

Reducing life cycle impacts of the existing Irish housing stock: A combination of process data and input-output analysis

Albert Famuyibo

School of Civil and Building Services Engineering

Supervisors:

Dr. Aidan Duffy

Dr Paul Strachan

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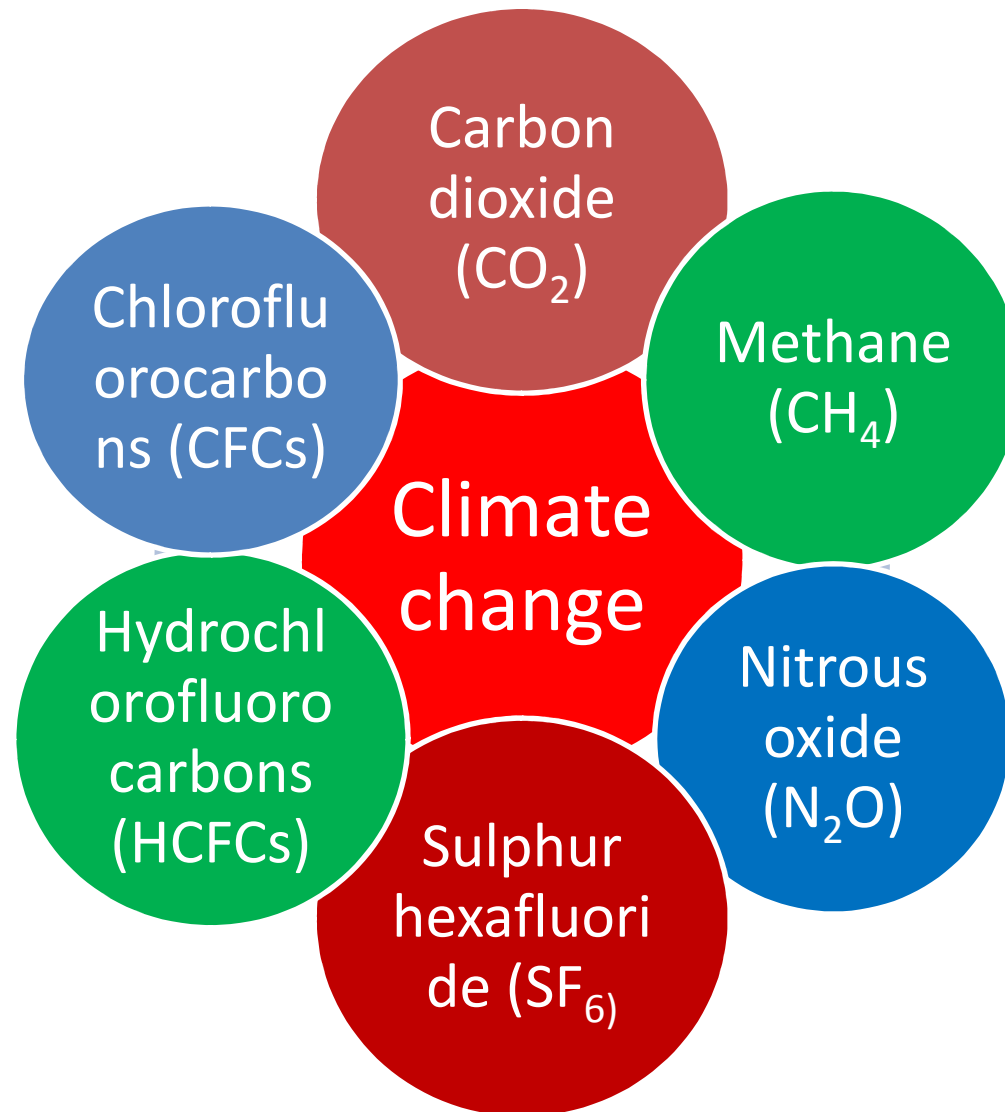


Outline of presentation

- Impacts of human activities
- Aims and objectives of study
- Existing stock modelling methodologies
- Data sources for domestic and imported emissions and resource uses
- Methodology for linking process analysis and economic data
- Results of analysis
- Interim conclusions and policy recommendations



Impacts of human activities



Research aims and objectives

- **Aims of study:**

- Develop a model for a 'true and fair' view of GHG emissions of retrofitting the existing Irish housing.
 - A production and consumption perspective
 - Primary energy and primary energy –related GHG emissions across life cycle phases
 - A combination of process data and I/O analysis

- **Objectives:**

- Establish and review previous studies
- identify the impact of retrofitting on life cycle performance of the housing stock
- Identify options that provide the most reduction of emissions at the least cost.
- Identify the life cycle proportion of total emissions of interventions induced by imports and net-domestic production
- Make policy recommendations



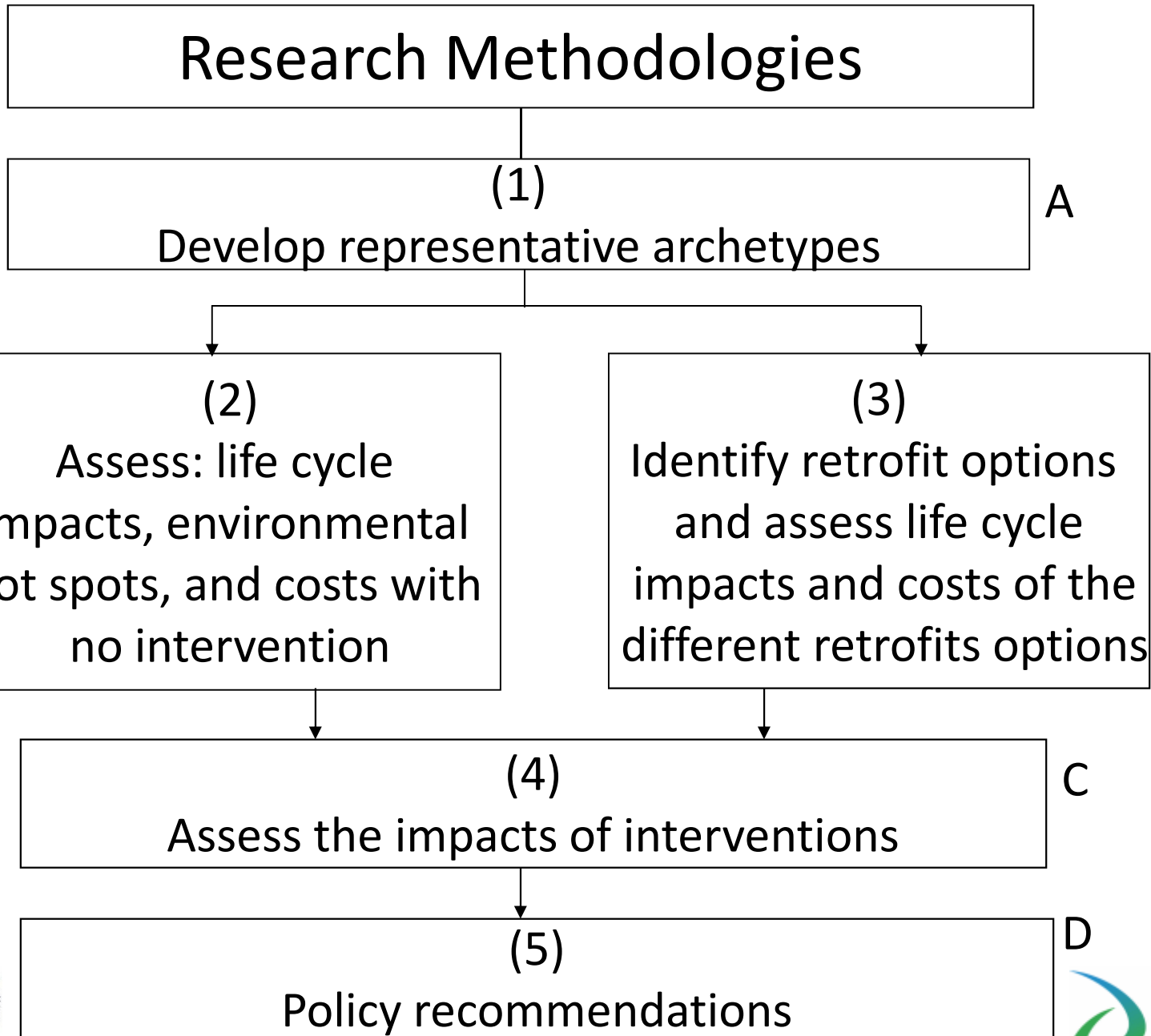
Literature review

- Existing modelling methodologies –
 - Top-down models –operate at aggregated levels
 - bottom-up (archetype approach) models – operate at disaggregated levels
- Existing few Irish studies focus on:
 - end-use energy and CO₂ emissions savings rather than life cycle impacts
 - domestic emissions
- Present study
 - investigated primary energy-related emissions across life cycle phases due to et domestic production and imports
 - directed towards experts from environmental policy
 - Imports represent our shared responsibility for the global environmental situation and Irish dependence on natural resources abroad

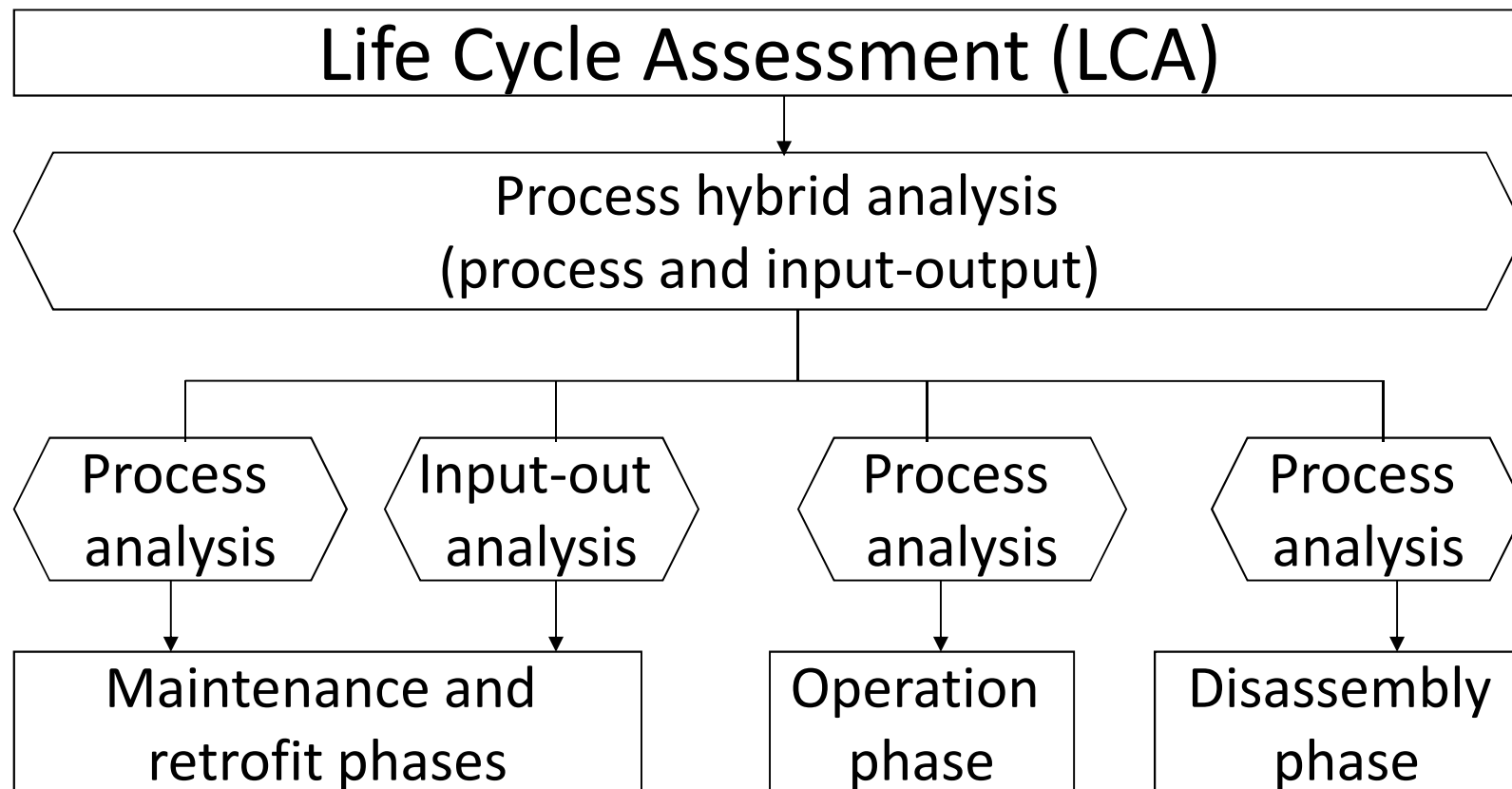


Data sources

- **Data sources: Process analysis:**
 - Housing database – the Energy Performance Survey of Irish Housing (EPSIH, 2005)
 - GaBi 4.4 data
 - PRODCOM survey data from Central Statistics Office [CSO] (kg/a, m³/a, and m²/a).
 - CSO Import and export trade data – year 2005
- **Data sources: I/O analysis:**
 - Matching physical units of materials quantities with monetary units of input-output.
 - Irish construction direct sub-sector embodied CO₂-eq intensity.

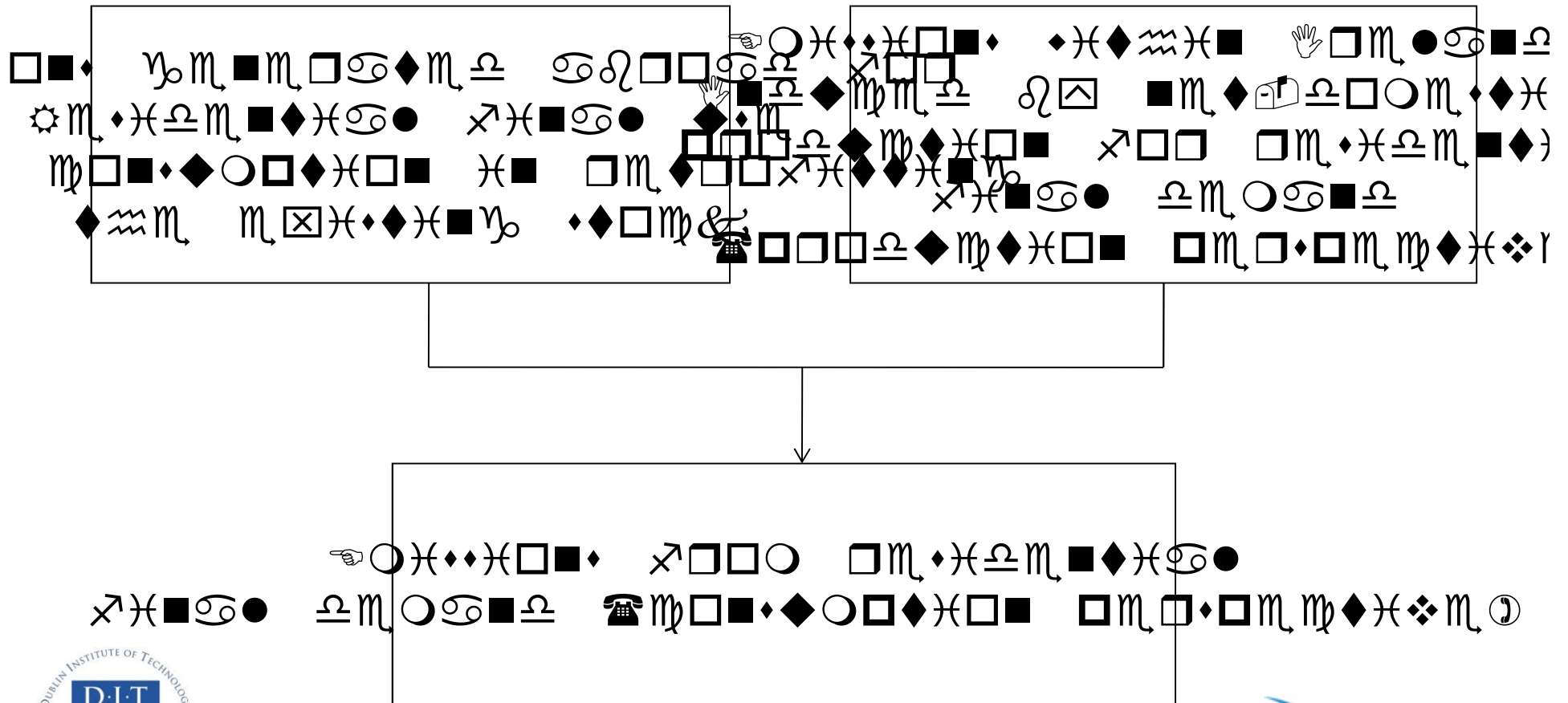


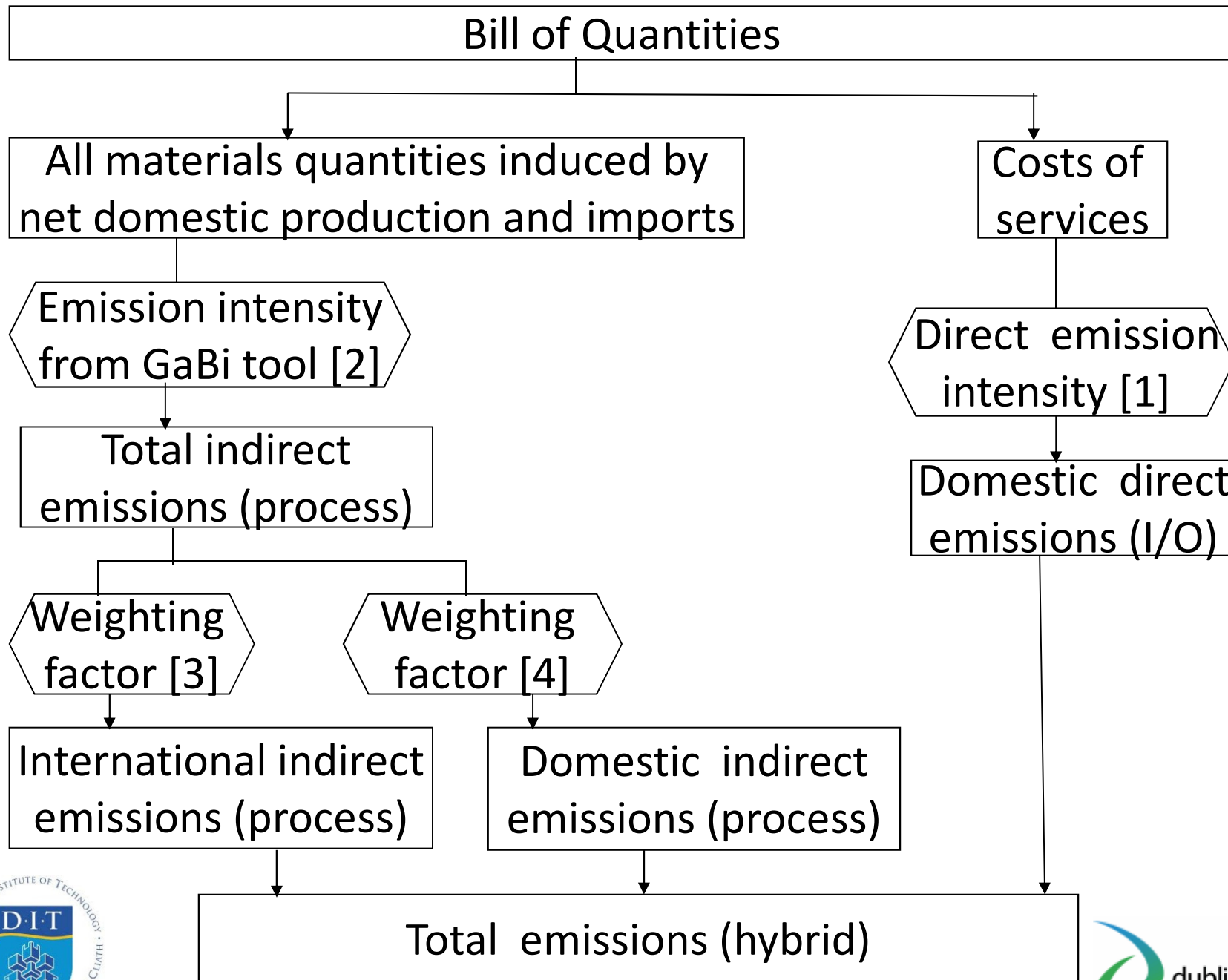
Combination of methods and data



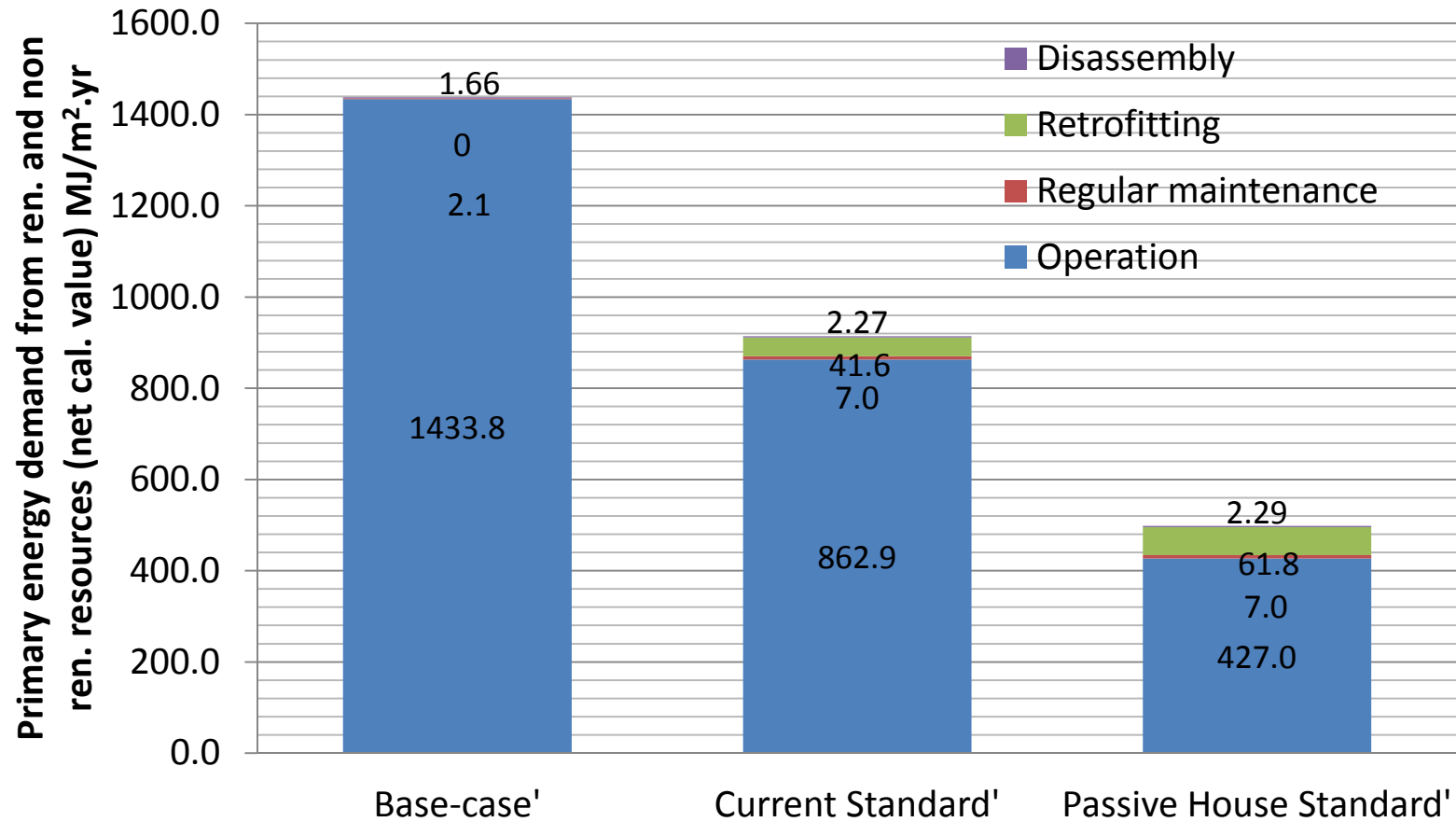
Several data sources are combined

Emissions in the production and consumption perspective – accounting method based on residence principle of national accounts (input-output tables)

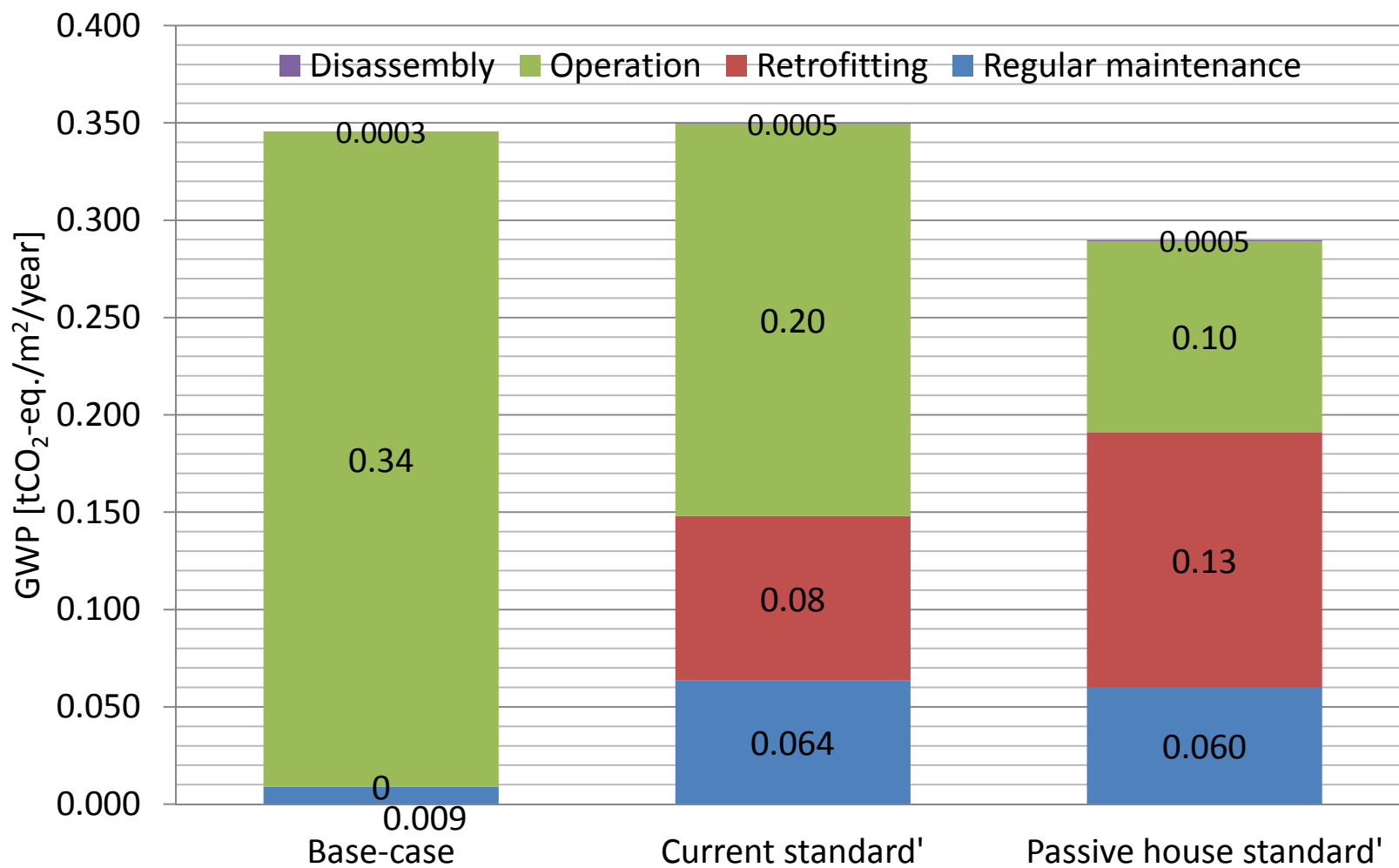




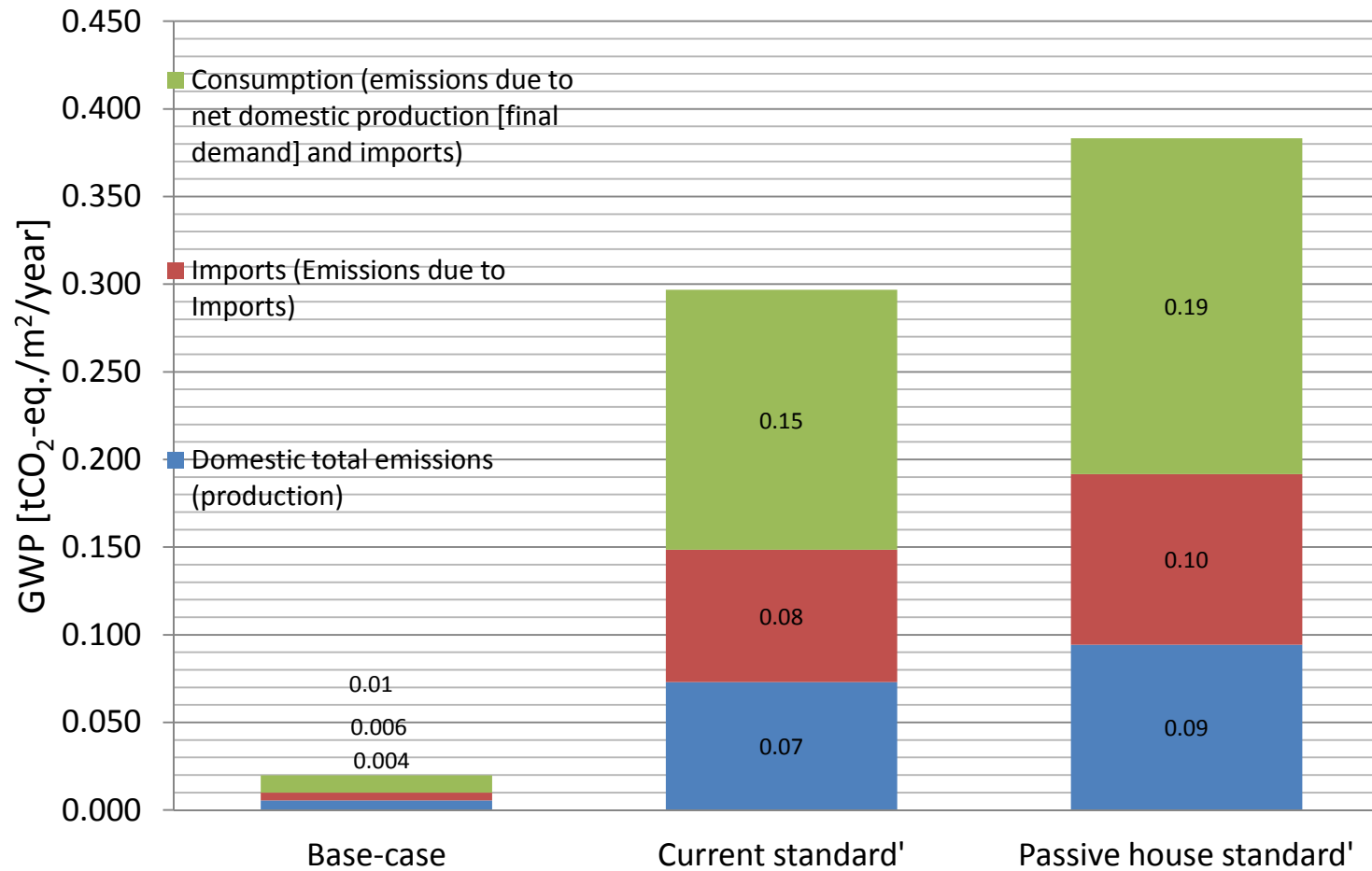
Primary energy use across life cycle phases



Emissions across life cycle phases



Total Balance



Imports cause 48% (average) of emissions due to retrofitting

Interim conclusions and recommendations

- **Key findings:**

- Current standard scenario indicates the highest values of life cycle impacts
- Use phase dominates the impacts across the three scenarios considered
- As operation energy reduces for both current and passive house standards, embodied energy increases.
- For all scenarios, regular maintenance remains low but has the potential to become significant with age
- The disassembly phase is of minor relevance for all scenarios
- Increased use of insulation and higher integration of renewables significantly reduces operation energy for the passive house scenario but also incurs additional cost, embodied energy and emissions.

Slide 15 continued

- Draught proofing and loft insulation represents the most cost effective measure
- Base-case consists 47% imported emissions
- Current standard consists 50% imported emissions
- Passive house standard consists 39%
- Imports represent our shared responsibility for the global environmental situation and Irish dependence on natural resources abroad.
- **Benefits of the present methodology**
- Potential harmonisation of methodology on a global scale
- The analysis considers total emissions (life cycle approach) of retrofitting and not limited to domestic emissions.

Slide 16 continued

- This is beneficial to Ireland because of the importance of foreign trade
- Provision of a database for the calculation of the emissions of retrofitting within the residential sector
- Performance measurement – a comparison of emissions in production and consumption for a given period.
- Study provides relevant information that requires decisions for input – political/consumption decisions (especially on environmental policy).
- **Further research:**
- Further research to improve the database and possible harmonization on global scale

END of PRESENTATION.

