

The driving forces of change in energy-related CO₂ emissions in eastern, western, northern and southern Europe: The LMDI approach to decomposition analysis

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The objective of this work is to identify the relevant factors that have influenced the changes in the level of CO₂ emissions among four groups (eastern, western, northern and southern) of European countries. Our results in fig.1 for Central/Eastern Europe Group (Czech Republic, Poland, Hungary, Slovakia and Estonia) show that in the 1999-2004 period (pre-Kyoto), there is a decrease (-24.41 tons) in the variation of emissions of approximately 4.1%. On the other hand, in the post-Kyoto period (2005-2010) the decreasing trend in the variation of CO₂ (-38.53 tons) continues with a decrease of 6.8%. The behaviour of the variation of emissions of countries for Western Europe (France, Netherlands, Belgium, Austria, Germany and Luxembourg) is presented in fig.2. Clearly, there is a slight increase of 0.4% in the pre-Kyoto period. On the other hand, during the post-Kyoto period there is a decrease in the variation of the carbon emissions (-174.02 tons), which corresponds to a decrease of 9.5%. Fig 3 present the results for the group of countries in Northern Europe (Finland, Denmark, Ireland, United Kingdom and Sweden). The pre-Kyoto period is dominated by the positive and significant effects of energy mix, renewable capacity productivity and renewable capacity per capita, overpowering the

negative effects of emissions intensity and energy intensity and contributing to an average increase of 22.01 tons, or a 2.7% change in the carbon emissions. However, the post-Kyoto period saw a significant volte-face in the emissions behaviour, with a decrease of 102.77 tons – a 12.2% decrease compared to the pre-Kyoto period. The Southern European countries (Italy, Spain, Portugal, Greece and Slovenia), as can be seen in Fig 4, testify to the fact that there was a major reversal in the variability of the carbon emissions behaviour. The pre-Kyoto period shows a positive and significant change in the emissions of 13.4% (i.e. a rise of 127.92 tons). In the post-Kyoto period the emissions behaviour changes markedly, falling by 12.7% (a drop of 140.55 tons). This improvement can be explained by the energy intensity and renewable capacity intensity effects which proved much larger than the major positive effects of renewable energy capacity per capita and energy mix. One can observe when analysing the four groups of European countries that most countries reduced their CO₂ emissions as a consequence of promoting renewable sources in energy used and reducing both the intensity and fuel mix factors.

