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3S1 Modeling the circular economy with sectoral and macro-economic models

Assessment of the baseline development of the EU Biobased plastic sector: exploring business-as-usual and alternative market and recycling options

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In this paper a baseline scenario related to Biobased Plastic (BBP) sector in the EU is developed and evaluated. The current BBP focal issues and existing measures in place in the EU are implemented in a business as usual (BAU) baseline. To provide a more comprehensive assessment, these issues and measures are then analyzed in the context of assumptions regarding the future of the EU (2040) including trends on demography, innovation, productivity and economic growth, and other related EU policy measures. For this, we use the 'Middle Road' scenario from the IPCC-based Shared Socio-Economic Pathways (SSPs). Finally, MAGNET model from WR integrated modelling toolbox is used to project a BAU evolution of the BBP sector in the EU and the expected sustainability towards 2050. In MAGNET the EU BBP sector is developed, which is represented by two value chains, Polyethylene terephthalate (PET) and Polyurethane (PUR). These choices are made based on the relevance of the BBP value chain in the EU, the representativeness in terms of covering the different feedstocks and categories of value chains and the availability of data. All the data are collected from the recently published EU commission report 'Biobased value chains for chemicals, plastics and pharmaceuticals' (Spekreijse et. al, 2021). The projection of drivers show that the overall EU economy in terms of average GDP is expected to grow by about 34 percent from 2014 to 2040, which is relatively low compare most of the other world regions. The assumed population growth trajectory is to some extent similar to GDP growth as EU average is expected to slightly increase by 2040. For the assessment of the baseline a selection of indicators within the three pillars of sustainability, 'People', 'Profit', and 'Planet' is presented. To assess the sensitivity of the baseline scenario projections, we also consider alternative baseline scenarios including different target for the use of BBP and its end-of-life options. BBP production and demand in the EU are projected to slightly increase due to the relatively low market share which is assumed in the baseline. Overall the production of fossil-based plastic are expected to increase in the baseline due to the economic growth and higher demands, and the relative slow uptake of the BBP products in the EU market. Consequently an increase in overall GHG emission in the BAU plastic sector, is expected, however, the GHG emission intensity is expected to be decrease.

Keywords: biobased plastic, economic impact, value chain analysis, baseline evaluation