Smart Growth Has a Wide Range of Environmental, Personal, and Societal Benefits

- Smart growth reduces the loss of wild lands or agricultural lands, and reducing endangered species conflicts cuts the amount of paved surfaces, reducing water pollution.
- By far the largest and most quantifiable benefit of smart growth development is reductions in the need to drive.
  - Reduced driving also has multiple benefits
  - In Southern California, reduced driving cuts air pollution

Some Benefits of Smart Growth Can Be Quantified

- Reduced personal transportation expenditures
  - Transportation is the second largest household expenditure at 18%.
- Enhanced equity: better access for all segments of the population.
- Reduced time spent in driving
  - Suburban mothers spend 17 full days a year behind the wheel, more than the average spends dressing, bathing, and feeding a child.
- Reductions in driving reduce air pollution, including greenhouse gas pollution
- Smart growth can reduce traffic congestion.

Quantifying the Smartness of Growth

- Recent research allows us to calculate how much people drive as a function of community characteristics.
- Efficient cities and efficient neighborhoods cause people to demand less automobile ownership and use, controlling for income.
- More efficient cities could cut smog in Southern California significantly.

Some Smart Growth Benefits Are Less Measurable

- Mixed use neighborhoods increase livability.
- Mixed income neighborhoods provide the benefits of diversity.
- Smart growth neighborhoods have access to recreational areas and open space.

The Concept of Efficient Cities is New

- Before 1973, it was easy to explain growth in vehicle miles traveled (VMT) by cars:
  - Cars were newly available.
  - Income was rising.
  - Costs of cars were decreasing.
  - Highway systems were growing.
- Little work was done comparing VMT Levels between different cities or nations.
The Concept of Efficient Cities is New

- Unabated growth of VMT After 1973 is harder to explain.
- Cost of driving no longer dropping.
- Income no longer growing

Vehicle Miles Traveled (VMT) Car and Light Truck VMT, Trillion Miles Per Year, U.S.

Income vs. Time, U.S.

Median Household Income vs. Time

Location Efficiency

- Cities are not all alike in their consumption of VMT.
- Density (housing units per acre or per hectare) is a key explanatory variable.

Location Efficiency: Developing Scientifically Robust Relationships I

- Statistical analysis performed for 4 major U.S. metropolitan areas.
- Unit of analysis was a neighborhood
  - The metropolitan areas had 500 to 3,000 neighborhoods.
- Dependent variables: automobile ownership per household and vehicle miles traveled (VMT) per automobile.
Location Efficiency: Developing Scientifically Robust Relationships II

- Independent variables tested:
  - Density (housing units per acre)
  - Public transportation availability (buses per hour within walking distance).
  - Neighborhood jobs/services: number of retail businesses within walking distance.
  - Access to jobs.
  - Pedestrian and bicycle friendliness.
  - Income.
  - Household size.

Location Efficiency: Study Results

- Excellent statistical fits.
  - R² for auto ownership equation exceeds 80%-90% for some cities.
- 4 variables highly significant:
  - Density
  - Transit
  - Income
  - Household size
- 2 variables modestly significant:
  - Pedestrian/bicycle friendliness
  - Proximity to jobs

Location Efficiency: Interpretation of Study Results

- Proximity to jobs had only modest statistical significance
  - Proximity to jobs reduced miles driven per car, but not car ownership, resulting in very modest improvements in regional air emissions.
  - Proximity to jobs was defined as the number of jobs within one half hour commuting distance.
  - Thus, there is little or no evidence that setbacks around polluting industrial facilities will increase driving.

Results:

Vehicles per Household vs. Households per Residential Acre – San Francisco

- Impact of Density and Transit on Driving
  - Annual VMT/Household
  - Zonal Transit Density
  - Hh/Res Acre

Impact of Density and Transit on Driving

- San Francisco Bay Area

- Los Angeles

- Annual VMT/Household

- Zonal Transit Density

- Hh/Res Acre
Vehicles per Household vs. Households per Residential Acre – Chicago

Adj Veh/HH versus residential density, Chicago

0.1 0.5 1 1.5 2 2.5
Normalized Vehicles per household

Density fit

Driving vs Density by Income
Chicago, Los Angeles & San Francisco regions

Poor (<$30K)

Middle Income

Wealthy (> $60K)

0 20 40 60 80 100
Households/Residential Acre

Annual VMT/Hh

The Results Are Similar Across Incomes

The Results Are The Same Everywhere

Daily Household Mileage

Single Adults

Adults, kids 16-21

Adults, kids <16

0 50 100 150 200 250 300 350 400
Households/Residential Acre

Significance of Location Efficiency

Results I

Urban design choices made in the U.S. affect VMT by 3:1.
- This increases to at least 5:1 for infill development.

Higher densities are most important.
- The most significant variable of all was the number of residential units per residential acre. Putting some acres off-limits to development will not affect this variable, and thus will not conflict with smart growth objectives.

Transit access is more important than previously believed:
- 1 passenger-mile on transit may reduce VMT by 4 to 8.
- Better transit can reduce traffic congestion by a lot.

Significance of Location Efficiency

Results II

Transit access is defined as the number of buses or rail vehicles per hour within walking distance of a home.
- Siting transit stations in highway rights of way reduces drastically the number of households that can live within walking distance of the transit stop.
- For this smart growth reason, major transit rights of way should be at least one half mile from a freeway.
- This is consistent with the proposal to require setbacks from major highways.
Significance of Location Efficiency

Results III

• Lower VMT reduces consumer costs:
  - Cars are almost 18% of household expenditures in the U.S.
• Lower VMT reduces the need to invest in highways.
• Effectiveness of transit alters the tradeoff between railroads, buses, and highways.
  - Transit can be far more cost effective due to reduction in passenger-miles.

Research Ideas

• Location of businesses may also affect VMT.
  - Does clustering uses in a metropolitan or regional downtown reduce driving?
  - Is locating businesses close to transit access more important than locating homes near transit?
• How much do economic factors affect the results?
  - Impact of free or paid parking.
  - Impact of gasoline prices and taxes/subsidies for auto ownership.
• Do results from large metropolitan areas apply to small towns as well?

Smart Growth Issues Not Addressed by Location Efficiency

• Since mixed use can most rigorously be justified as an amenity rather than a way to reduce traffic, separating polluting industrial uses from residential enhances mixed-use goals.
  - Some smart growth model developments intentionally place industrial and trucking related facilities near the outskirts of the development along the freeway exits, while placing heavy commercial and residential development around a transit station located away from the highway.
  - There is little or no evidence that setbacks around industrial facilities could increase driving.
  - Siting development near freeways may increase driving.

Setbacks Should Be Standard

• Designating setbacks between pollution sources and homes does NOT constrict development.
• In many cases a one block radius around a pollution source can be a sufficient setback, allowing for commercial development or open space.
• Residential design elements can often take care of setback requirements: Access roads, landscaping, etc.

Smart Growth Can Be Smarter

• No need for “smart development” or affordable housing to put residents in harm’s way.
• Homes that are too close to large pollution sources expose residents to air toxics.
  - Residents pay the price in increased health care $ & diminished quality of life.

Setback: The distance it takes for pollutants to drop to near background levels

- Freeway Impacts on Outdoor Air (vs) Distance from Edge of Freeway

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<th>Distance from Edge of Freeway (m)</th>
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