Life Cycle Assessment of a Football Match

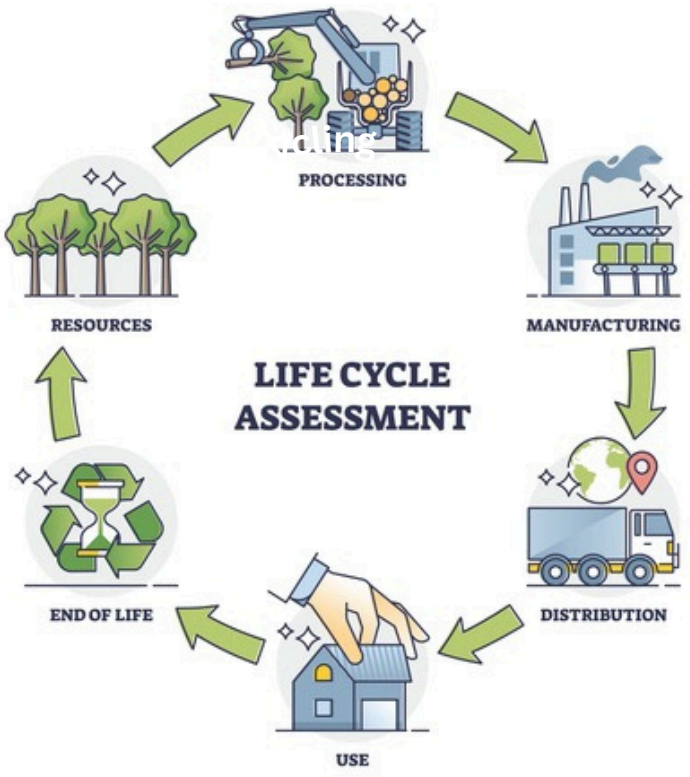
Co-funded by the European Union

www.free-kicks.eu

What is a Life Cycle Assessment (LCA)?

Life cycle assessment (LCA) is a methodology to assess the overall environmental burden associated to the whole life cycle of a product or service.

Being quantitative, standardized and scientific, this methodology allows the production of reliable information about the environmental performance of a product and it overcomes some issues that might arise while focusing on a single life cycle phase, typically the production one.



What is an LCA? (cont.)

It is generally considered the most reliable tool to assess properly the sustainability of a product.

LCA is an iterative process, which consists of 4 main phases:

1. Goal and scope definition
2. Inventory analysis (Life Cycle Inventory - LCI)
3. Impact assessment (Life Cycle Impact Assessment - LCIA)
4. Interpretation of the results

Today, LCA is defined in two ISO standards:

- ISO 14040:2021 - Environmental management -- Life cycle assessment -- Principles and framework
- ISO 14044:2021 - Environmental management -- Life cycle assessment -- Requirements and guidelines

Goal and Scope

To identify the environmental footprint of a professional football match in a specific season (2022-23).

The unit of analysis of the study is one football match played at the Estádio do Dragão.

During the 2022-23 season, a total of 27 matches were played at the Estádio do Dragão from 23/07/22 to 27/05/23.

Did You Know?

An environmental footprint isn't just about carbon emissions. For example, it can include:

- Climate change
- Ozone depletion
- Ionising radiation
- Photochemical ozone formation
- Particulate matter
- Human toxicity (cancer and non-cancer)
- Acidification
- Eutrophication (marine, freshwater, terrestrial)
- Ecotoxicity – freshwater
- Land use
- Water use
- Resource use, fossils, minerals and metals

International Development Research Network, 2023

Inventory Analysis

The scope of the study is to assess the environmental footprint of a football match, considering the following system boundaries:

- energy and water consumption associated to the football match processes (with reference to the stadium and training facilities).
- production and end of life of the sport apparel and equipment merchandised (t-shirt, shorts, balls).
- production and end of life of waste materials associated to the football match, and related production of the corresponding materials (paper, plastic, glass, metal, household waste).
- production and end of life of food and beverages associated to the football match (bar and kiosk and catering including the menus served at the stadium), including packaging.
- production of the chemicals and materials used for cleaning operations and for the pitch maintenance (i.e., fertilizers, cleaning product, disposal bags, turf, silica sand, etc.).
- transport of the public attending the football match (home team and away team).
- transport of the FC Porto Staff to the football pitch (away matches).
- transport of the FC Porto talent scouts throughout the whole season;
- material used for choreographies by home supporters.

FREE KICKS

Impact Assessment

For FC Porto, the main environmental impacts of a professional football match are:

- Climate change 33.3%
- Resource use, fossils 20.0%
- Resource use, minerals and metals 7.7%
- Photochemical ozone formation 6.3%
- Particulate matter 6.2%
- Acidification 6.1%

Most Impactful Activities

68% - Supporters' mobility is the key contributor to the overall footprint

20.9% - Followed by energy consumed at the stadium and training facility

7.0% - The third largest contributor was food and beverages served at bars, kiosks and catering

Smaller contributions include sports apparel and merchandising, food and beverage packaging and waste management

Interpretation Of Results and Recommendations

Supporters' mobility, energy consumed at the stadium and training facility, followed by food & beverages served both at kiosks and at catering, are the three most relevant contributors to the overall footprint.

These top 3 processes together represent more than 90% of the overall environmental footprint.

Read on for recommendations on these areas.

Transport

Supporters' mobility is the largest contributor to FC Porto's overall footprint.

Though mobility is seldom under direct control of the professional football organisation, to lower the total environmental footprint, it is necessary to reduce the use of cars for home supporters as well as flights for guest supporters.

A further boost in the use of public transport could contribute to reducing the impact of home supporters' mobility.

The promotion of an increased use of public transport by home supporters could lead to an annual saving of roughly 239 ton of CO_2 equivalent emissions.

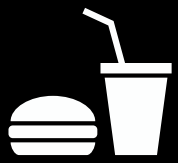
FREE KICKS

Energy

Energy consumed at the stadium and training facility is the second largest impact.

Energy consumption will be reduced through the installation of a second energy community of 2000 photovoltaic panels. FC Porto will also reduce energy consumption through the investment of energy-saving equipment and solutions.

Food



The third largest contributor was food and beverages served at bars, kiosks and catering

Since this is an area where the professional football organisation might have direct influence, the composition of the menu and the inclusion of more environmentally friendly types of food and beverages could be a target for potential improvement actions.

Limitations of the Study & Possible Improvements

A significant share of input data does not reach the “very good” quality rate, mainly due to proxy data used to model food and beverage production and the relevant packaging production, accounting for 20% of the total environmental footprint of the professional football match.

Mobility: the model for home supporters is based on a sample representing 7.2% of the total average season value.

Data for sports apparel and equipment are not included. Merchandising data only considered shirts, shorts and balls.

Lifecycle Assessment of a Football Match

Date published: February 2024

Study carried out by the institute of Management of S. Anna School of Advanced Studies. The results are based on the data provided by the club and elaborated with SimaPro software and ecoinvent database version 3.9.1

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

FREE KICKS

Co-funded by the European Union

www.free-kicks.eu