Choosing Smart Locations: A GIS Tool for Better Facility Siting

New Partners for Smart Growth
February 4, 2017
GSA Business Context

375+ million square feet for 1 million workers
8,700 buildings in 2,000+ communities
482 historic buildings with 80+ NHLs
Annual buildings budget of $10 Billion

Courthouses, border stations, IRS offices...
EPA Office of Sustainable Communities

Helps communities pursue smart growth strategies through:

• Grants and technical assistance

• Partnerships

• Research and tool development
Overview

- EPA’s Smart Location Database
- Smart Location Calculator overview
- SLC application
- Q&A
Why model VMT?

- Location of federal/state facilities impacts local communities:
  - Development and sustainability goals
  - Land conservation
  - Access to employment and services
  - Congestion, pollution, fuel consumption
  - Infrastructure costs/impacts

- National modelling can support more informed planning & better understanding of impacts

- Promote location efficient site decisions
Introduction to the Smart Location Database

- Density
- Diversity
- Design of Street Network
- Destination Accessibility
- Distance to Transit

Image sources: Lincoln Land Institute’s “Visualizing Density” and Victor Dover
Introduction to the Smart Location Database

• EPA’s Smart Location Database (SLD)
  • Nationwide geographic data resource including more than 90 attributes summarizing characteristics such as diversity of land use, neighborhood design, destination accessibility, employment, and demographics.

  • Data sources include American Community Survey, NAVTEQ streets, Longitudinal Employment Household Dataset

  • Find more information about the SLD, including interactive mapping, data downloads and user guide at http://www2.epa.gov/smartgrowth.smart-location-mapping#SLD
Background to the Smart Location Calculator

• Much like energy efficiency, location efficiency reduces resource demands while fostering a healthier, more sustainable built environment and providing equitable access to government jobs and services.

• Location-efficient commercial facilities are generally:
  • Accessible via multiple transportation options, including public transit and active transportation;
  • Centrally-located within their “commute shed” or region so as to maximize accessibility and minimize travel distances for employees and other users; and
  • Integrated within a mixed-use environment that offers easy access to services and destinations.
SLC Research Questions

• What measures of location efficiency would enable us to compare facility locations relative to each other – ie put numbers to the policy?

• How can we fill the gap where there has been little research into the effect of the built environment around workplace locations?

• How can we estimate worker vehicle miles traveled (VMT) and greenhouse gas emissions (GHG) associated with that travel?
SLC Model: Modelling Process

- Likelihood of worker to generate VMT
- Amount of VMT generated
- Average VMT per worker
• The block group scores are categorized using the following scale:

- 90-100 = Excellent
- 80-89 = Very good
- 70-79 = Good
- 60-69 = Fair
- 40-59 = Low
- <40 = Very low
SLC Demonstration

https://www.slc.gsa.gov/sl
SLC Demonstration

Navigate to the application

Enter facility address
SLC Demonstration
SLC Demonstration
• User-entered data
• Distance to transit
• ¼ mile buffer
  • Tool adjusts for edge effects
  • Variables impacted: residential and employment densities, network variables (links), transit density, access, land use mix
SLC Application

- GSA Application
  - National Measure (since 2016)
  - Local Portfolio Planning
  - Lease Acquisition Planning

- State facilities and strategic planning
  - California Strategic Growth Council & Dept. of General Services
  - Future state partnerships (RGGI)

- Rating systems
  - Use of the SLC to measure community compactness/site sustainability
Testing and Feedback

- Questions
- Use case scenarios
- Enhancements
- Methodology critique

https://www.slc.gsa.gov/slc

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Questions

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Appendix

Additional slides follow with more information about the SLC modeling process
A few example variables and their impact on VMT

- **Density of development in workplace block group**
  - Gross residential density \( \uparrow \) VMT \( \downarrow \)
  - Gross employment density \( \uparrow \) VMT \( \downarrow \)

- **Street design characteristics in workplace block group**
  - Auto-oriented links per square mile \( \uparrow \) VMT \( \uparrow \)
  - Pedestrian-oriented links per square mile \( \uparrow \) VMT \( \downarrow \)
### SLC Model: Commute vs. Non-Commute Travel

<table>
<thead>
<tr>
<th>Commute Travel</th>
<th>Non-Commute Travel</th>
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<tbody>
<tr>
<td><strong>Home-Work</strong></td>
<td><strong>Work-work</strong></td>
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<tr>
<td>Any trip made between home and work, including all legs of trip (stopping to drop off child, go shopping, go to gym, etc.)</td>
<td>Any trip starting and ending at a workplace. Includes mid-day lunch trips, business outings, or trips from one workplace to another</td>
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Home-based-other trips were removed from dataset (trips from home to social events, shopping, recreation, etc)
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<thead>
<tr>
<th></th>
<th>Commute VMT</th>
<th>Non-Commute VMT</th>
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<tr>
<td>Jobs Density</td>
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<td>Housing Density</td>
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<tr>
<td>Employment Mix</td>
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<tr>
<td>Job/Housing Balance</td>
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<tr>
<td>Pedestrian Oriented Network</td>
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<td>Transit Proximity</td>
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<td>Transit Density</td>
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<td>Auto Accessibility for Workers</td>
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<td>Transit Accessibility for Workers</td>
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<tr>
<td>Regional Compactness</td>
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<td>Regional Transit Trips per Capita</td>
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*Other factors: income, car ownership, gender, gas price*
After VMT modeling is complete, each block group is evaluated relative to the other block groups in its region (CBSA or county)

\[
\text{Smart Location Score} = 100 \times \left( 1 - \frac{VMT_{\text{tot}} - VMT_{\text{tot min}}}{VMT_{\text{tot max}} - VMT_{\text{tot min}}} \right)
\]

where \(VMT_{\text{tot min}}\) and \(VMT_{\text{tot max}}\) are the minimum and maximum VMT_{tot} scores for the region