

Boston Smart Utilities Workshop

Urban Systems Modeling

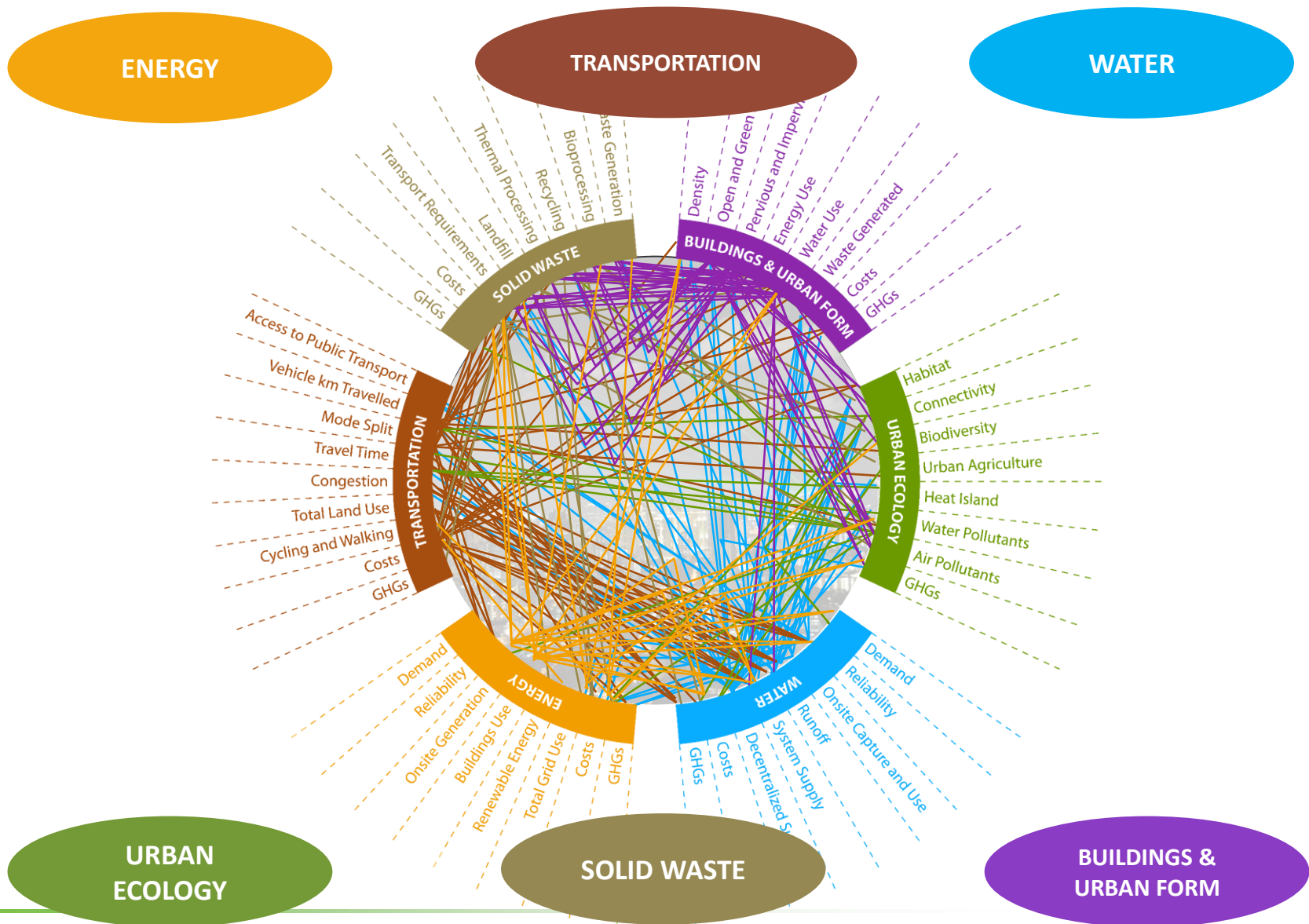
Robert O. Button, PE

May 25, 2016



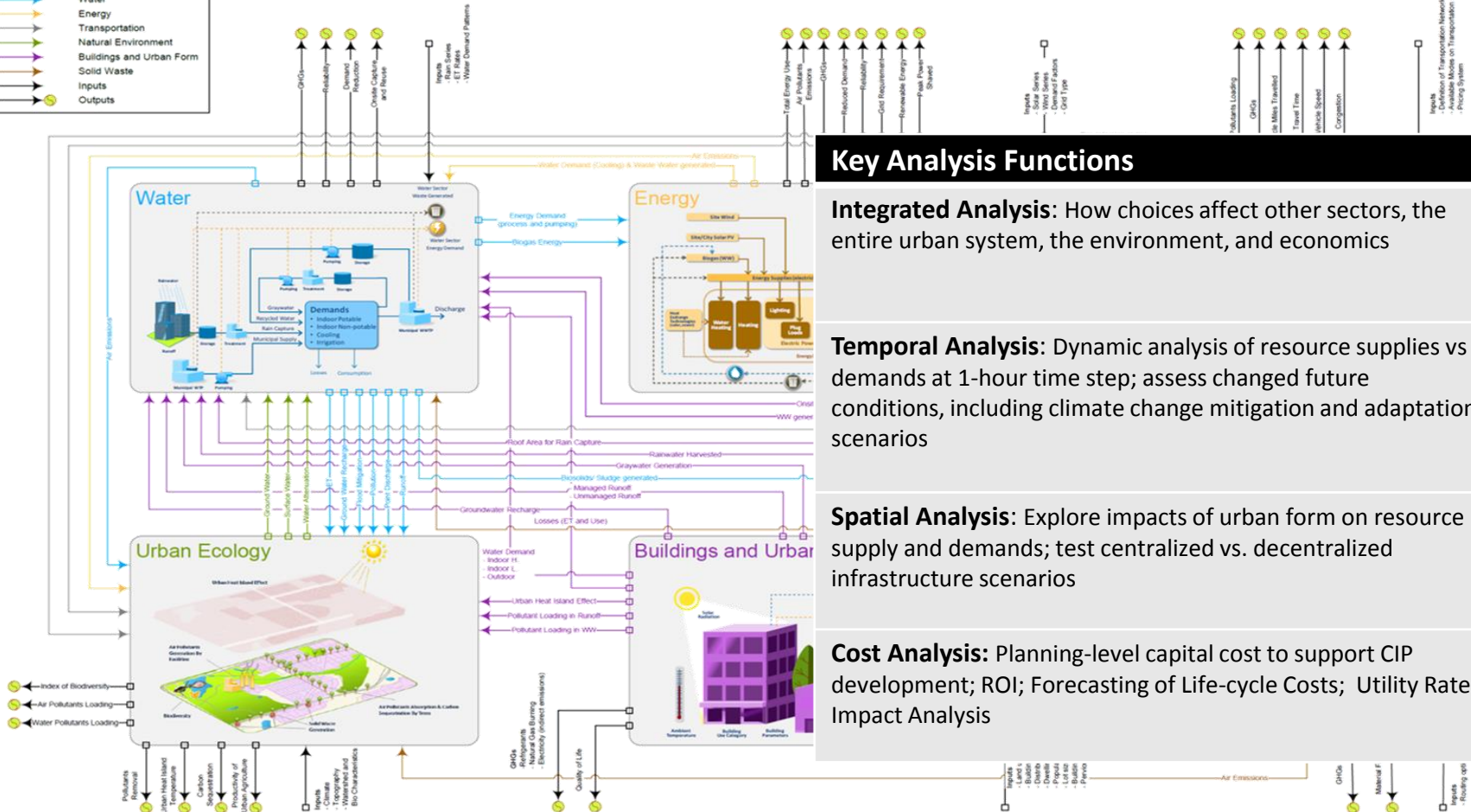
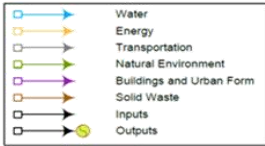
**CDM
Smith**

Urban Systems Model – Input Data



Urban Systems Model – Logic Diagram

CDM Smith Neysadurai Centre



Key Analysis Functions

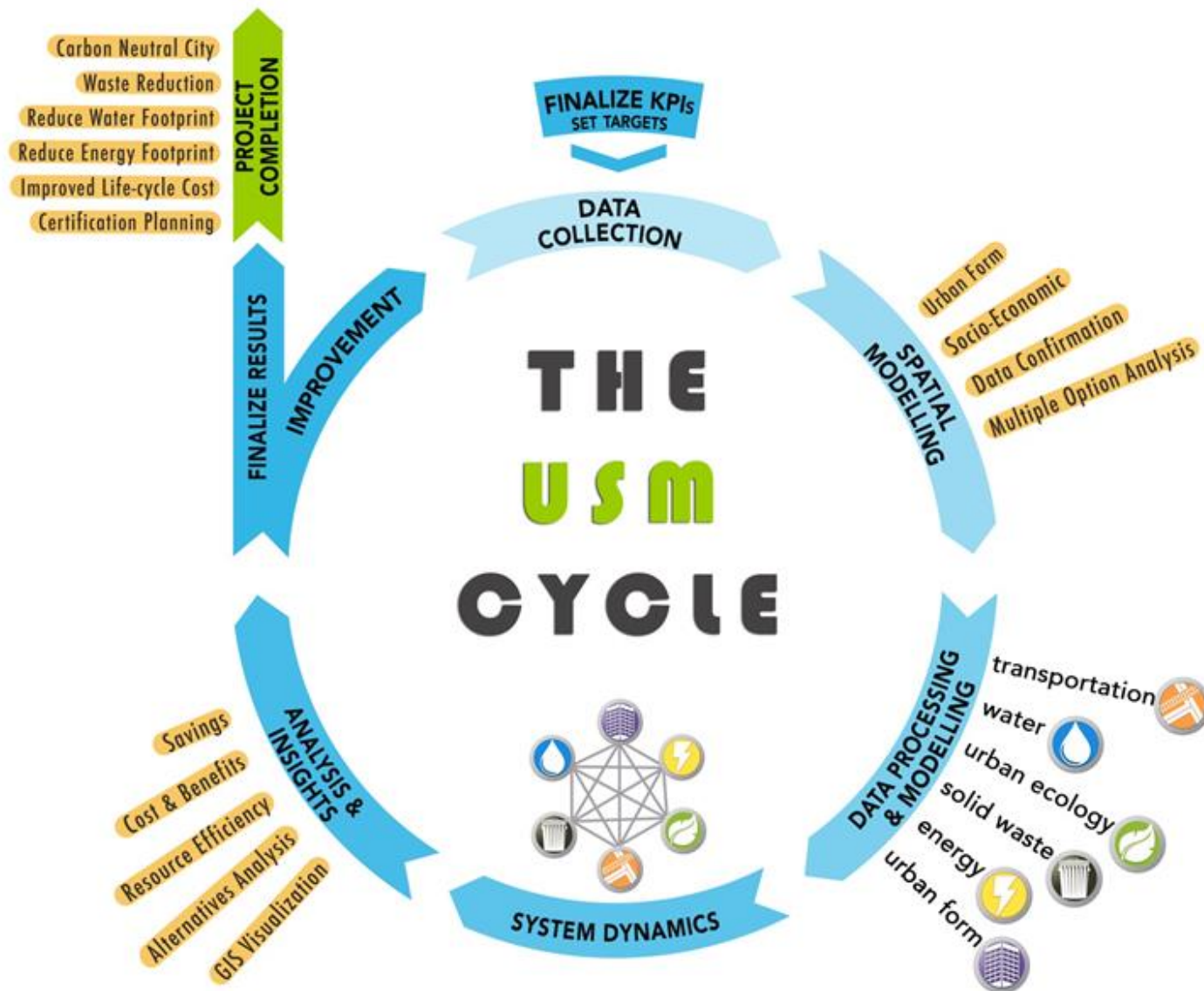
Integrated Analysis: How choices affect other sectors, the entire urban system, the environment, and economics

Temporal Analysis: Dynamic analysis of resource supplies vs demands at 1-hour time step; assess changed future conditions, including climate change mitigation and adaptation scenarios

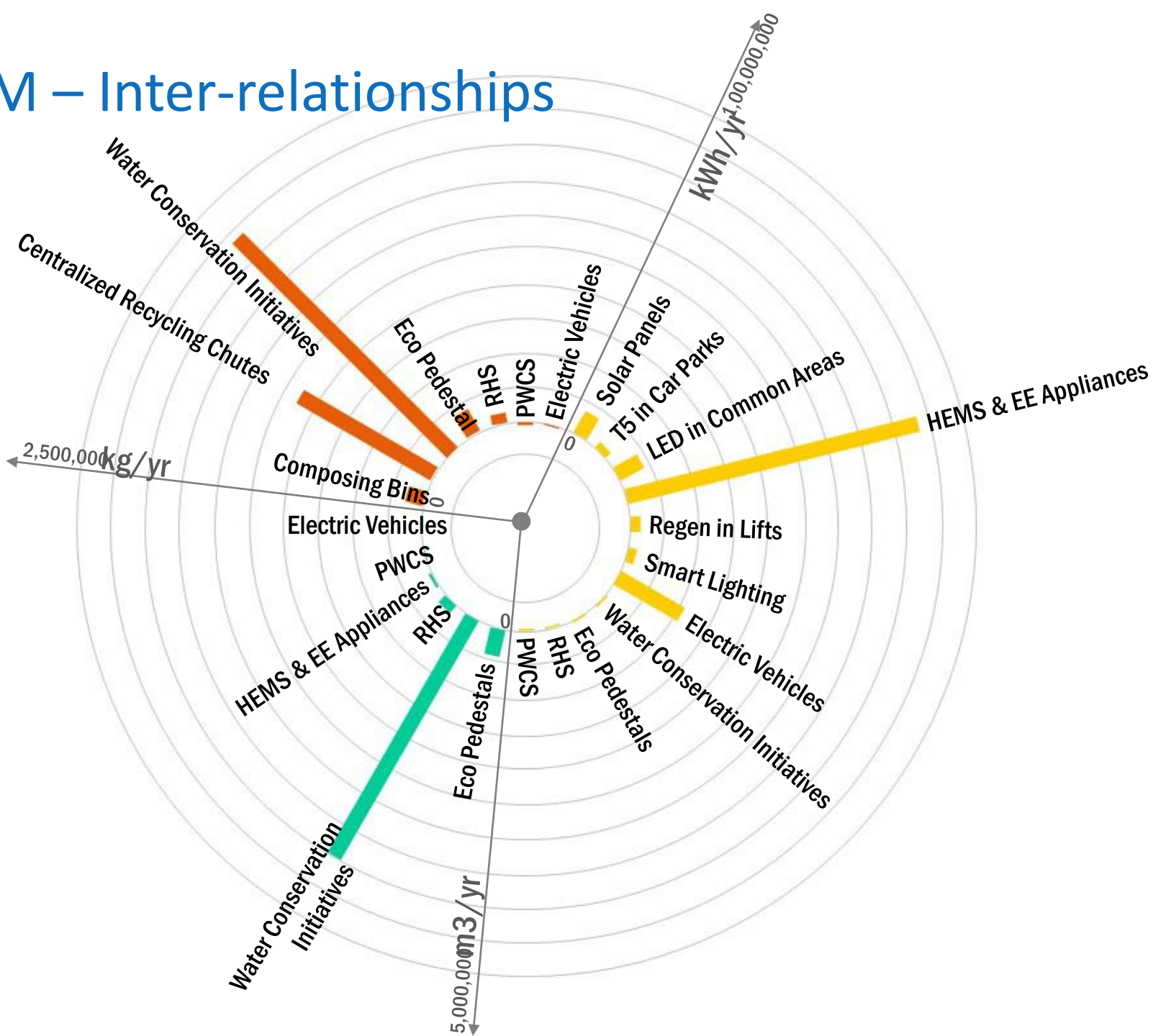
Spatial Analysis: Explore impacts of urban form on resource supply and demands; test centralized vs. decentralized infrastructure scenarios

Cost Analysis: Planning-level capital cost to support CIP development; ROI; Forecasting of Life-cycle Costs; Utility Rate Impact Analysis

Urban Systems Model – Cycle



USM – Inter-relationships



Urban Systems Model – Overall Performance

Energy Savings  ~ 24,000

Per capita ~ 8,000 kWh/yr

Water Savings  ~ 41,000

Per capita ~ 105 m³/yr

Solid Waste Diversion  ~ 1,000

Per capita ~ 1,500 kg/yr

Emissions Savings  ~ 10,000

Per capita ~ 10 tonnes CO₂ eq/yr

 = Consumption by 1,000 people per year

