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Quantifying socio-economic impacts of bioenergy production in Brazil on micro-regional level

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Background & Aim

The main argument for many politicians to support greening the energy system is not the environmental benefit, but the expected socio-economic benefits. Employment and economic growth are, however, not equally distributed over the country and income groups. The aim of this research is to gain insight in the distribution of the socioeconomic effects over the country in three specific microregions and to gain insight in the employment effect for twelve income classes.

Case study: Brazil



Sugarcane ethanol in Brazil



photo: Mariordo

Manual harvesting of sugarcane is labour intensive and working conditions are poor. This will be phased-out in favour of mechanical harvesting, which reduces the employment in the sector.



Figure 2

Figure 3

The aggregated numbers for Brazil are positive: more employment and increased economic activity in 2030, compared to 2012. These data include *direct effects* from additional production and the direct suppliers, *indirect effects* from the next level suppliers and *induced effects* from more employment.

Figure 1

Brazil is the main producer of sugarcane ethanol in the world. The production in 2015 was 28 billion litres. Ethanol production requires around half of the harvested sugarcane, the rest is for regular sugar production. Sugarcane production in Brazil is centred around the state of Sao Paulo.

Approach

A mixed technological interregional input output (IO) model was used to calculate the effect on GDP and employment of additional sugarcane for ethanol in Brazil, the results are presented for the whole country and three micro-regions (Piracicaba, Presidente Prudente and South West Goias, see figure 1). The additional production is estimated using the macro economic model MAGNET; the PLUC land-use change model was used for the regional division of the sugarcane production. Here we present the reference situation (2012, 24 billion litres) and for 2030 a business as usual scenario without additional ethanol demand (35 billion litres), and a scenario with additional ethanol (63.5 billion litres).

Division



The GDP growth shows large differences between the regions, based on the ecnomic structure of the regions and the size of the sugarcane expansion in that region. The majority of the employment growth (compared to 2012) is in the lowest income classes; but can be negative in the lowest income class.

Discussion and conclusions

- Although the IO model has some limitations **an expansion in sugarcane** for ethanol will increase the GDP and employment from the sector • in each region in each scenario in 2030 compared to 2012.
- **President Prudente profits substantially more** from the expansion of sugarcane than the other two regions.

• It is found that most additional employment will be in the lowest **income classes**, suggesting no better income distribution.

The IO-model shows the distribution of the socio-economic effects and thereby identify the 'winners' of the development. Only aggregated results show the general positive trend, but the internal distribution varied a lot, underlining the importance of showing the results on a microregional level.