Energy Consumption & Greenhouse Gas Emissions

Linking environmental and transportation planning in a two-state region

Location: Greater Kansas City region, Kansas and Missouri
Partners: Mid-America Regional Council; Parsons Brinckerhoff

Context: The Mid-America Regional Council (MARC) is a nonprofit organization that promotes regional cooperation in the two-state, nine-county, 120-city region centered on Kansas City. Regional transportation planning is among MARC's responsibilities. Recently, over a period of two years, MARC developed a new 30-year regional transportation plan called *Transportation Outlook 2040*. Scenario development and scenario analysis were key components in developing the plan. Compared to earlier plans, it includes several important new goals related to regional health, place-making, and the importance of linking transportation and environmental planning. As a result, *Transportation Outlook 2040* includes strong policy directions to implement climate protection and energy and natural resource conservation in future transportation investments.

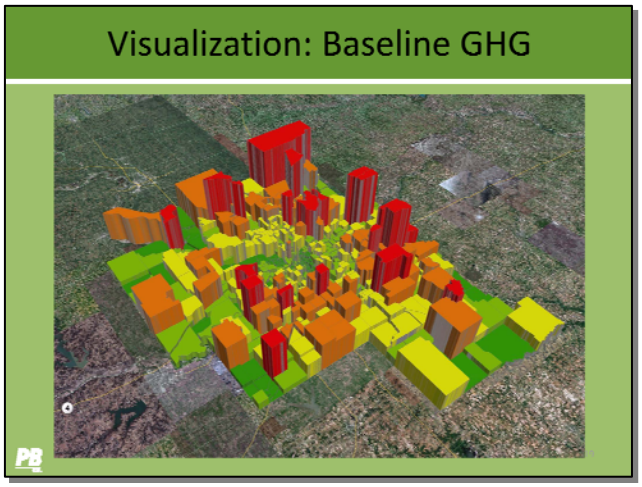
Project Description: As part of plan development, MARC led an extensive engagement process involving the local jurisdictions, numerous committees, and the public. MARC developed two alternative 2040 land use scenarios: a *baseline scenario* based on the comprehensive plans of local communities and various growth trends, and an *adaptive scenario* based on the vision of a more vibrant, connected, and green region, with projected growth directed more toward compact centers and priority corridors. The scenarios were subjected to several analyses including trip travel time, roadway congestion, and cost of new infrastructure. MARC retained Parsons Brinckerhoff to specifically evaluate the scenarios for their anticipated energy consumption and greenhouse gas (GHG) emissions.

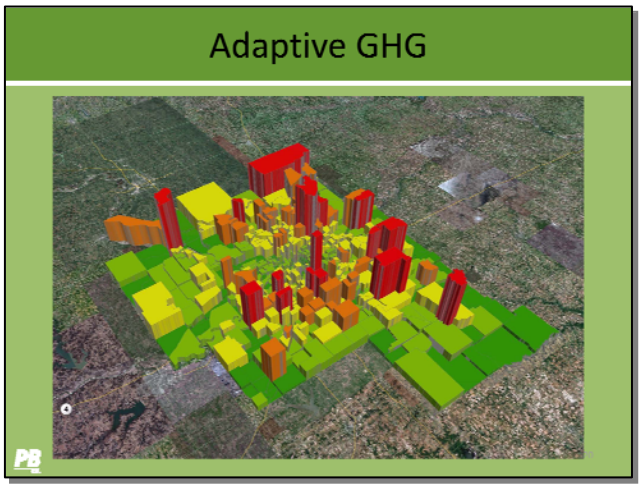
Parsons Brinckerhoff's PlaceMaking group, which has developed a CommunityViz-based scenario-analysis tool called CarbonFIT, used their tool to evaluate GHG emissions from the two scenarios. CarbonFIT estimates GHG emissions from both vehicle travel and building energy consumption. For this project, they tested the impacts of land use variables such as population density, employment density, and jobs-housing mix, as well as travel-demand management strategies like carpooling, fuel pricing, compressed work-week programs, and fuel economy. Impacts of these inputs on total and per-capita vehicle miles traveled, GHG emissions, and energy consumption were estimated using best available research, factors and elasticity values for the region. To estimate emissions from building use, the CarbonFIT model estimates and compares quantities of development (residential dwelling units and non-residential square feet), the resulting energy consumption, fuel source splits, and estimated emissions. When the consultants applied

> *"The CarbonFIT tool will help us achieve our transportation plan's new climate change and energy use goal. We anticipate that CommunityViz will be useful for many other projects as well, particularly those focused on implementing our regional centers and corridors strategy."*
>
> - Lisa Pool, MARC Transportation Planner

the model to MARC's two scenarios, they found that the *adaptive scenario* produced about 7.2 percent fewer GHG emissions for the given assumptions.

The final population and employment forecast that was adopted as part of *Transportation Outlook 2040* was a compromise between the *baseline scenario* and *adaptive scenario*, and it maintained the centers and corridors strategy outlined in the *adaptive scenario*. The CommunityViz/CarbonFIT tool allows users to add new scenarios and compare them using impact indicators. Parsons Brinkerhoff provided a User's Guide for MARC transportation planners. In the future, MARC transportation planners expect to use CarbonFIT to evaluate more detailed transportation strategies to determine which will be most effective in reducing greenhouse gases.





Technology and Tools: CarbonFIT model developed by Parsons Brinckerhoff on a CommunityViz 4.0 platform; ArcGIS 9.3.

Outcomes: The CarbonFIT analysis has been presented to various committees dealing with transportation and land use within the region, and it is expected to be used on an ongoing basis by the region's transportation planners to evaluate transportation and land-use alternatives. The *Transportation Outlook 2040* plan targets a centers-and-corridors strategy, as described in the adaptive scenario. As stated in the plan, "According to statistics developed for the baseline and adaptive scenarios, vehicle miles traveled, trip distances, and trip travel times decrease with a centers and corridors approach, which also means a reduction in carbon dioxide emissions." *Outlook* was adopted by the Mid-America Regional Council's Board of Directors in June 2010.

KEY LINKS

CommunityViz
http://placeways.com/communityviz
Mid-America Regional Council
http://www.marc.org
Parsons Brinckerhoff
http://www.pbworld.com

Sources: Parsons Brinckerhoff; Mid-America Regional Council; Transportation Outlook 2040 at http://www.marc.org/2040/ ; http://www.marc.org/2040/Plan/Policy_Goals/climateandenergy.aspx. CommunityViz is a registered trademark of Placeways LLC.