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# A DYNAMIC SIMULATION TOOL FOR MODELLING CLIMATE NEUTRALITY SCENARIOS IN MUNICIPALITIES

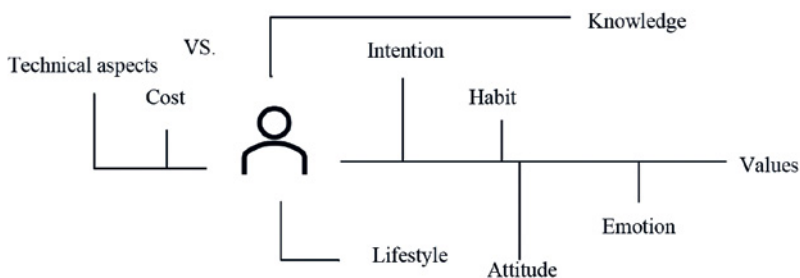
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**Abstract** – Human activities, primarily burning fossil fuels, have increased global temperature at an unprecedented rate since the pre-industrial period. Cities and municipalities have a crucial role in accelerating the decarbonization of economic sectors, since they are at the hub of economic development and progress. The percentage of people who live in cities is expected to rise significantly by 2050, and so do GHG emissions from cities unless urban decision-makers commit to significant improvements. They are in charge of establishing a strategy course to boost energy efficiency, generate renewable energy, and reduce GHG emissions. They are crucial in inspiring communities and stakeholders to promote energy alternatives that are climate neutral. Nevertheless, this potential is not yet fully realized due to a lack of knowledge and helpful tools. It is challenging for municipality representatives to estimate baseline CO<sub>2</sub> emissions, and it is even more difficult to comprehend several potential future situations. This research contextualizes a new computer simulation tool called the CommitClimate Simulator. The tool was developed to help municipalities calculate the carbon footprint and propose a framework for long-term scenario design and future projections. The modeling tool is based on the System Dynamics approach and includes all major GHG emission sectors following international guidelines. The modeling results emphasize the significant impact of behavior change measures on transforming local economies towards climate neutrality. Behavioral change measures are especially crucial in hard-to-decarbonize sectors such as transport. This means that policymakers should not only consider technical or economic aspects in the policy design process, but great care should also be placed on public education and involvement, information and awareness raising campaigns, and fundamental research of energy consumption habits and determining factors.

**Keywords** – Carbon neutrality; city; climate; energy; GHG; zero emission



Incorporating behavior-related aspects of energy use into modeling climate neutrality scenarios.