Integrated multi-dimensional framework for assessing the feasibility of bioenergy technologies and their connection to the SDGs

Samira Garcia-Freites[a], Andrew Welfle[a], Amanda Lea-Langton[a], Mirjam Röder[b], Patricia Thornley[b]

[a] Tyndall Centre for Climate Change Research, The University of Manchester, UK, [b] Supergen Bioenergy Hub, European Biomass Research Institute (EBRI), Aston University, UK

INTRODUCTION

- Bioenergy participation in the transport sector is projected to meet biofuels demands and deliver emissions reductions, increasing its contribution by ten-fold from 2015 to 2060.
- Current deployment of biofuels technologies is concentrated geographically in a few countries.
- Meeting the biofuels demand requires an accelerated and geographically-extended deployment of the technologies which could impact producer countries economies, agriculture and biodiversity.
- Key to address attention to evaluate benefits and trade-offs of rolling out biofuels technologies and their implications on climate change, land-use, food and water security.
- Imperative to understand how bioenergy technologies could contribute towards, or contrarily stall, achieving the Sustainable Development Goals, as few studies have examined the potential contribution of biofuels production to the SDGs.

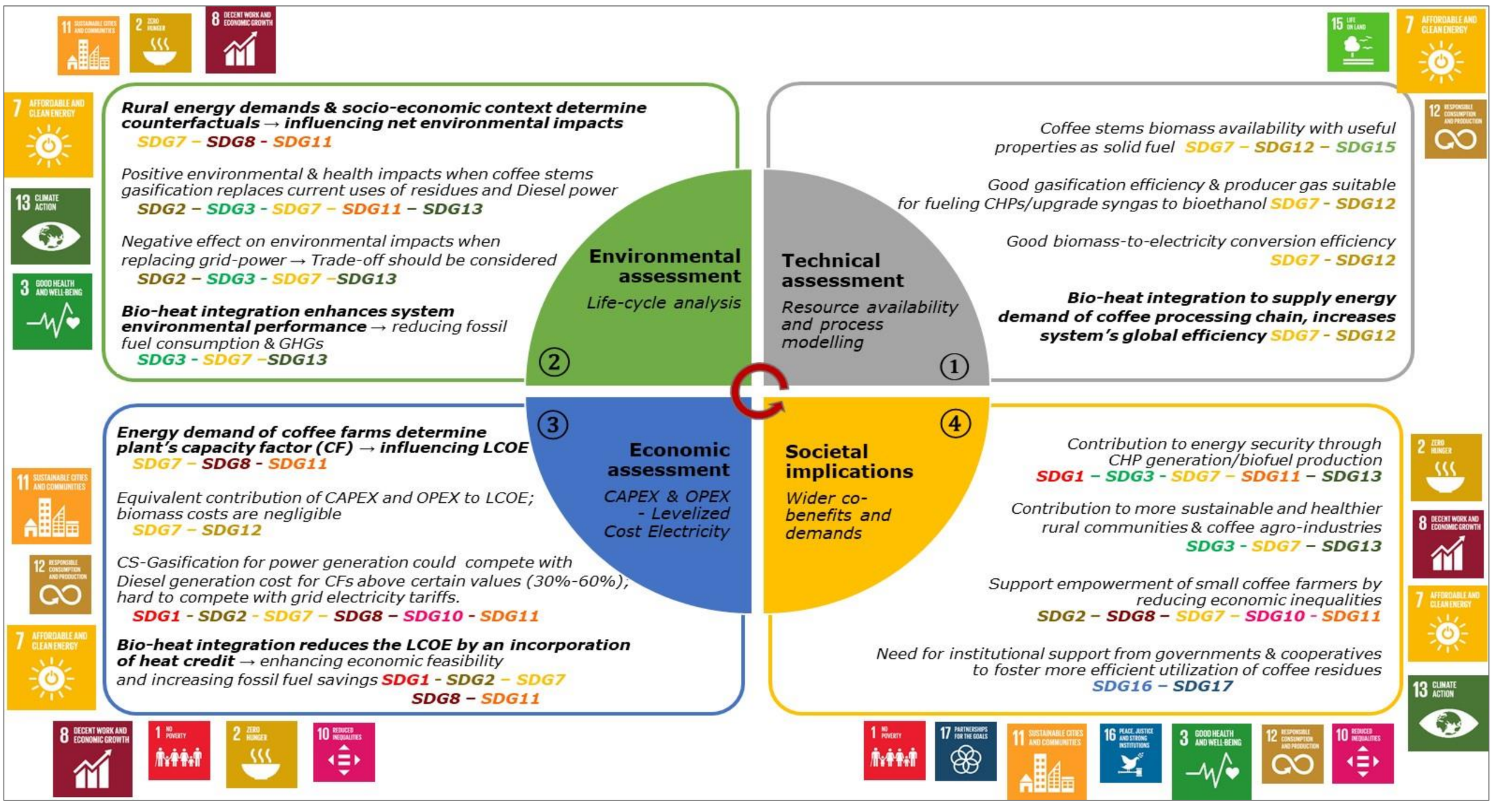
METHODOLOGY

This work aims to bridge this gap by developing a framework that integrates technical, environmental, economic and societal issues around the sustainable deployment of biofuels technologies and their links to the SDGs

This framework comprises the technical, environmental and economic dimensions; and wieder societal implications. Dimensions are assessed differently, but pivotal synergies *(in bold)* emerge, interconnecting with each other.

The main outcomes from each dimension were associated with SDGs targets, to explore which are the most relevant linkages.

This framework was applied to a small-scale coffee stems gasification plant for electricity and heat production, or alternatively for syngas upgrading to produce lignocellulosic bioethanol in the Colombian coffee sector.



Technical and **environmental** dimension:
Untapped biomass with potential for **efficient** and **sustainable utilisation in** modern **bioenergy applications**; however environmental trade-offs must be considered

Economic and **societal dimensions:**
Bioenergy must **meet an energy demand** while being **economically competitive** and **provide positive societal co-benefits** in rural communities.

CONCLUSIONS

Key findings from the integrated multi-dimensional assessment and its links to SDGs:

- ✓ Assessing the feasibility of bioenergy systems using a multi-dimensional approach allows to maximise benefits, identify trade-offs and mitigate challenges
- ✓ Understanding and balancing energy demands and biomass availability in rural contexts contributes to determine operating scales and increases the system's capacity factor
- ✓ Evaluating the impact of counterfactuals allows to identify trade-offs and limitations in different rural contexts, hence guiding decision making.
- ✓ Analysing the SDGs when assesing the feasibility of bioenergy systems is key to understand wider impacts of bioenergy development and identify opportunities to contribute to SDGs.

For further information contact:
Samira Garcia Freites
samira.garciafreites@manchester.ac.uk
@samiragf
samiragarcia

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