Tracking GHG emission from agricultural and energy sectors in the EU from 1990 to 2016

Safwan MOHAMMED[1] – Seyed Mohammad Nasir MOUSAVI[1] – Karam ALSAFADI[2] – Karamchand BRAMDEO[1]

1: Institute of Land Use, Technology and Regional Development, University of Debrecen, Debrecen, 4032, Hungary; E-mail: safwan@agr.unideb.hu

2: Department of Geography and GIS, Faculty of Arts, Alexandria University, Alexandria 25435, Egypt

Keywords: Greenhouse Gas (GHG) Emission, Climate Change, EU

Introduction

Climate change resulting from greenhouse gas (GHG) emission (e.g. CO_2, N_2O, and CH_4) has adversely affected ecosystems on a global scale (Qi et al., 2018). Recently, (GHG) emission had accelerated rapidly, with 3.93% and 1.23% in 2013 and 2014, respectively (Lu and Li, 2019). Whereas 10 to 12% of the global GHG emissions originate from agricultural practices and one-third of anthropogenic CH_4 emissions produce in agriculture sector too (IPCC, 2013; Fellmann et al., 2018). All of these activities would increase the mean earth temperature between 1.4 and 5.8 °C before this present century is over (IPCC, 2014; Schwartz et al., 2004). Thus, the objective of this work is to present (GHG) emission changes between 1990 and 2016 from agricultural and energy sectors in the EU.

Materials and methods

Secondary data were collected from *OECD.Stat* website (https://stats.oecd.org/), for EU countries. Data included: GHG emission by countries, GHG emission by agricultural and energy sectors. After that, trends and significant changes were analysed by using Simple Linear Regression Model (SLRM) and Mann-Kendall trend test. Finally, maps were generated by using GIS software.

Results and discussion

The results showed a negative trend in the GHG emission in most of the EU, while some countries showed a positive trend but not statistically significant as can be tracked in table 1 and figure 1. Also, results pointed out that agricultural sector contributes to 10% of the total GHG emission in the European Union, while the energy sector contributes to 77% of it. Interestingly, the GHG emissions from the energy and agricultural sectors showed an insignificant increase between 1990 and 2016 as can be seen in figure 2. Overall, the results showed a 4% reduction in CO_2 emissions, while CH_4 and N_2O increased by 1% and 3%, respectively.

Table 1: Trends of GHG emission in the EU from 1990 to 2016

Country	GHG trends	Sig.
Austria; Irland; Portugal; and Slovenia	+	Not Sig.
Estonia; Grece; Luxmborg; Italy; and Spain.	-	Not Sig.
Belgium; Czech Republic; Denmark; Finland; France; Germany; Hungary; Latvia; Lithuania; Netherlands; Poland; Slovak Republic; Sweden; and UK	-	Sig. (95%)

doi: 10.34116/NTI.2019.AA.48

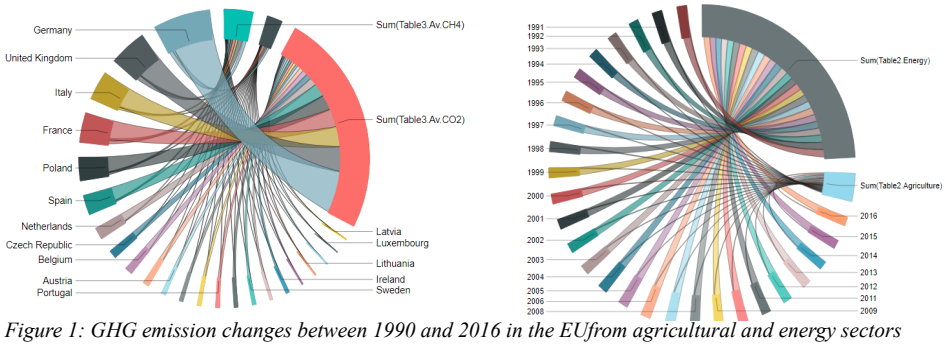

Figure 1: GHG emission changes between 1990 and 2016 in the EUfrom agricultural and energy sectors (right); and controbution of every country (left).

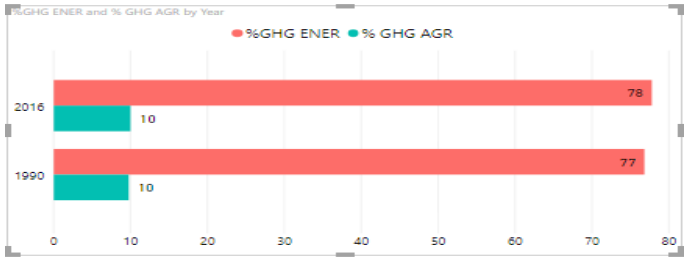

Figure 2: GHG emission changes from agricultural and energy sectors in the EU from 1990-2016

Conclusions

Further study shall be conducted for tracking GHG emission from different sectors.

Acknowledgement

The research was financed by the Higher Education Institutional Excellence Programme of the Ministry of Human Capacities in Hungary, within the framework of the 4.thematic programme of the University of Debrecen, and the projects “GINOP-2.2.1-15-2016-00001 - Developing a scale-independent complex precision consultancy system” and “EFOP-3.6.3-VEKOP-16-2017-00008”.

References

Fellmann, T., Witzke, P., Weiss, F., Van Doorslaer, B., Drabik, D., Huck, I., Salputra, G., Jansson, T. and Leip, A. (2018): Major challenges of integrating agriculture into climate change mitigation policy frameworks. Mitigation and Adaptation Strategies for Global Change, 23(3), pp.451-468. https://doi.org/10.1007/s11027-017-9743-2

IPCC. 2013. Summary for policymakers. In: Stocker, T.F., Qin, D., Plattner, G. K., Tignor, M., Allen, S.K., Boschung, J., Nauels, A., Xia, Y., Bex, V., Midgley, P.M. (Eds.), Climate Change (2013): The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge and New York, NY, USA.

IPCC, 2014: Climate Change (2014): Synthesis Report. Contribution of Working Groups I, II and III to the 5 th AR of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, page no. 57.

Lu, C., & Li, W. (2019): A comprehensive city-level GHGs inventory accounting quantitative estimation with an empirical case of Baoding. Science of The Total Environment, 651, 601-613. https://doi.org/10.1016/j.scitotenv.2018.09.223

Qi, C., Wang, Q., Ma, X., Ye, L., Yang, D., & Hong, J. (2018): Inventory, environmental impact, and economic burden of GHG emission at the city level: Case study of Jinan, China. Journal of Cleaner Production, 192, 236-243. DOI: https://doi.org/10.1016/j.jclepro.2018.04.259