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Optimal policy for mitigating emissions in the European transport sector

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A geographic explicit techno-economic model, BeWhere (www.iiasa.ac.at/bewhere), has been developed at the European scale (Europe 28, the Balkans countries, Turkey, Moldavia and Ukraine) at a 40km grid size, to assess the potential of bioenergy from non-food feedstock. Based on the minimization of the supply chain from feedstock collection to the final energy product distribution, the model identifies the optimal bioenergy production plants in terms of spatial location, technology and capacity. The feedstock of interests are woody biomass (divided into eight types from conifers and non-conifers) and five different crop residuals. For each type of feedstock, one or multiple technologies can be applied for either heat, electricity or biofuel production.
The model is run for different policy tools such as carbon cost, biofuel support, or subsidies, and the optimal mix of technologies and biomass needed is optimized to reach a production cost competitive against the actual reference system which is fossil fuel based. From this approach, the optimal mix of policy tools that can be applied country wide in Europe will be identified. The preliminary results show that high carbon tax and biofuel support contribute to the development of large scale biofuel production based on woody biomass plants mainly located in the northern part of Europe. Finally the highest emission reduction is reached with low biofuel support and high carbon tax evenly distributed in Europe.