CARBON FOOTPRINT REDUCTIONS SCENARIOS FOR AUSTRALIAN CITIES VIA INDUSTRY STRUCTURE SHIFTS ACROSS CITIES BASED ON NOVEL LINEAR PROGRAMMING OPTIMISATIONS

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Industry structure shifts contribute to carbon footprints relocation that could be integrated into carbon-reduction action. After the theory of industry adjustment is firstly presented in America and Japan, a practical application of long-term national planning IO-LP model in Japan is a necessary complement to market-oriented economies overall. Most IO-LP models study resource allocation, waste management and micro energy decision in developed and less-developed countries. Optimal industry shifts along with decision of changes in industrial carbon intensity and technology coefficients serve as accurate guidance for citiesâ€™ carbon reduction action. Yet a clear industrial scheme meeting three principles simultaneously are not made by traditional analysis that explains emissionsâ€™ drive and responsibilities. Here we develop novel inter-cities IO-LP models based on 2009 Australia inter-cities input-output table (IOT) earliest transferred from inter-cities supply and using table (SUT) to address optimal industrial shifts over cities attempting both growth and emissions reduction goal and decomposition of citiesâ€™ industrial carbon budgets. Our IO-LP model is novel as the first practice of industry adjustment related to reduction in emissions in developed countries and inclusive of emissions constraints that CGE model is hard to do, and also avoids the corner solution that other optimal models may meet. To overcome the limit of infeasible solution in normal optimization, it presents a two-tier IO-LP model. A multi-dimension recursive IO-LP model. Four scenarios help cities to make crucial strategies for an average annual 1.197% national reduction - the greatest decrease in output share by 0.1% for Energy in Melbourne companying 71 million ton emissions for Agriculture in Rest of Australia at the largest reduction by 5.7%, and the highest GDP resulted from Rest of Australiaâ€™s 10% drop in carbon intensity for Agriculture and that in technology coefficients for Services- rather than solely megacitiesâ€™ energy-related industry emissions reduction in current research. The advantage is domestic final demands no lesser than the original, for which lower exports dependency is trade-off, whereas the forth scenario avoids lower exports if Melbourneâ€™s Goods drop 10% of carbon intensity, bringing forth the largest impact on national carbon intensity decreased by 0.6179% compared with other citiesâ€™ industries.