



Investigating Sustainability Impacts of Bioenergy Usage Within the Eisenwurzen Region in Austria

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Within the past few years sustainability and bioenergy usage become a key term in emphasizing the relationship between economic progress and the protection of the environment. One key difficulty is the definition of criteria and indicators for assessing sustainability issues and their change over time. This work introduces methods to create linear parametric models of the sustainable impact issues relevant in the establishment of new bio-energetic heating systems. Our application example is the Eisenwurzen region in Austria. The total area covers 5743 km² and includes 99 municipalities. A total of 11 impact issues covering the economic, social and environmental areas are proposed for developing the linear parametric models. The indicator selection for deriving the impact issues is based on public official data from 68 indicators, as well as stakeholder interviews and the impact assessment framework. In total we obtained 415 variables from the 99 municipalities to create the 68 indicators for the Local Administration Unit 2 (LAU2) over the last (if available) 25 years. The 68 indicators are on a relative scale to address the size differences of the municipalities. The idea of the analysis is to create linear models which derive 11 defined impact issues related to the establishment of new bio-energetic heating systems. Each analysis follows a strict statistical procedure based on (i) independent indicator selection, (ii) remove indicators with higher VIF value greater than 6, (iii) remove indicators with higher than 0,05, (iv) possible linear transformation, (v) remove the non-significant indicators (p-value >0,05), (vi) model valuation, (vii) remove the out-lines plots and (viii) test of the normality distribution of the residual with a Kolmogorov- Smirnov test. The results suggest that for the 11 sustainable impact issues 21 of the 68 indicators are significant drives. The models revealed that it is possible to create tools for assessing impact issues in a municipality level. In this case impact issues related to bio-energy usages on a rural mountain region.