

Los Angeles Energy Baseline: Urban Metabolism and Life Cycle Assessment

ASU: Mikhail Chester, Janet Ferrell

Economic Roundtable: Daniel Flaming

UCLA: Paul Bunje, Zoe Elizabeth, Sinnott Murphy, Stephanie Pincetl

California Energy Commission: Dan Gallagher

UC Davis: Giovanni Circella, Mike McCoy

Introduction

Current city structures are unsustainable and produce inequitable burdens through environmental, economic, and health impacts to both those living directly in urban environments as well as those outside who are indirectly affected [Kennedy 2010]. The current framework for assessing urban sustainability does not connect physical flow metrics (energy use, water use, air emissions, solid waste generation, etc.) to human and environmental impacts. In order to fully understand potential for improvements, a more rigorous framework is needed to assess these impacts, as well as the interconnectedness of infrastructure systems.

Problem Statement

Our team is composed of seven researchers from three different universities. Our task from the California Energy Commission is to assess an energy and environmental impact "baseline" for Los Angeles to aid in the implementation of SB 375. This will include a life cycle inventory of energy and material inputs, the production of desirable goods and services, accumulation effects, air, water and solid waste outputs, and the corresponding output impacts including socio-economic considerations. The ASU team is compiling data on the infrastructure of Los Angeles. This includes: transportation systems, roads, parking facilities, and buildings. This data will be integrated into a Los Angeles spatial economic analysis and prediction model.

Methodology

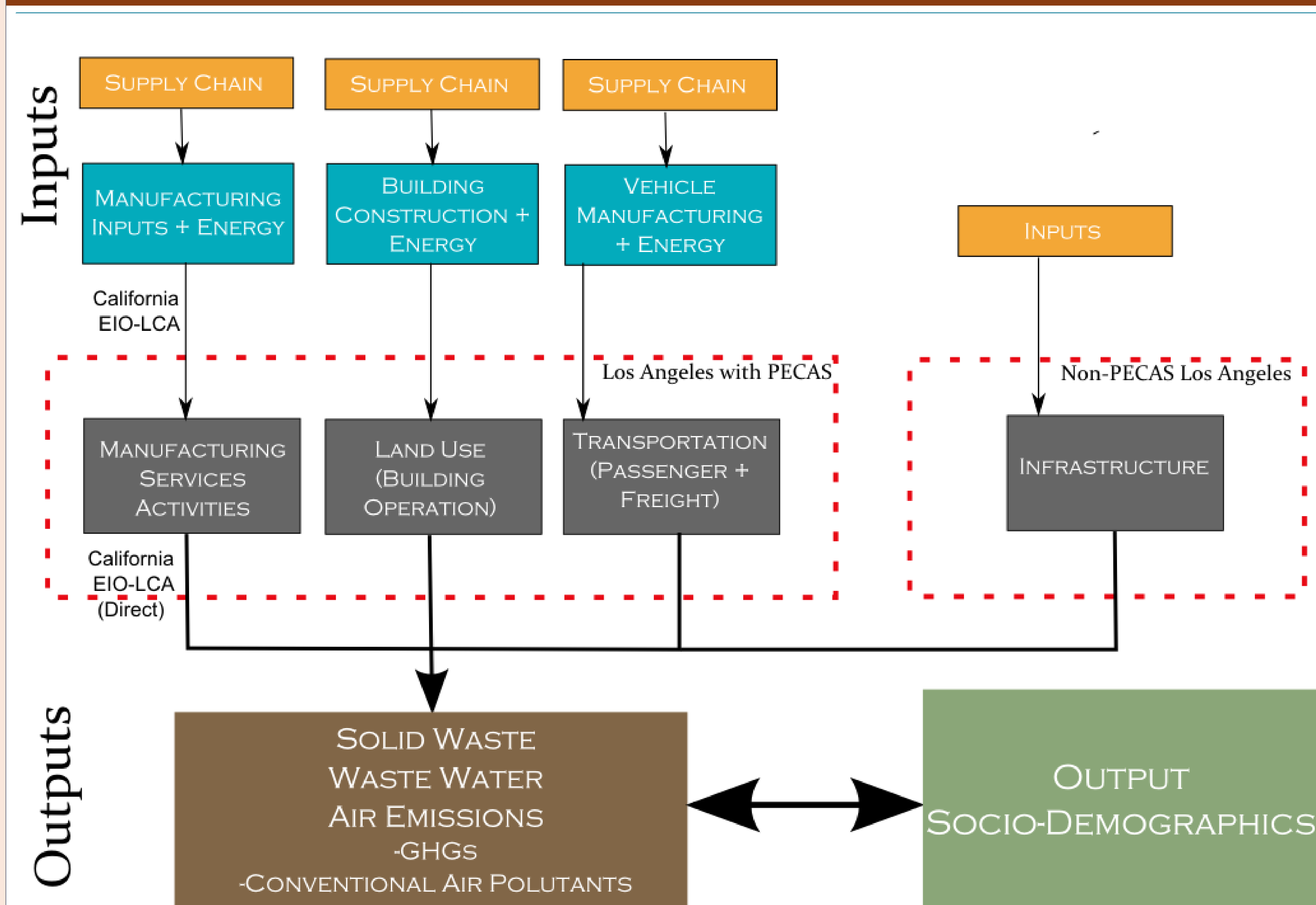
We will merge life cycle assessment (LCA) methodology with urban metabolism(UM). This improved LCA-UM methodology will allow for more accurate accounting of the true urban footprint by incorporating indirect and supply chain effects [Chester et al. 2011].

Data will be input into the existing PECAS (Production, Exchange, and Consumption Allocation System) model for California. Although PECAS will serve as the foundation of the assessment, the impact boundaries will be expanded to capture life cycle effects.

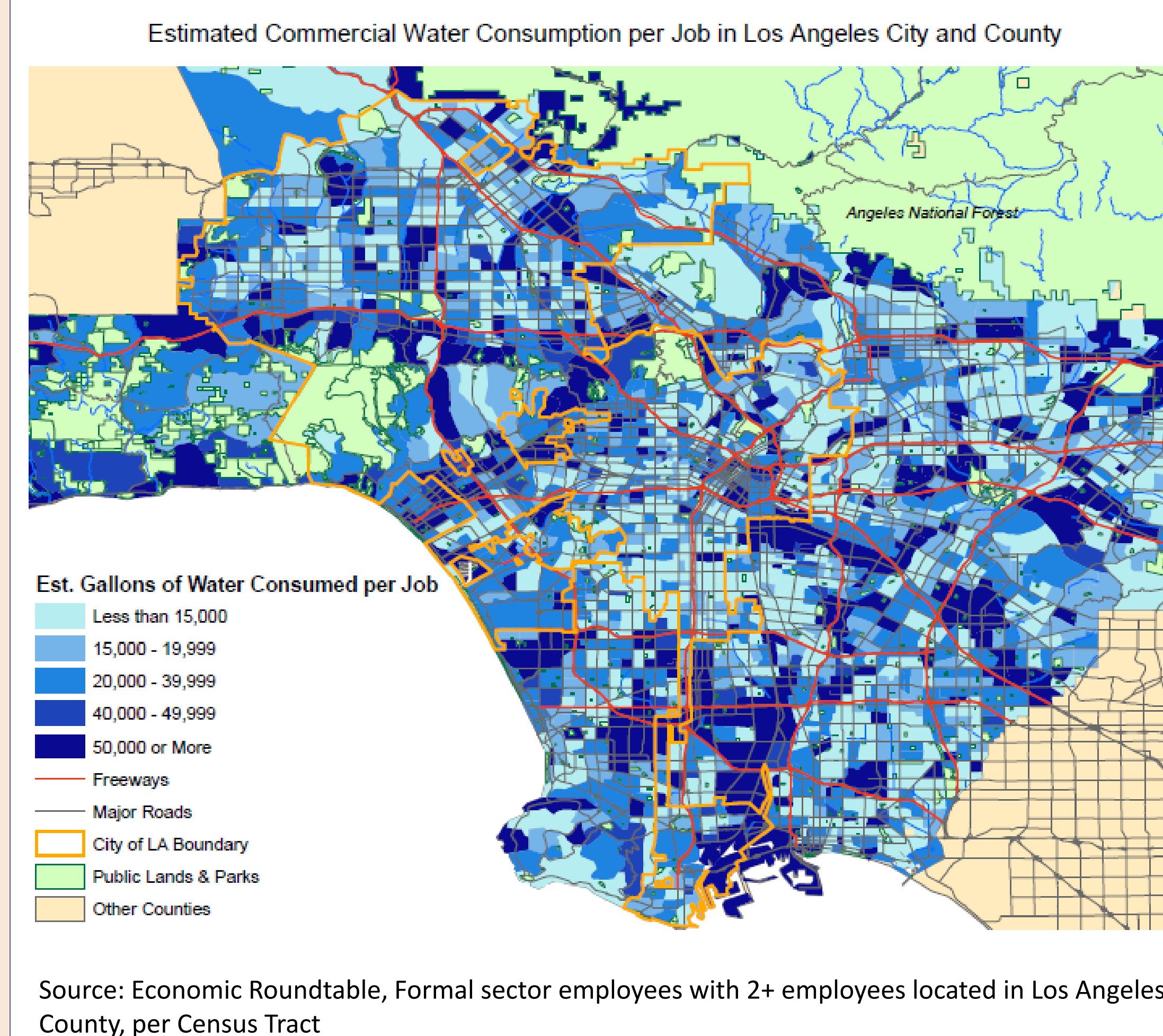
Appropriate indicators including energy use, water consumption, GHG emissions, jobs, and economic costs are being considered to maximize policy applications.

From this, the team seeks to identify current environmental impacts of the city of Los Angeles and the linked socio-economic effects of current city structure.

Overview



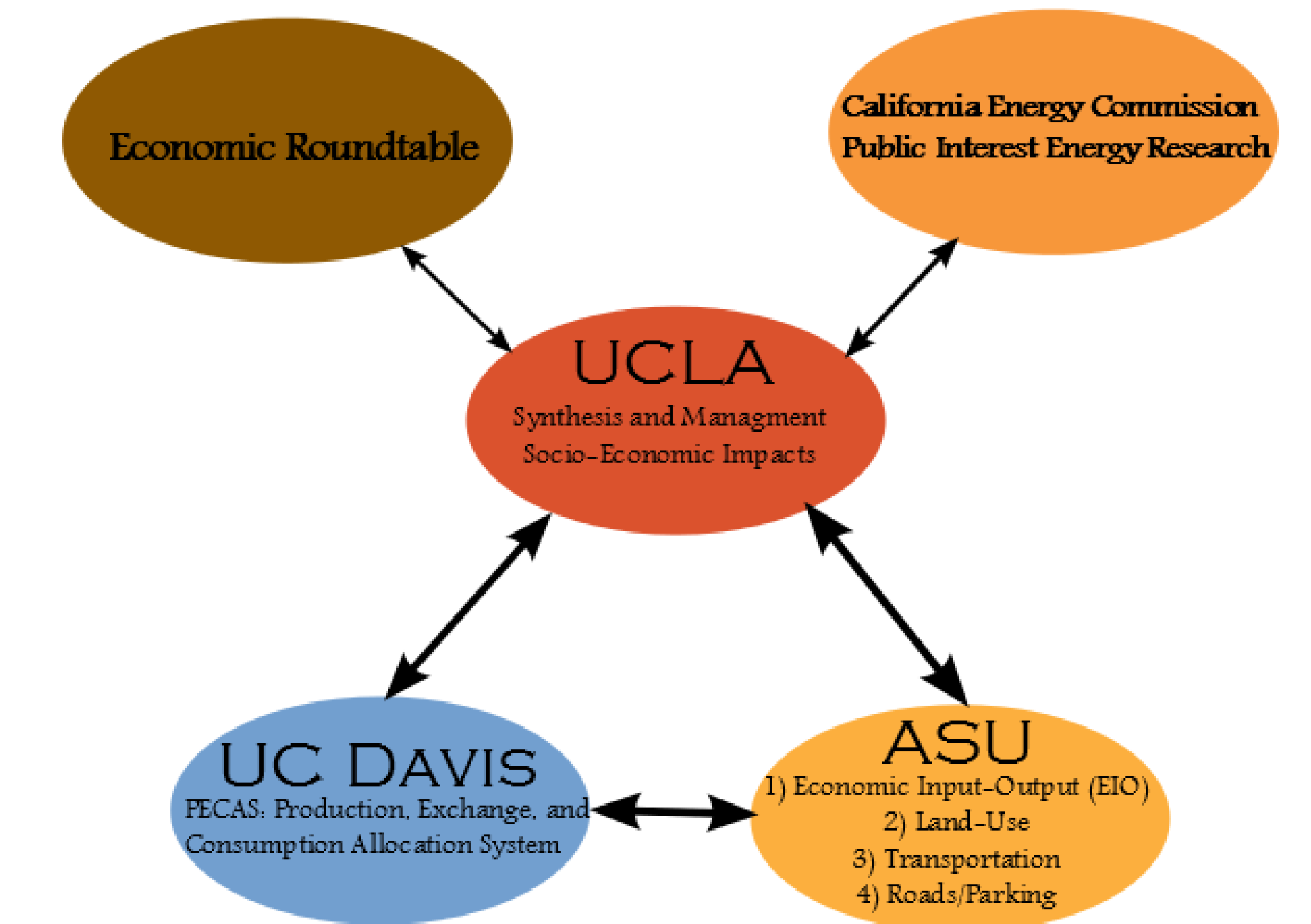
Expected Results



At ASU, we are compiling a life cycle inventory for all buildings in the Los Angeles area. This comprehensive building life cycle assessment for a large area has not been done before and can provide a base for future studies in this area. The building inventory will be complemented by life cycle transportation and associated infrastructure services.

The team will produce methods and a Los Angeles energy baseline including human and environmental impacts, and will serve as a template for future urban studies. More importantly, our team will have developed a new approach for assessing sustainability of urban areas. Such a method would be adaptable, thus providing a framework for evaluating other urban areas. This could be used as a tool by those in the urban sustainability planning field.

Team Structure



References

Chester, M.V, S. Pincetl, and P. Bunje, 2011, Complementing Urban Metabolisms with Life-cycle Assessment for Sustainable Communities, In Review at the Journal of Industrial Ecology's Special Issue "Sustainable Urban Systems"

Economic Roundtable; California Employment Development Department. Quarterly Census of Employment and Wages, 3rd Quarter 2009; Carnegie Mellon University Green Design Institute. Economic Input-Output Life Cycle Assessment (EIO-LCA), US 1997.

Kennedy C., S. Pincetl, and P. Bunje, 2010, The Study of Urban Metabolism and its Applications to Urban Planning and Design, Environmental Pollution 159(8-9):1965-1973 [Available online at <http://dx.doi.org/10.1016/j.envpol.2010.10.022>].

Contact Information

Mike Chester

mchester@asu.edu

Janet Ferrell

janet.ferrell@asu.edu