

Environmental Effects and Energy Balance of Bio-energy Production System: a Review

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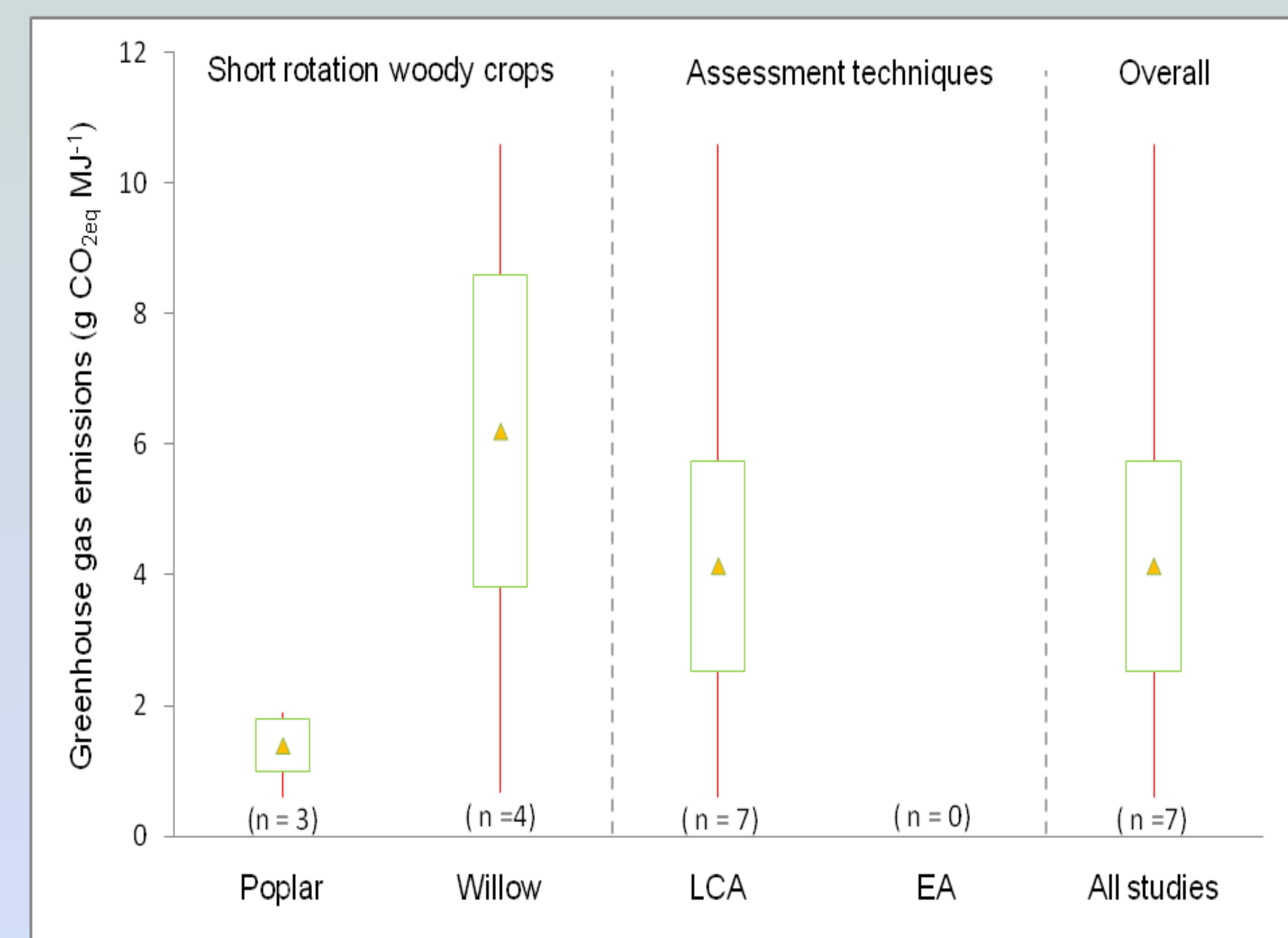
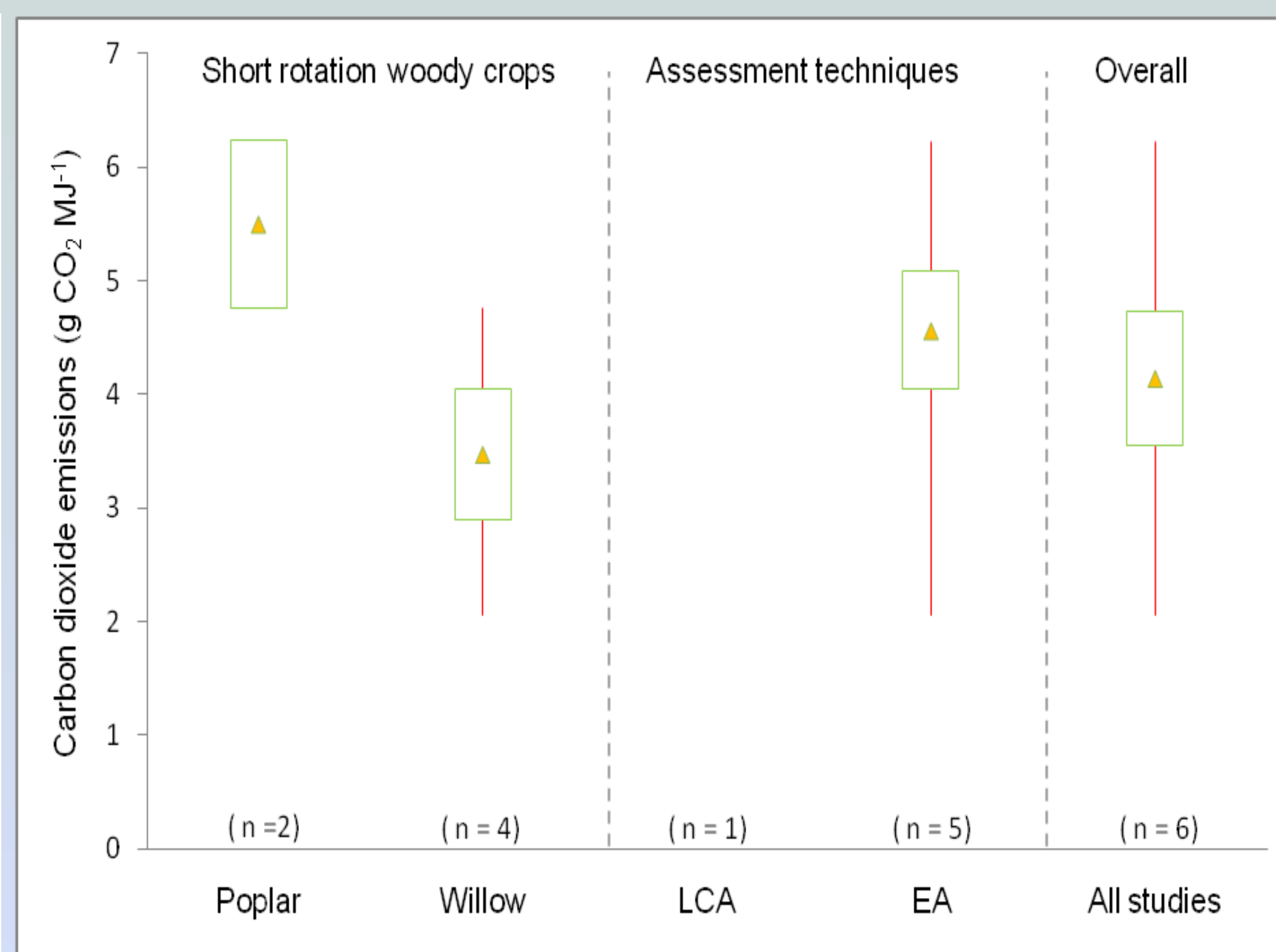
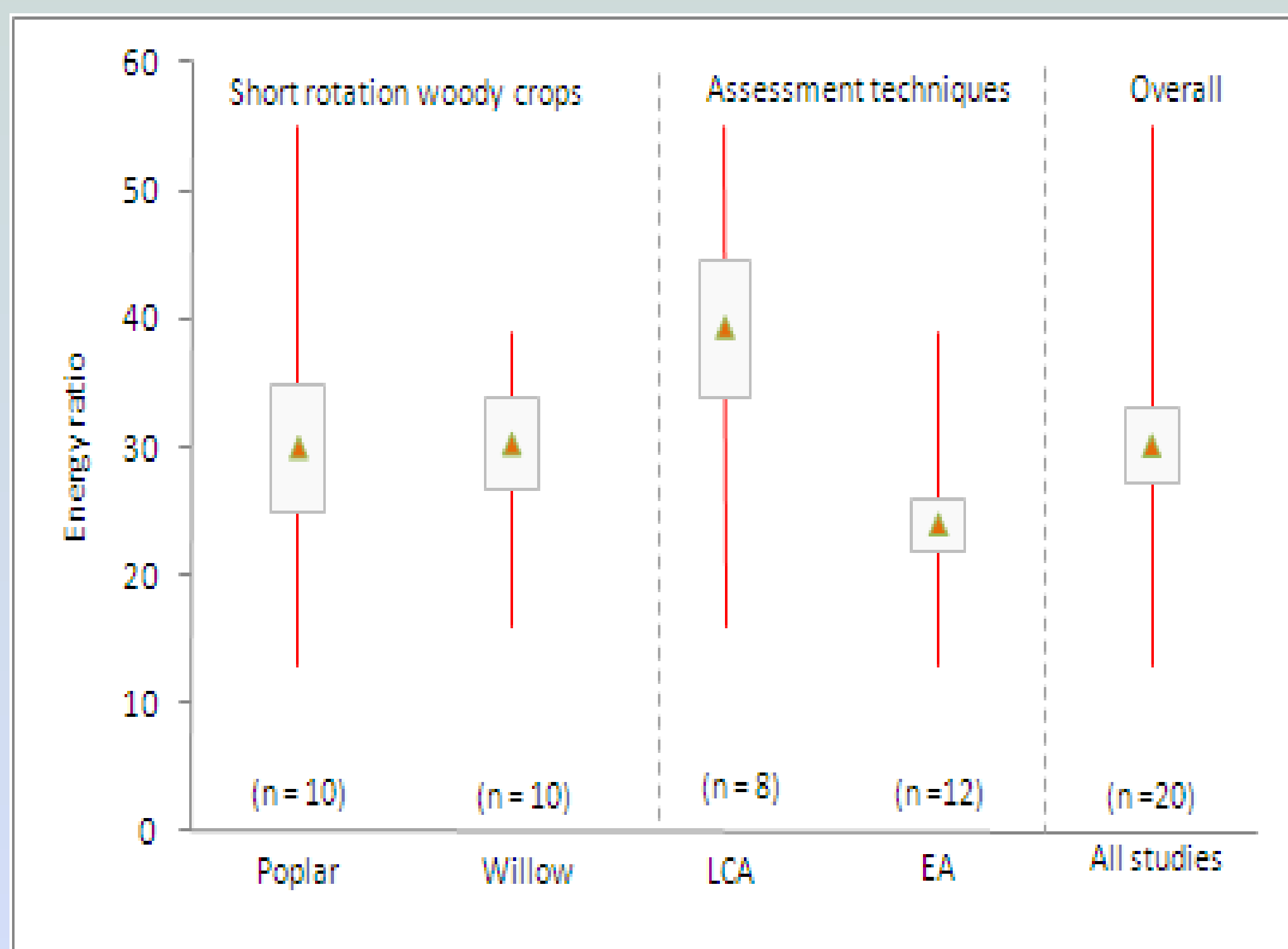
Introduction

- Short rotation coppice crops (SRWCs) are a potential source of renewable energy
- Many studies have examined the ecological effects and energy balance of bio-energy systems using various approaches

Method

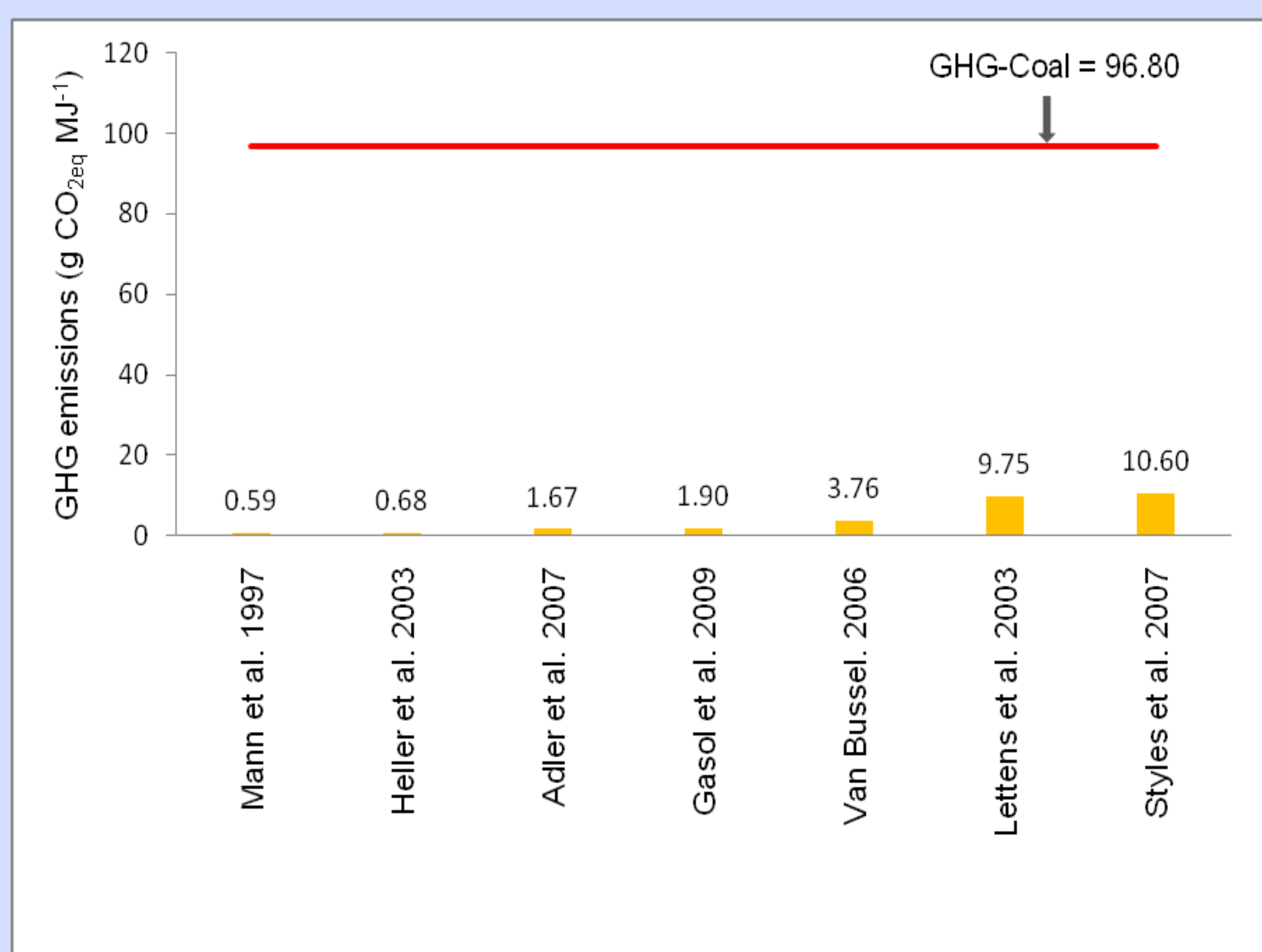
- Review of 26 studies on environmental impacts and energy balance of SRWC for bio-energy production published between 1990 and 2009 where life cycle assessment (LCA) or Energy Analysis (EA) approaches are used
- Extraction of data using standard approach

Results

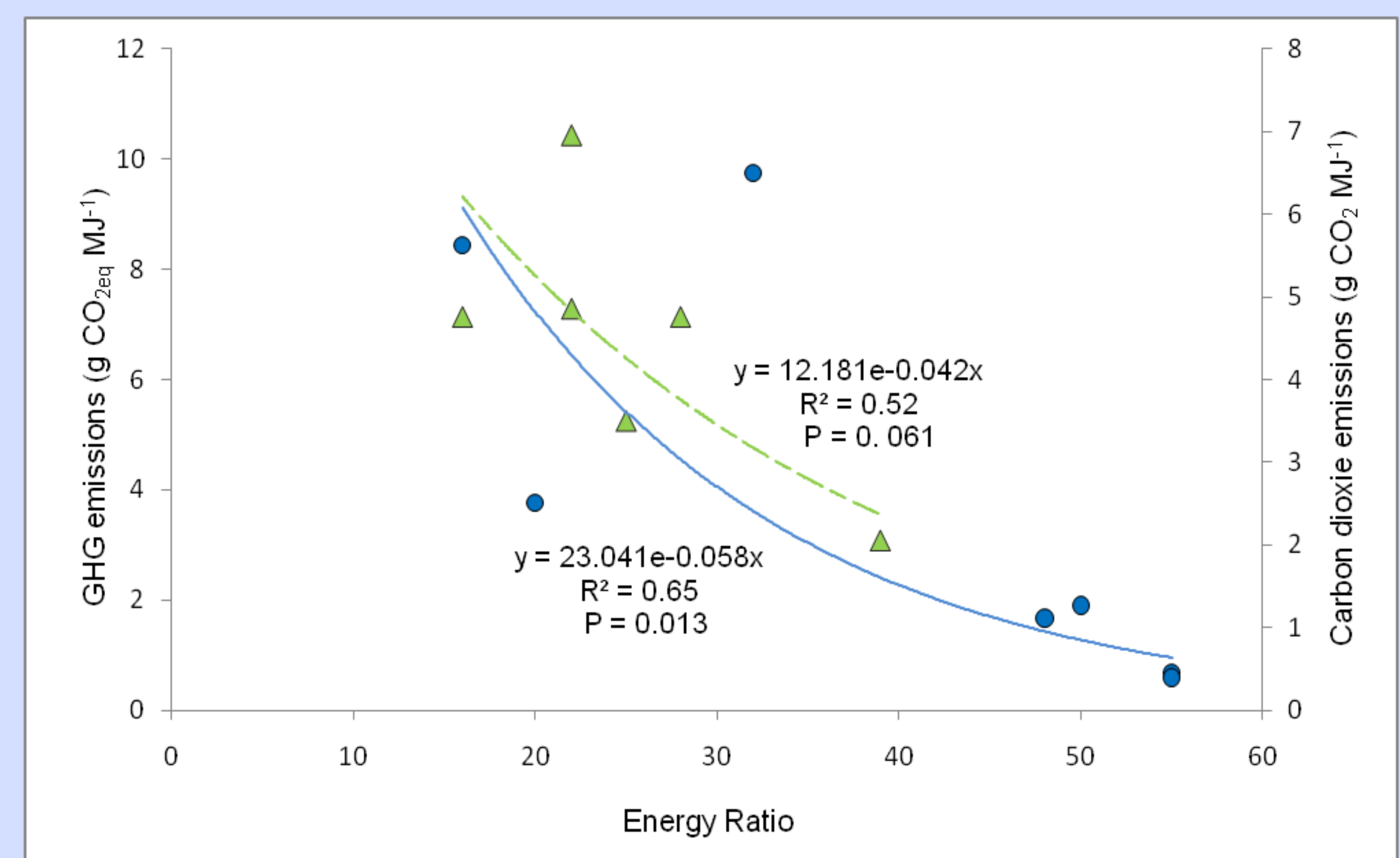


EA studies focused solely on CO₂ emissions from fuel combustion, and overlooked non-CO₂ GHG emissions such as NO₂ and CH₄

Most LCA studies include these pollutants (N₂O and CH₄) in addition to CO₂



SRWCs reduce GHG emissions between 90 and 99 % compared to coal



CO₂ or GHG emissions declined exponentially as energy ratio increased



Conclusion

- The energy ratio is greater than unity; GHG emission intensities are lower than those of fossil fuels.
- Standard methodologies, sets of life cycle stages and sets of assumptions are needed to reduce variability and create more consistency.
- Inventories for the farming practices of bio-energy systems should be established.
- A widely accepted framework is needed for the analysis of energy efficiency.

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