

# Cálculo y Registro de la Huella de Carbono. de la Universidad Miguel Hernández de Elche (España)

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# Calculation and Registration of the Carbon Footprint of the *Miguel Hernández University (Spain)*

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Once upon a time...

Once upon a time...

In 1992 the **United Nations Framework Convention on Climate Change (UNFCCC)** defined **climate change** as:

*“a change of climate which is **attributed** directly or indirectly **to human activity** that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” [1].*

## Once upon a time...

Afterwards, in 2014, the **Intergovernmental Panel on Climate Change** concluded that:

**“The human influence on climate is evident and it is growing and anthropogenic emissions of greenhouse gases (GHG) are the highest in history [2].”**

## Once upon a time...

In this sense, some **public organizations as universities**, which should be an example to follow, are currently

**reporting their GHG emissions voluntarily**

in order to contribute to a greater knowledge of global emissions and their effects on climate change.

The Carbon Footprint...

## The Carbon Footprint...

**the sum of the Greenhouses Gases emitted** due to the activity of an organization



(CO<sub>2</sub>, Methane, Nitrogen dioxide,...)

is its **Carbon Footprint**

## The Carbon Footprint...

The Carbon Footprint is expressed as the amount of **CO<sub>2</sub> equivalent**,

a **universal unit of measurement** that indicates

the **global warming potential (GWP) relative to CO<sub>2</sub>** of each one of the different GHGs

Global warming potential (GWP) values relative to CO<sub>2</sub>

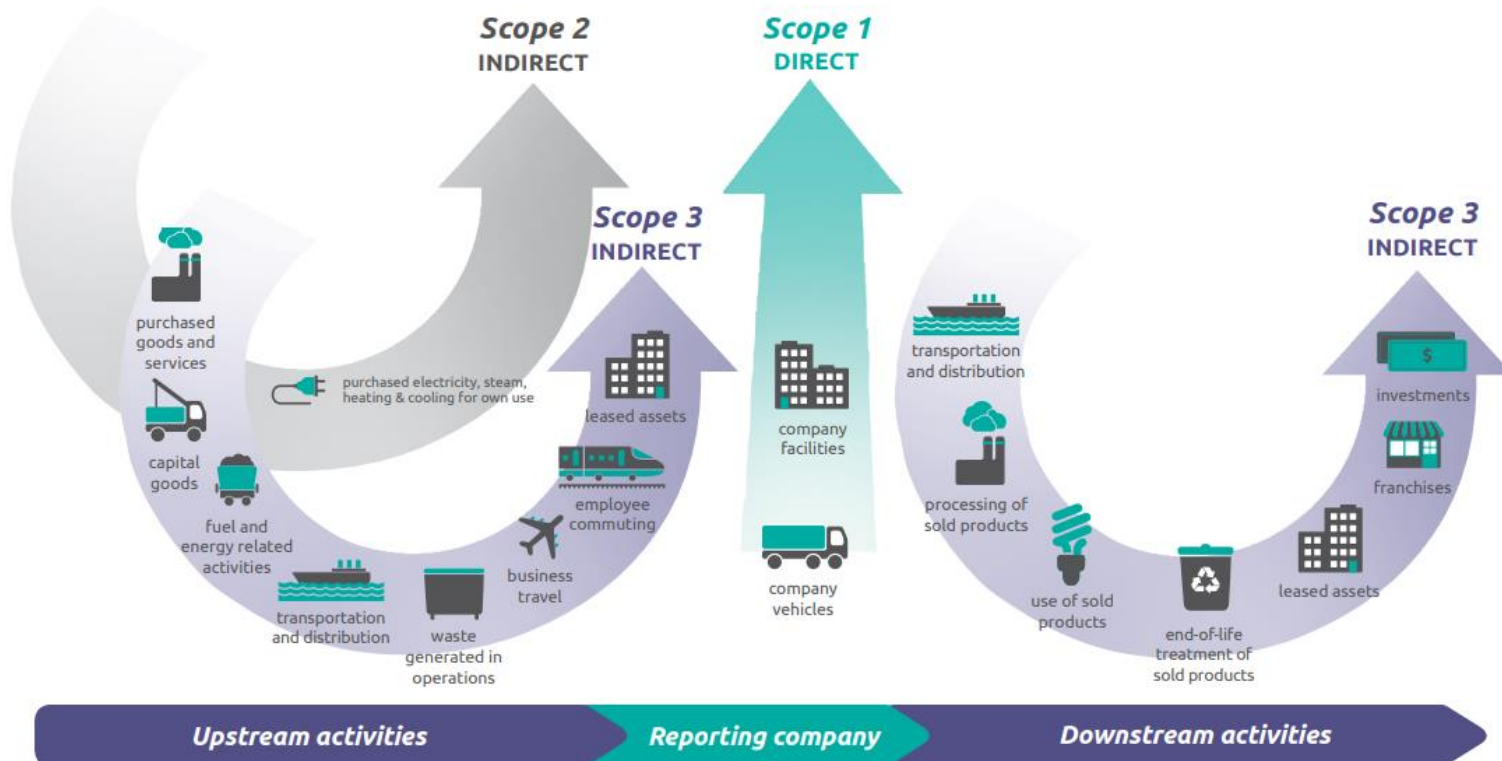
Industrial designation or common name	Chemical formula	GWP values for 100-year time horizon		
		Second Assessment Report (SAR)	Fourth Assessment Report (AR4)	Fifth Assessment Report (AR5)
Carbon dioxide	CO <sub>2</sub>	1	1	1
Methane	CH <sub>4</sub>	21	25	28
Nitrous oxide	N <sub>2</sub> O	310	298	265

Source GHG protocol

## The Carbon Footprint...

An activity can have **several sources of GHG**, commonly classified in three **scopes**:

- **Scope 1: direct emissions** from sources they own or control (like the combustion of fuel or the gases emissions during the use of air conditioning equipment)
- **Scope 2: indirect emissions** for electricity consumption.
- **Scope 3: other indirect emissions**.



(Source: GHG Protocol)



The Spanish Registry...

## The Spanish Registry

In **2014** the **Government of Spain**, through the Spanish Office of Climate Change,  
created by Royal Decree 163/2014

**The Spanish REGISTRY OF CARBON FOOTPRINT,  
OFFSETTING AND CO<sub>2</sub> REMOVAL [3].**

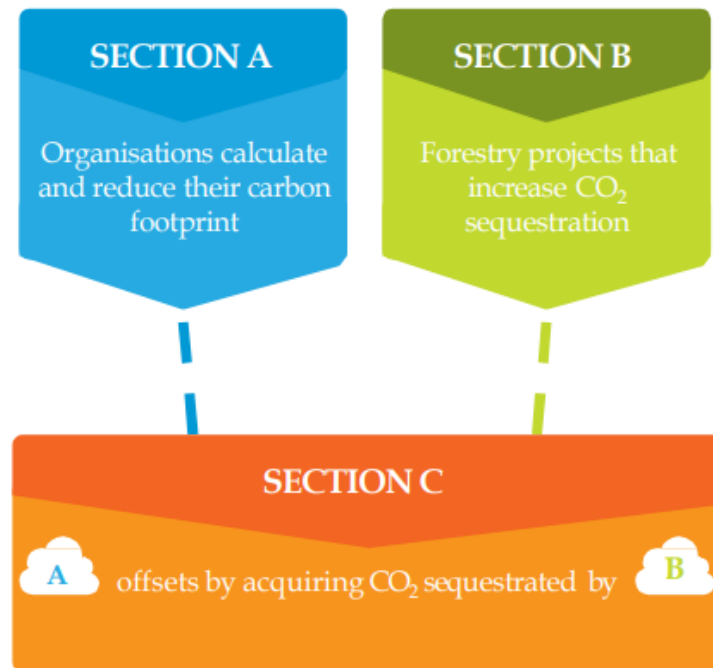


which aims to **fight against climate change** by  
promoting the calculation and reduction of the Carbon Footprint  
by Spanish organizations.

## The Spanish Registry

This **public** registry, **has three sections**:

- A. A section of Carbon Footprint **calculation and commitments to reduce** GHG emissions.
- B. A **CO<sub>2</sub> sequestration/absorption projects** section.
- C. A **CO<sub>2</sub> offsetting/compensation** section (where A and B sections can interact).



This study focuses on the first one (A)

## The Spanish Registry

The entities that **voluntarily** participate have to calculate their Carbon Footprint and report it.

No specific calculation methodology is required:

Any **internationally recognized calculation methodology** can be used  
(like UNE-ISO 14064, GHG Protocol<sup>[4]</sup>, PAS 2050, etc.)

However, **the emission factors** must be those **provided by the Government**.

Minimum scopes required are: **Scopes 1 and 2**. (Scope 3 is voluntary)

But, also they must have and report a **Reduction Plan**.

## The Spanish Registry

Afterwards the Government issues **a seal certifying their inclusion in the registry and the level of commitment reached** (calculation, reduction and offsetting).



Different levels of participation for organizations that calculate their carbon footprint (calculate, reduce and offsets)

A close-up photograph of a scientist in a white lab coat and blue gloves using a pipette to transfer liquid into a small vial. The background is a laboratory bench with various bottles and equipment.

The case of study...

## The case of study...

**Miguel Hernandez of Elche University**, a public university located in the **southeastern of Spain**, was chosen for the study.

It was established in **1996** and operates in **four different campuses**.

Its campuses have **75 university buildings** and **25,000 students** enrolled.



## The case of study...

For the study the **GHG Protocol** was chosen.

**As the base year, 2011** was established.

It was decided to measure the Carbon Footprint associated with **scope 1 and scope 2**.

Over **7 years, consumption data** were compiled for each GHG emission source,  
(like natural gas, propane gas, gasoline and gases of the air conditioning system.)

And also the **electricity consumption** data was compiled for scope 2.

Used a **calculation tool freeware provided by the Spanish Government**,  
(based in the **GHG Protocol methodology**)

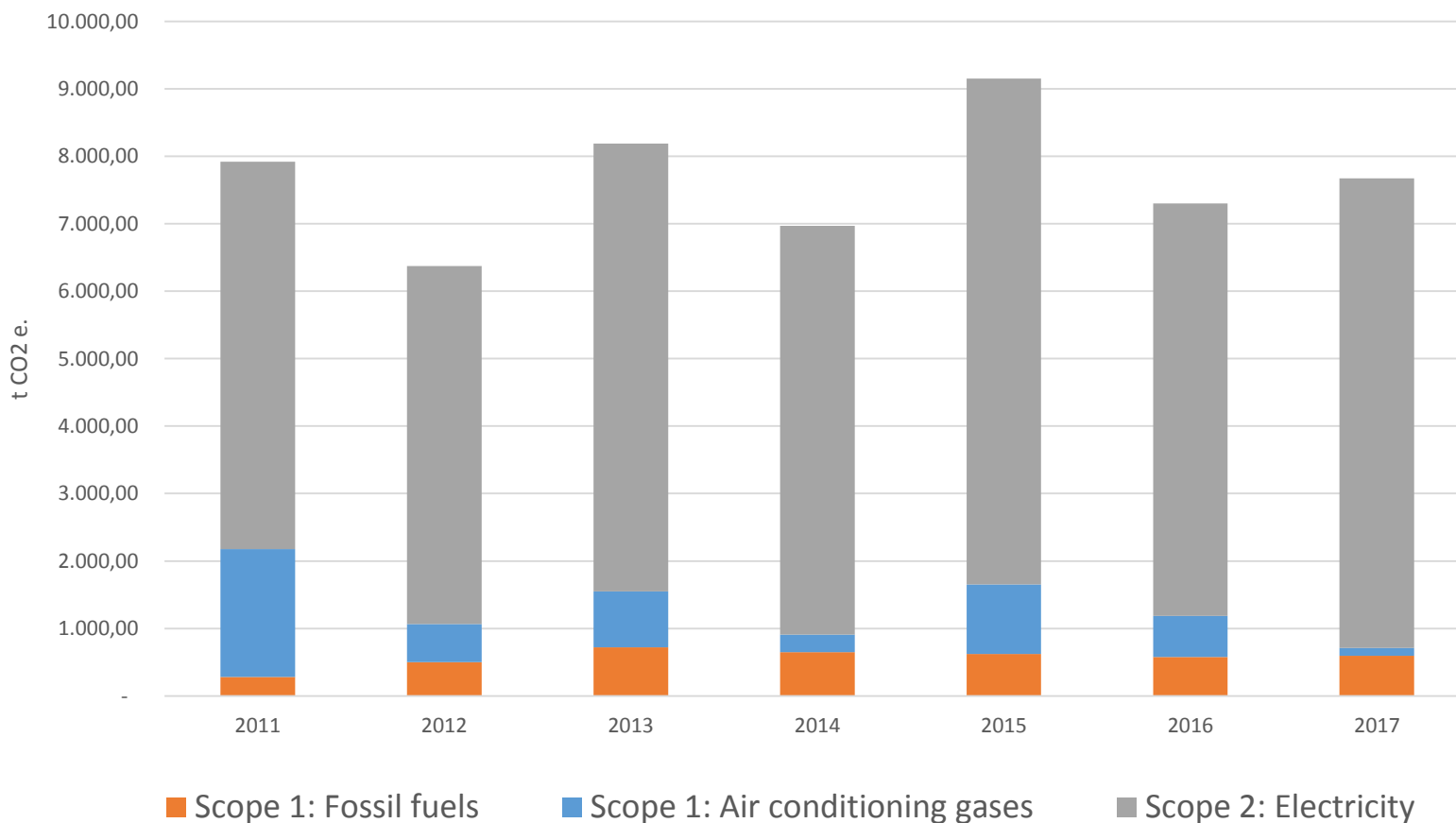
The Carbon Footprint of the Miguel Hernández University was calculated **for each year**, and the **results reported** to the Spanish Office of Climate Change.

The results...



## RESULTS

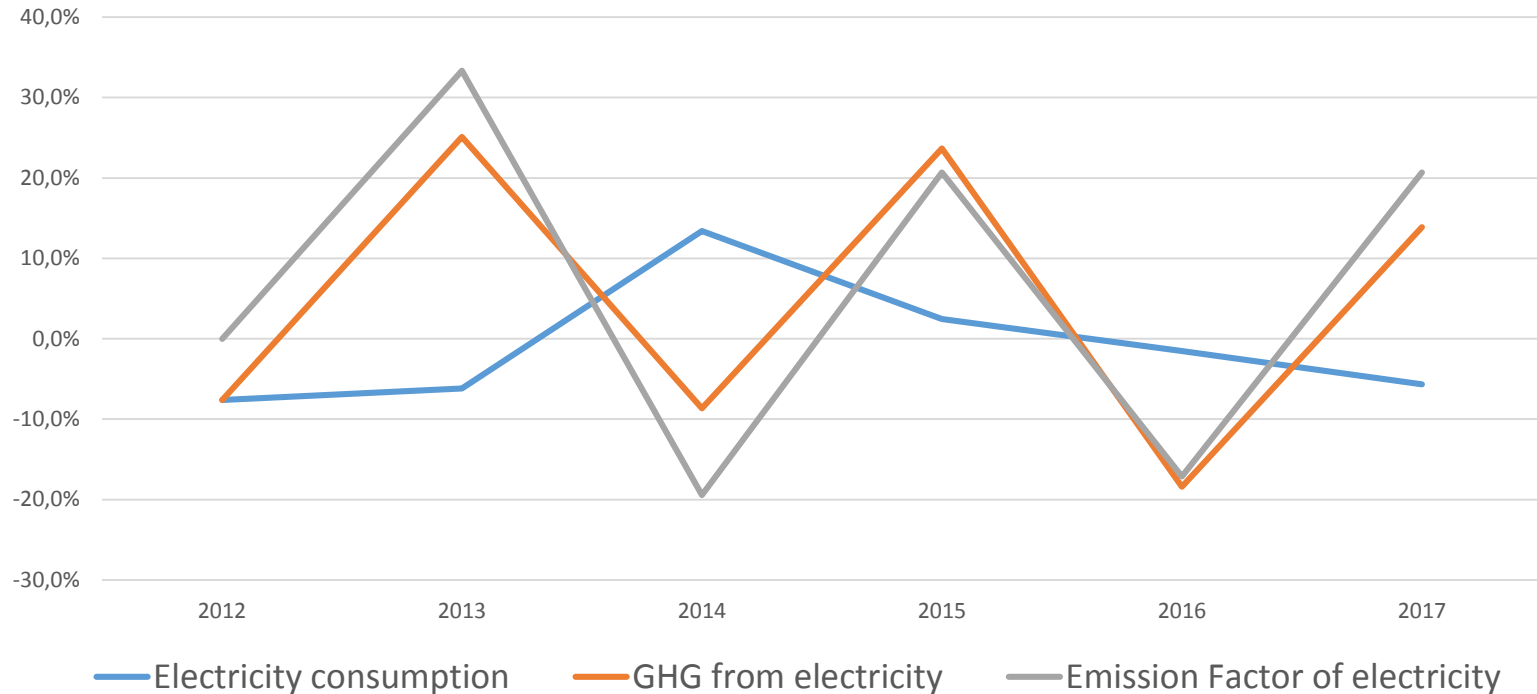
As the main result, the measures of the **Carbon Footprint** of the Miguel Hernández University between **2011 and 2017** have been obtained, with a breakdown **by the types of scope and sources of emission:**



*Evolution of the Carbon Footprint of the Miguel Hernández of Elche University by sources of GHG.*

## RESULTS

Variation with respect to the previous year of GHG emissions from electricity consumption, GHG from electricity and the associated emission factor.



We can observe that the **GHG emissions data from the electricity consumption** are not correlated with the amounts of electricity consumed.

It is **correlated with the emission factor** associated with the **source of that electricity**, which is different depending on the supplier company

For example, in 2017 the electricity consumption was reduced by 6%, but due to an increase in the emission factor of the energy consumed (kg CO<sub>2</sub> / kWh), the CO<sub>2</sub> equivalent emissions were increased by 14%.

## RESULTS

Finally, as a result of the inclusion of the data in the  
Carbon Footprint Registry,  
**the corresponding certificates and seals are obtained.**

Registro de huella de carbono, compensación y proyectos de absorción de CO<sub>2</sub> del Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente

La organización:

**UNIVERSIDAD MIGUEL HERNÁNDEZ DE ELCHE**

Ha inscrito su huella de carbono en la sección a) de Huella de carbono y de compromisos de reducción de las emisiones de gases de efecto invernadero, con los siguientes datos:

Año de cálculo	2015
Alcances	1 + 2

Limites de la organización incluidos en el cálculo

Se incluye la actividad de docencia e investigación desarrollada en todos los edificios de la Universidad, ubicados en Elche (Alicante).

y se le otorga el derecho al uso del siguiente sello:



Valvanera Urquía Aparido  
Directora General  
Oficina Española de Cambio Climático  
Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente

Fecha de inscripción: 15 - 03 - 2018  
Código: 2017\_00\_a069



One of the certificates granted to the UMH by the Spanish Government.

## Conclusions...



## CONCLUSIONS

1. The **mayor contribution** of Carbon Footprint in the UMH are the emissions associated with the **electrical consumption**. But this depends on the type of energy source used and the emission factor associated to them.
2. So, it is recommended to obtain the **electrical energy from sources with a lower emission factor** or even from renewable energies (emission factor equal to zero <sup>[5]</sup>), which would imply a decrease of 84% of the Carbon Footprint. (in this way, thanks to this study, this year the UMH is getting its electrical energy from renewable sources)
3. The data obtained from the **Carbon Footprint per person** of an organization allows obtaining an **environmental indicator** directly correlated with its **environmental impact**. Also it serves as a frame of reference for making decisions aimed at reducing GHG emissions.
4. Including an organization in the Government Registry, allows **external recognition** as an environmentally responsible company, and can be used as a tool to **raise environmental awareness**.

## References

- [1] UNFCCC, 1992. <http://unfccc.int>
- [2] Intergovernmental Panel on Climate Change, 2014. <http://www.ipcc.ch>.
- [3] Spanish Royal Decree 163/2014. Carbon Footprint registry, compensation and carbon dioxide absorption projects.
- [4] GHG Protocol (Greenhouse Gas Protocol) WRI/WBCSD.
- [5] Spanish Order ITC/1522/2007, of May 24, which establishes the regulation of the guarantee of the origin of electricity from renewable energy sources and high efficiency cogeneration.

**Calculation and Registration of the Carbon Footprint  
of the *Miguel Hernández* University (Spain)**



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More information and full reports at  
<https://www.umhsostenible.com/huella-de-carbono/>