

Carbon footprint of Educational Establishments: The Case of the University of Alicante

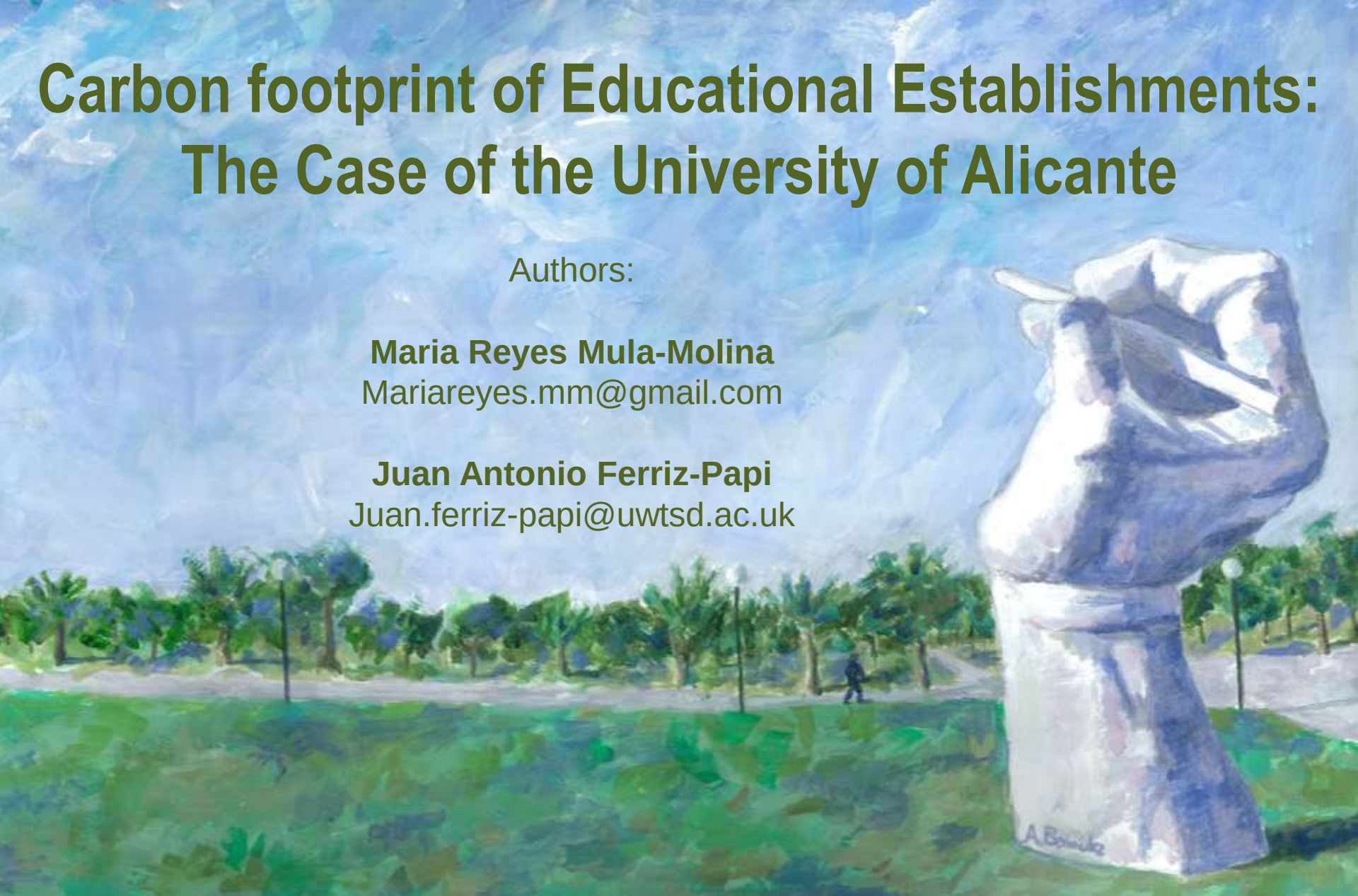
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Universitat d'Alacant
Universidad de Alicante



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University of Wales
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1. Introduction

2. Aim and Objectives

3. Methodology

4. Results and analysis

5. Conclusions

**Society expectative about environment protection
and sustainable development**



**Universities as centres of knowledge and research
excellence**



Solutions for our challenging world

Environment awareness of Spanish Universities

CRUE. Environment Quality and Sustainable Development Workgroup

2007. Creation of ECOCAMPUS office at the University of Alicante

Necessity of environment assessment

Know present situation – scarce or non-existing information

Some actions already carried out. Others to put in practice

Aim:

- Develop a simplified methodology to calculate and compare carbon emissions per user at the University campus.

Objectives:

- Study other methodologies applied in different campuses in Spain;
- Establish own methodology considering building operations and transport;
- Compare and analyse these results.

- Sustainable development
- Environment assessment
- Indicators

- Ecological footprint
- Carbon footprint
- Corporate ecological footprint

INFORMATION
COMPILATION
+
REFERENCES

METHODOLOGIES
FOR ASSESSMENT

DEFINITION OF
OWN
METHODOLOGY

- UNO publications
- ISO, BSI, AENOR
- EU Directives
- World Resources Institute
- etc.

- University of Santiago de Compostela
- University of Barcelona
- Polytechnic University of Cataluña
- University Miguel Hernández





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Universidad de Alicante

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ESTIMATION OF CARBON FOOTPRINT DUE TO BUILDING AND URBAN SERVICES IN THE CAMPUS

OBTAIN ENERGY CONSUMPTION

ESTIMATION OF
ELECTRICITY
CARBON EMISSIONS

EMISSION FACTOR:
ELECTRIC MIX

ESTIMATION OF
NATURAL GAS
CARBON EMISSIONS

EMISSION FACTOR:
IDAE

ESTIMATION OF TOTAL
CARBON FOOTPRINT

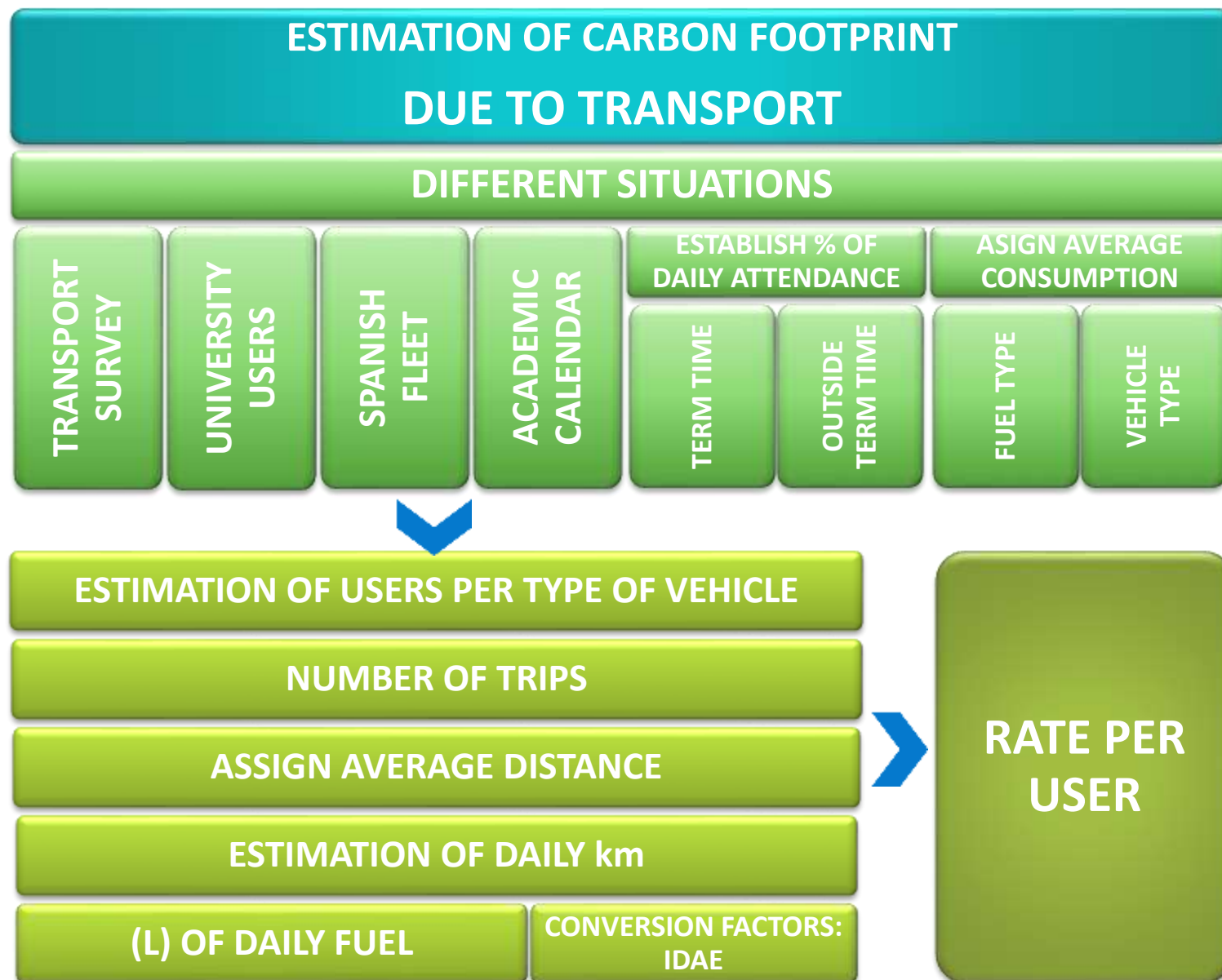
ELECTRICITY
+
NATURAL GAS

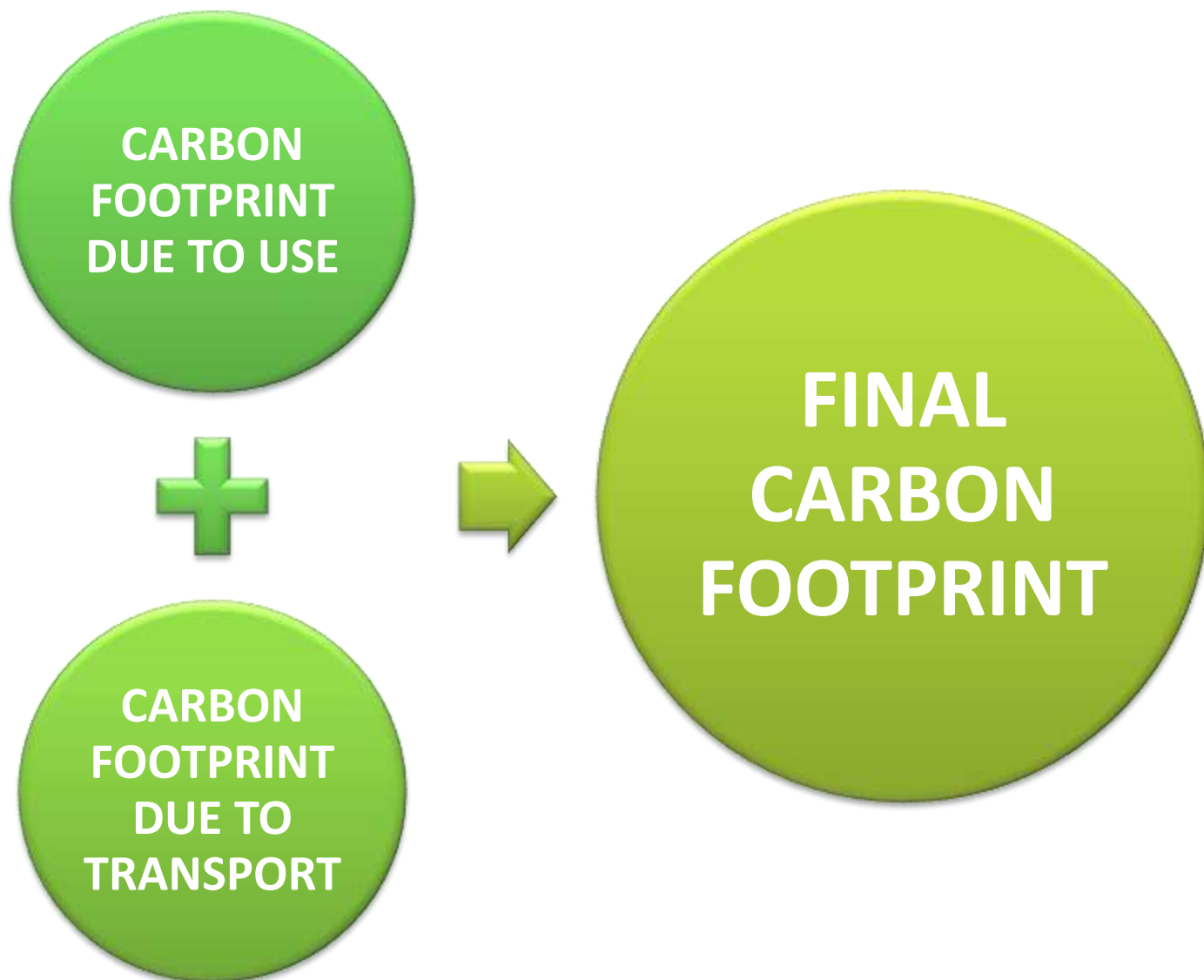
RATE

PER M² BUILT

OVER THE CAMPUS

PER USER





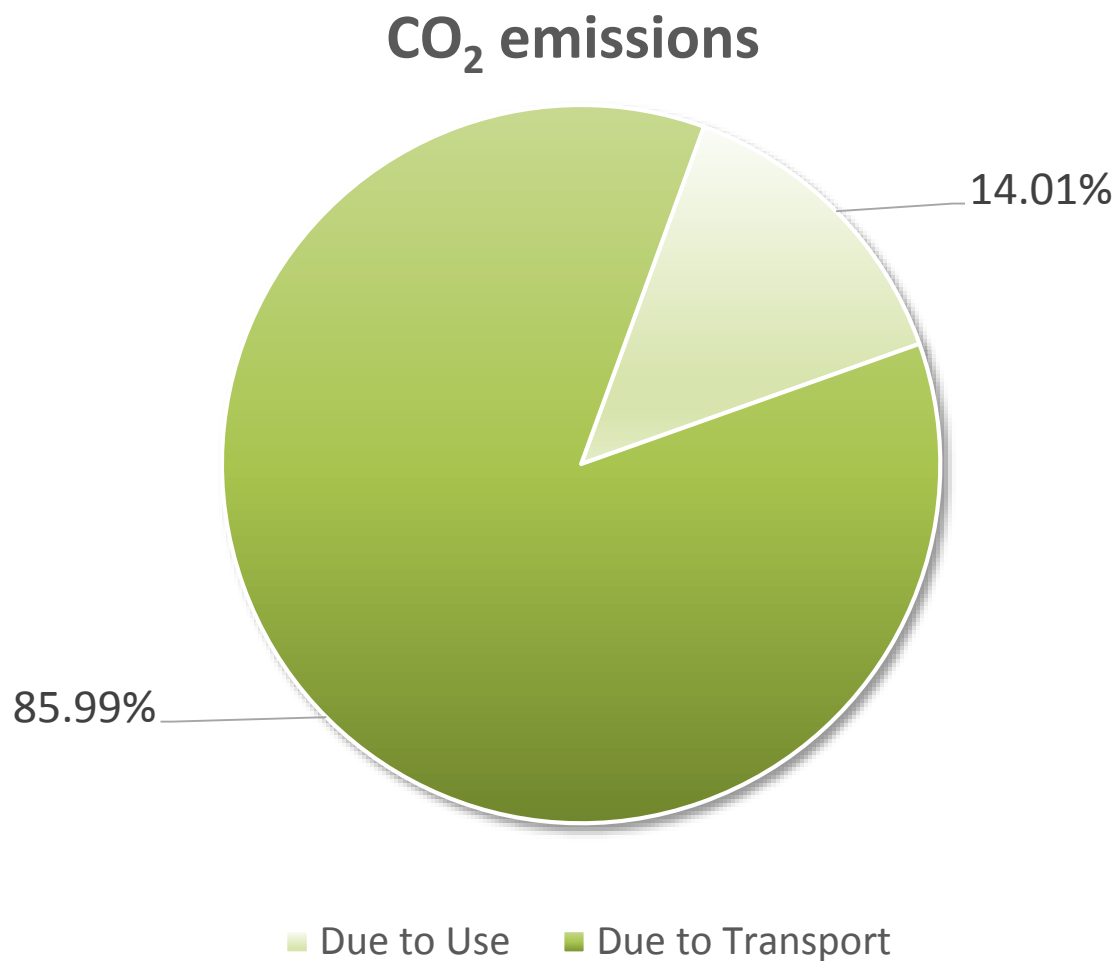
2011		
Kg CO ₂		TOTAL
Carbon Footprint due to Use	Carbon Footprint due to Transport	
4,716,481	28,938,875	33,655,356



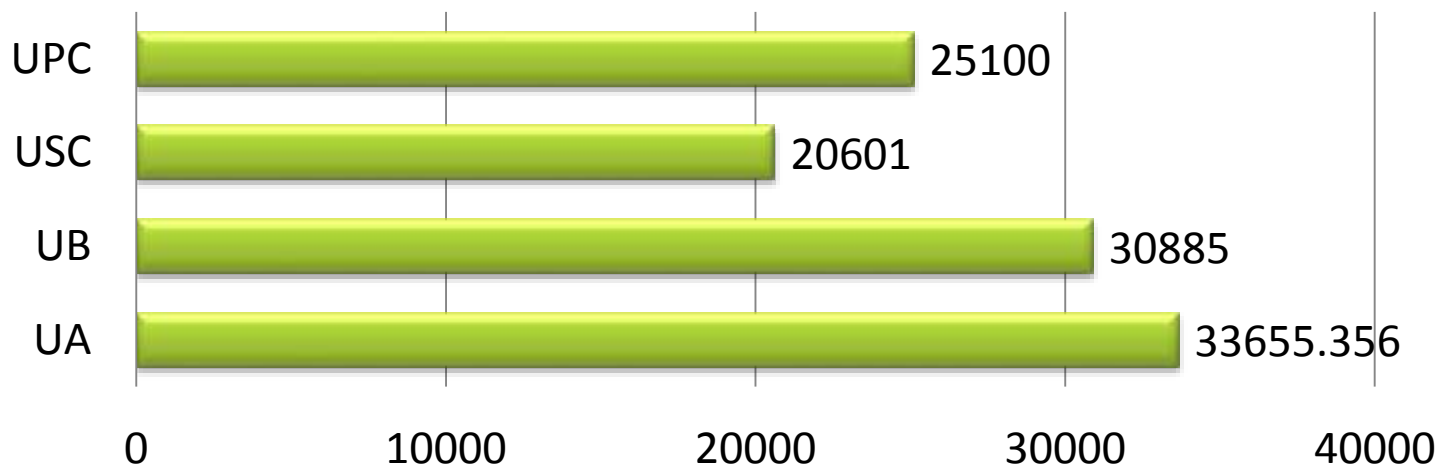
RATE PER USER

$$\text{Emissions per user} = \frac{33,655,356}{43,258} = 778.01 \text{ kg CO}_2 \text{ per year}$$

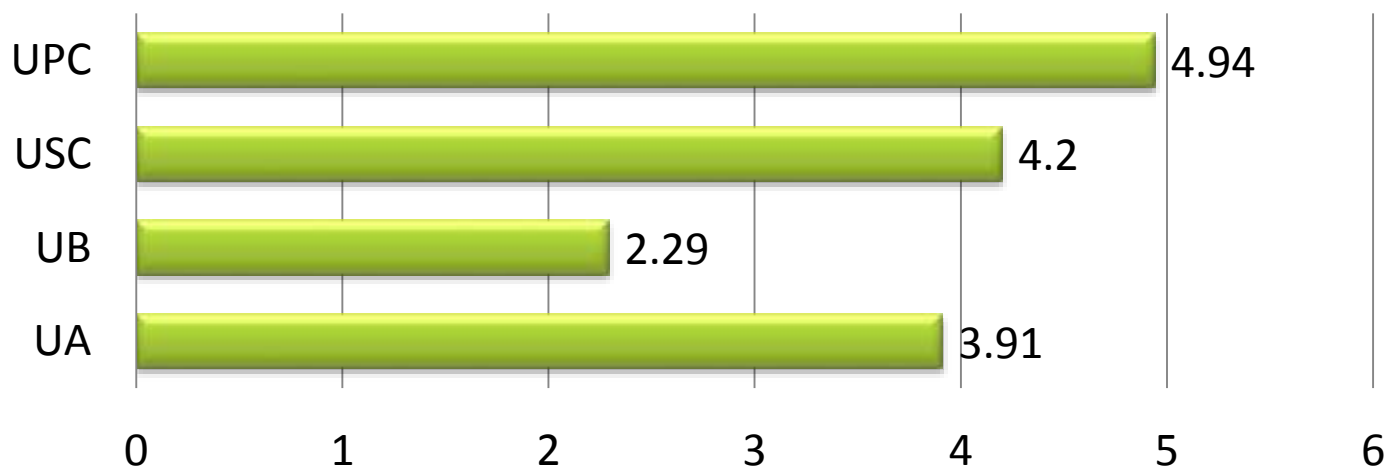
$$\text{Emissions per user} = \frac{778.01}{199} = 3.91 \text{ kg CO}_2 \text{ per day}$$



Tons of CO₂ emissions in a year



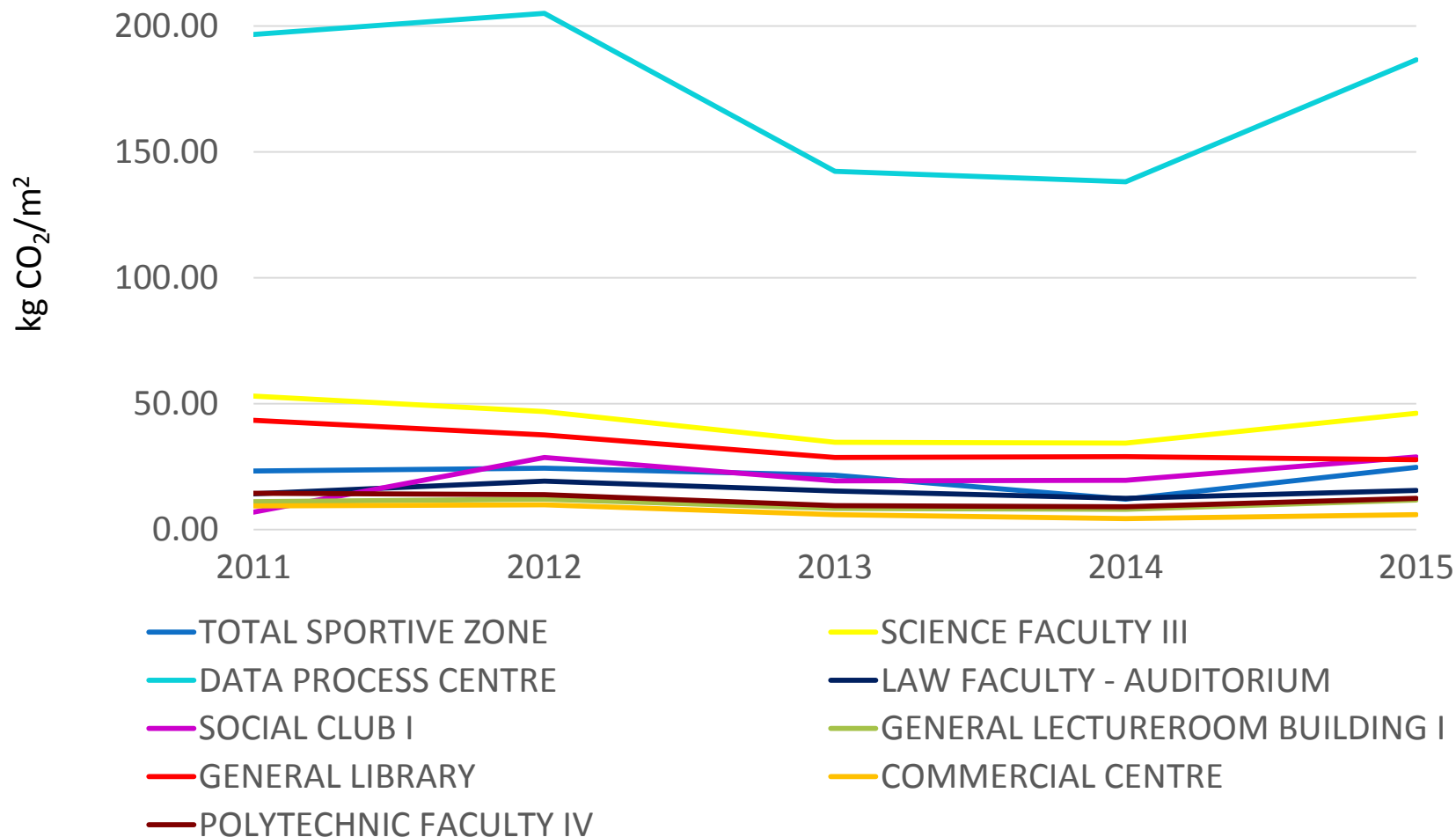
Tons of CO₂ emissions per user and day



TOTAL CARBON FOOTPRINT DUE TO USE



CO₂ EMISSIONS PER BUILDING IN USE



CONCLUSIONS

- ☐ Methodology established for carbon footprint estimation
 - Consideration of use and transport footprints
 - Aspects not considered: water consumption, paper or other consumables, waste management, etc.
- ☐ No apparent decrease of carbon footprint
 - Energy meters since 2010
 - It was reduced in 2013 and 2014. What happened?
 - No evolution comparison per user, only per m²
 - New buildings have been incorporated, not analysed
- ☐ No possibility to split per use inside the building
 - Global meters, not per zones or use
- ☐ Different uses in each building, difficult to compare
- ☐ Transport Report only in 2011
 - No later information. Change in bus lanes and new tram lane

FURTHER RESEARCH

- ☐ Evolution of carbon footprint along time
 - Per user and per m2
 - Consideration of new buildings
 - Extension to other campuses of the UA

- ☐ Consideration of other carbon footprints
 - Water consumption
 - Paper and other consumables
 - LCA of buildings

- ☐ Action Plan to reduce the carbon footprint in this campus
 - Reduction of energy consumption
 - Separate energy meters per use
 - Use of renewable energies
 - New Transport Study
 - Analysis of uses in each building
 - Energy efficiency, LED technology, Smart buildings

- ☐ Comparison to other universities. Network

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Thank you
for your attention



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