SYDDANSK UNIVERSITET

Life Cycle Assessment of renewable energy scenarios for Denmark

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Outline

- Context and background
- Overall goal of the project
- Outcomes

Context

- **100 % RE system for Denmark in 2050**
- **Several alternatives, but 2 main sources :**
  - Wind power (onshore and offshore)
  - Biomass resources
- **Biomass : Easily storable, versatility, not dependent on the wind blowing**
- **Biomass-for-energy is an integral component of a 100 % RE system for Denmark**

Renewable...but not unlimited in supp

- ✓Land is limited
- ✓Competition
- ✓Pressure to increase

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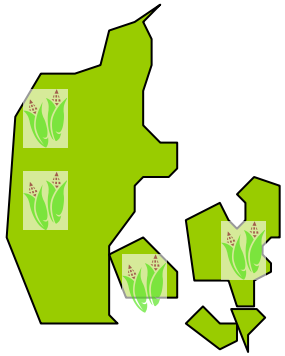
Agricultural Biomass



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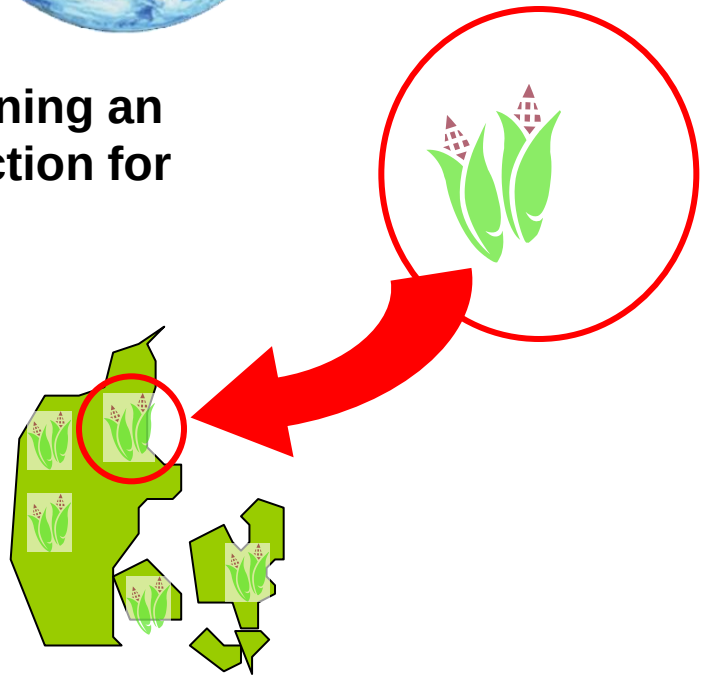
What are the repercussions of turning an extra land into agricultural production for energy purposes in Denmark?



Some questions...

What are the repercussions of turning an extra land into agricultural production for energy purposes in Denmark?

In Denmark?

- **Land type (C?)**
- **Where?**
- **Crop type?**
- **Agricultural practices?**

Direct environmental impacts

Some questions...

Outside Denmark?

- Land type (C?)
- Where?
- How?
- How much is converted?
- Crop affected?

Indirect environmental impacts

What are the repercussions of turning an extra land into agricultural production for energy purposes in Denmark?

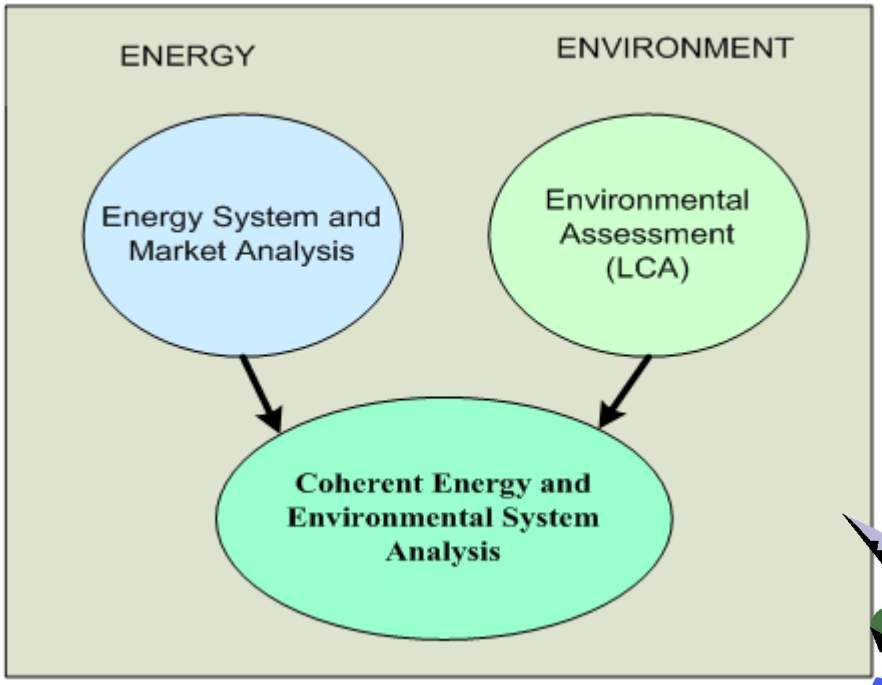
In Denmark?

- Land type (C?)
- Where?
- Crop type?
- Agricultural practices?

Direct environmental impacts

Some tools...

Highlighting the pathway through a 100 % RE system having the lowest possible environmental impacts



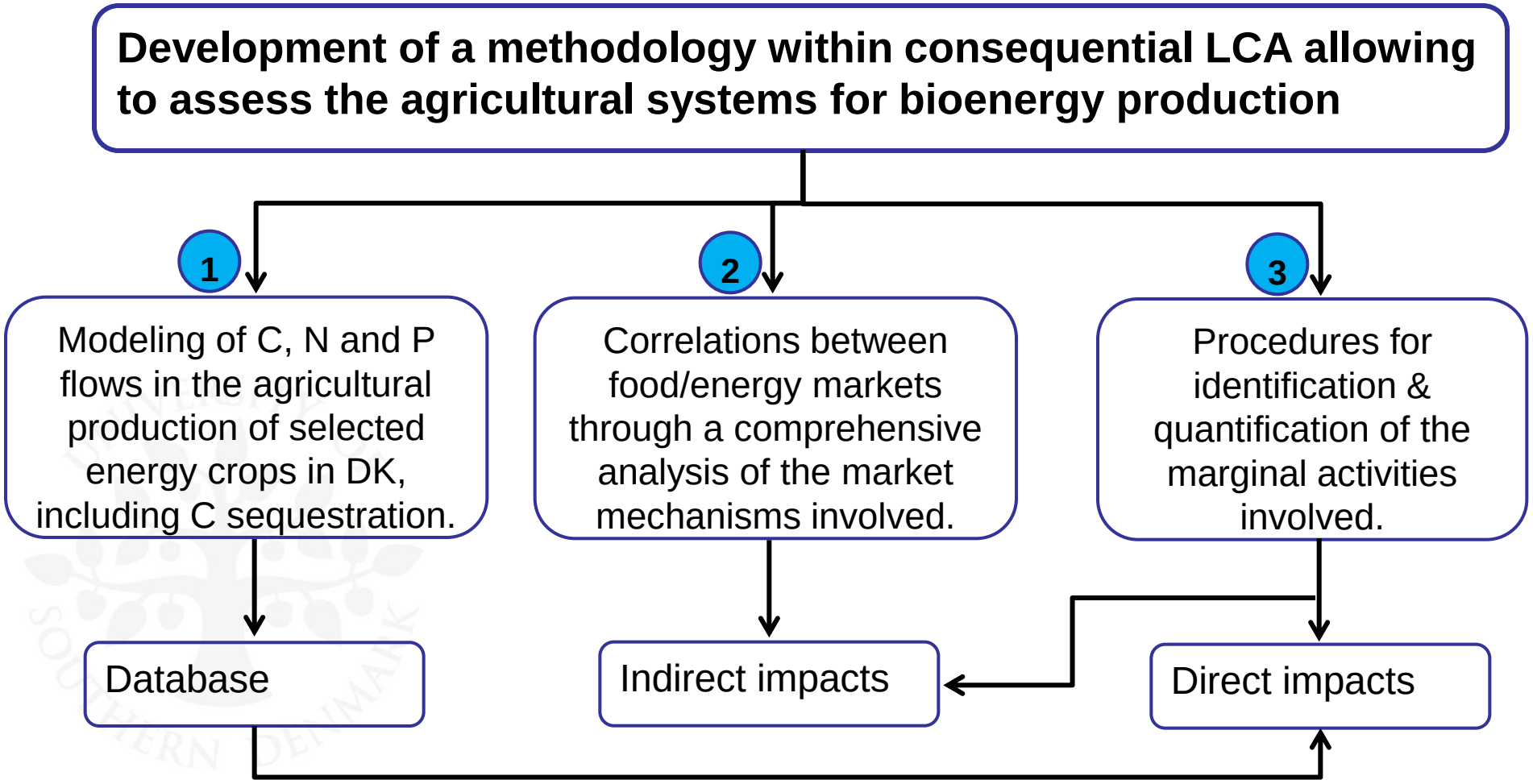
Some weaknesses...

- Indirect land use changes (iLUC)
- Quantification of CO_2 emissions related to LUC
- Uncertainties (CO_2 and N_2O)
- Identification of marginals processes and activities (electricity, fertilizer, crop, land-type, etc.)
- A poor consideration of correlations between food and energy markets (What is the resulting chain of events and what are the key variables?)

Overall goal of this PhD project

- **Assessing, through consequential LCA, the environmental significance of changes in bioenergy production from agricultural origin in Denmark in a context of Denmark using 100 % RE in 2050.**

Outcomes


Development of a methodology within consequential LCA allowing to assess the agricultural systems for bioenergy production
1
2
3
Modeling of C, N and P flows in the agricultural production of selected energy crops in DK, including C sequestration.
Correlations between food/energy markets through a comprehensive analysis of the market mechanisms involved.
Procedures for identification & quantification of the marginal activities involved.
Database
Indirect impacts
Direct impacts

Questions?
Comments?