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An Input-Output Hybrid LCA of Timber Construction Products Produced in Ireland

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coillte

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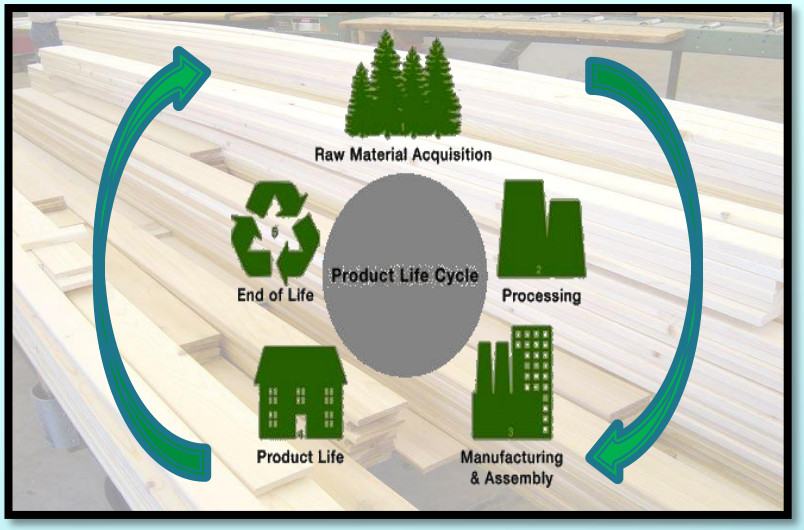
Introduction

- Sustainability & Climate Change
- Why Timber Materials
- Life Cycle Assessment
- Hybrid IO LCA Model
- Results to date
- Continued research



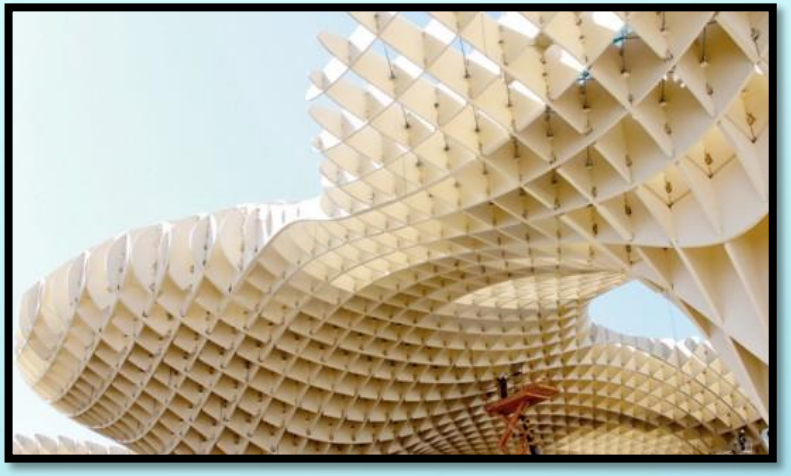
Why are Carbon Impacts Important?

- Climate Change.
- Under the Kyoto Agreement a 20% reduction CO_2 emissions by 2020 is required by Ireland.
- Buildings account for 36% of EU CO_2 emissions.

Why Wood products?

- The use of sustainable construction materials, such as wood, has a major role to play in reducing our carbon footprint.

- Only renewable major building material.
- Operational properties.
- Carbon Sequestration.
- Use of Bio-energy.

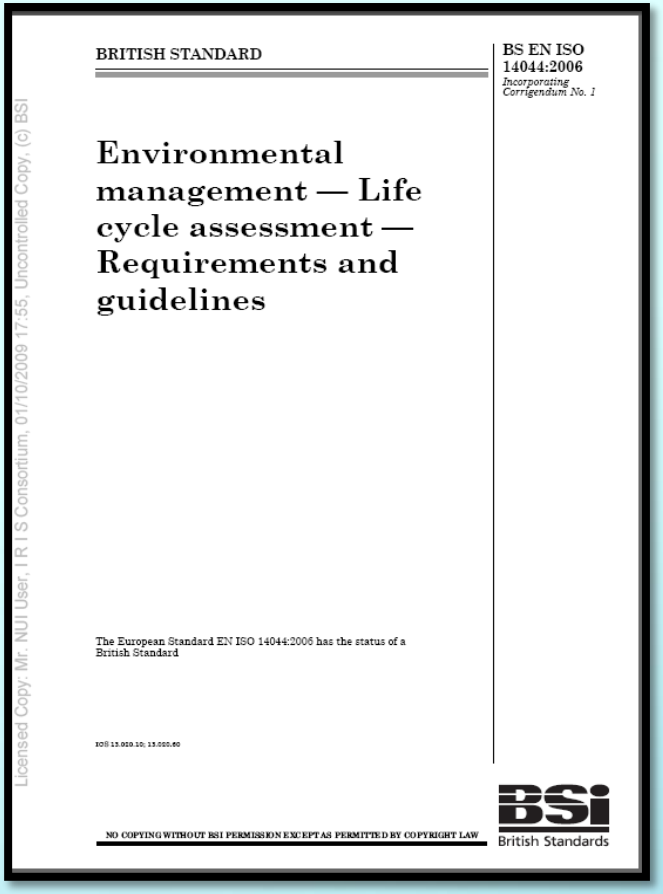


Green Washing

Implying a green attitude with no science behind statements.

Life Cycle Assessment (LCA)

- LCA involves analysing the total environmental impacts of a product over its whole life.
- LCA is defined by the ISO 14000 series.
- The four phases of an LCA include:
  - The Goal and Scope Phase
  - The Inventory Analysis
  - The Impact Assessment
  - The Interpretation Phase


BRITISH STANDARD

BS EN ISO 14044:2006
Incorporating Corrigendum No. 1

Environmental management — Life cycle assessment — Requirements and guidelines

The European Standard EN ISO 14044:2006 has the status of a British Standard

ICS 13.020.10; 13.020.60

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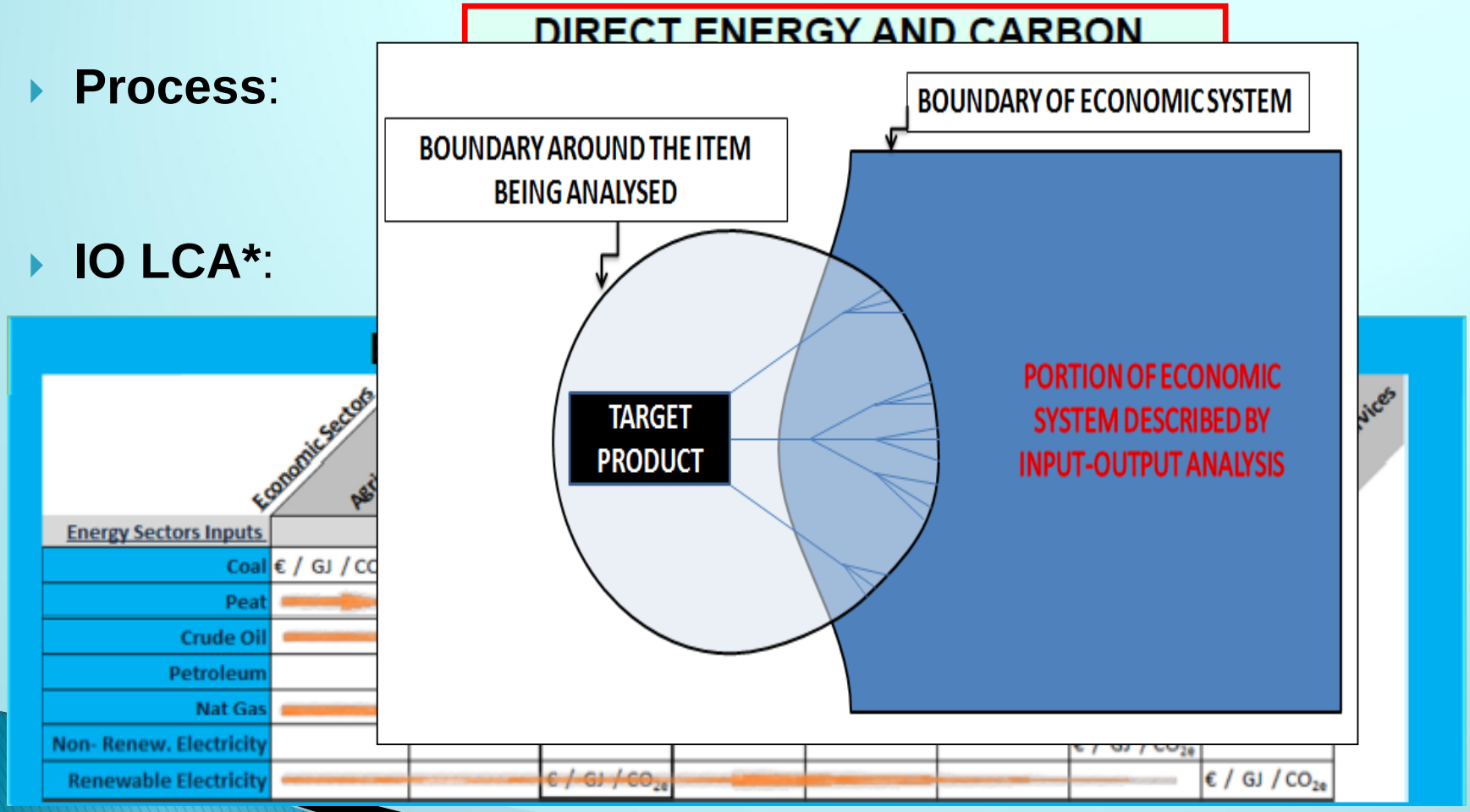
BSI British Standards

Life Cycle Assessment (LCA)

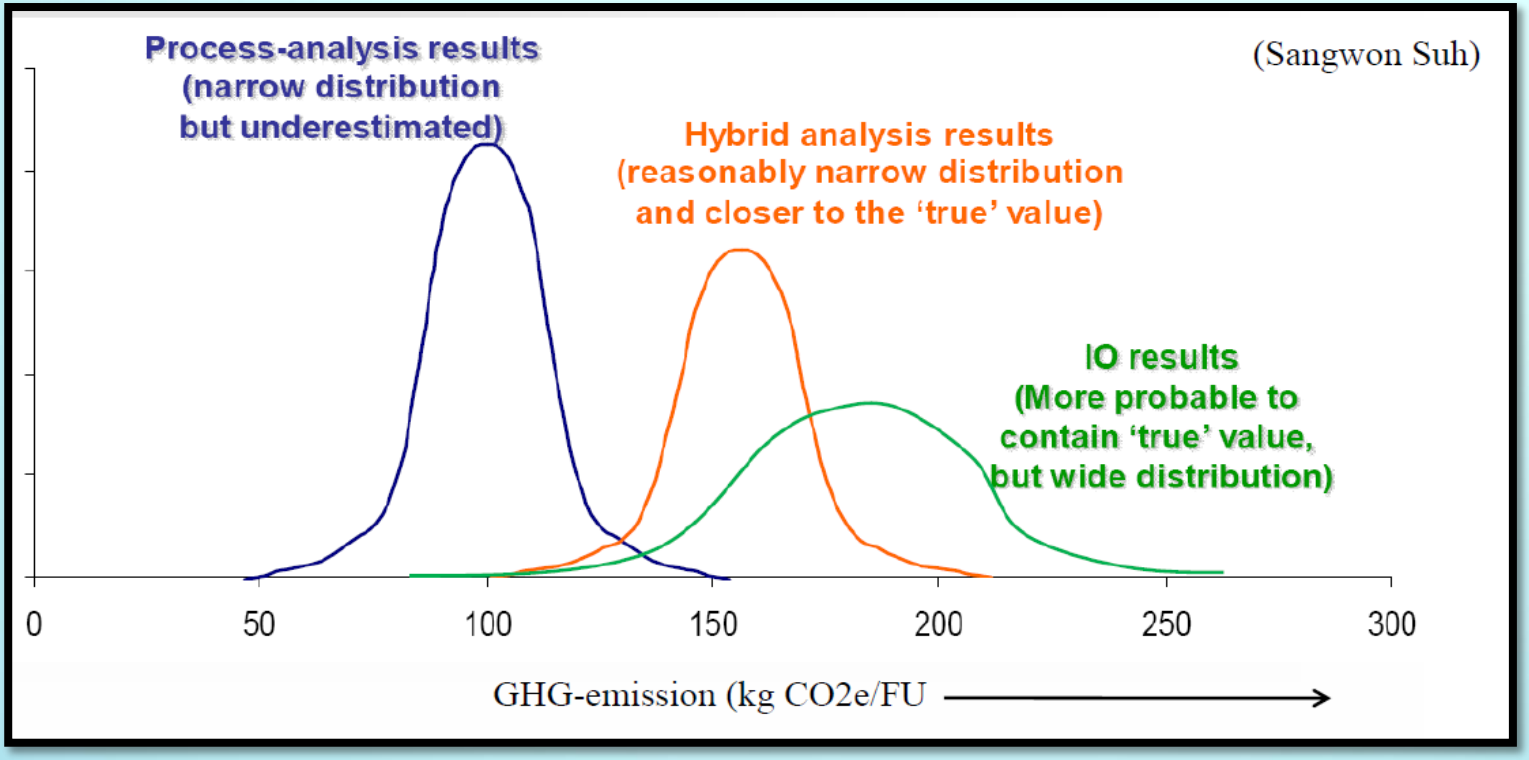
Types of LCA

- The three main types of LCA are:
- **Process**:
- **IO LCA***:



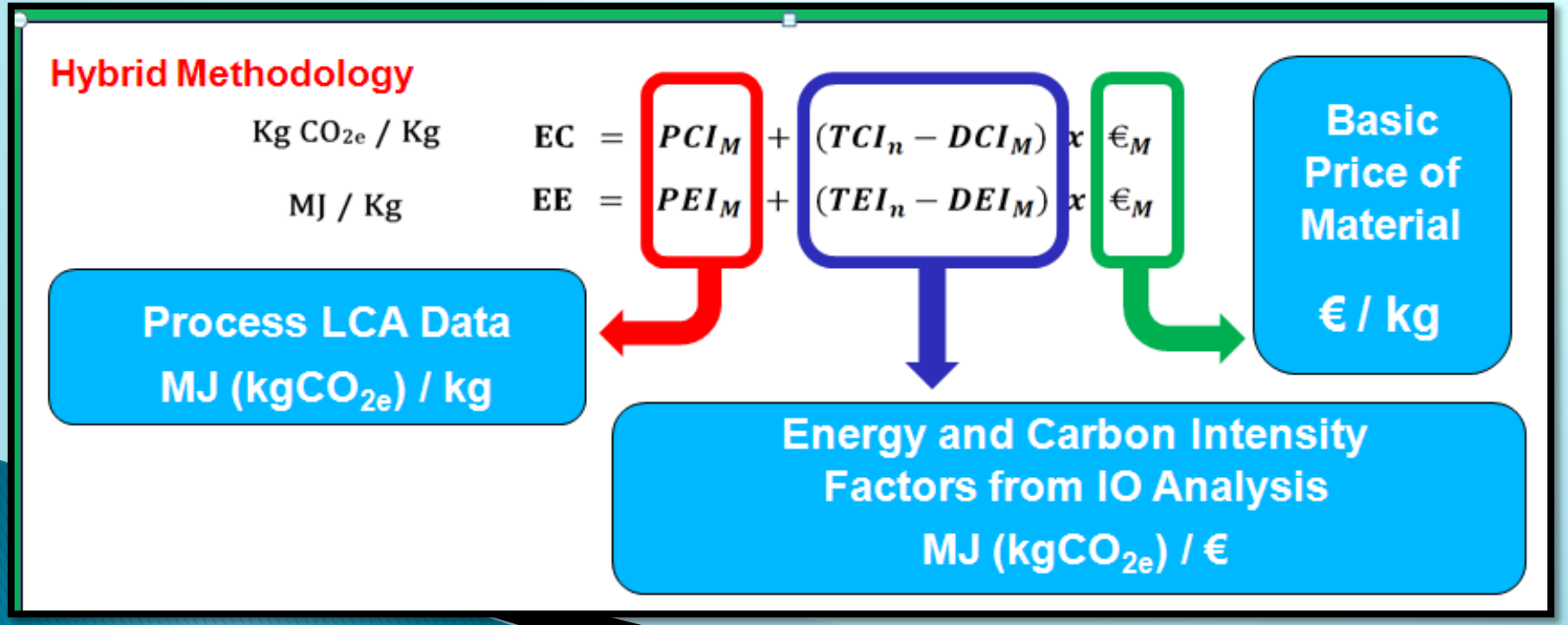
Types of LCA

- Underestimation vs loss of accuracy



Hybrid Methodology

- Uses process based input output hybrid analysis developed by Treloar (1998), Crawford (2009) and Goggins et al (2010).
- Combines both IO and process based LCA.

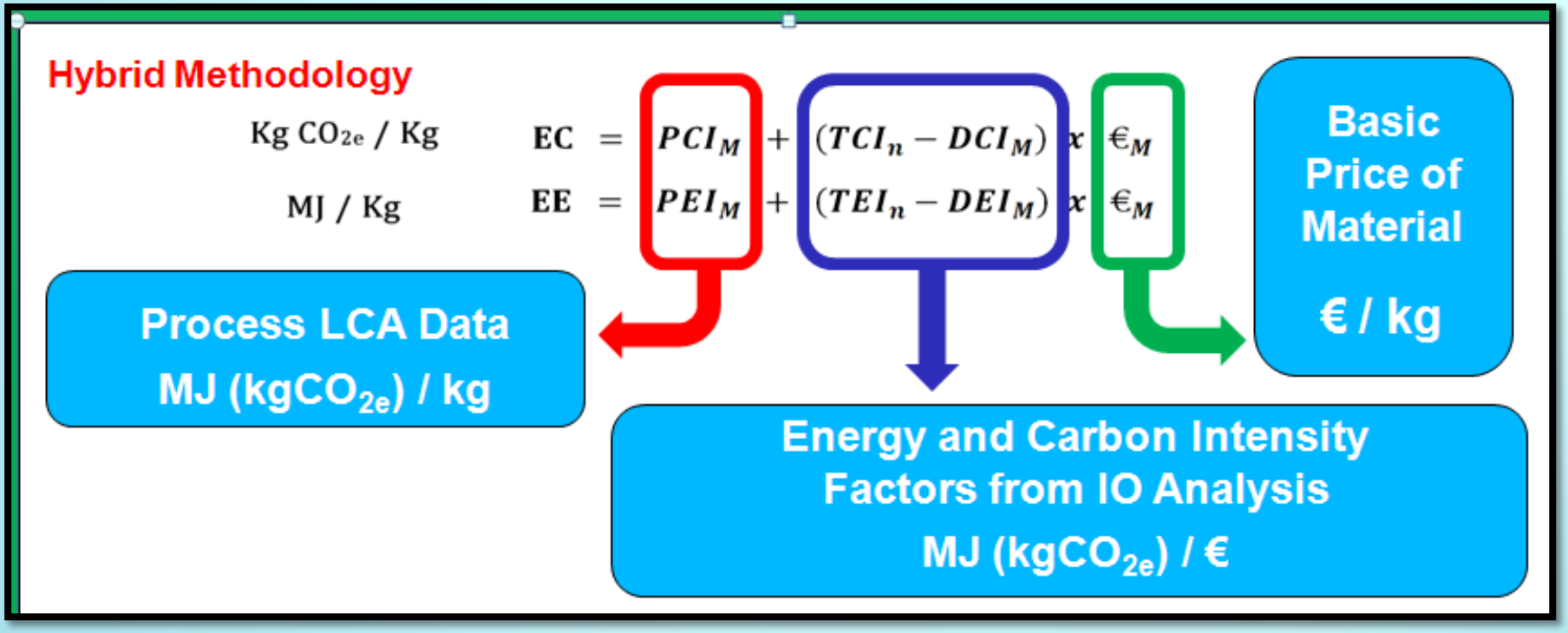


Hybrid Methodology

Process LCA data

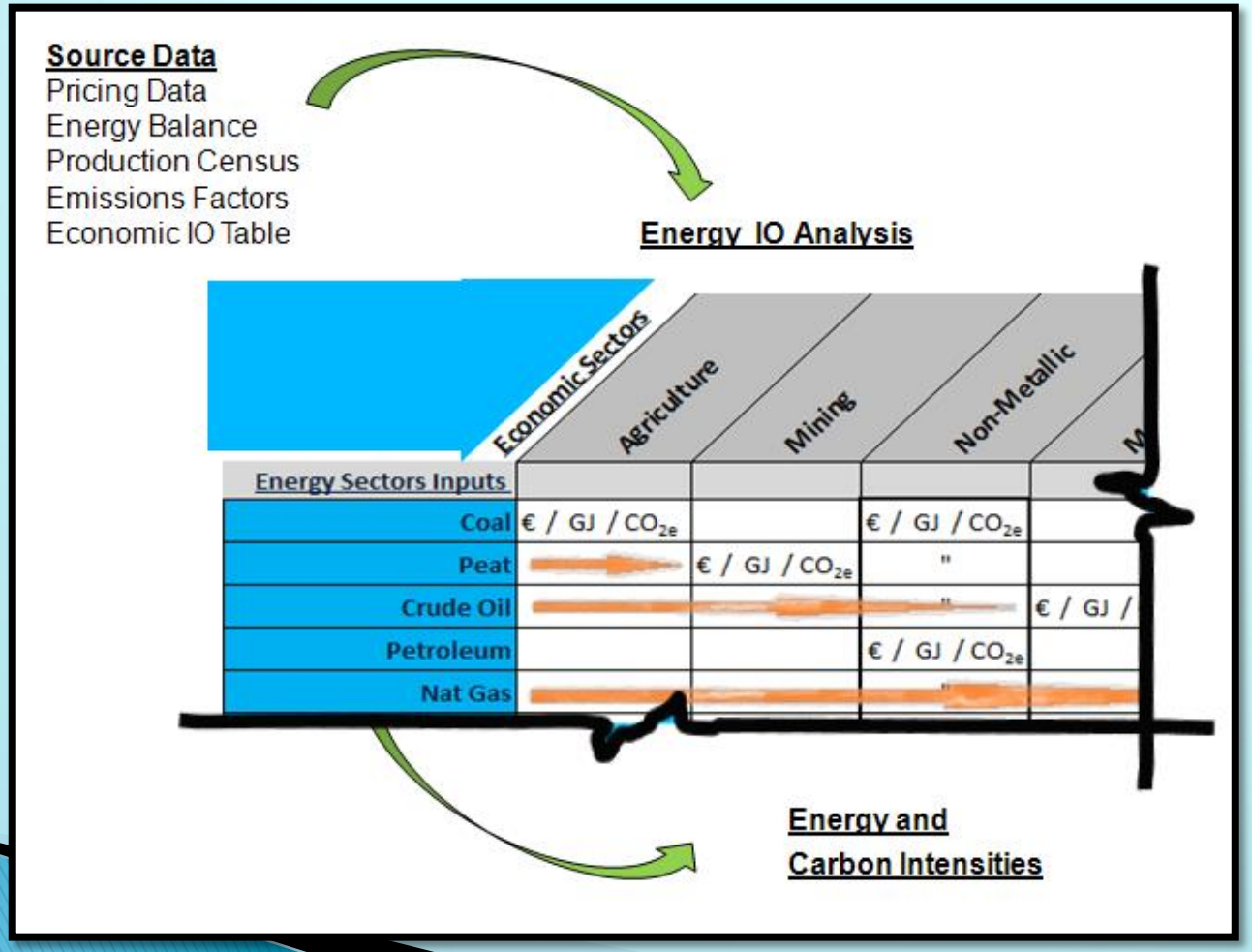
- As there is currently no existing data available for the Irish market.
- Embodied Carbon and Embodied Energy data is taken from the ICE database.
- Work is currently underway to quantify Irish specific process LCA data for construction wood products which would further improve the quality of the hybrid model.

Hybrid Methodology



Hybrid Methodology

- Energy and Carbon Intensities



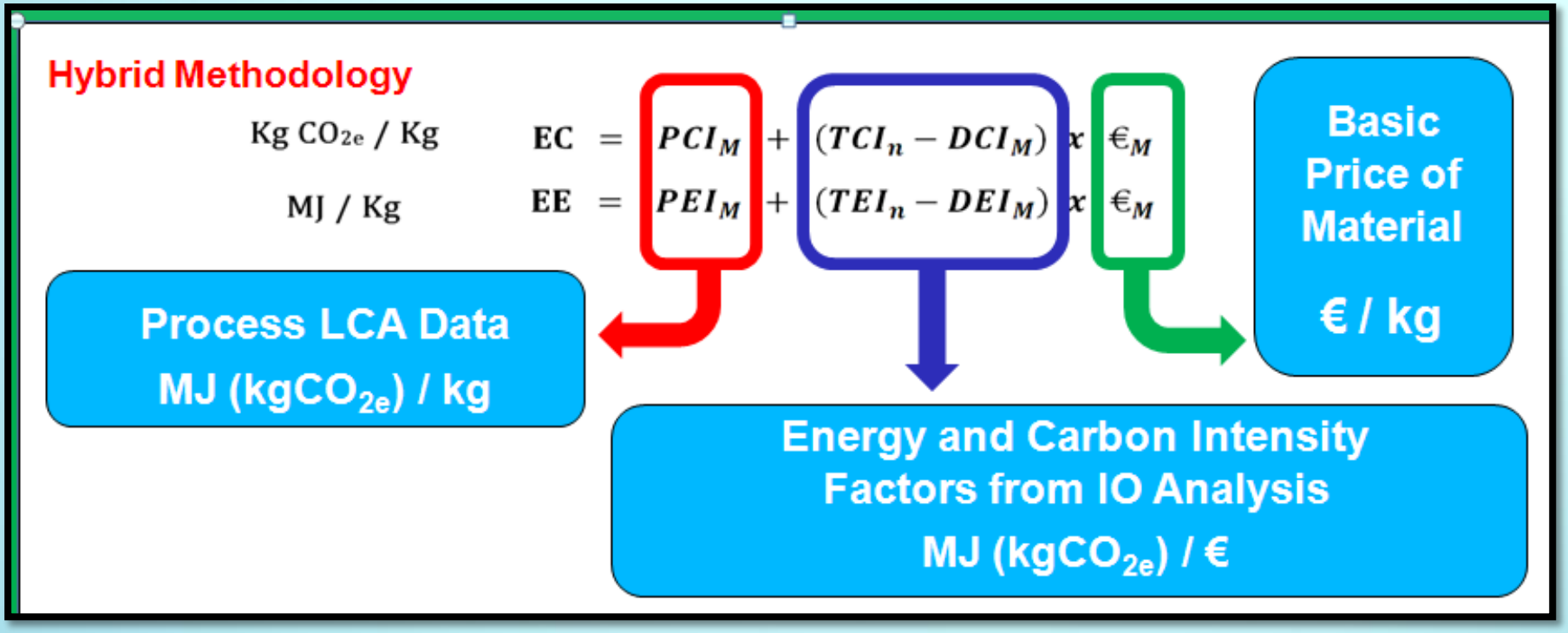
Hybrid Methodology

Formula for Total Carbon Emission Intensity (TCI_n):

$$TCI_n = \sum_{e=1}^{E} C_d x\ PEF\ x\ T_{rc}\ x\ T_e\ x\ ECO_{2e}$$

- C_d: Disaggregation Constants
- PEF: Primary Energy Factors
- T_{rc}: Direct and Total Energy Requirement Coefficients
- T_e: Average Energy Tariffs
- ECO_{2e}: Emission Factors

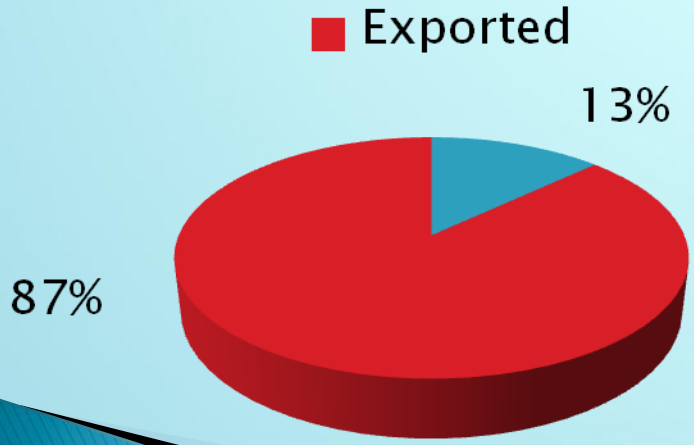
Hybrid Methodology



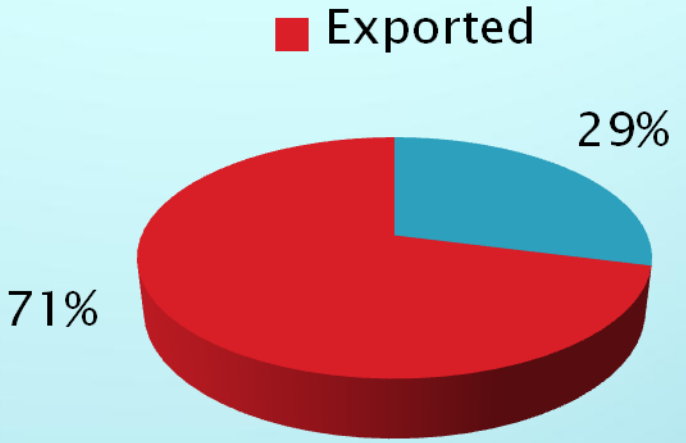
The Timber Industry in Ireland

- Capacity of Ireland's Forests is set to double by 2028 compared to 2010.
- 9 Companies form the core of the Irish sawmilling sector with 3 wood panel mills in operation.

Wood-Based Panel Products: 758,000m^3

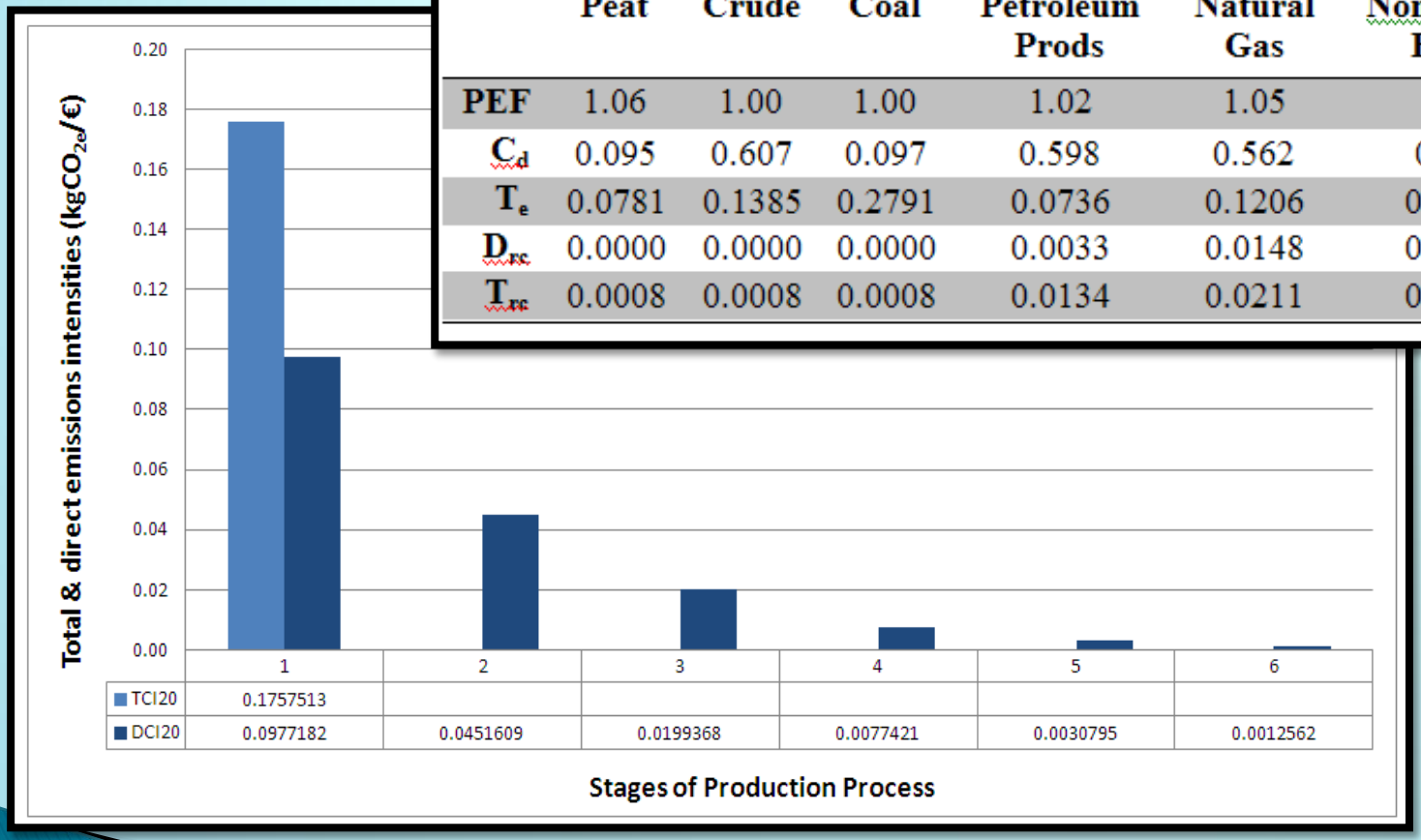


Sawn Timber Products: 879,000m^3



Results

	Peat	Crude	Coal	Petroleum Prods	Natural Gas	Non Renew Elect.	Renew Elect.
PEF	1.06	1.00	1.00	1.02	1.05	2.58	1.12
C_d	0.095	0.607	0.097	0.598	0.562	0.343	0.095
T_e	0.0781	0.1385	0.2791	0.0736	0.1206	0.0269	0.0960
D_{re}	0.0000	0.0000	0.0000	0.0033	0.0148	0.0148	0.0148
T_{re}	0.0008	0.0008	0.0008	0.0134	0.0211	0.0211	0.0211



Results

- Results of Sawn Timber

$EI = 7.4 + (2.91 - 1.70)x0.155$	$EI = 7.59\ MJ/kg$
$CI = 0.59 + (0.176 - 0.0977)\ x0.155$	$CI = 0.602\ kgCO2e\ /\ kg$

- Results of OSB

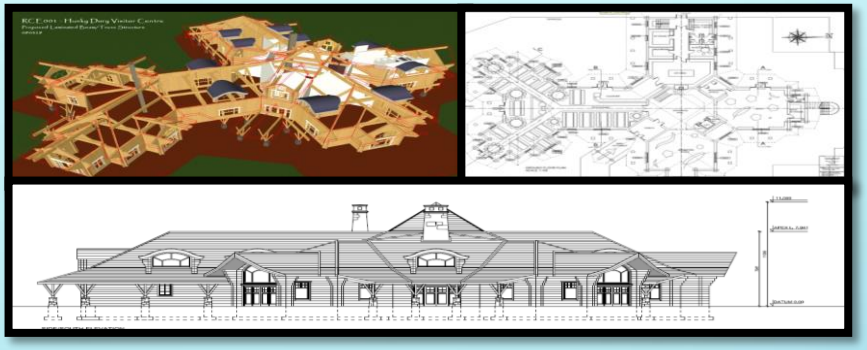
$EI = 14.95 + (2.91 - 1.70)x0.369$	$EI = 15.40\ MJ/kg$
$CI = 0.99 + (0.176 - 0.0977)\ x0.369$	$CI = 1.019\ kgCO2e\ /\ kg$

2005 Model

- Increase of 2 – 3 % for wood products
- Other materials as much as 40%

Current and Future Work

- Update model to recently published 2011 IO tables.
- Incorporate Irish specific sawn timber and OSB process LCA data.
- Apply results to existing and planned timber constructed structures in Ireland.
- Develop web based portal to allow public access to model.



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Thank you for your Time

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