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Regional impacts of electricity system transition in Central Europe until 2035

Jan-Philipp Sasse and Evelina Trutnevvyte

University of Geneva, Switzerland (jan-philipp.sasse@unige.ch)

Achieving current electricity sector targets in Central Europe (Austria, Denmark, France, Germany, Poland and Switzerland) will redistribute regional benefits and burdens at sub-national level. Limiting emerging regional inequalities would foster the implementation success. We model one hundred scenarios of electricity generation, storage and transmission for 2035 in these countries for 650 regions and quantify associated regional impacts on system costs, employment, greenhouse gas and particulate matter emissions, and land use. We highlight tradeoffs among the scenarios that minimize system costs, maximize regional equality, and maximize renewable electricity generation. Here, we show that these three aims have vastly different implementation pathways as well as associated regional impacts and cannot be optimized simultaneously. Minimizing system costs leads to spatially-concentrated impacts. Maximizing regional equality of system costs has higher, but more evenly distributed impacts. Maximizing renewable electricity generation contributes to minimizing regional inequalities, although comes at higher costs and land use impacts.