## A Computable General Equilibrium Analysis of Sustainable Toyohashi City with Green Energy and Smart Technology

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## Abstract:

Since the industrialization, the appearance of cities has been enhancing great changes of people's lives by mass production and mass consumption. Because of the human society has been developing through industrialization and urbanization, many environmental problems, such as Green House Gas (GHG) emissions, waste generation have been occurring as well. Thus, city planners and urban policy makers look forward for designing a compact city to attain a sustainable urban system. Because the form of compact city contributes to improve harmful effects of urban sprawl and offers us many benefits, such as less car dependency thus lower emissions, reduce energy consumption, etc. An influential study in "Cities and Automobile Dependence: An International Sourcebook, 1989" by Peter Newman and Jeff Kenworthy show that the denser urban areas in the developed countries have a greater mixture of land use and lower car dependency, thus trends to lower energy consumption and emissions. However, the suburban cities in the developed countries have a common trend of high car dependency, thus increasing energy consumption and emissions. Thus, in order to reduce GHG (especial focus on  $CO_2$ ) emissions from the suburban areas this research takes vehicle as subject and is dedicated to introduce an electric vehicle and the low-carbon society. The great advantage of electric vehicle will be to reduce  $CO_2$  emissions, but only when the electric automobiles are powered by natural energy, like solar power. If EVs are powered by the electricity generated from coal, gas, petroleum etc., there will be no significant impact for reducing  $CO_2$ emissions. Thus, solar energy comes first to our mind to reduce  $CO_2$  emissions. We set Toyohashi City as the study region and apply a computable general equilibrium (CGE) model to analyze the economic impact after putting electric automobiles into operation. Our model will significantly impact on to meet the goal of GHG emissions reduction of Japan and will offer us to reside in a Low Carbon Society (LCS) in the world. And this model could be easily extended in other suburban areas of Japan and in other countries to reduce GHG emissions and energy consumption.