, space heating, domestic water heating, and ventilation which can all be considered as significant sources for energy consumption.

Furthermore, it is certain that the volume of food ingredients procured will make it as a significant contributor of GHG emissions even if the GHG emissions associated with the farming practices are small compared to those associated with other food service processes.

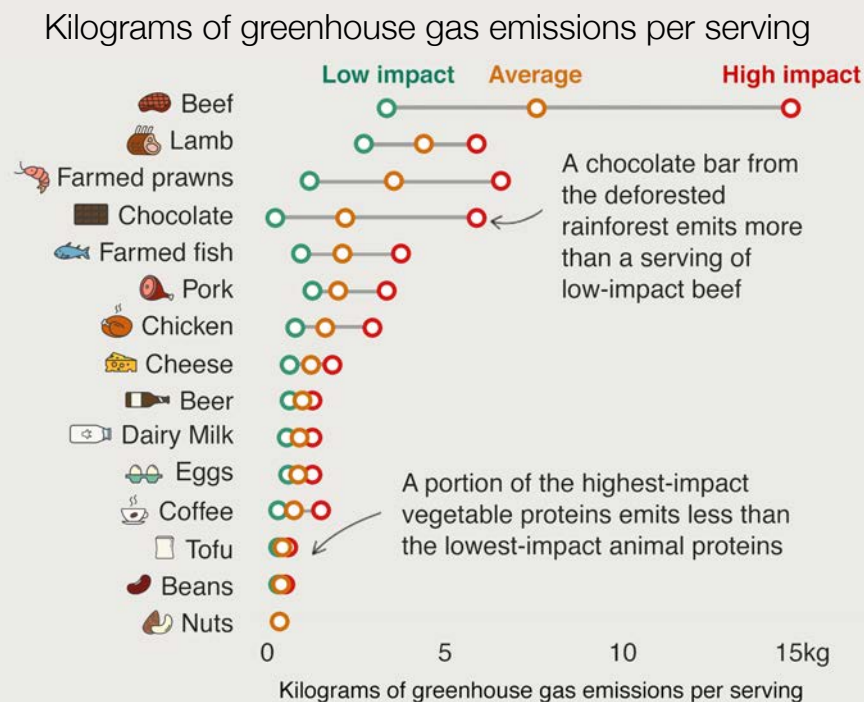
**Overall, the environmental hotspots were primarily due to the material procurement and operation processes of the food services.**

\*Factors are expressed as Global Warming Potential for time horizon of 100 years (GWP 100), expressed in kg carbon dioxide

# Carbon Footprint Calculation of Most Ordered Dishes

**Carbon Footprint** is historically defined as the total sets of greenhouse gas emissions caused by an organisation, event, product or person. A product's carbon footprint is measured in the amount of greenhouse gases (GHG) that is generated throughout its lifecycle (*Life Cycle Initiative, 2018*).

Knowing the environmental impact of your food is as important as knowing where and how your food is produced. Poore and Nemecek (2018) found out that the environmental impact of different foods varies hugely.



Source: Poore & Nemecek (2018), Science



In this study, the casual restaurants were asked to list the **top three (3) dishes** that are mostly ordered by the diners.

RESTAURANT	DISH 1	DISH 2	DISH 3
A	Bulalo (Beef Dish)	Crispy Chicken	Crispy Pata
B	Beef Kare-kare	Bulalo (Beef Dish)	Wonton Noodle Soup (Mixed Meat)
C	Beef Caldereta	Bulalo (Beef Dish)	Tilapia sa Laing (Fish Dish)
D	Beef Kare-kare	Bulalo (Beef Dish)	Crispy Sisig (Pork Dish)
E	Sinigang na Sinangag (Pork Dish)	Seafood Kare-kare	Crispy Dinuguan (Pork Dish)
F	Salad with Chicken Flakes	Seared Salad Steak	Light Sweet Salad

The carbon footprint of the restaurants' top dishes was then calculated through the Greenhouse Gas Protocol, and some of the methods used in preparing LCA.

To do this, the main ingredients of the dishes were identified. The source of the main ingredient, the quantity of the main ingredient used were obtained with further consideration on the energy consumed.

## Out of 18 dishes

covered in the study, these are the

## top 5 dishes

with the highest carbon footprint



Photo by: Recipe nt Juan

**Sinigang na baboy** is a popular and traditional Filipino pork soup. It's well known for its distinctive sour broth, which is typically flavoured with tamarind fruit.

# 5

2.89 Kg CO<sub>2</sub>-e : **Low Impact**

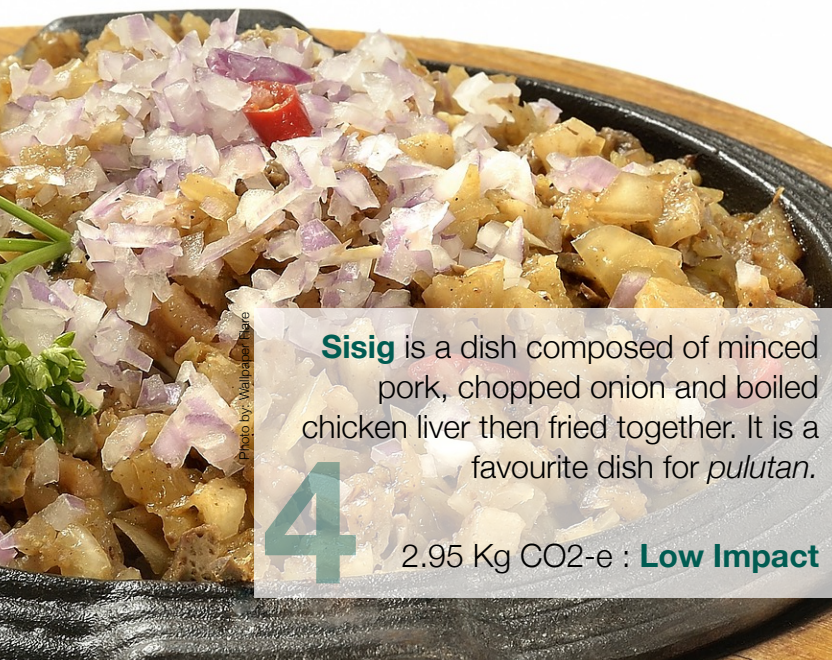


Photo by: WallpaperHire

**Sisig** is a dish composed of minced pork, chopped onion and boiled chicken liver then fried together. It is a favourite dish for *pulutan*.

# 4

2.95 Kg CO<sub>2</sub>-e : **Low Impact**



**Chicken** is deep fried in a way that the skin is extremely crunchy, but the white meat is relatively soft.

# 3

3.12 Kg CO<sub>2</sub>-e : **Low Impact**



**Crispy Pata** is made with whole pork leg, boiled until tender and then deep-fried until golden and crispy. Crunchy on the outside and moist on the inside.

1

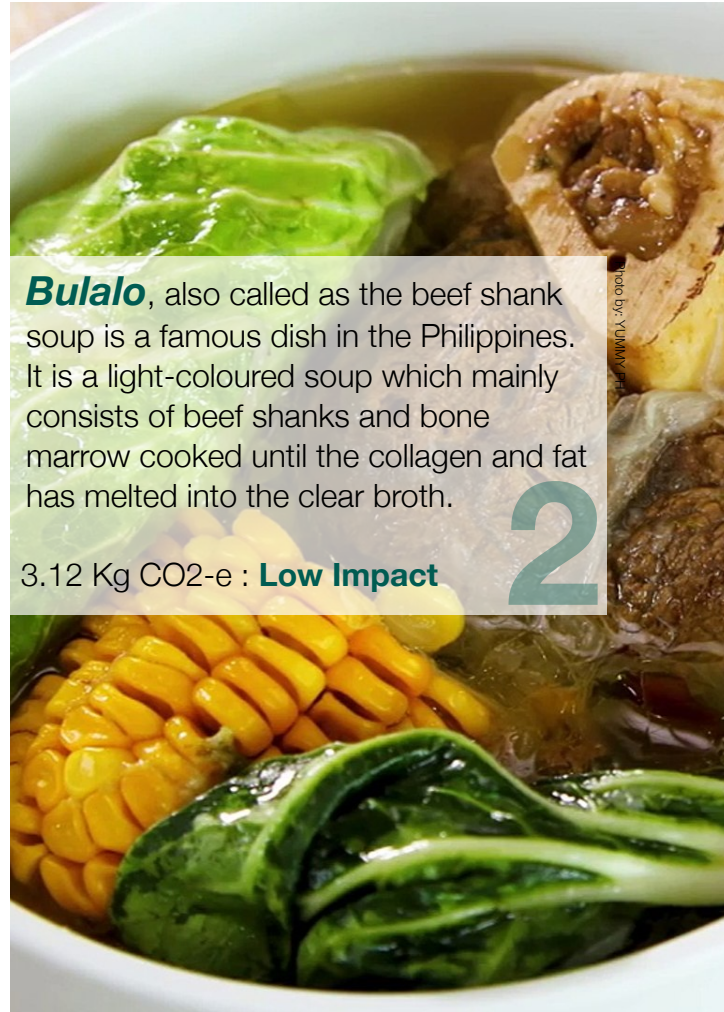
5.98 Kg CO<sub>2</sub>-e : **Low Impact**

Out of **18** dishes

covered in the study,

**Crispy Pata**

has the highest carbon footprint (measured in CO<sub>2</sub>-e).



**Bulalo**, also called as the beef shank soup is a famous dish in the Philippines. It is a light-coloured soup which mainly consists of beef shanks and bone marrow cooked until the collagen and fat has melted into the clear broth.

2

3.12 Kg CO<sub>2</sub>-e : **Low Impact**

Emissions from transport can make a substantial part of the total carbon footprint of the products since they make up a great proportion of global GHG emissions. However, local sourcing should not solely be considered but also how the food is transported as it has a great potential for reduced emissions.



“  
**Vegetable based salads have the lowest carbon footprint**”

Vegetable based dishes have the lowest carbon footprint compared to other meat-dishes. All of the vegetable-based dishes in the study are considered to have low impact on the environment.

- Salad A: 2.09 CO<sub>2</sub>-e
- Salad B: 2.06 CO<sub>2</sub>-e
- Salad C: 2.04 CO<sub>2</sub>-e





# How to **green** a Food Service Establishment



Casual restaurants are encouraged to shift to serving vegetable dishes and create awareness campaigns to encourage diners to consume higher portion of vegetables than meat.



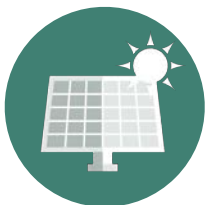
Raw materials purchased from responsibly grown resources or farms are better sources of food for preparation.



Waste Management System and Monitoring should be in place. Establishments are encouraged to implement the minimisation of their kitchen wastes and its proper disposal through segregation, composting, recycling and/or upcycling.



Water and energy conservation systems and strategies should be implemented. It can be through rain water catchments, use of solar energy and other latest technologies. With the implementation of proper procedural changes and good housekeeping, electricity and water savings can be achieved without capital expense.



Most of the businesses today are willing to shift to more sustainable options in the advent of more demand and relative incentives. A food service establishment can be more resource-efficient through installation and proper maintenance of equipment.





A Key Ingredient For Sustainable Tourism.

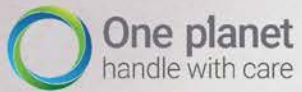
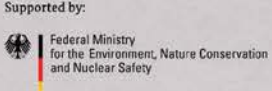
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This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.