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Locally Produced Solid Biofuels – Carbon Dioxide Emissions and Competitiveness with Conventional Ways of Individual Space Heating

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Abstract : The paper deals with the results of research focused on the complex aspects of the use of intentionally grown biomass on agricultural land for the production of solid biofuels as an alternative for individual household heating. . The study primarily deals with the analysis of CO2 emissions of the logistics cycle of biomass for the production of energy pellets. Growing, harvesting, transport and storage are evaluated in the pellet production cycle. The aim is also to take into account the consumption profile during the year in terms of heating of common family houses, which are typical end-market segment for these fuels. It is assumed that in family houses, bio-pellets are able to substitute typical fossil fuels, such as brown coal and old wood burning heating devices and also electric boilers. One of the competing technology with the pellets are heat pumps. The results show the CO2 emissions related with considered fuels and technologies for their utilization. Comparative analysis is aimed biopellets from intentionally grown biomass, brown coal, natural gas and electricity used in electric boilers and heat pumps. Analysis combines CO2 emissions related with individual fuels utilization with costs of these fuels utilization. Cost of biopellets from intentionally grown biomass is derived from the economic models of individual energy crop plantations. At the same time, the restrictions imposed by EU legislation on Ecodesign's fuel and combustion equipment requirements and NOx emissions are discussed. Preliminary results of analyzes show that to achieve the competitiveness of pellets produced from specifically grown biomass, it would be necessary to either significantly ecological tax on coal (from about 0.3 to 3-3.5 EUR/GJ), or to multiply the agricultural subsidy per area. In addition to the Czech Republic, the results are also relevant for other countries, such as Bulgaria and Poland, which also have a high proportion of solid fuels for household heating.

Keywords : CO2 emissions, heating costs, energy crop, pellets, brown coal, heat pumps, economical evaluation
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