We have to consume biodiesel but… which one is better to mitigate climate

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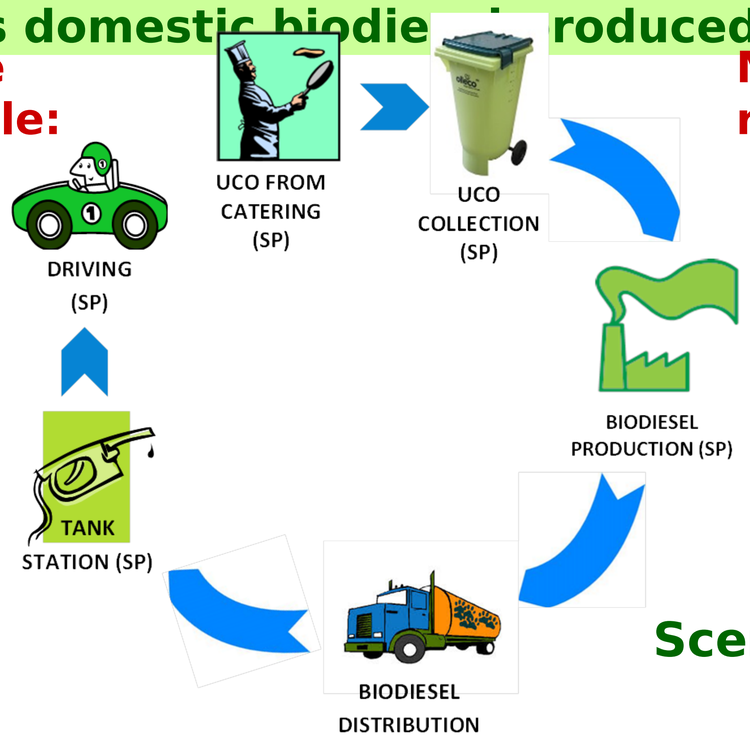
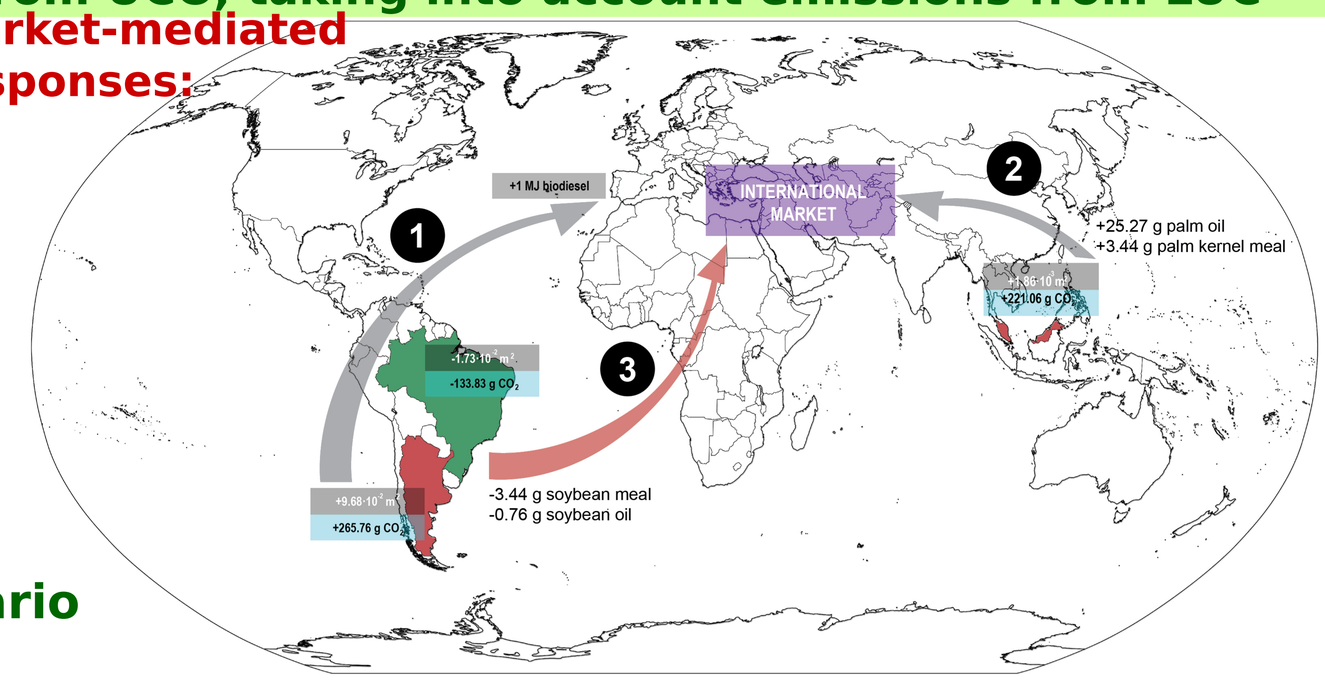
- Increasing the worldwide demand for biofuels will require a significant amount of biomass, also inducing major **Land Use Change (LUC)** across the globe
- To compare biofuel alternatives, impacts must be estimated over the entire life cycle: **Life Cycle Assessment (LCA) methodology**
- *General goal*: to estimate the **economic and environmental effects of changing biodiesel consumption patterns in Spain due to EU biofuel policies** (e.g. Directive 2009/28/CE), by applying different approaches
- *Specific goals and research stages*:
  - to carry out an environmental and economic assessment of a system for producing biodiesel from Used Cooking Oil (UCO), by using **attributional LCA**
  - to assess two current alternatives for biodiesel consumption in the Spanish transport sector, by using **consequential LCA** to calculate **emissions from Indirect LUC (i-LUC)** (case study shown in the following section)
  - to evaluate the environmental and economic implications of the whole biodiesel production chain in Spain, considering different feedstocks, by **combining LCA and Partial Equilibrium (PE)**

Case study: Comparison of two biodiesel pathways, soybean biodiesel imported from Argentina into Spain
vs domestic biodiesel produced from UCO, taking into account emissions from LUC

Life Cycle:

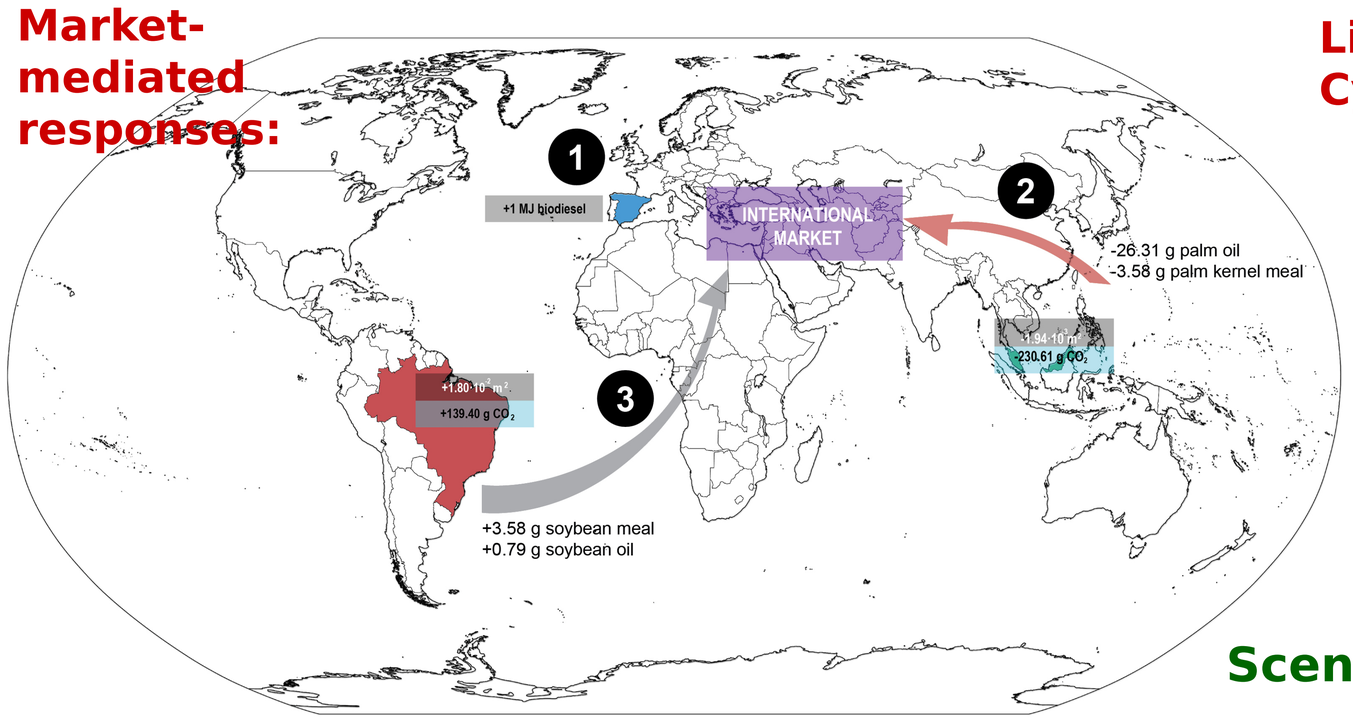


Market-mediated responses:

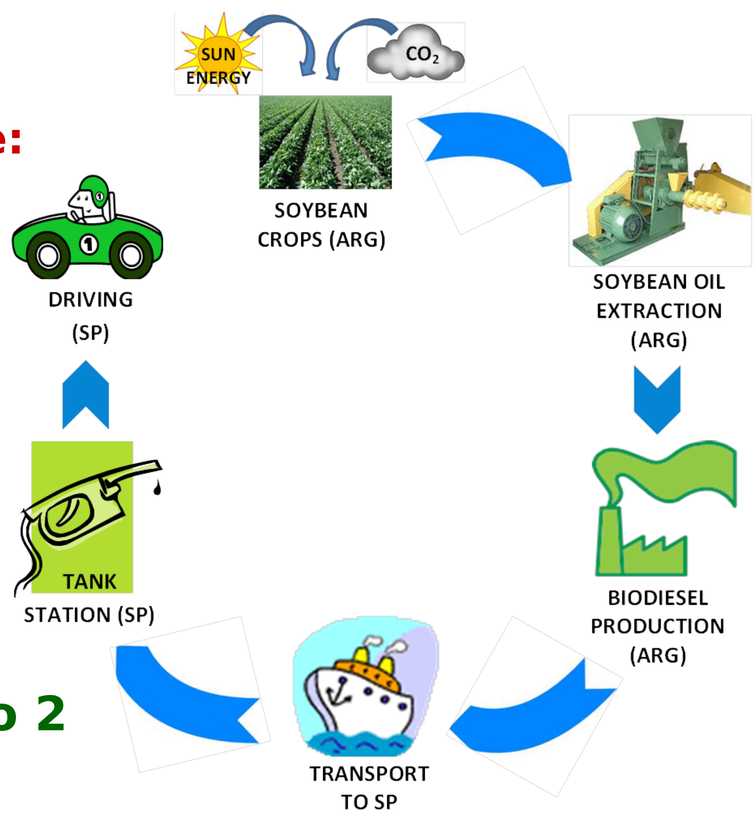


Scenario 1

Market-mediated responses:



Life Cycle:



Scenario 2

CONCLUSIONS AND FURTHER WORK:

- The EU is debating a proposal to start the **transition to biofuels that deliver substantial GHG savings**, known as "advanced biofuels", and the Member States must report i-LUC emissions from the biofuels they produce
- The methodologies used in the present dissertation allow determining the GHG emissions (and other impacts) associated to different biofuel alternatives for fulfilling the EU requirements and thus can **influence decision-making processes**
- **Economic modeling** is a robust tool to quantify indirect effects of biofuel policies since it takes into account markets performance, although it is not widely used in LCA
- Integrating these methodologies into the LCA framework offers the possibility to carry out an **economic optimization and to apply multicriteria decision methods while quantifying environmental impacts:** this is the main goal of our research