Driven to Wealth:
Defining the Economic Benefits of Mass Transit

Jacky Grimshaw

Center for Neighborhood Technology

February 6, 2009

CNT

CNT's Mission:
Livable and Sustainable Communities

1. Benefits economy & environment;
2. Makes good use of existing resources & community assets; and
3. Improves health of natural systems & well-being of people.

Now and in the Future

CNT is a Think-and-Do Tank

We **Research**, **Promote**, and **Implement**
Innovative Solutions



CNT

"An Innovations Center for Urban Sustainability"

Four Issue Areas

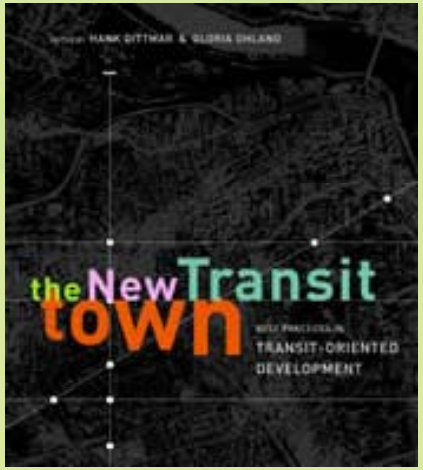
- Climate
- Energy
- Natural Resources
- Transportation & Community Development

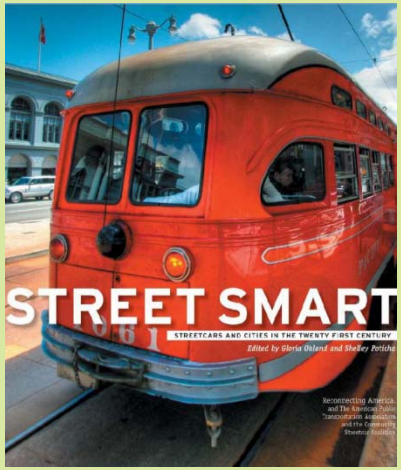
Two Affiliates

- I-GO Car Sharing
- CNT Energy

Purpose of Presentation

- To define an objective and achievable set of economic, social & environmental benefits for increasing transportation choice and wealth of the residents of Idaho

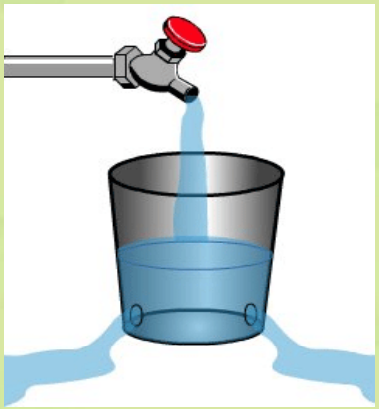




CNT

What a Nourishing Economy Does—Reduces Risk, Increases Gain

Connectedness



When Coffee Came to London: Lloyd's Coffee House, Social Capital & Urbanism Create the Insurance Industry, 1700s

Poverty

Productivity

Isolation

CNT

Economic Benefits

- What determines the need to travel
- A measure you can take to the bank: location efficiency and the housing + transportation affordability index
- Value creation and value capture associated with different scales of development
- The value of time savings
- Job creation
- Environmental improvement

Trends
Shaping Demand for Residential Locations

- Aging and demographics
- Climate
- Quality of local and regional transportation
- Quality of inter-city transportation
- Cost of living—e.g. energy expenditures
- Perceived “coolness”—cultural amenities, adaptive character, proximity to colleges, etc.

Trends
Shaping Demand for Business Locations

- Population
- Workforce
- Cost of living
- Quality of local and regional transportation
- Quality of inter-city transportation
- Exposure to energy prices
- Access to knowledge institutions and workers

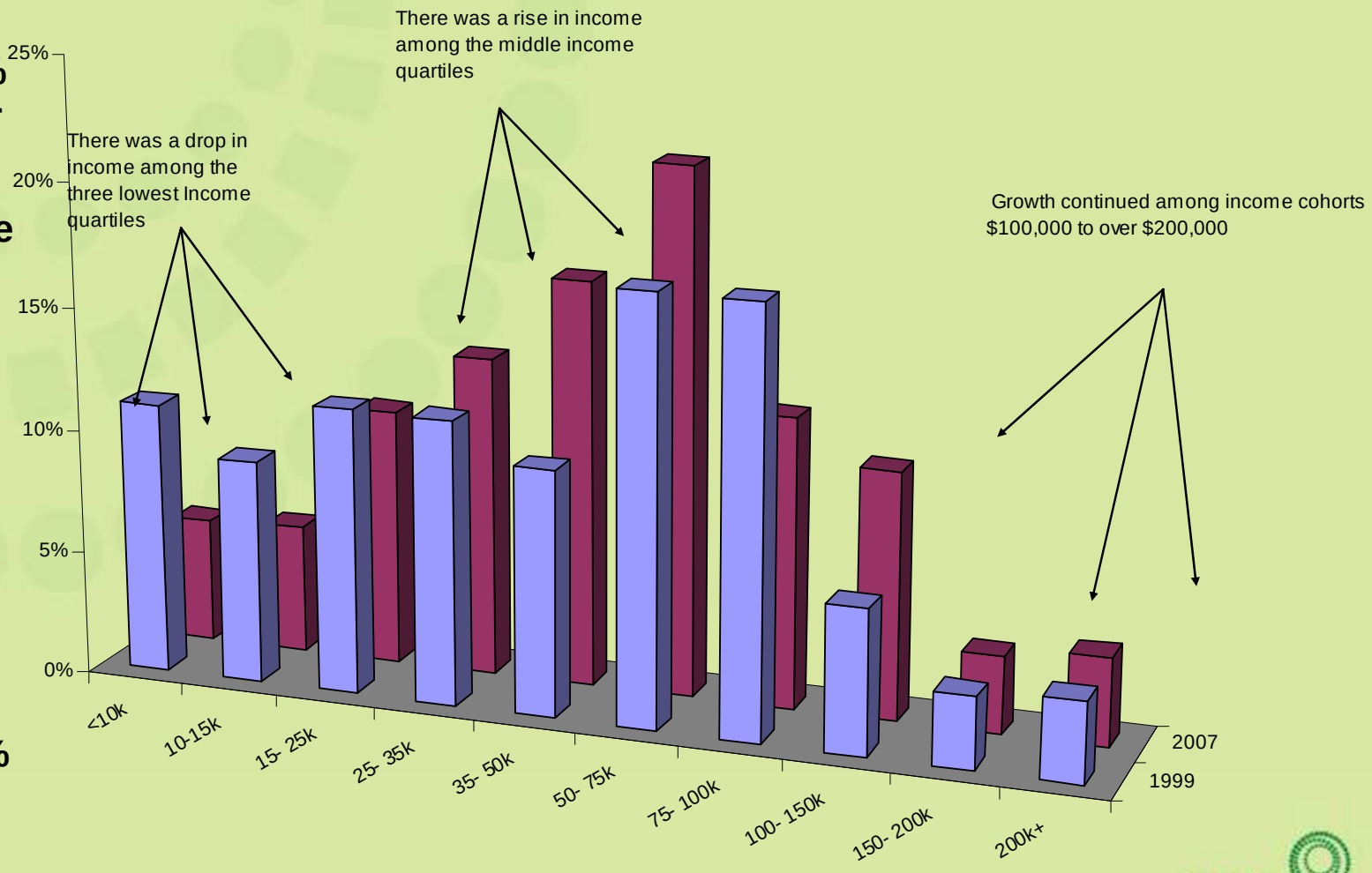
Idaho's Metro Area and Cities' Core Assets

- Originally served by streetcars, regional traction and river traffic
- Location efficiency still reflected in basic street patterns and land uses and statewide ROW
- Have significant plans to improve local transportation choices and are looking for investment partners

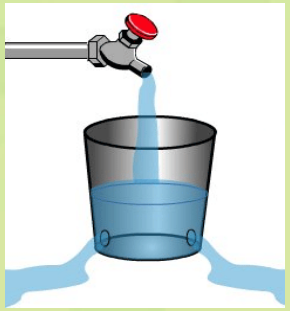
Income Distribution

1999-2007:

- **Median HH income rose 17% ($3547-$4157 per month**
- **But to keep pace with inflation, needed 24.5% increase ($4416)**
- **Avg HH fell behind $259 per month**
- **Housing costs rose 29% ($981-1267)**
- **Gas prices 112%**

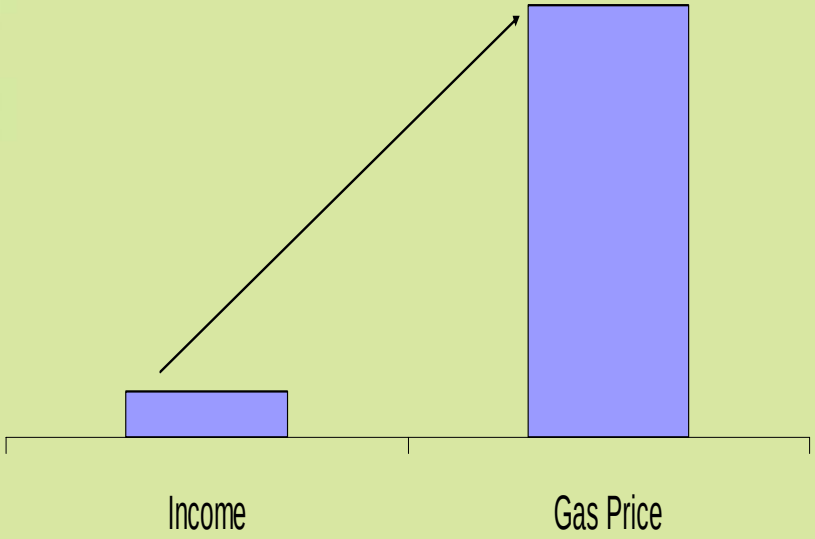


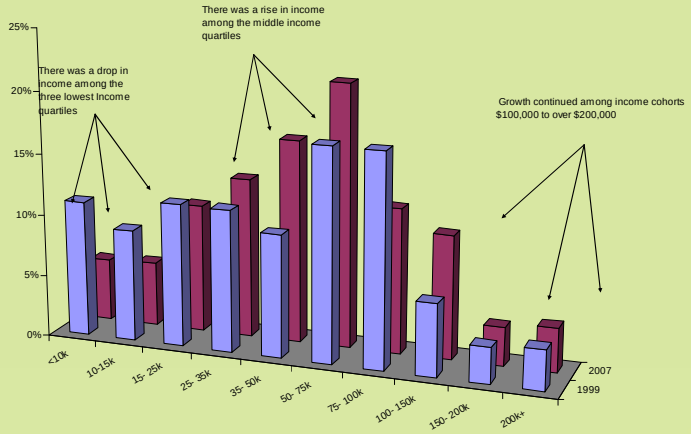
While General Inflation was 24.5%, the Price of Gasoline More than Tripled from $1.25 to $4.10 per gallon



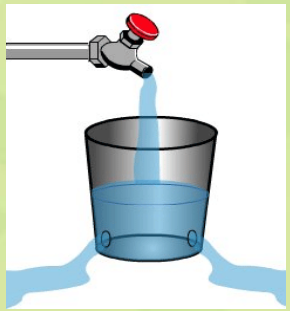
Need to Increase Income AND Reduce Cost of Living

- ID 2000-2008 Gas Prices Grew 8 Times Faster than Income
- 2000 Gas Price Increase Bled Extra $665 Million Annually from ID
- 2008 Total Statewide Passenger Tab >>$1.4B



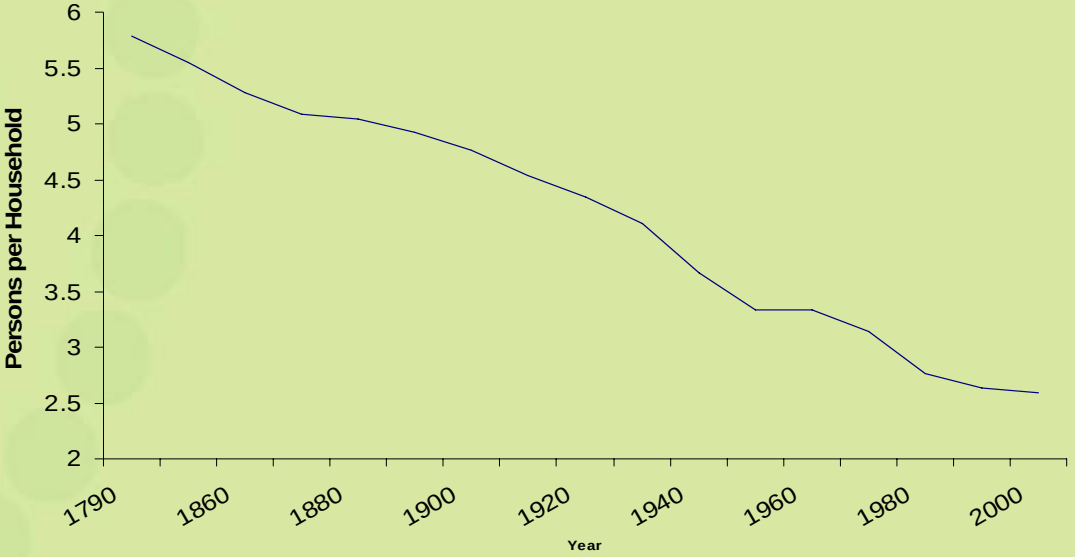


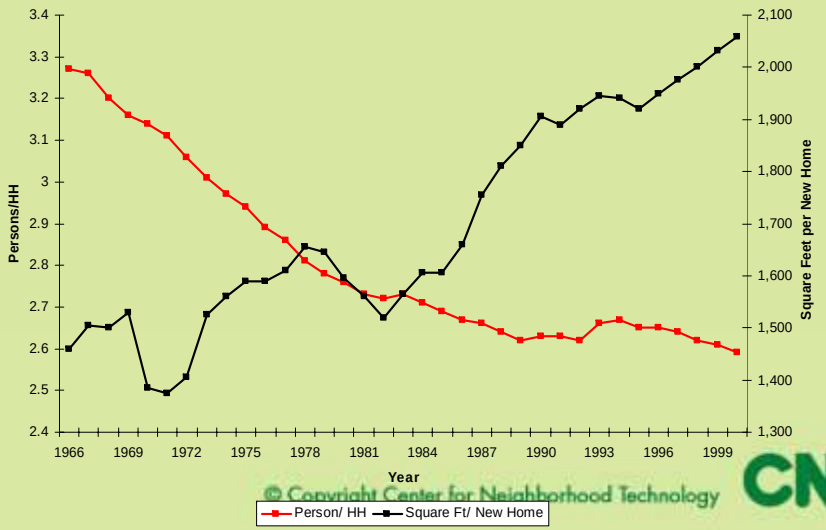
In Idaho from 2000 to Present, Housing Costs Rose Twice as Fast as Income, Gasoline Costs Rose 8 Times as Fast as Income and 5 Times Faster than Housing



Demographic & Price Trends Promote Urbanism and Demand Reduction

- Continuous drop in household size since 1790
- Aging in place
- "Married w/kids" only 23% of total
- Rising energy and gas prices
- Limited public funds to keep sprawling

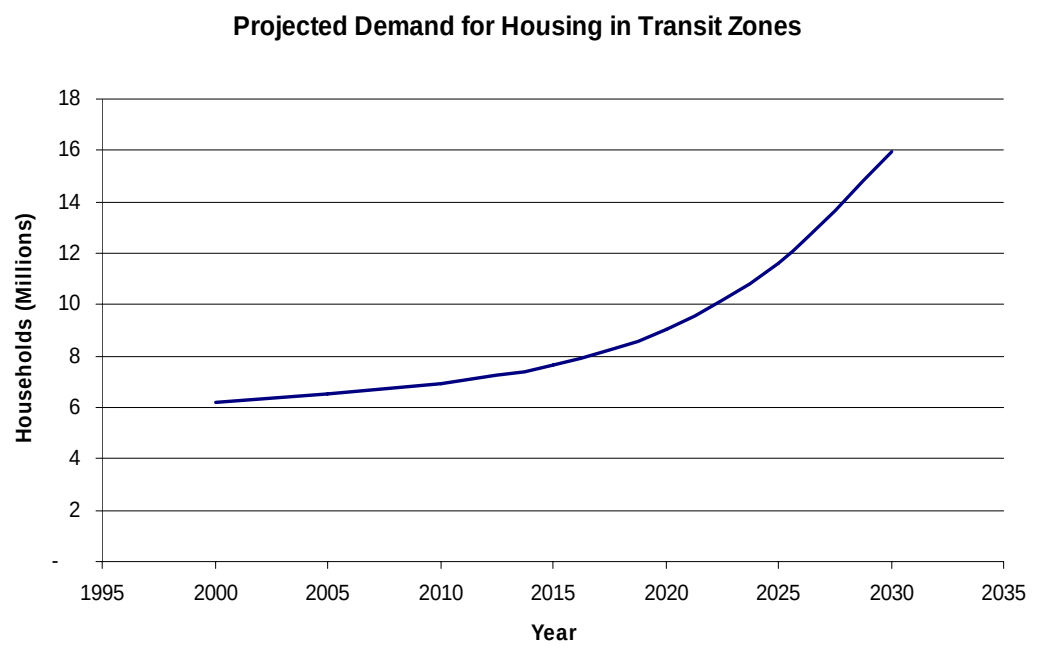


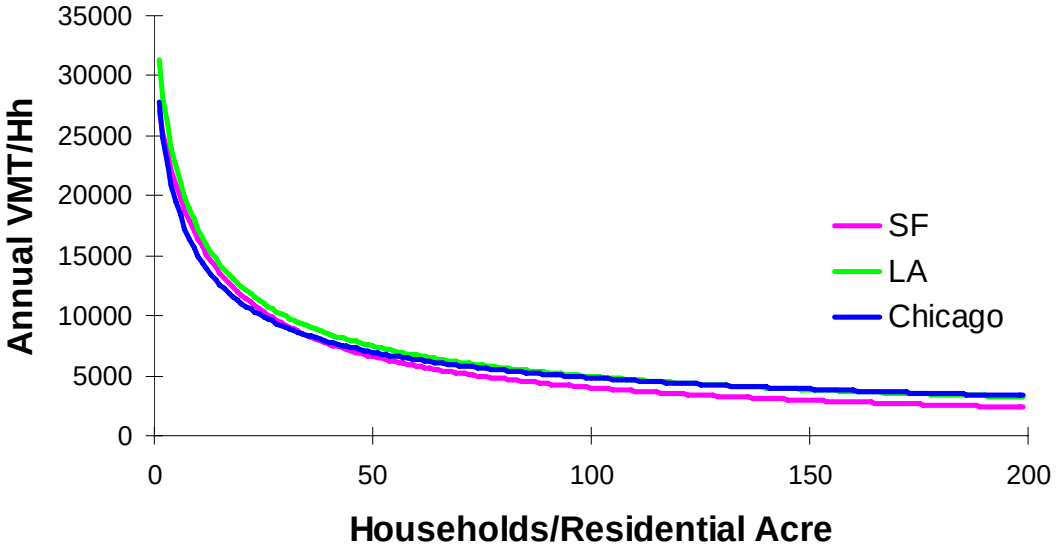


CNT

Energy and Driving Costs and Demographic Trends Will Keep Growing the Demand for Housing Near Transit

- Unmet demand for 9 million units within ½ mile of America's 4000 transit stops by 2030
- Many times that within bus or shuttle distance
- Cuts vehicle ownership
- Cuts VMT
- Cuts emissions

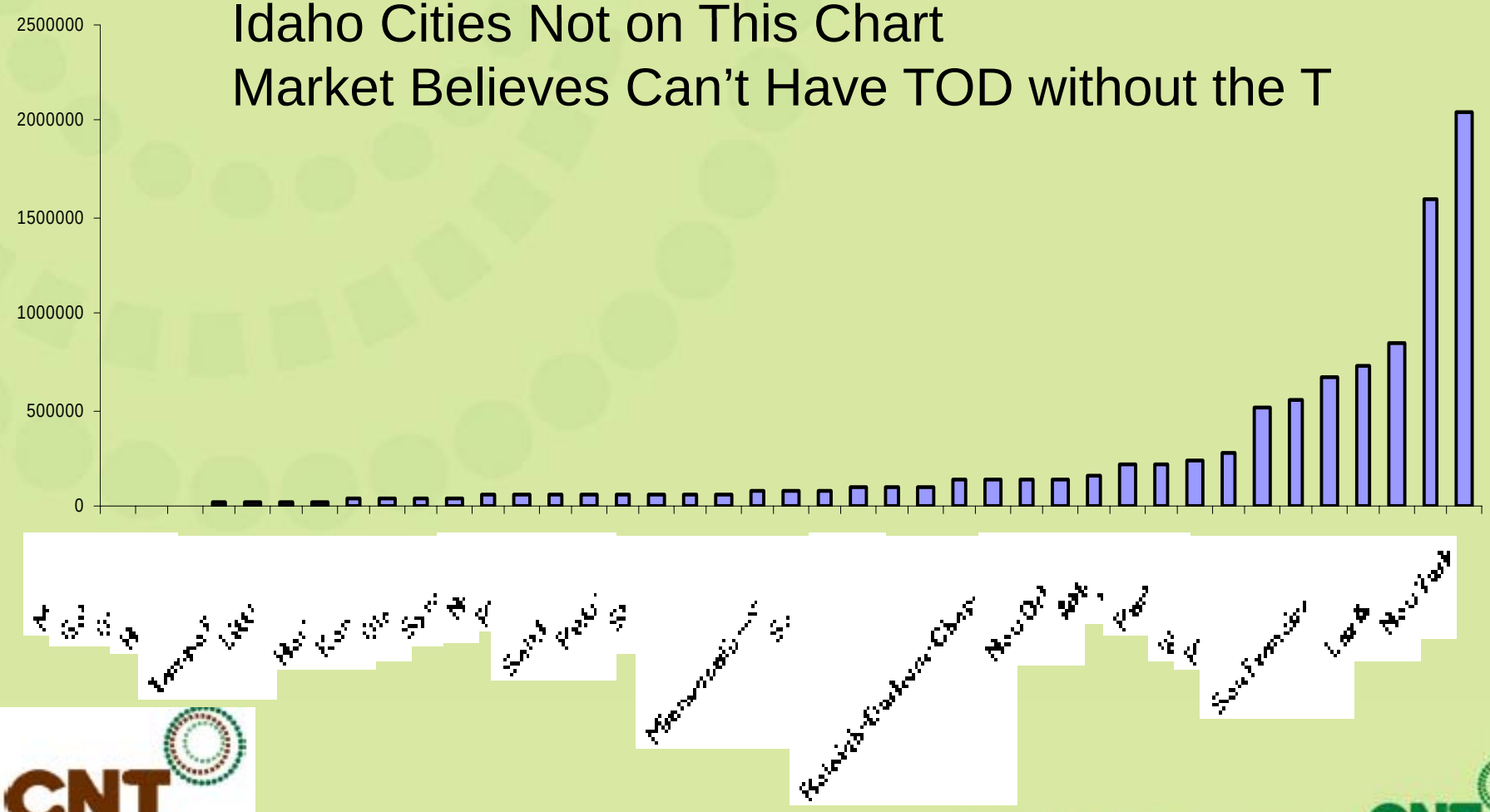




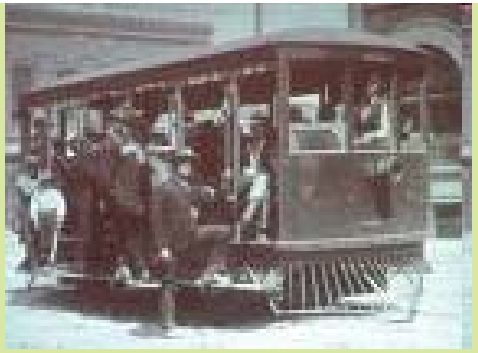
CNT
Sustainable Communities
Attainable Results

Demand for Housing Near Fixed Guideway Transit—Will Grow by 9 Million Households 2005-2030

Idaho Cities Not on This Chart
Market Believes Can't Have TOD without the T

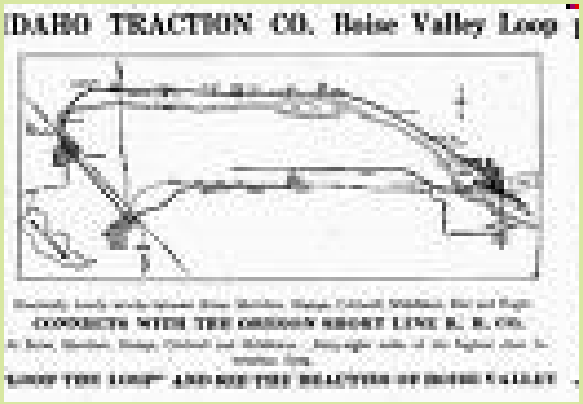


Legacy Transit Features Helped Shape Land Use



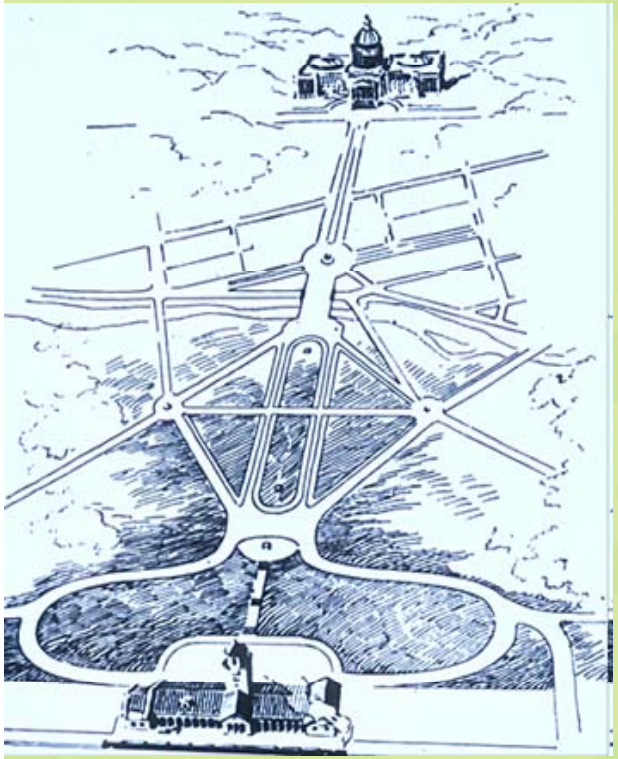
Boise Back in 1924

- Boise population 21,393
- Boise Street Car Co, 5 miles “of which 3 miles are in paved street”, 10 cars, fare 7c cash or 5c per ticket
- Boise Valley Traction, 82 miles
- Connected Boise, Eagle, Star, Middleton, Caldwell, Nampa, Meridian
- 22 passenger, 22 freight cars



CNT

In the Meantime…

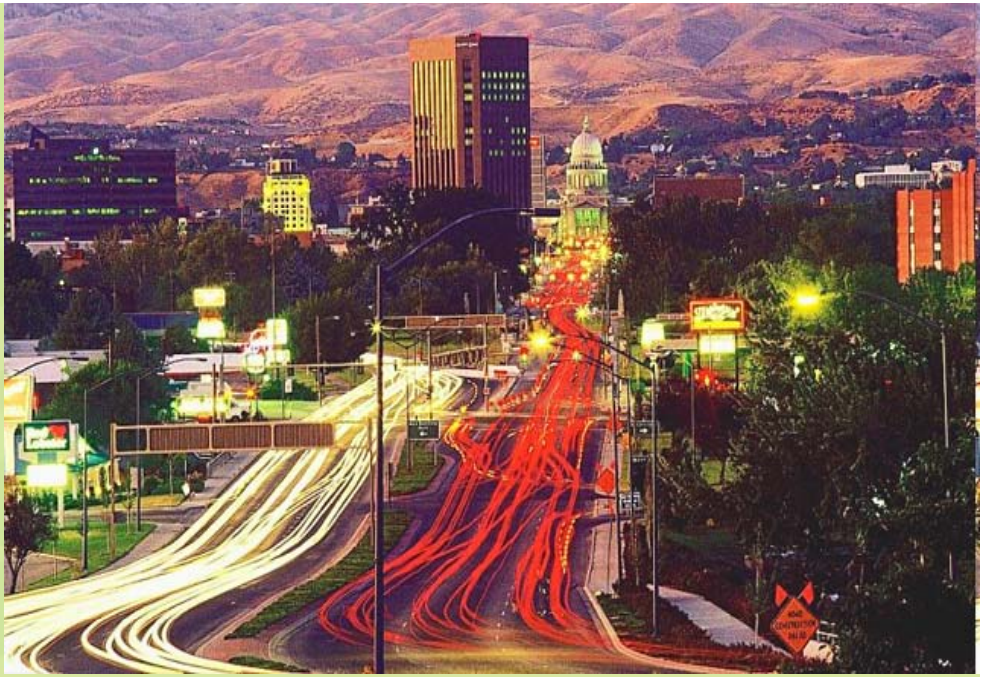


1924 City Plan Bracketed by Union Station and Capital

The Plan will “beautify Boise and control the River without cost”

1925 UP Mainline hookup made boulevard possible

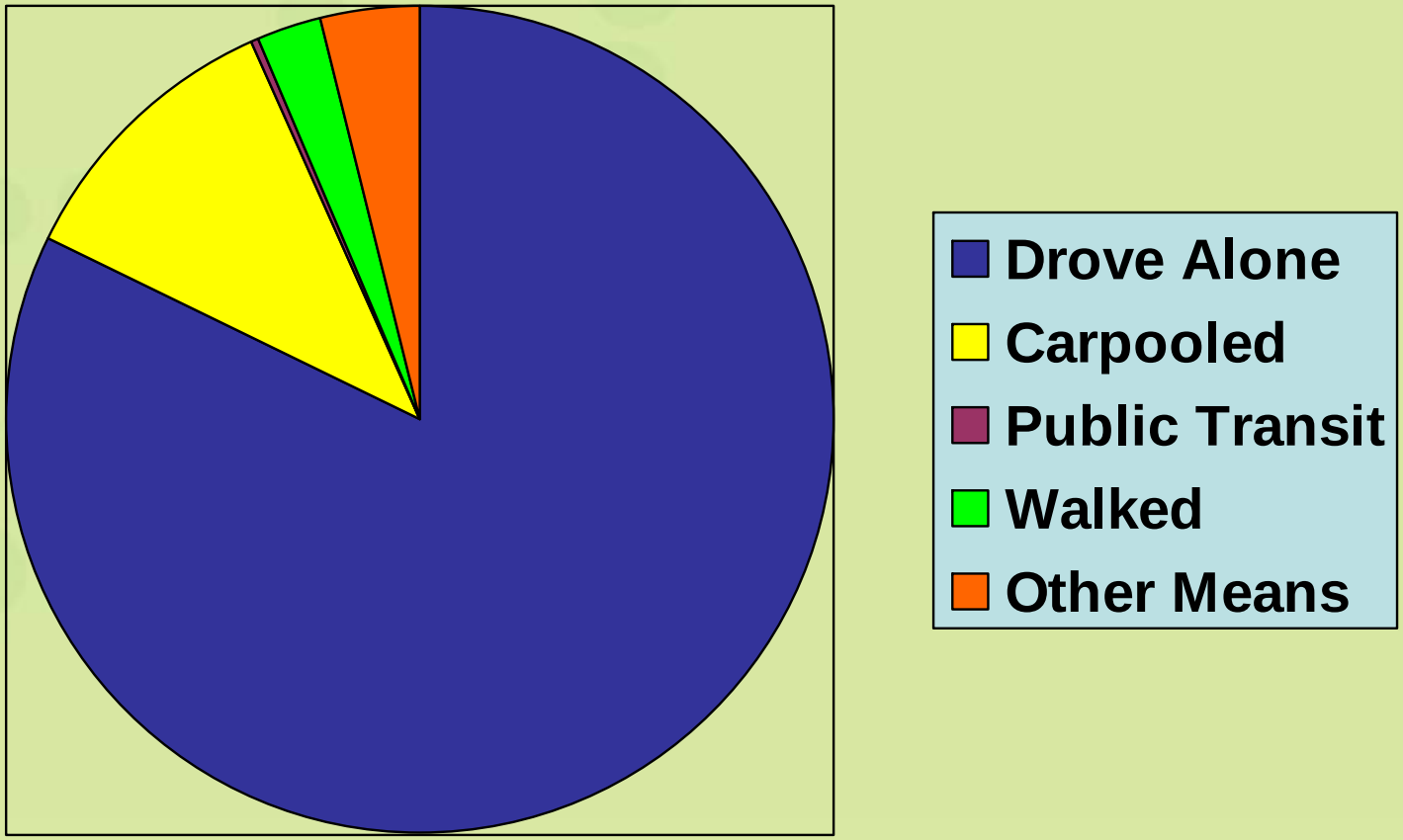
CNT



A region rebuilt around its traffic flow…

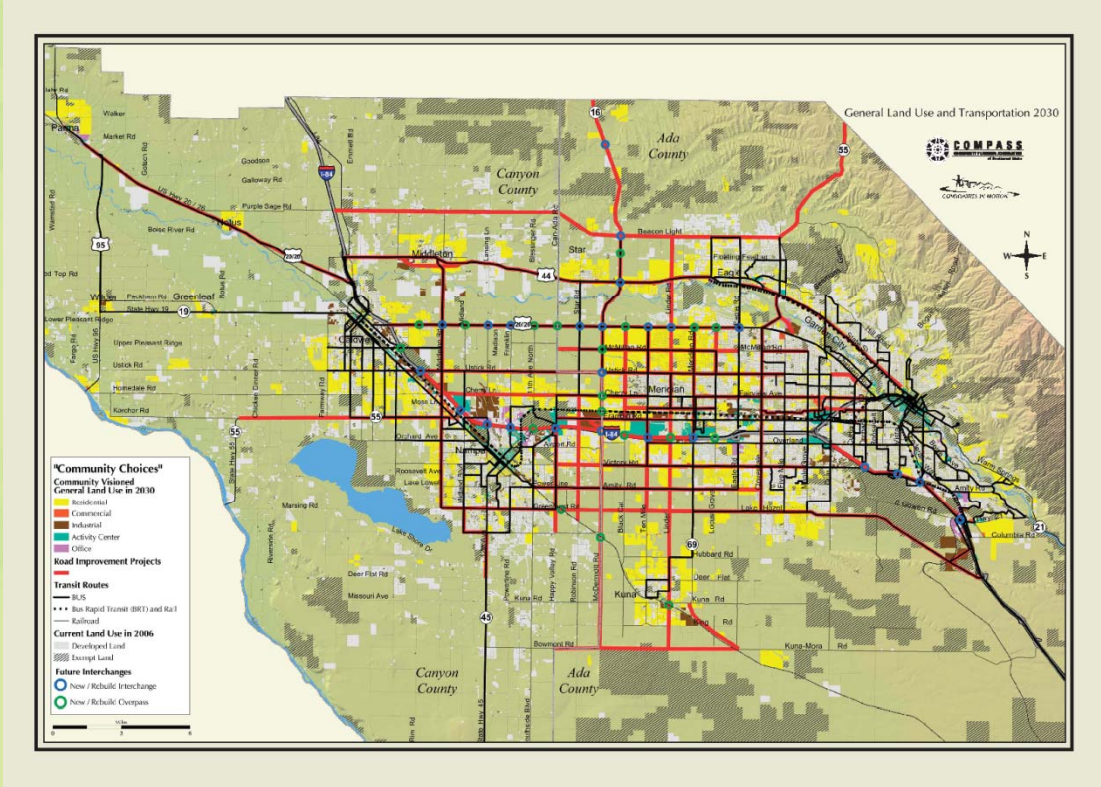
CNT

Resulting in Mode Split…



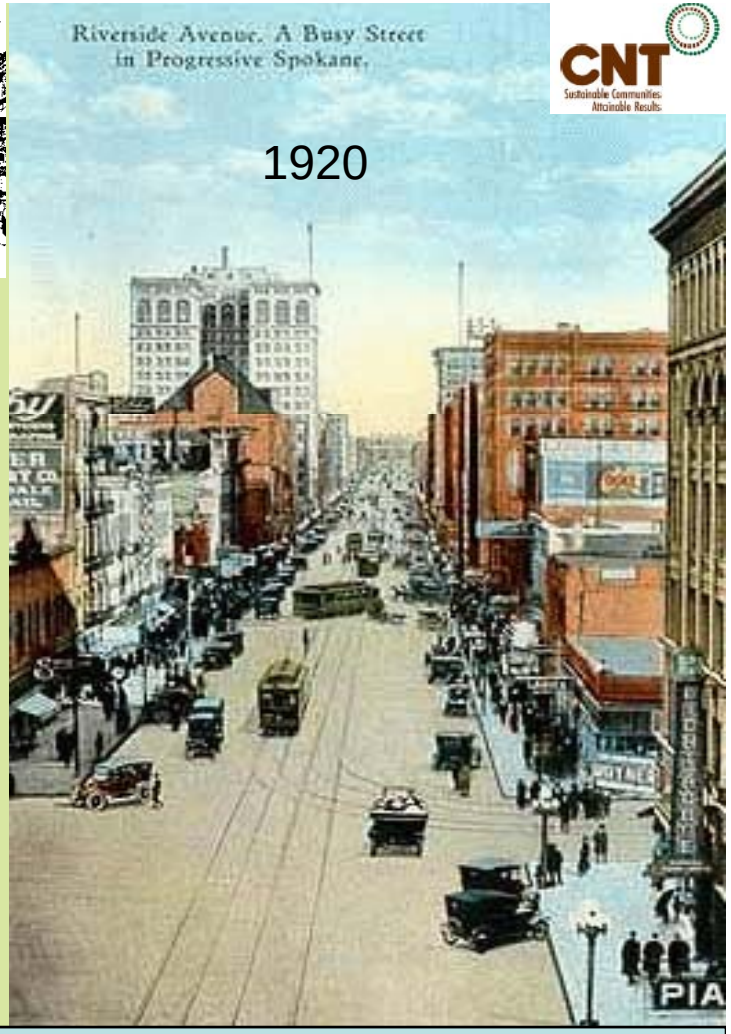
Legacy Transit Features Helped Shape Land Use

- Higher population densities
- Much lower vehicle ownership
- Transportation expenditures were 5 percent of HH budgets



CNT

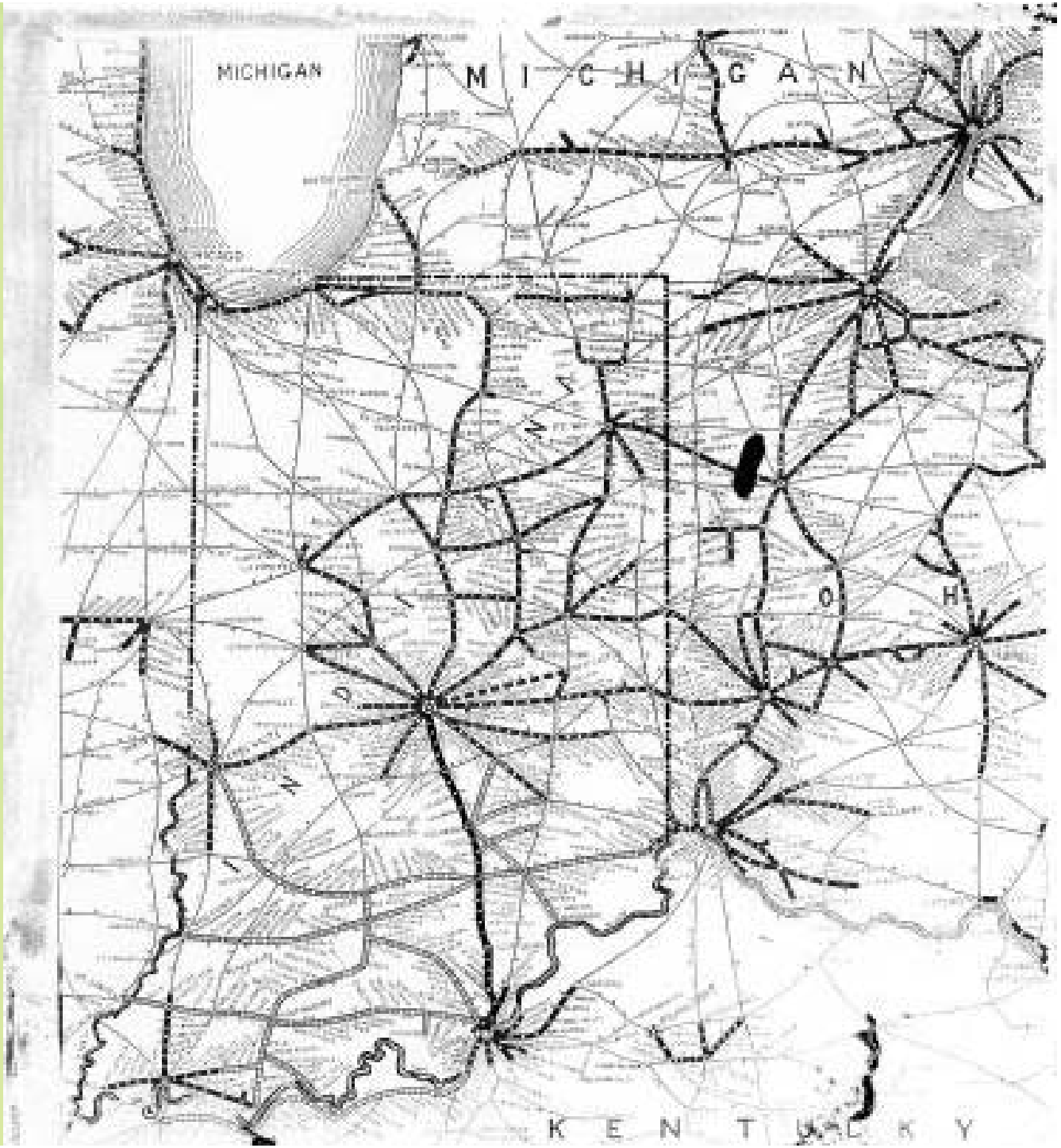
Historical Precedent for Rapid Change— From 1885 to 1902



- **America went from 1 electric street railway to 1 in every city of 5,000**
- **Rate of growth = to the Internet**
- **Demand boosted by important social movements—e.g. home economics**
- **Idaho had good electric street railway coverage**

Getting to scale through network economies—when a large number of connected small investments are worth more than a few big ones

1910

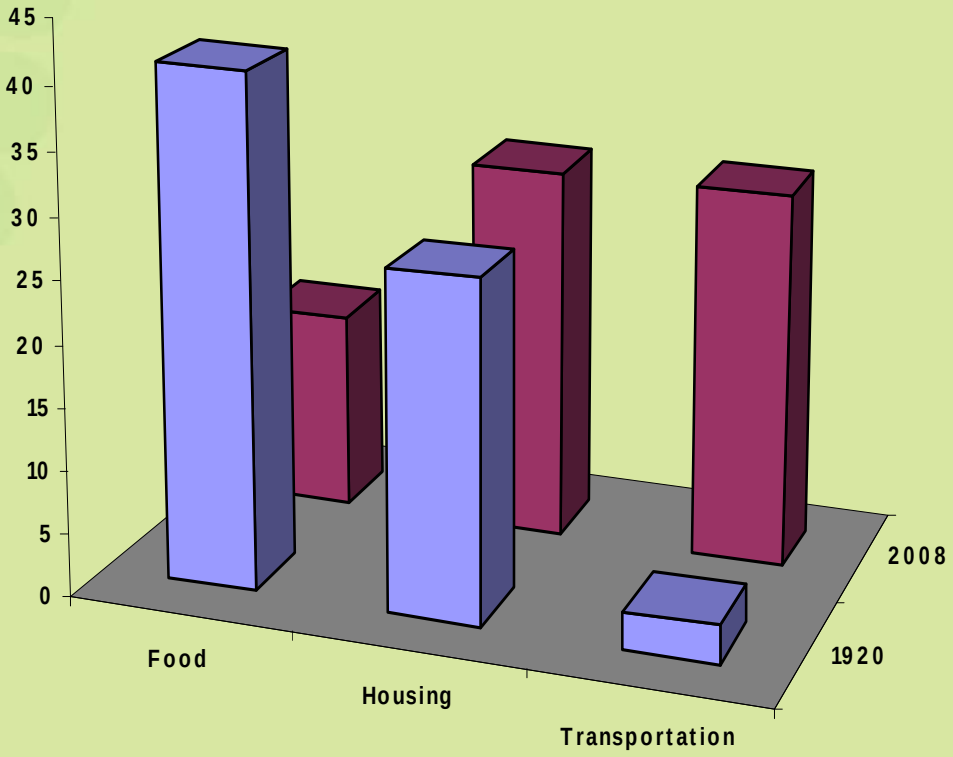


CNT
Sustainable Communities
Attainable Results

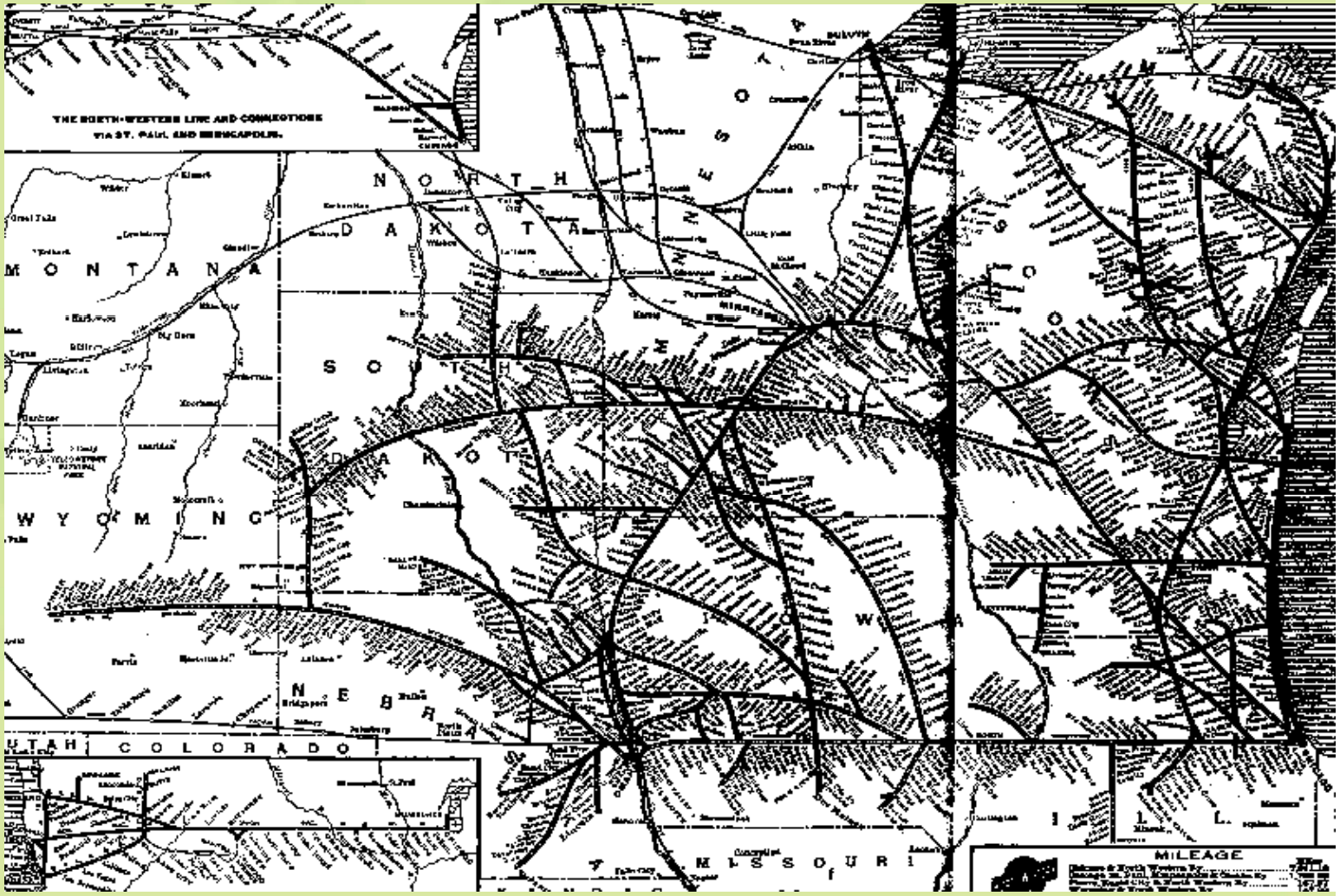
Historical changes

- 1920, Food was 41 percent of HH expenditures, housing 27, transportation 3 percent

- Today food 16, housing 25-35, transportation 15-35 percent respectively



America's Inter-City System Was Largely Abandoned



CNT

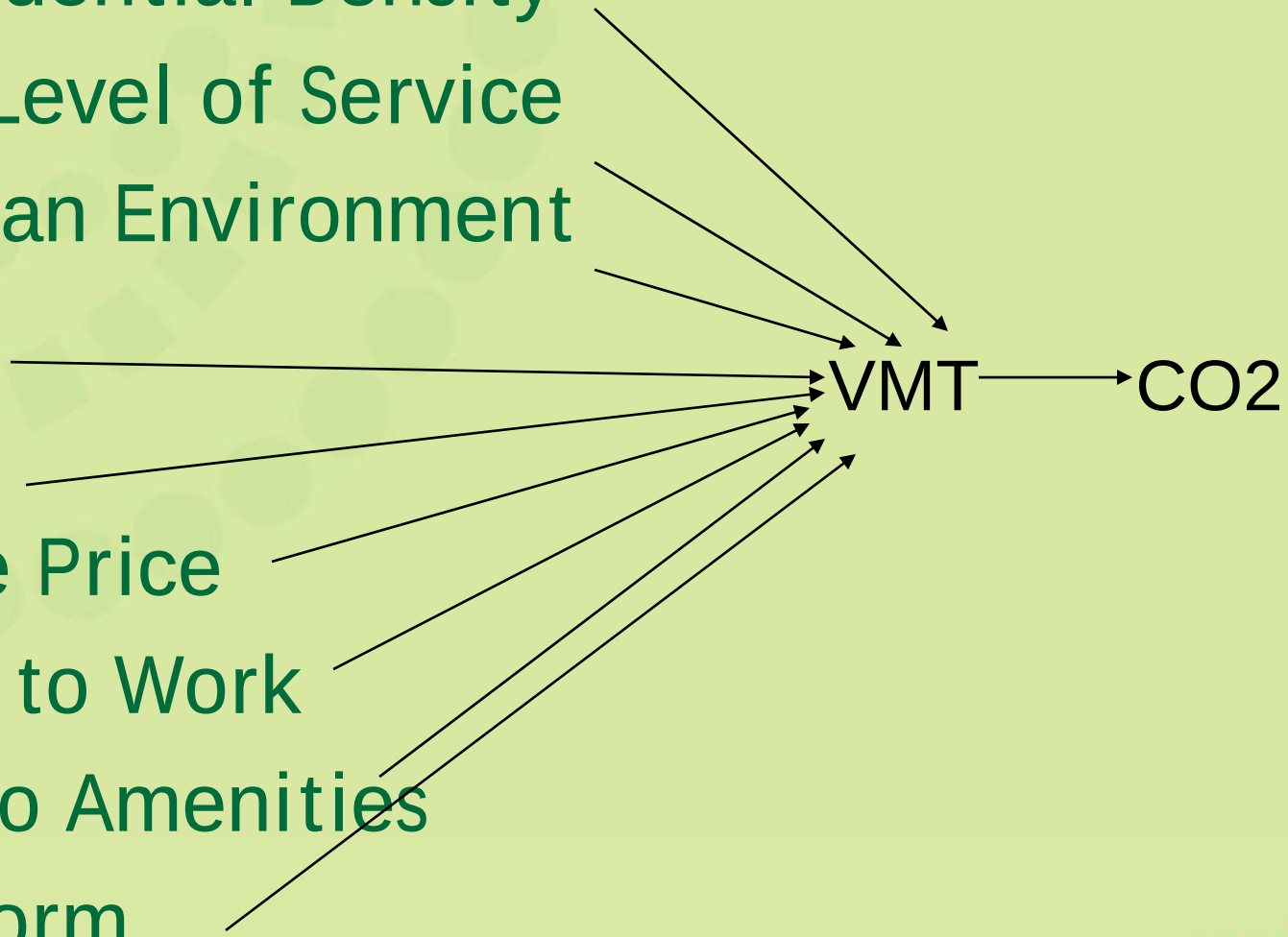
Most Places Abandoned Their Transit Systems

How to Get There

CNT
Sustainable Communities
Attainable Results

What Influences Travel Demand & CO2 From Passenger Transportation

- Net Residential Density
- Transit Level of Service
- Pedestrian Environment
- Income
- HH Size
- Gasoline Price
- Journey to Work
- Access to Amenities
- Urban Form



CNT

Travel Demand:

- Density, Transit Access (Proximity, Frequency, Connectivity), and Amenities Determine Transportation Demand
- Statistics Used to Estimate Likely Travel Demand
- Demand is Verified by Measuring Vehicle Ownership and Extent of Use
- Demand is Then Valued in Dollars and Cents

Explain Using Regression?

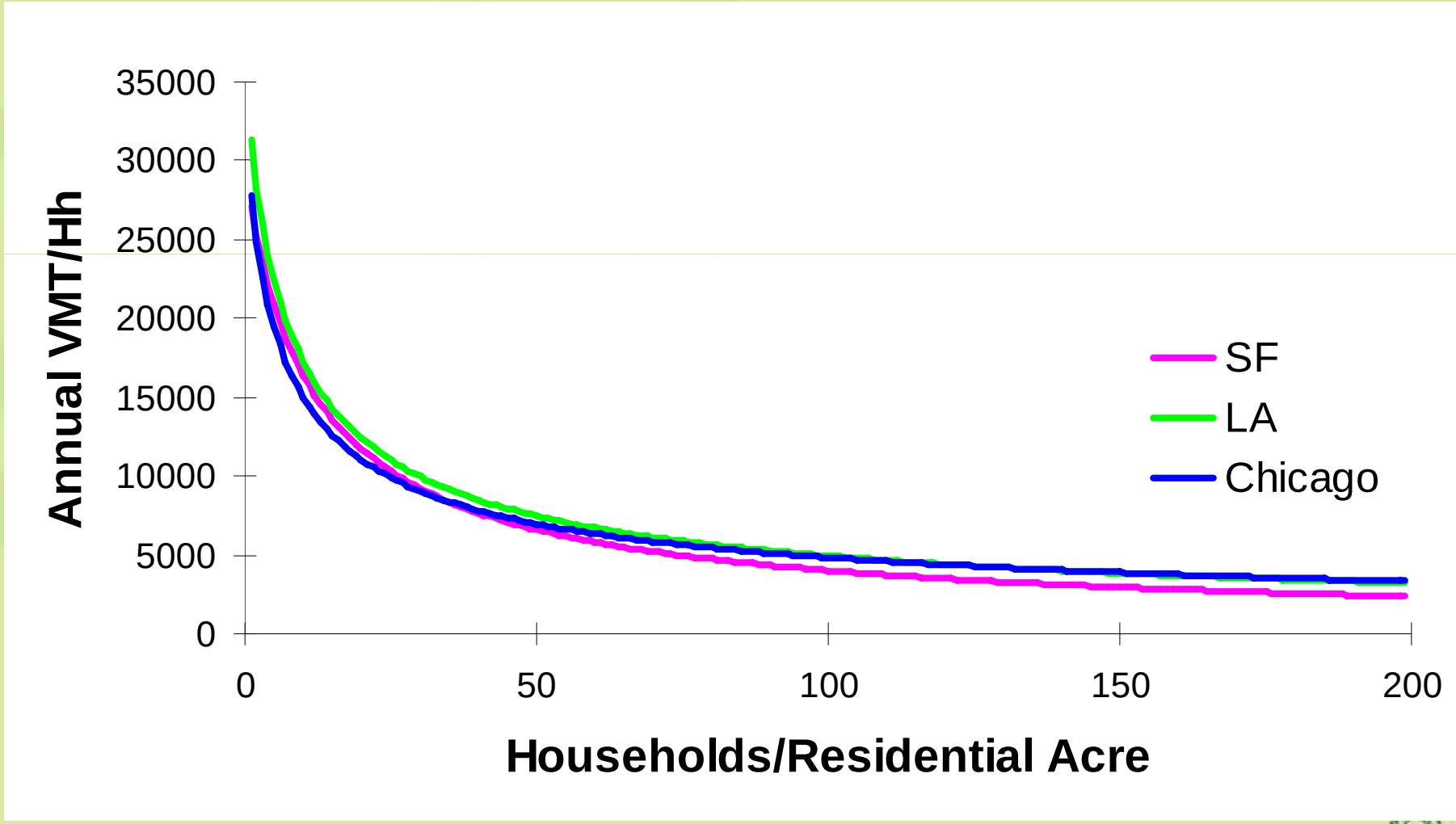
$$\frac{Veh}{Hh} = 4.722\left(22.520 + \frac{H}{RA}\right)^{-0.3471}\left(1 - e^{-\left(0.000112\frac{\$}{P}\right)^{1.2386}}\right)\left(1 + 1.0519\frac{P}{H}\right)(Tr + 60.312)^{-0.2336}$$

$$\frac{VMT}{Veh} = 10386\left(0.5041 + \frac{H}{TA}\right)^{-0.0419}\left(1 + 0.02759\frac{P}{H}\right)\left(1 - 0.0704\sqrt{Ped}\right) - 0.01743\left(\frac{\$}{P} - 22136\right)$$

$$\frac{VMT}{Hh} = \frac{Veh}{Hh} \times \frac{VMT}{Veh}$$

CNT
Sustainable Communities
Attainable Results

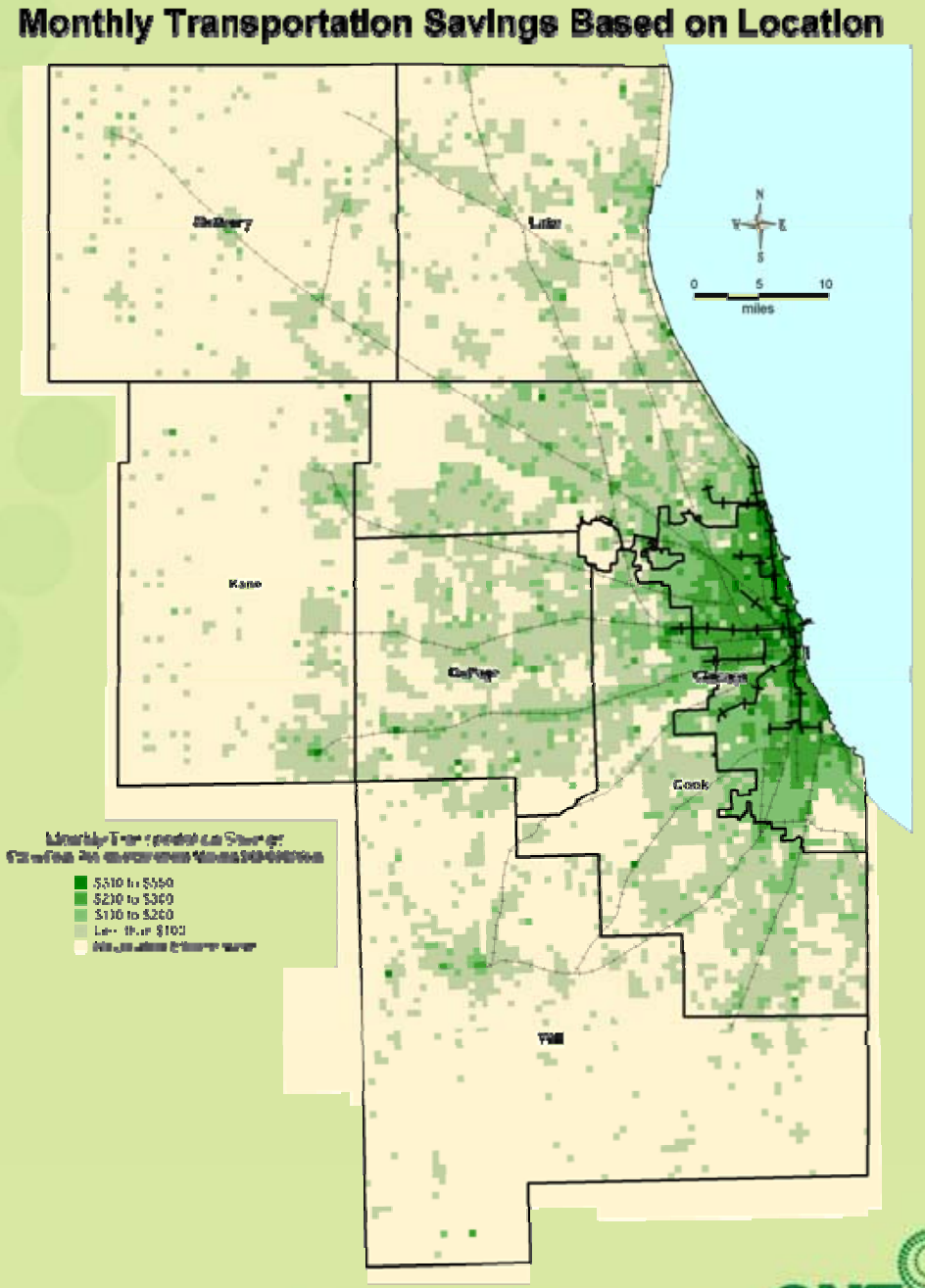
Curve has been shown to work for 54 US Regions, London, Paris, and 37 Japanese Cities



CNT

Mapping the Benefit

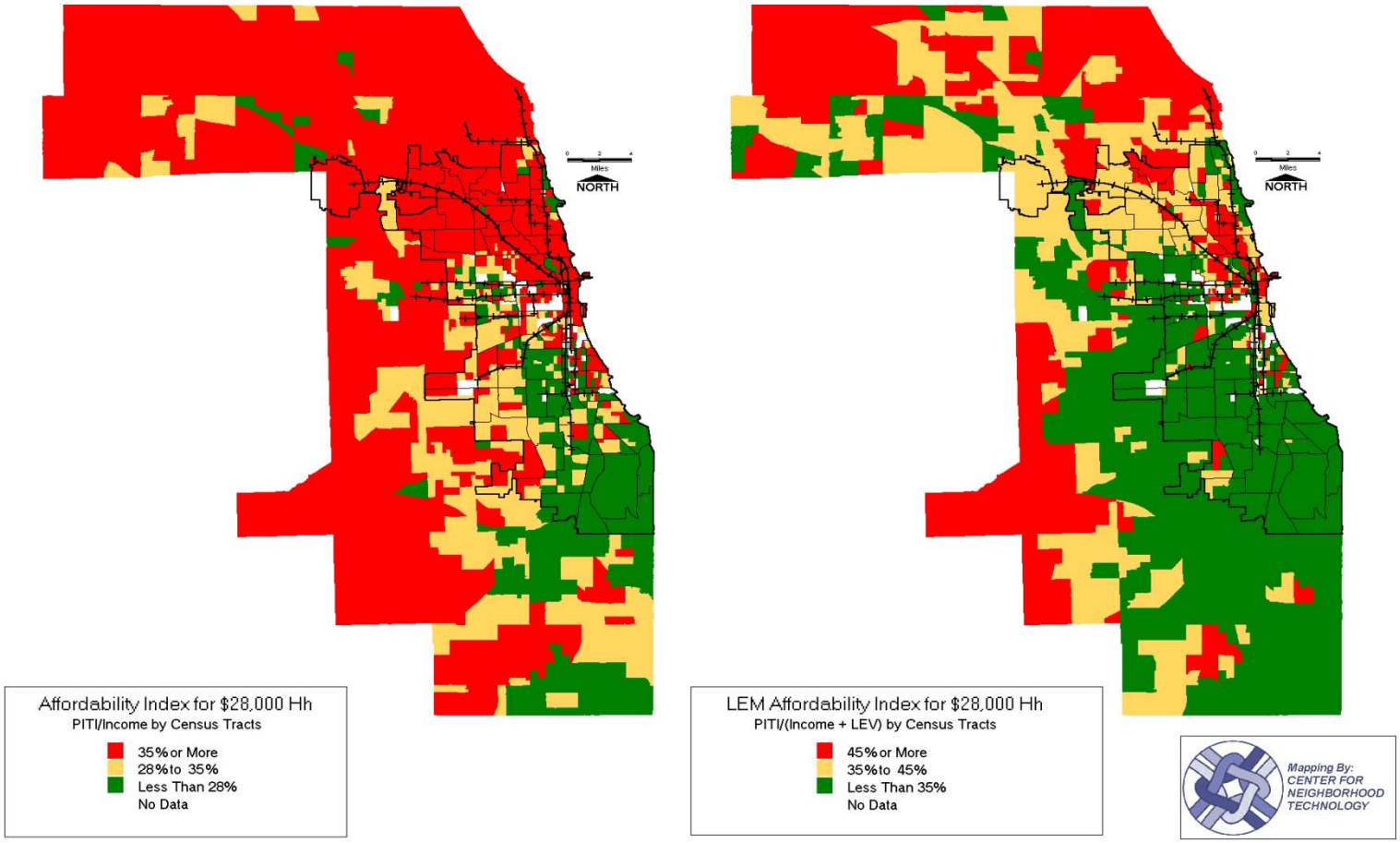
- Good transit access yields one less car per HH
- Lowers cost of living by $300-600/month
- Equivalent of **increasing income** 10-20 percent tax free



CNT

Showing the Benefits of Capturing the Value

How much more of Cook County is Affordable for
the Working Poor when we count Transportation Savings



Chicago Tribune

18 Section 1 Sunday, June 4, 2000

Skip the car, buy a house

There's a lot of hand-wringing nowadays about suburban sprawl and the need for "smart growth."

But like the weather, nobody's doing much about it.

Much of the home-buying public still opts for wide-open spaces along the metropolitan fringe. And despite thoughtful warnings from civic and regional groups, political realities in Illinois militate against significant governmental action.

Now comes a modest but innovative pilot program that just might make a small difference. Maybe even a big difference—*if* it educates the public about the true cost of living "out there."

It's called the Location Efficient Mortgage, or LEM, and it has been developed by environmental groups such as Chicago's Center for Neighborhood Technology along with Fannie Mae, the government-chartered, stockholder-owned repurchaser of home mortgages.

It works like this: Participating lenders, in evaluating applicants, take into consideration how close the dwelling is located to public transportation. If it's so close the applicant can live without a car, or a working couple can get by with just one, the estimate of disposable income is increased, and with it, the size of the mortgage for which they qualify.

A couple jointly earning $60,000 and buying into Chicago's transit-rich Edgewater neighborhood, for instance, would qualify for a home selling for $212,218. Out in the boonies, under traditional guidelines, the limit would be $158,364.

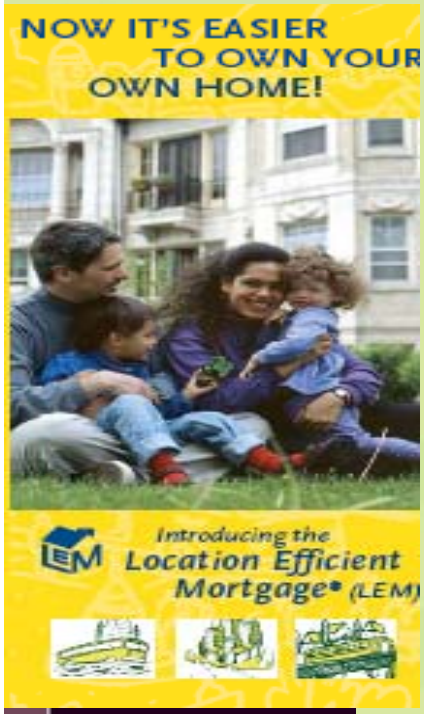
And there are sweeteners. LEMs are not subject to income limits and they offer more flexibility, including lower down payments, than conventional mortgages. The City of Chicago, moreover, is offering vouchers worth $900 toward the purchase of energy-efficient appliances to the first 100 LEM borrowers.

Downsides? There's mandatory counseling. And for now it's limited to Chicago and three West Coast cities.

The ultimate value of LEM, however, may be to show, in ways people readily understand, that sprawl does impose costs. Some of that cost is paid, knowingly and gladly, by those who choose to live "out there." Much of it, however, is hidden, and paid indirectly by those who live "back here."

For more information about LEMs call 1-800-732-6643.

Where Has it Been Tried



- LEM's in Seattle, Chicago, San Francisco, and Los Angeles (Fannie Mae and local lenders)
- Take the T Home Mortgage in Boston (Fannie Mae and state housing finance)
- Smart Commute Mortgages in several dozen cities (Fannie Mae plus local lenders)-Columbus, OH

CNT

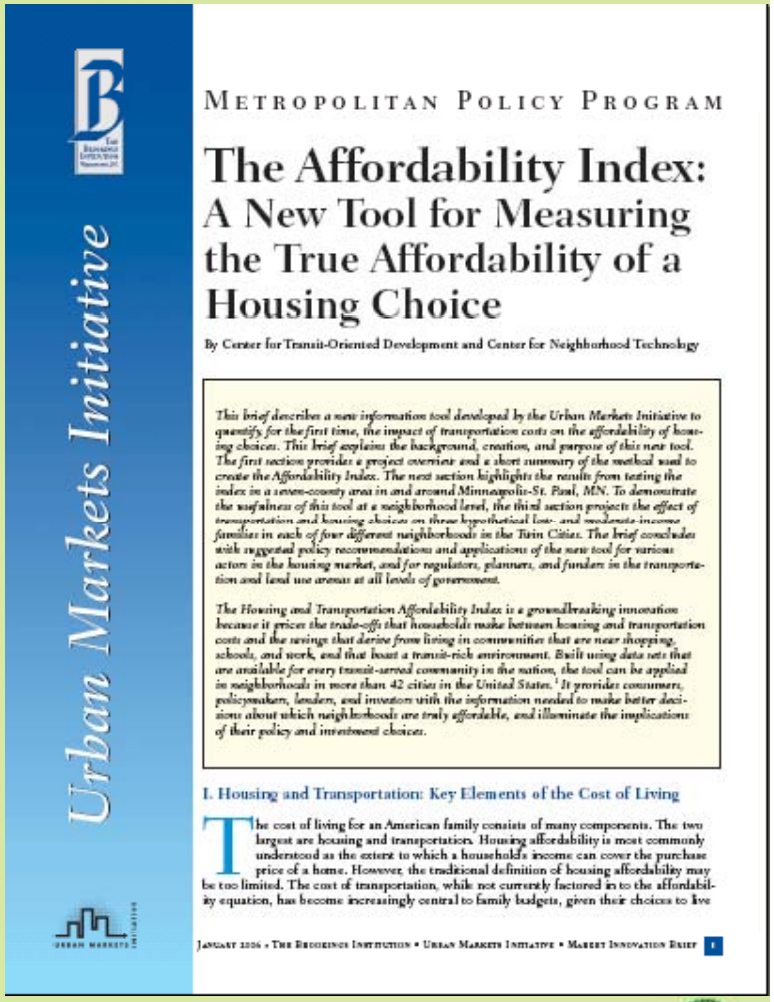
Another Approach
Indexing Truer Affordability and Relating it to Climate Change

https://htaindex.cnt.org

How Housing Affordability is Usually Calculated— Then and Now

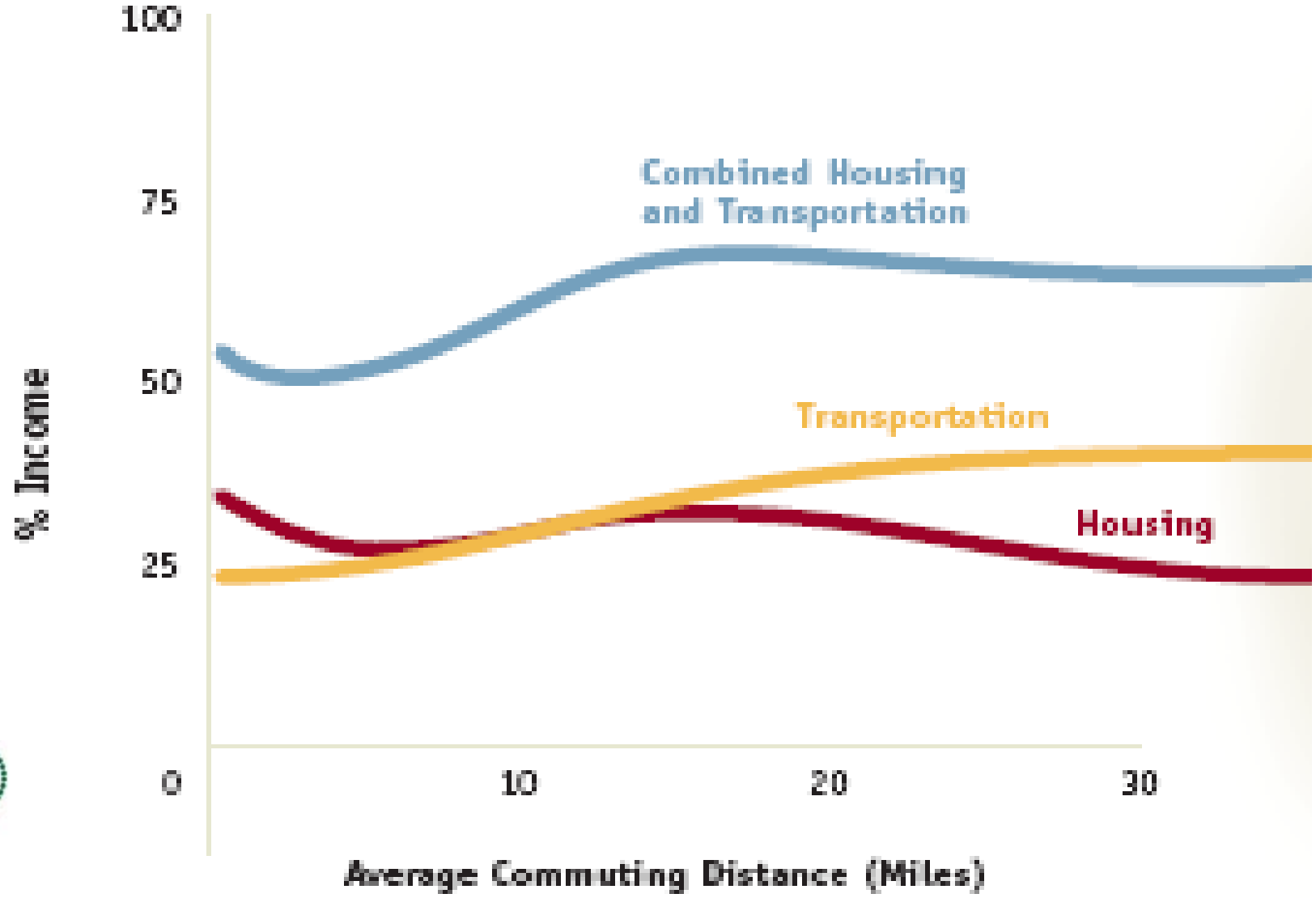
- Historically: Traced to 19th Century ideal—A Week's Pay for a Month's Rent

- Today benchmark affordability is defined as housing costs/Income less than or equal to 30 Percent of target population AMI



CNT

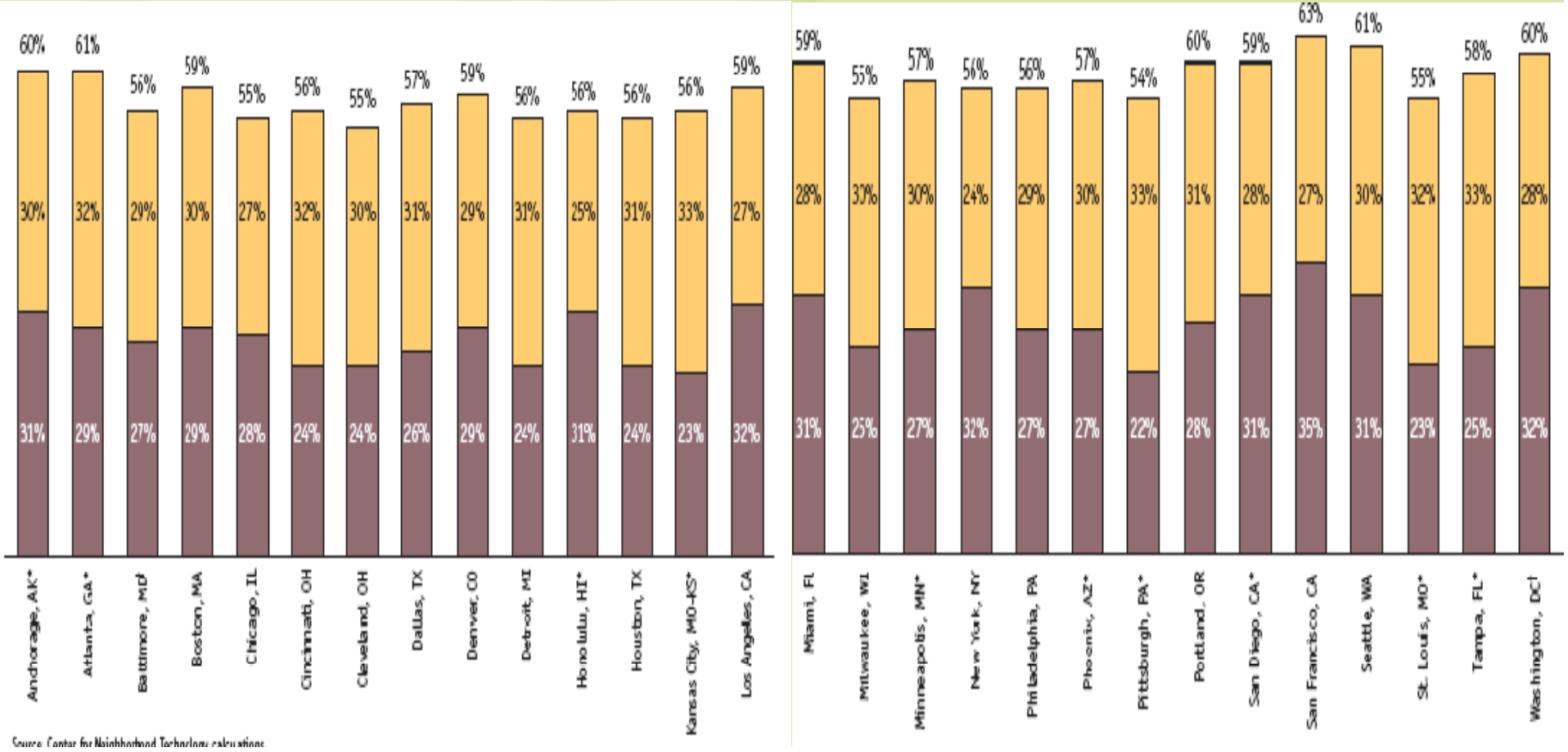
Where We Build Matters: Poor Locations Drive Up Emissions and Costs



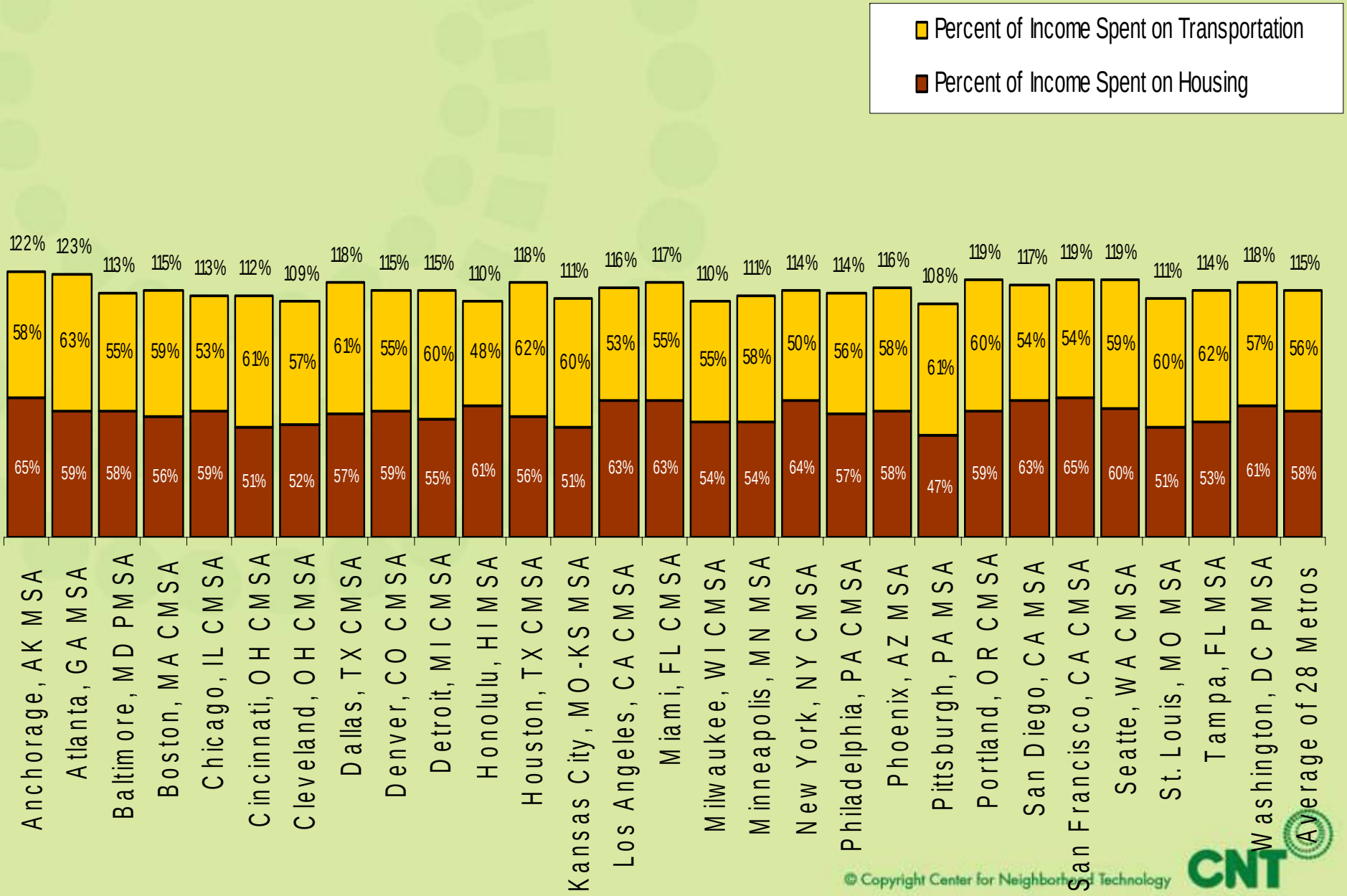
CNT
Sustainable Communities Attainable Results

What All Households in 28 Metro Areas Earning Between $20 and $50,000 Spend on Housing and Transportation as a Percentage of Income

Average = 30% for Housing
And 27 % for Transportation
=57% for H+T

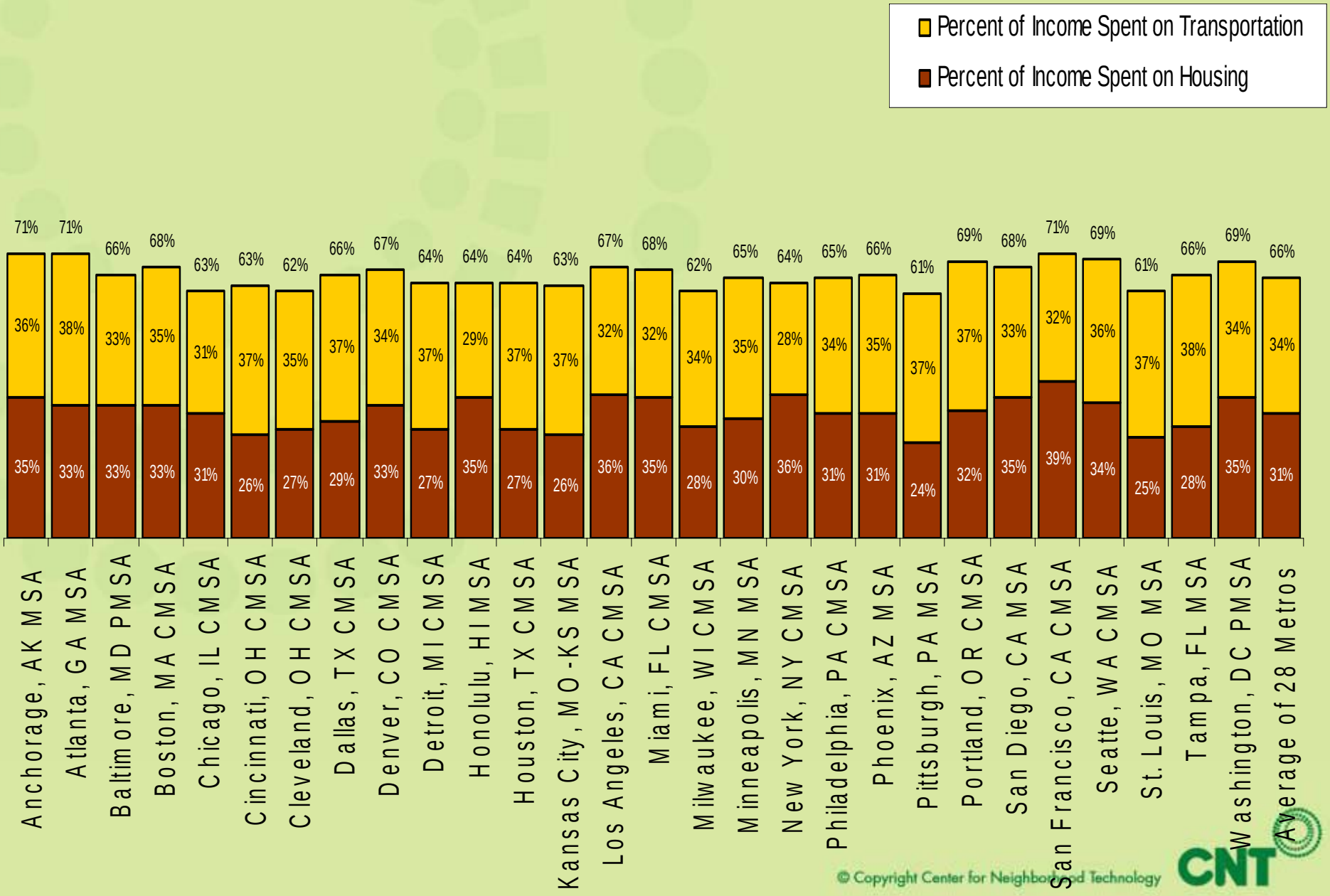


Percent of Income Spent by Households Earning Less than $20,000 on Housing + Transportation in 28 Metro Areas



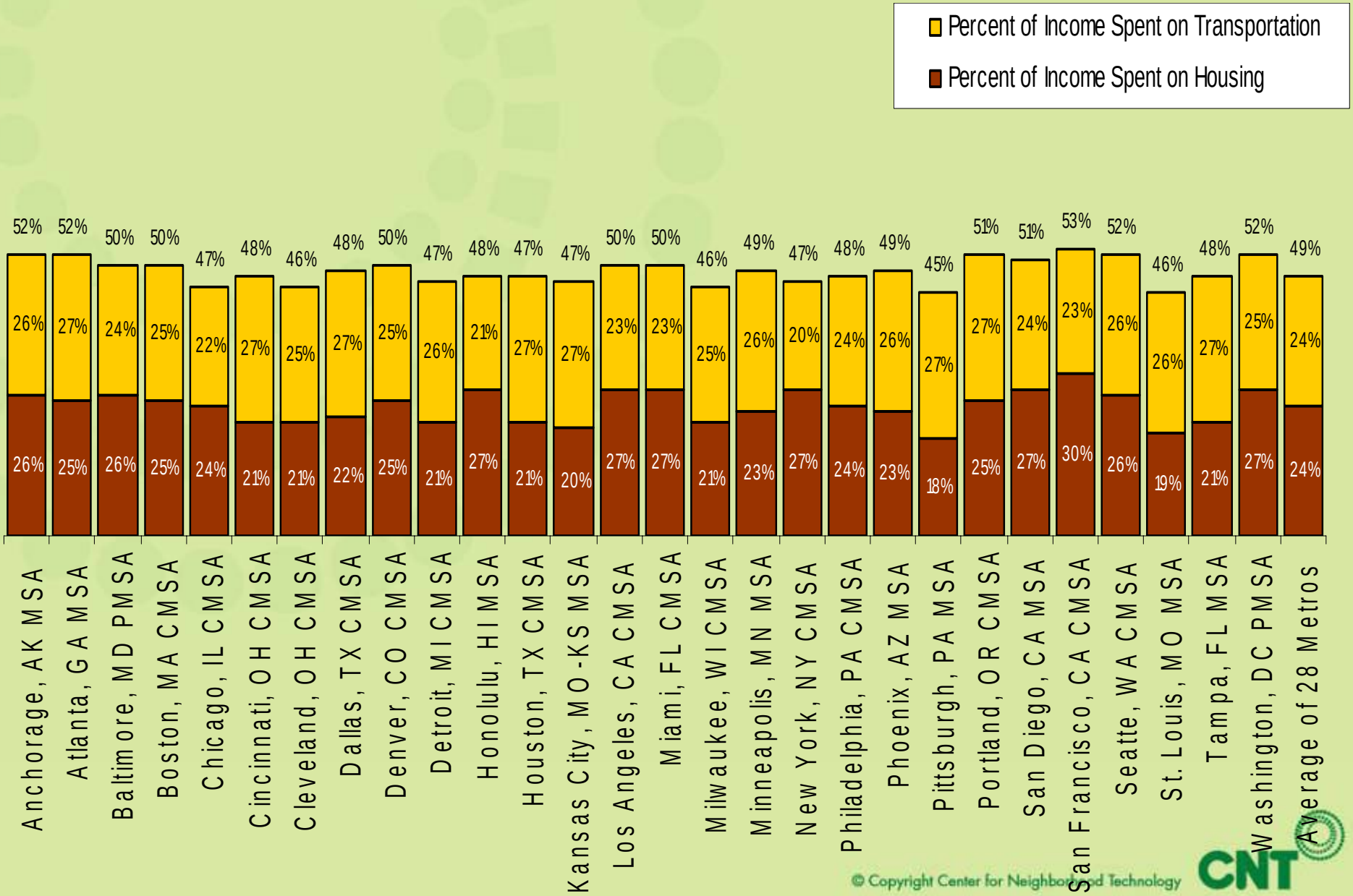
CNT

Percent of Income Spent by Households Earning $20,000 to $35,000 on Housing + Transportation in 28 Metro Areas



CNT

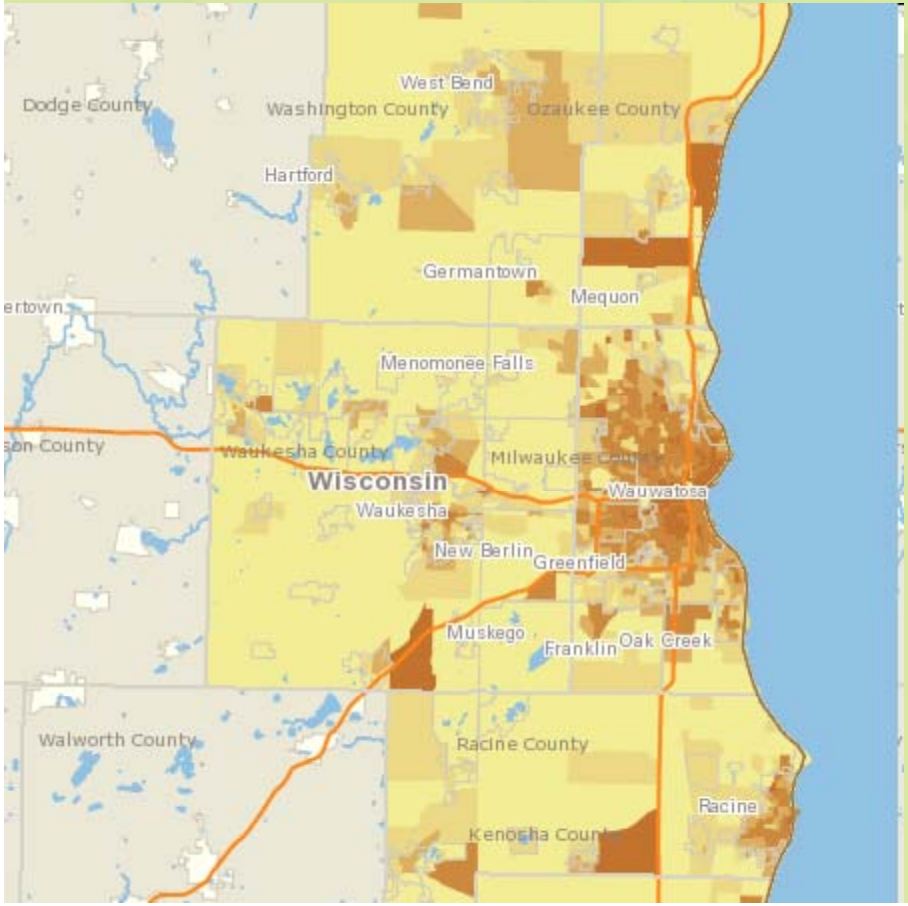
Percent of Income Spent by Households Earning $35,000 to $50,000 in 28 Metro Areas



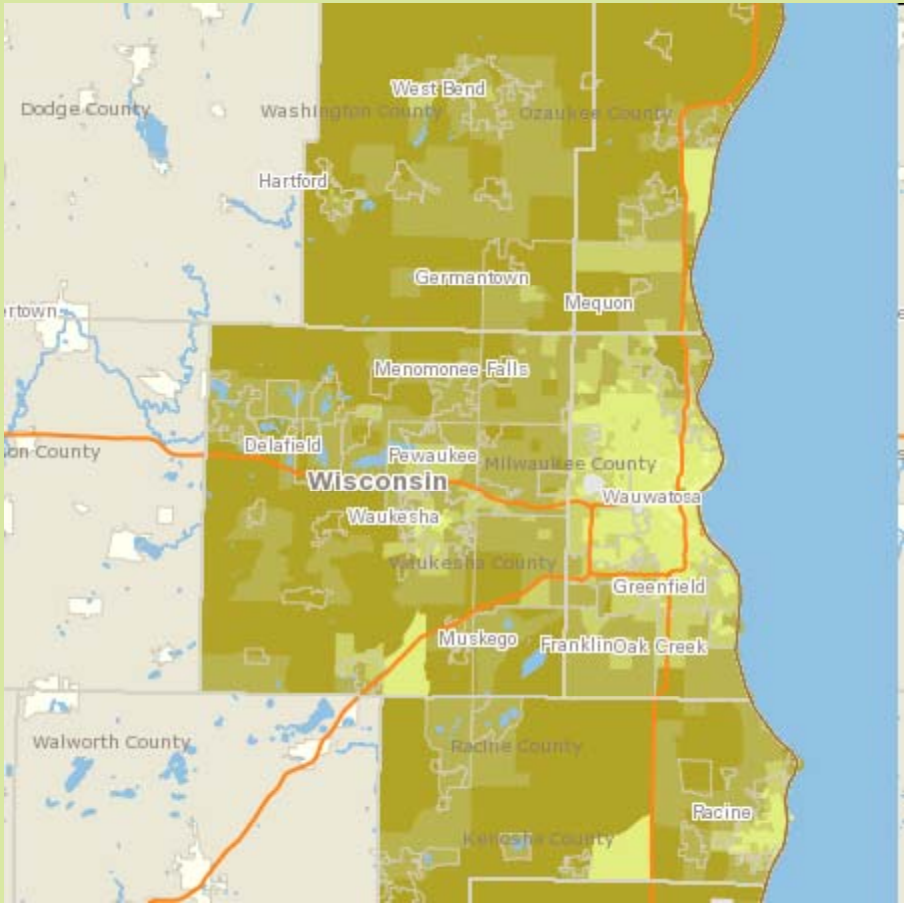
CNT

Milwaukee-Racine-Kenosha MSA
Mirror Images—
Density and Vehicle Ownership

0.02 to 32.19 HH per Residential Acre

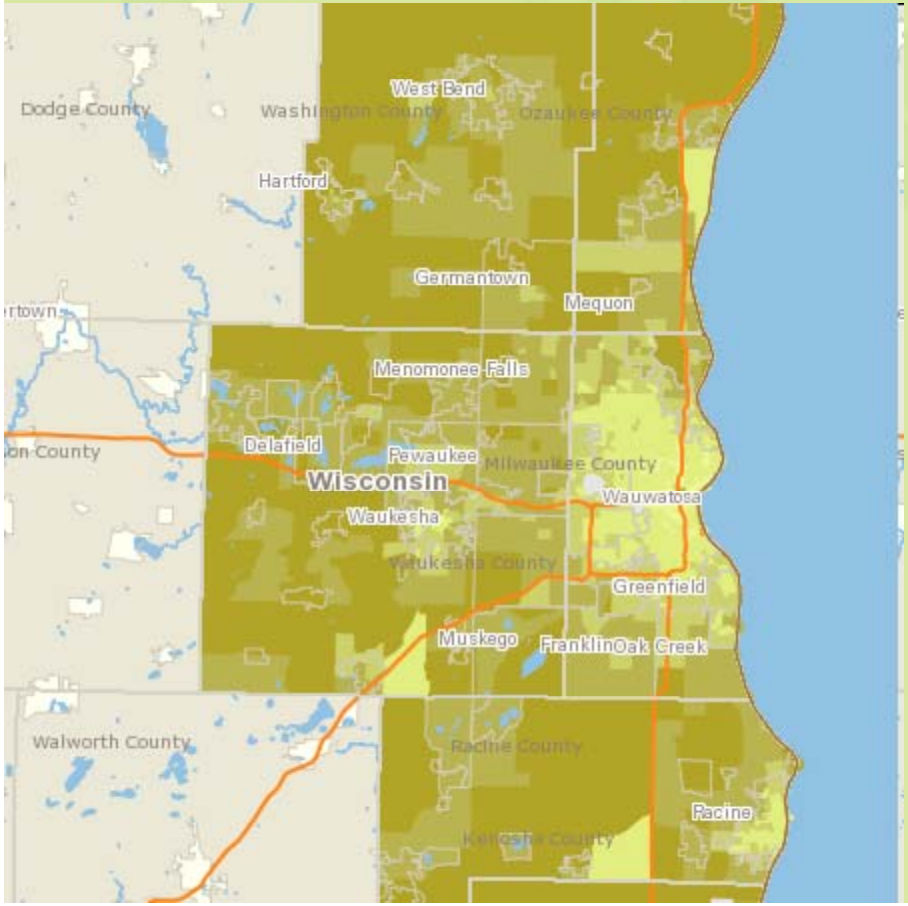


1.13 to 3.52 Vehicles Per HH

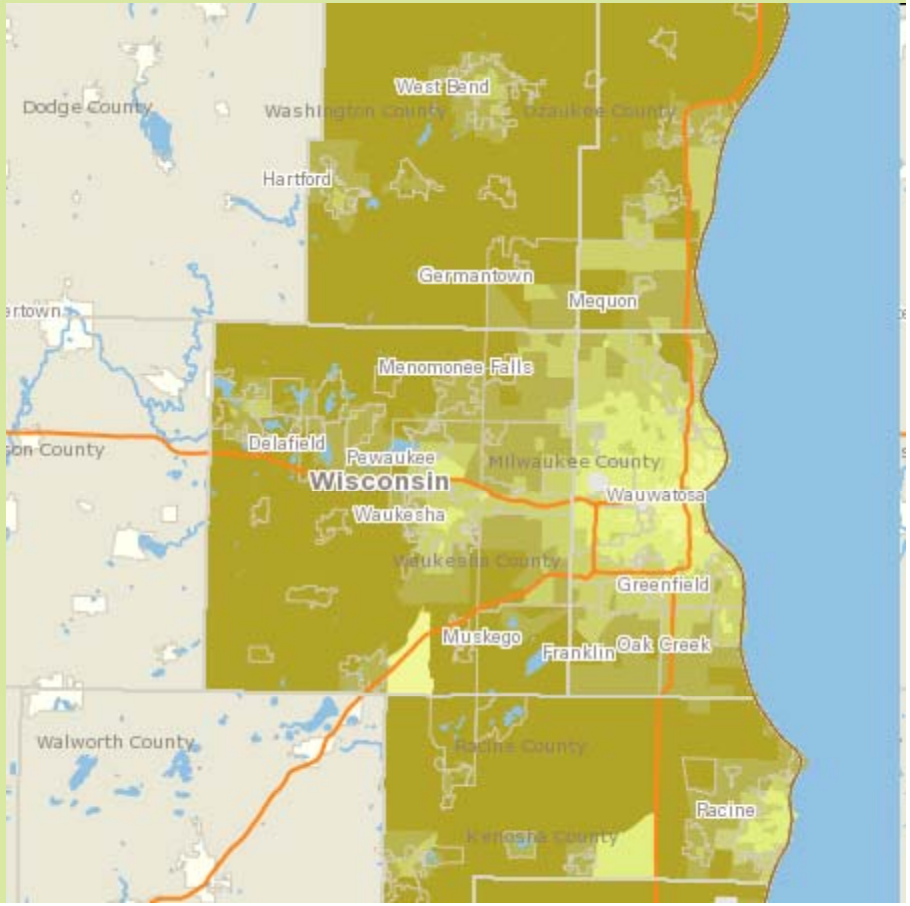


Milwaukee-Racine-Kenosha MSA
Vehicles per HH and VMT/HH/Year

1.13 to 3.52 Vehicles Per HH

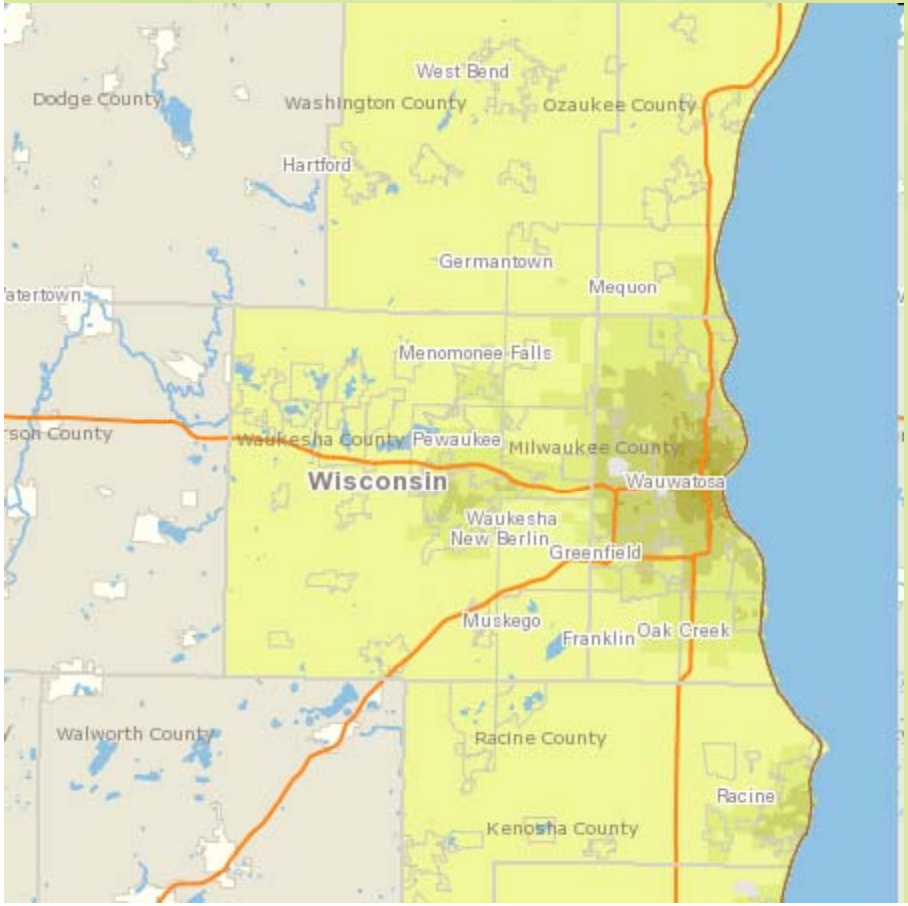


8376 to 38175 VMT per HH per Year

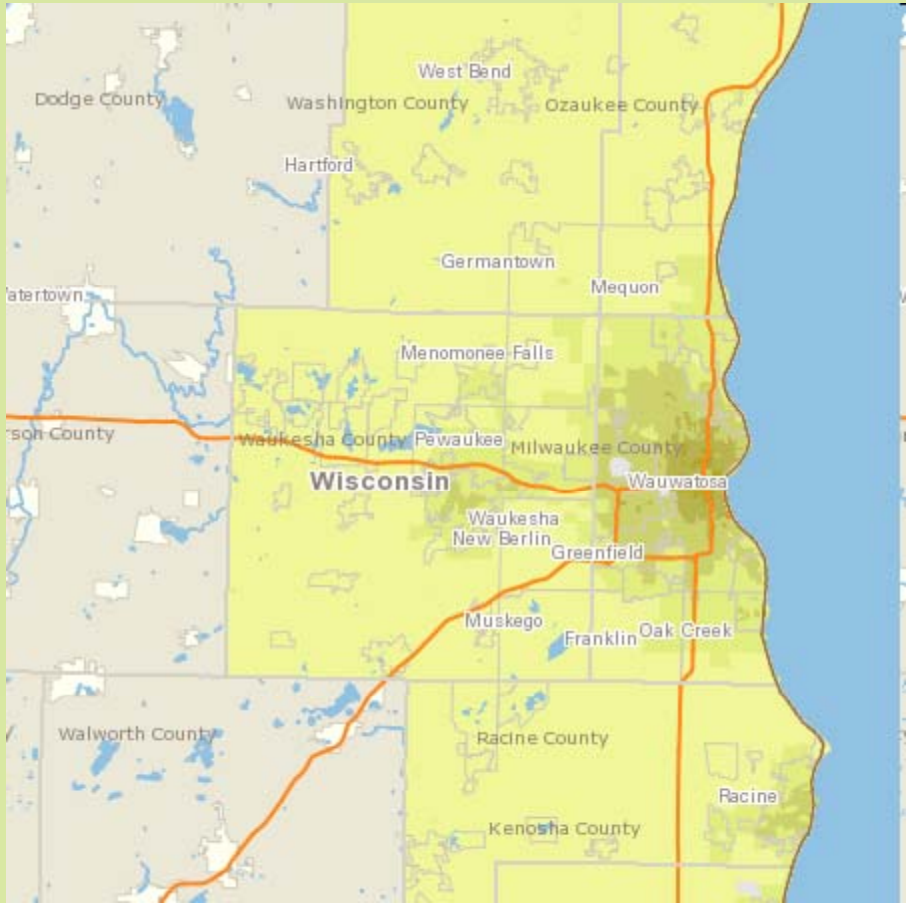


Milwaukee-Racine-Kenosha MSA Transit Ridership and Connectivity

0.03 to 17.76 Percent of Workers



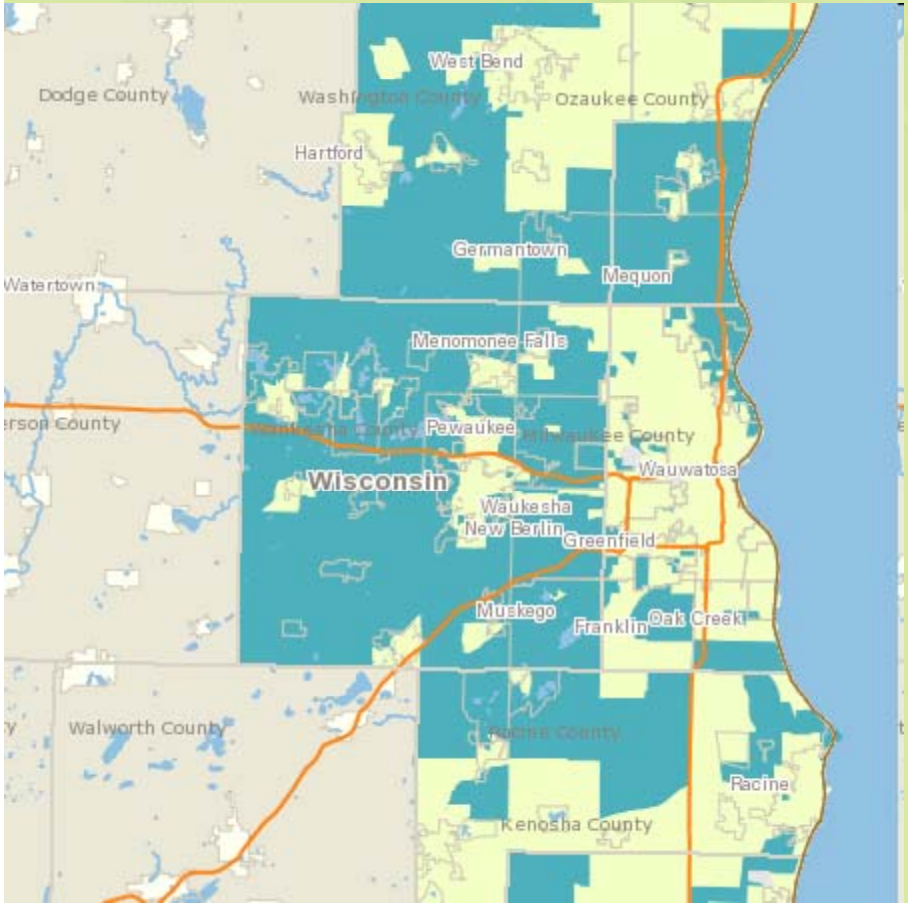
0 to 32.45 Scheduled Rides per Hour



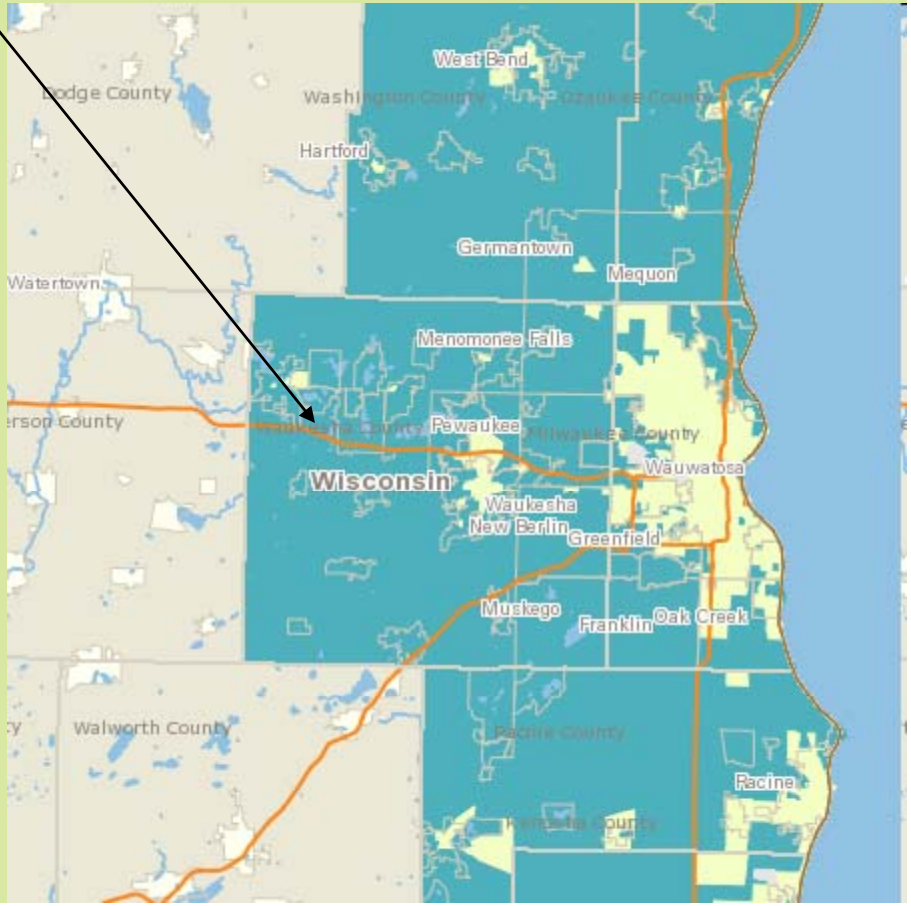
Milwaukee-Racine-Kenosha MSA
Two Views of Affordability
Housing @30% vs H+T@45% of Median Income

Large number of homes
No longer affordable

12.18 to 35.24 % of Median HH Income

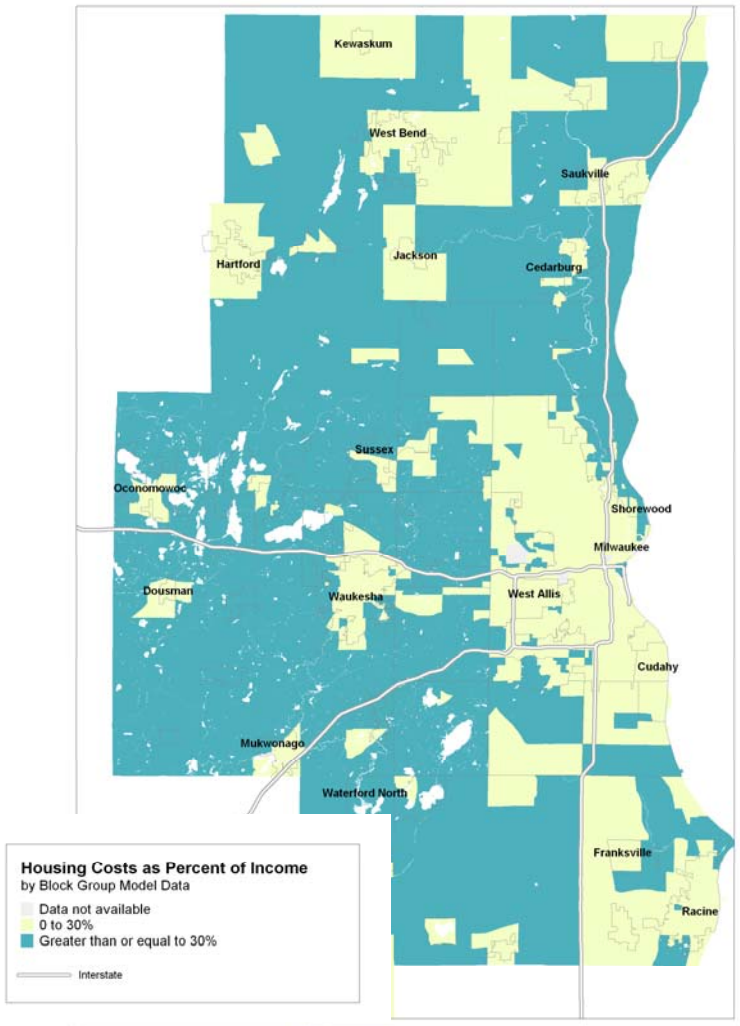


30.19 to 66.45 % of Median HH Income



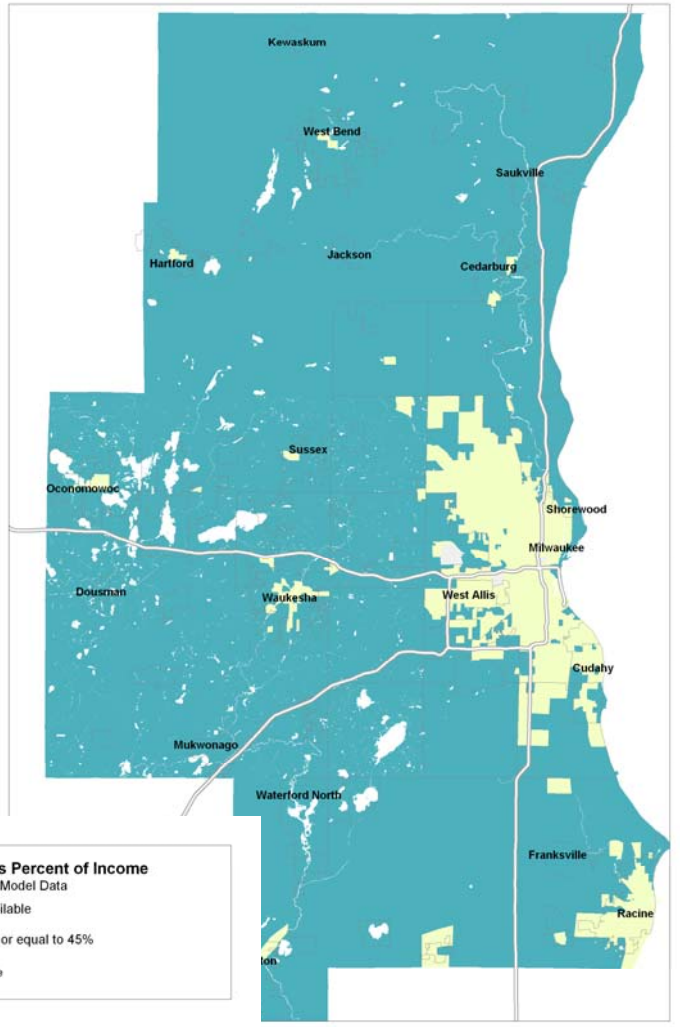
Milwaukee-Racine-Kenosha MSA
Two Views of Affordability for HHs Earning AMI

462,349 Affordable Housing Units, @ H<30%



An Estimated 148,863 Affordable Housing Units Lost When Transportation Costs Are Included

313,486 Affordable Housing Units, H+T <45%



Note: Affordable units based on the number of households paying <=30% for housing & <= 45% for housing + transportation. The assumption is made that each HH will occupy 1 housing unit.

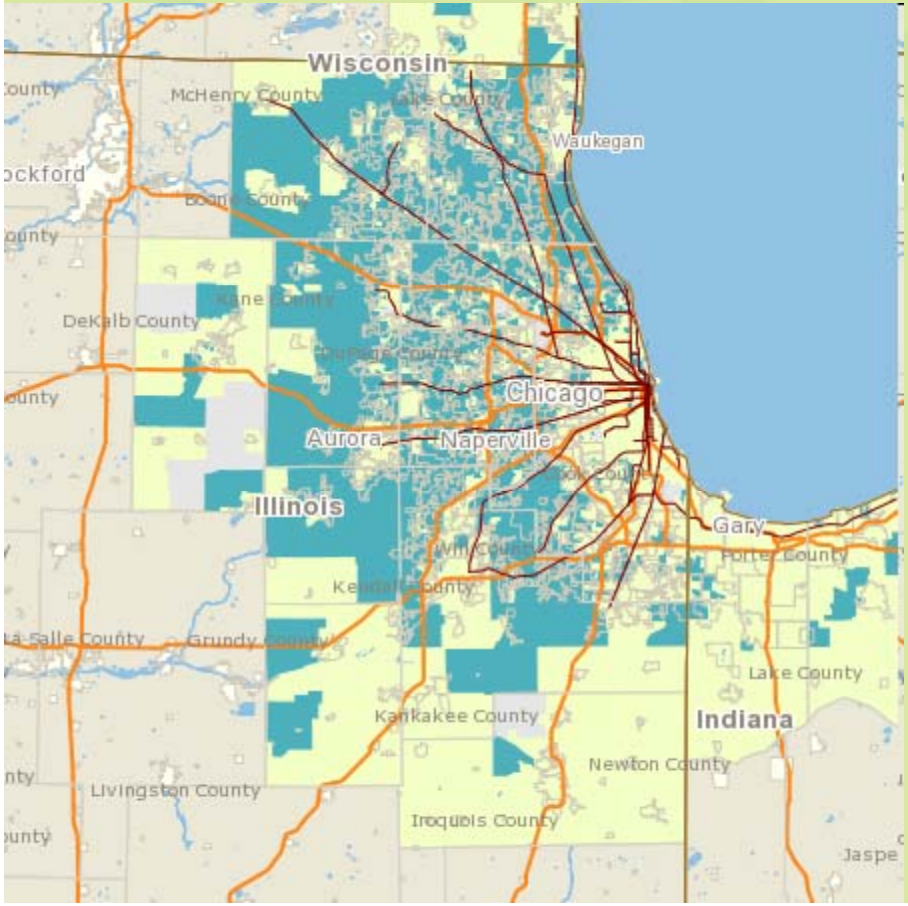
Chicagoland MSA

Housing Affordability at <30% of AMI vs

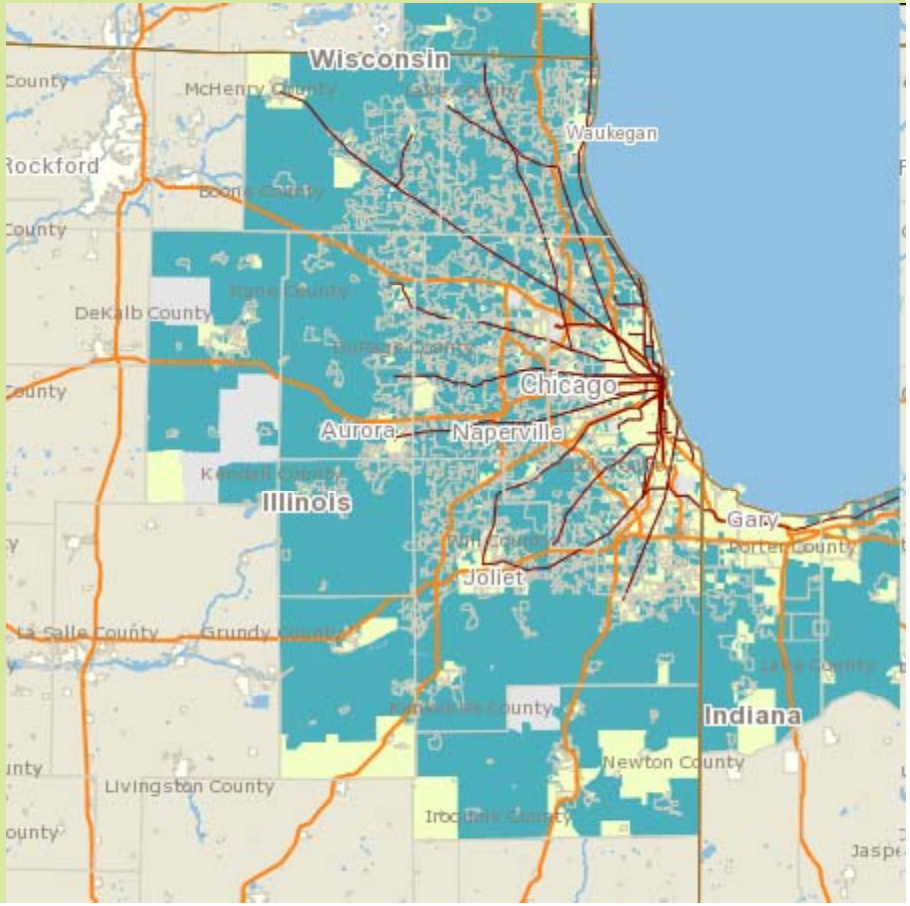
Housing + Transport Affordability at <45%

Drop of 977,000 HHs from Affordability
When Transportation is Counted,
= Drop of 29.6% of Total Stock

H = 13.25 to 72.07 Percent of AMI



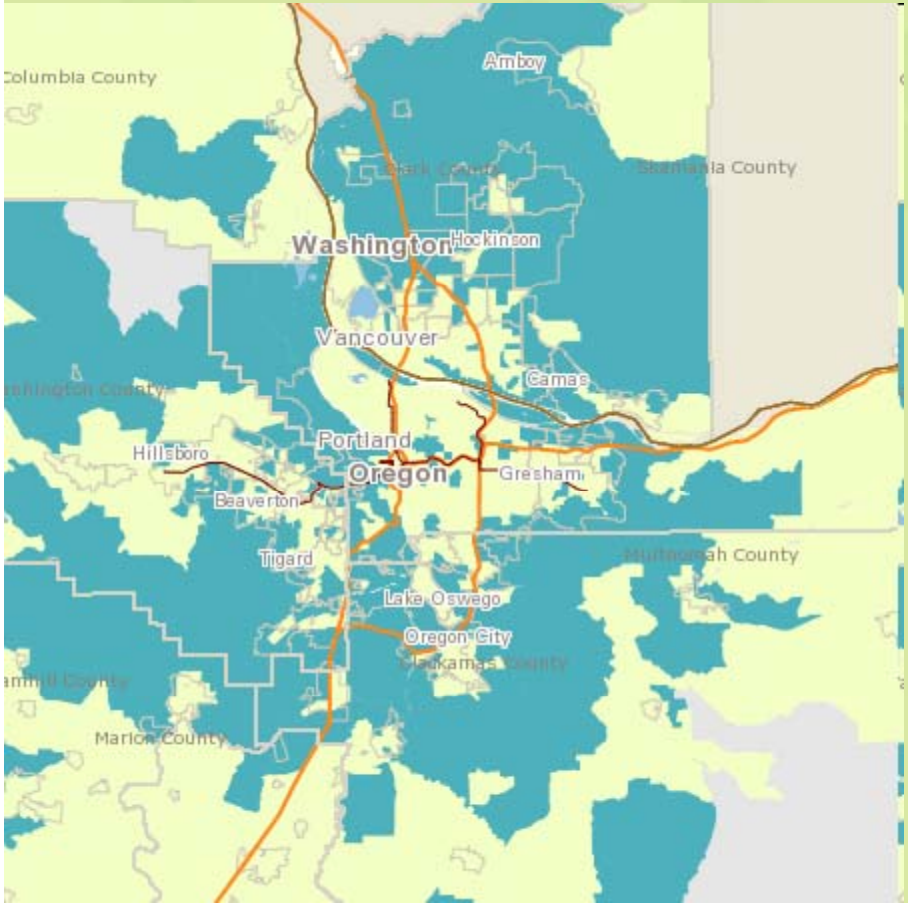
H + T = 34.68 to 119 Percent of AMI

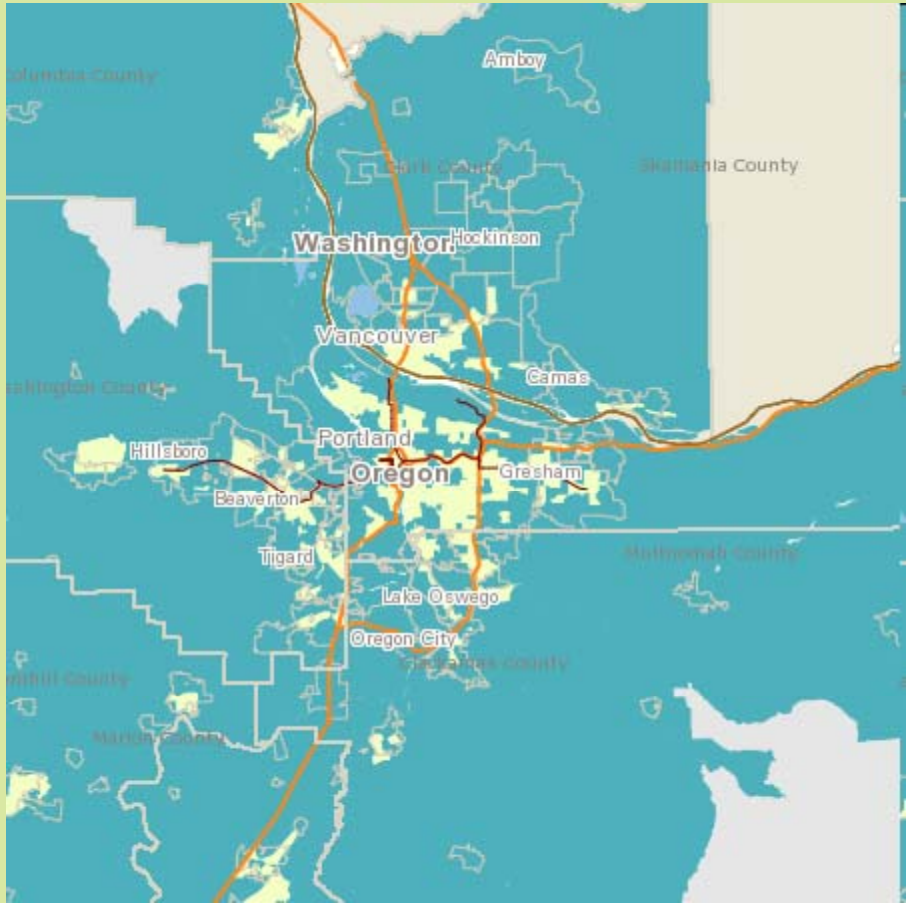


Portland OR MSA

Housing Affordability at <30% AMI vs Housing + Transportation Affordability at <45%

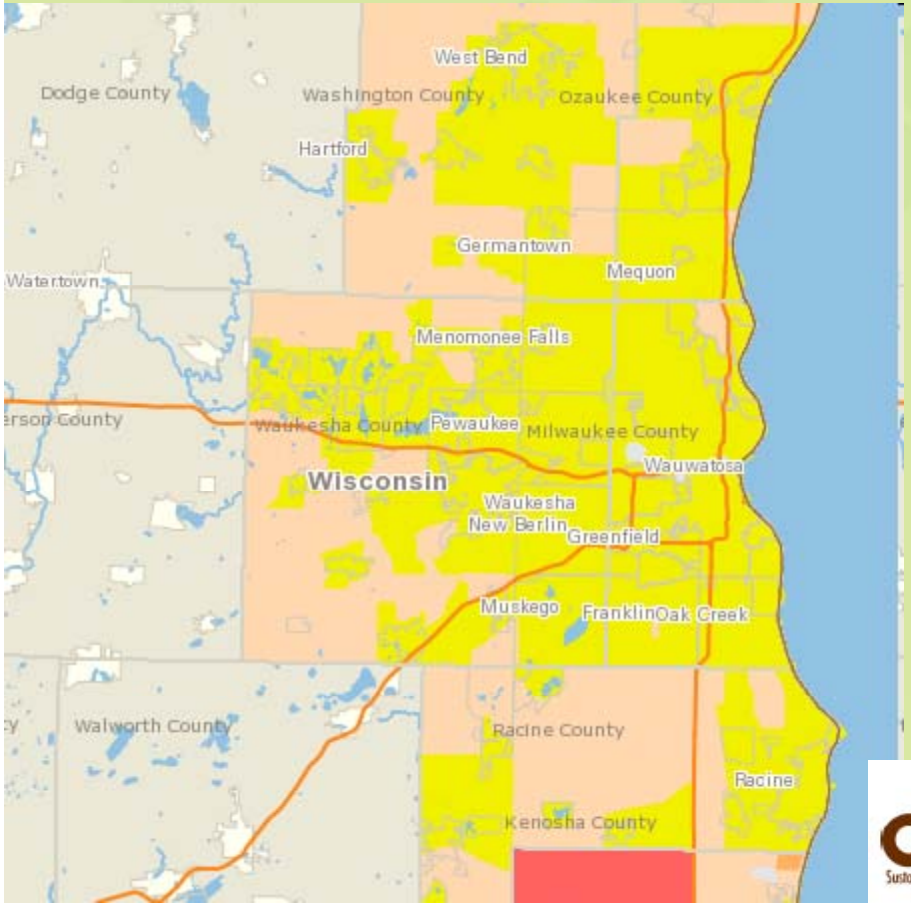
365,211 Fewer Affordable Units
Drop of 42.2 Percent of Total Stock



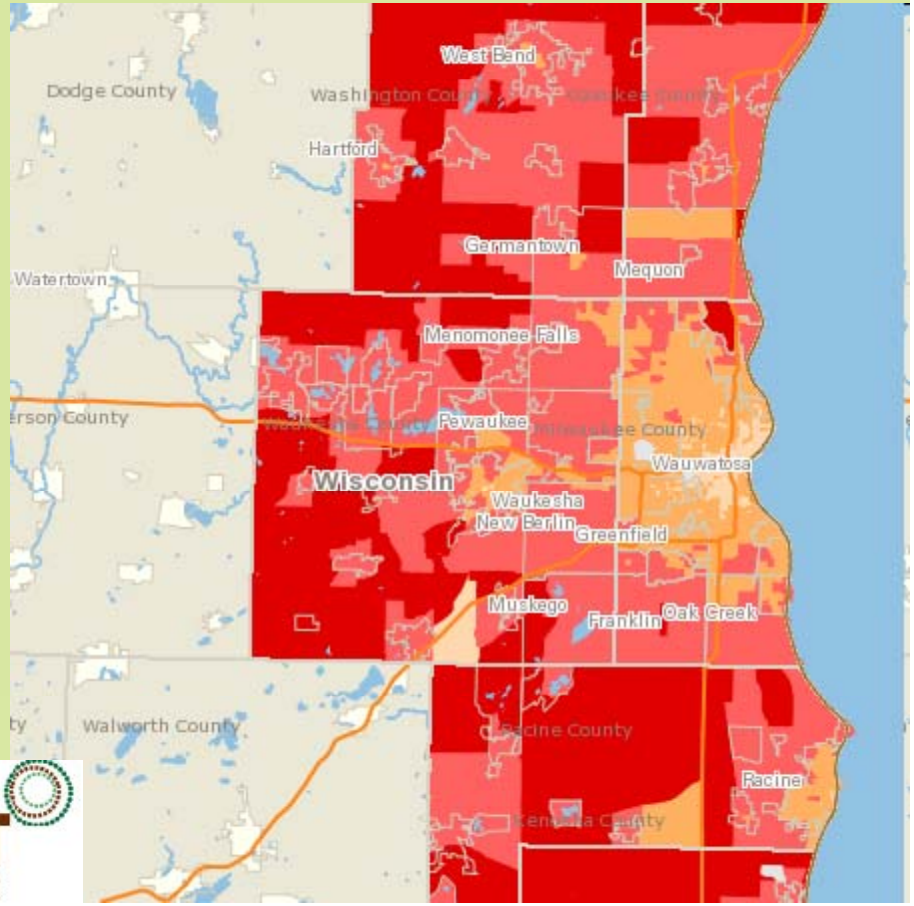


Milwaukee-Racine-Kenosha MSA
As Gas Prices Soared from $1.68 to $4.02 per Gallon
June 30 2000 vs June 30 2008

$692 to $3551 per HH per Year



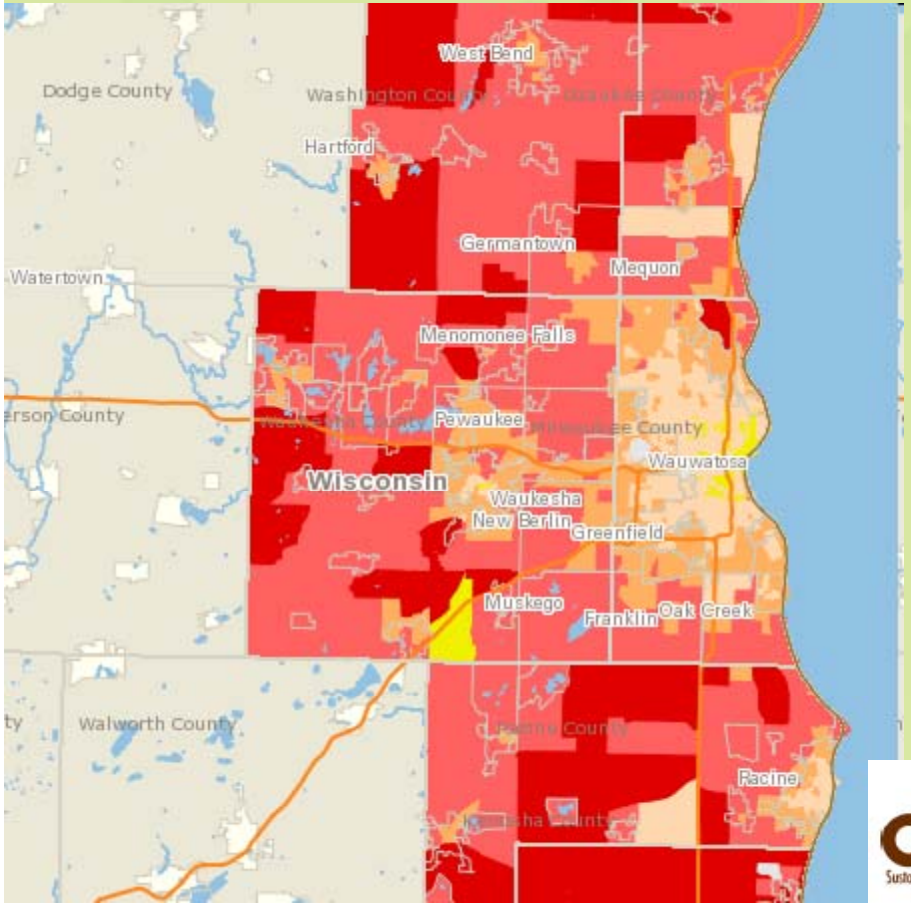
$1757 to $7519 per HH per Year



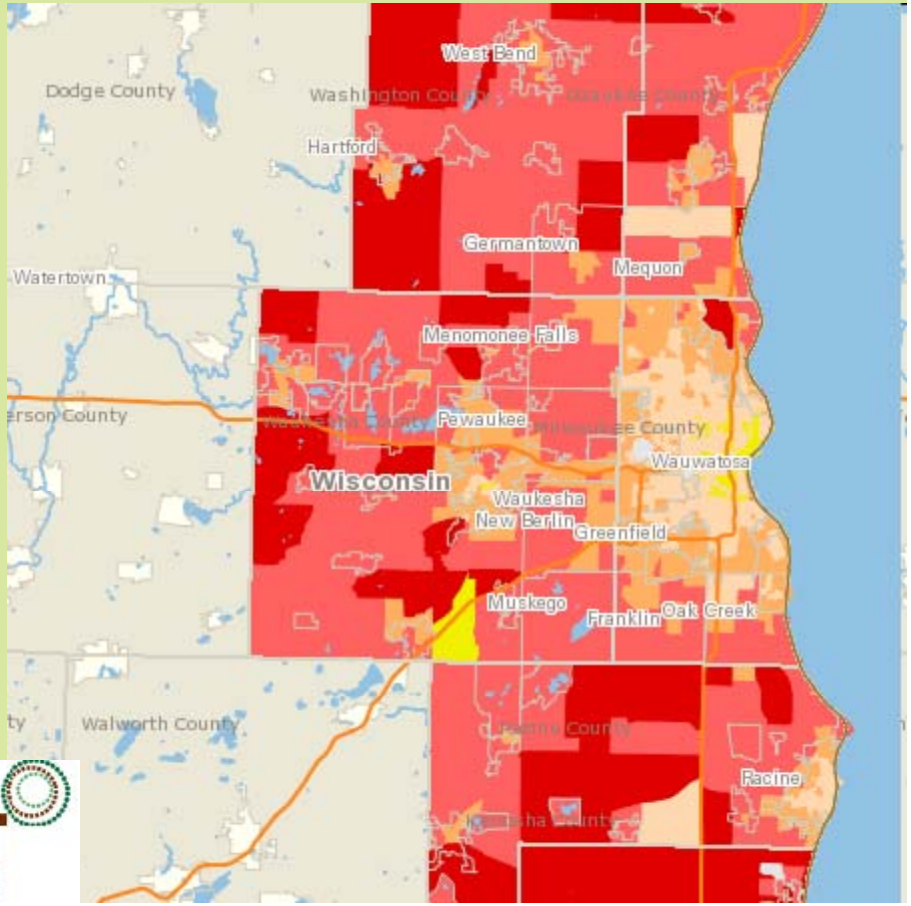
CNT
Sustainable Communities
Attainable Results

Milwaukee-Racine-Kenosha MSA
Total Monthly HH Transportation Costs
June 30 2000 vs June 30 2008

$590 to $1762 per HH per Month



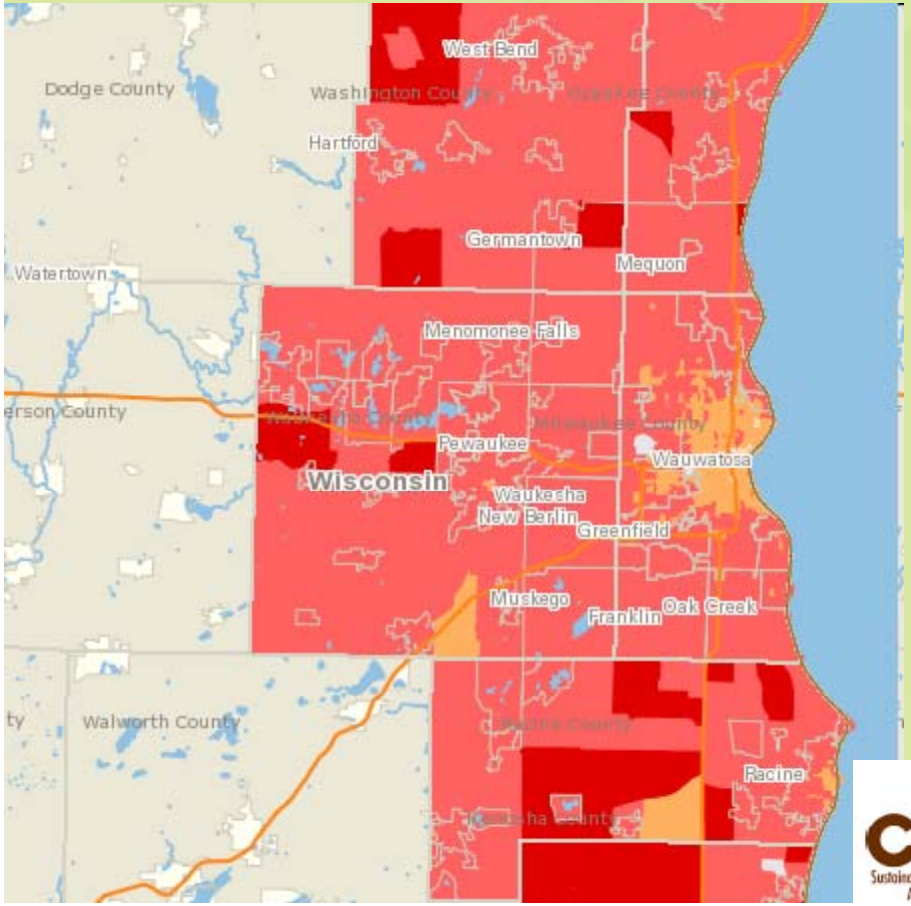
$747 to $2093 per HH per Month



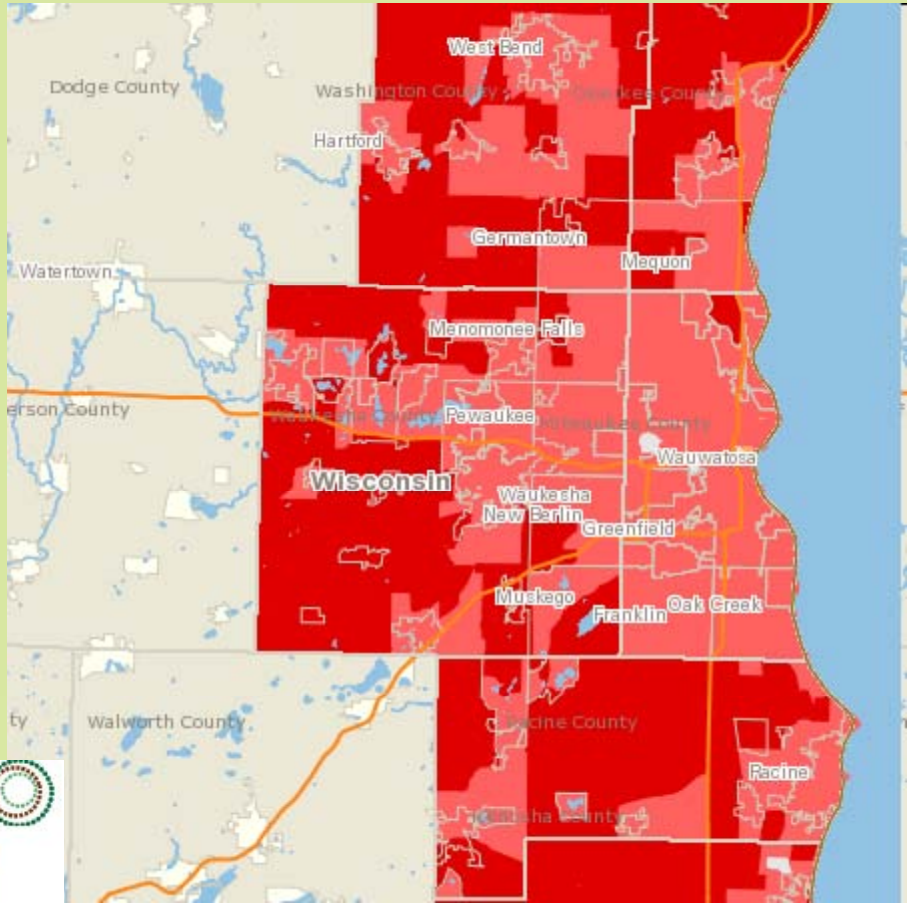
CNT
Sustainable Communities
Attainable Results

Milwaukee-Racine-Kenosha MSA
Percentage of Income Spent on Transportation
June 30 2000 vs. June 30 2008

15.6 to 41.65 % of Income



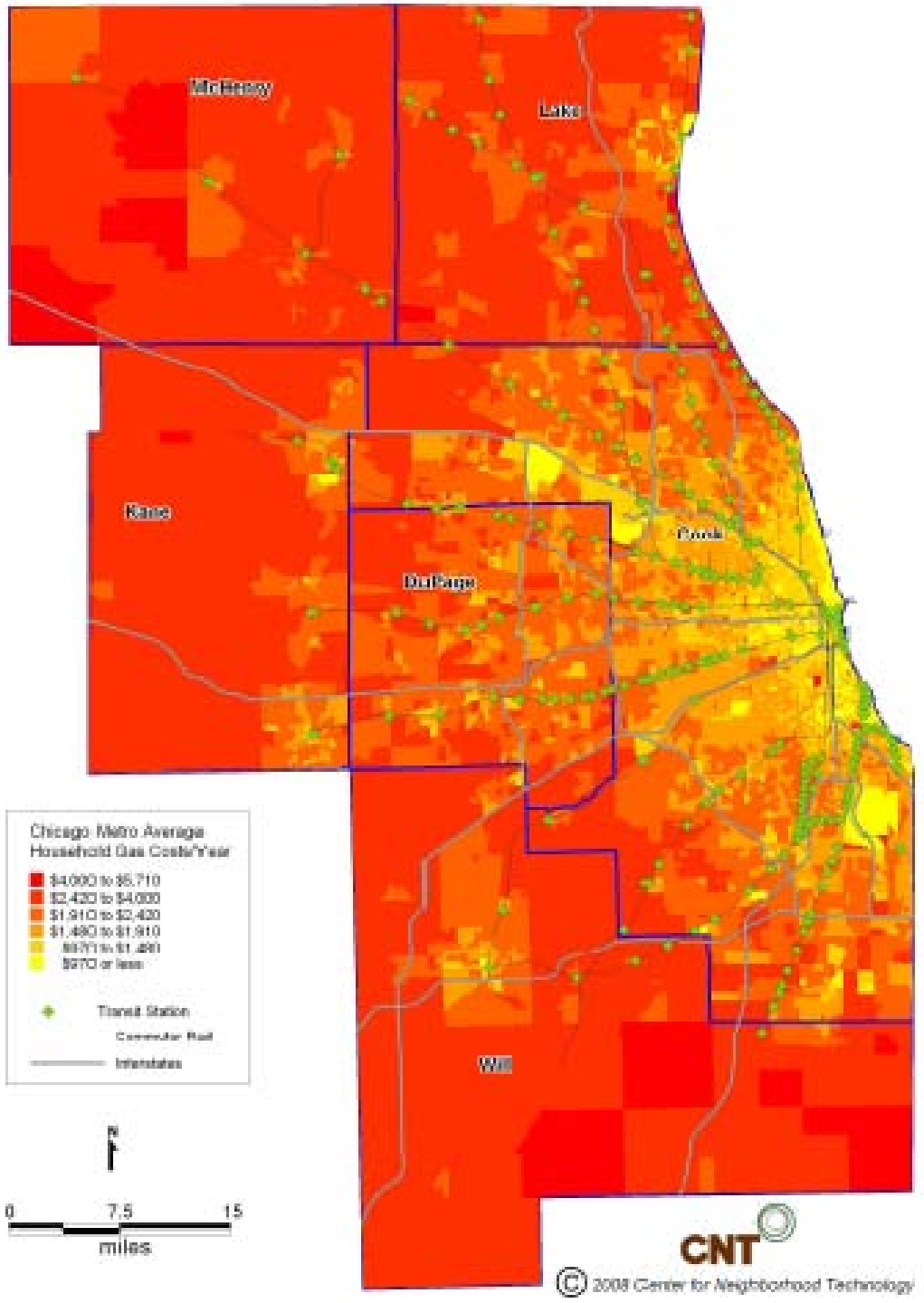
19.42 to 42.2 % of Income



CNT
Sustainable Communities Attainable Results

Different parts of Chicago region more exposed than others

- Varies from under $1000-1900 in Cook County to $4000-$6000 in collar counties annually
- Function of available transportation choice
- Calculated using $4/gallon and 20.3 MPG



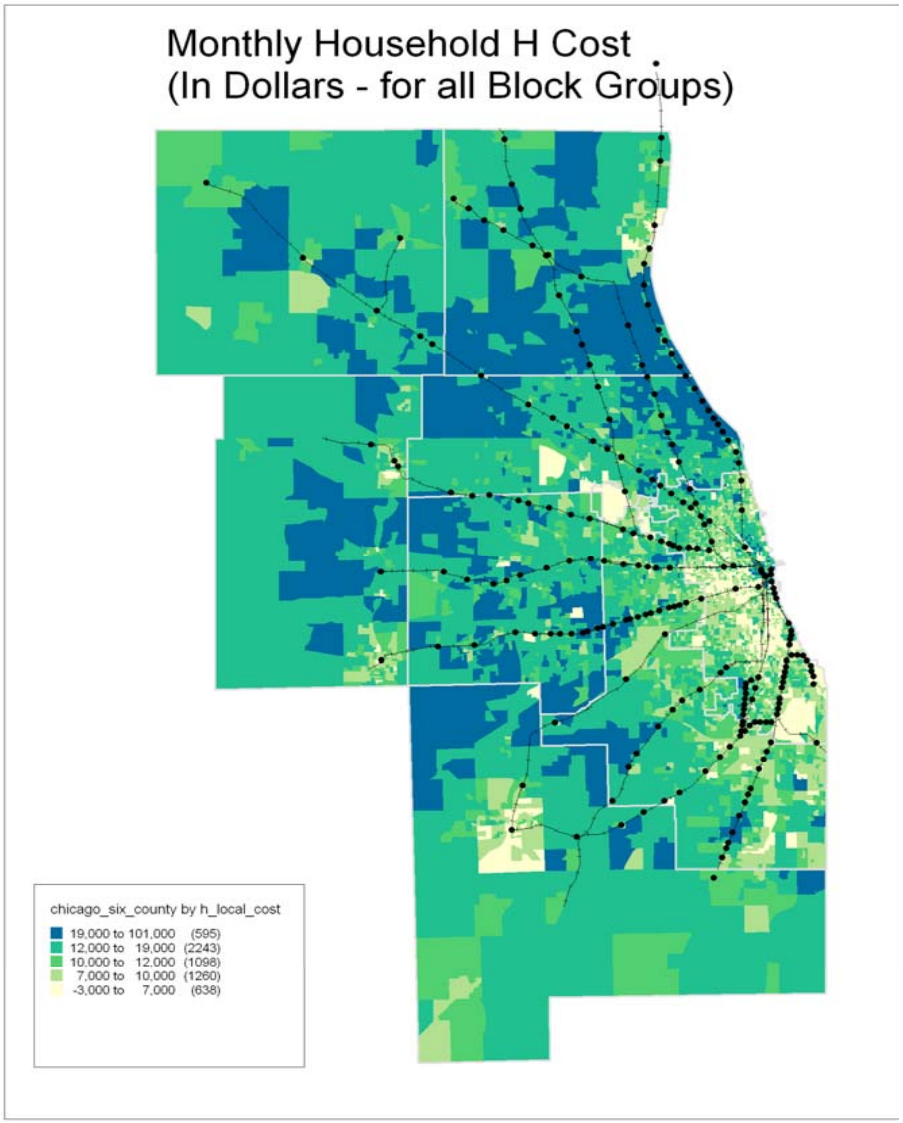
Rethinking the Drive 'til You Qualify Housing Market in SE Wisconsin

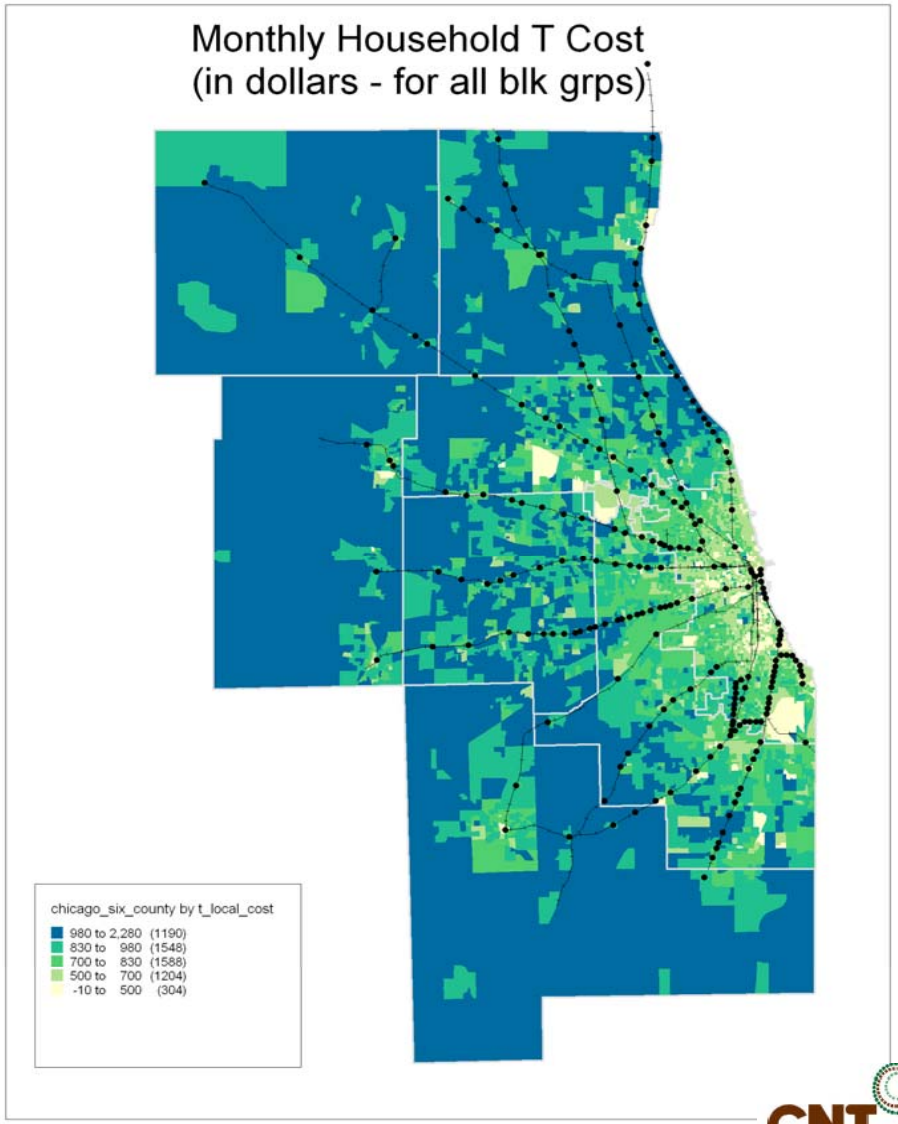
- On June 30 2008, Gas = $1.60/gallon, Median Income = $52,000
- 3 Cars, 35,000 VMT, No Transit, $15k/year housing = 72.8% for H+T
- 2 Cars, 25,000 VMT, No Transit, $18,684/year housing = 65.9% for H+T
- 1 Car, 15,000 VMT, $100/Month Transit, $20k/year housing = 56.5% for H+T
- 0 Car, $200/Month for Transit, $200/Month for Car-Sharing, $22k/year housing = 51.5% for H+T

A Metropolitan Area of 700,000 Households

- Assume 2 Cars per HH, 20,000 VMT
- $5,078 per vehicle-year, $0.12 per VM
- $10,156 + $2,400 =$12,556 per HH
- $8.5 Billion per Year Region-Wide
- $5.5 Billion per Year for Business Transport
- $1.5 Billion per Year Total Provided by Government ($0.6 Fed, $0.45 State, $0.45 Local)
- $15.5 Billion Total per Year
- $465 Billion Over 30 Years

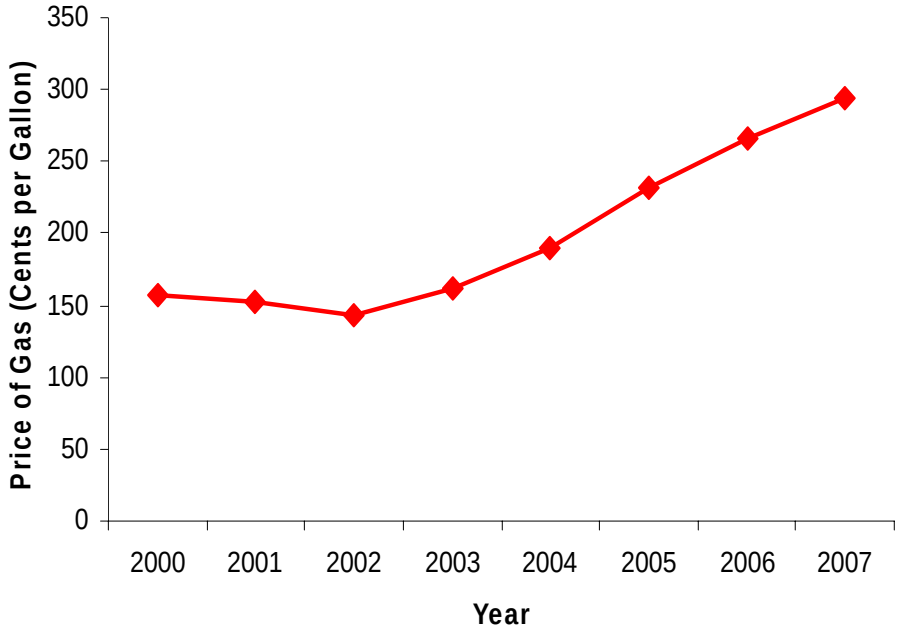
The Effect of 'Drive 'til You Qualify': High T Costs with Distance

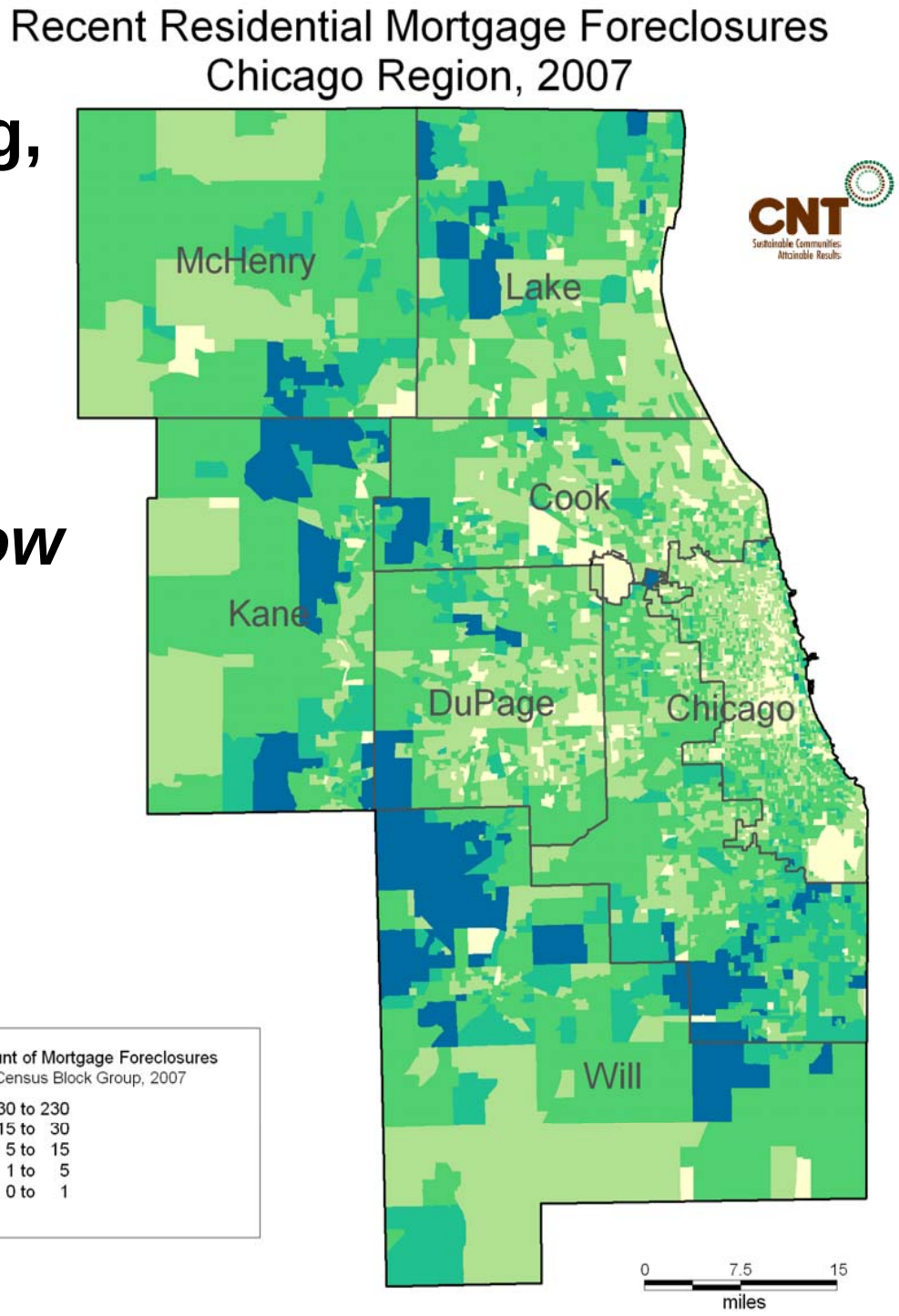




CNT
Sustainable Communities. Attainable Results.

It's Not Over Yet—
-Gas Costs Keep Climbing,
-12 month's foreclosures Up 5% in Cook County Il
-Up 70% in surrounding collar counties
-Worst where income is low & VMT exposure is high



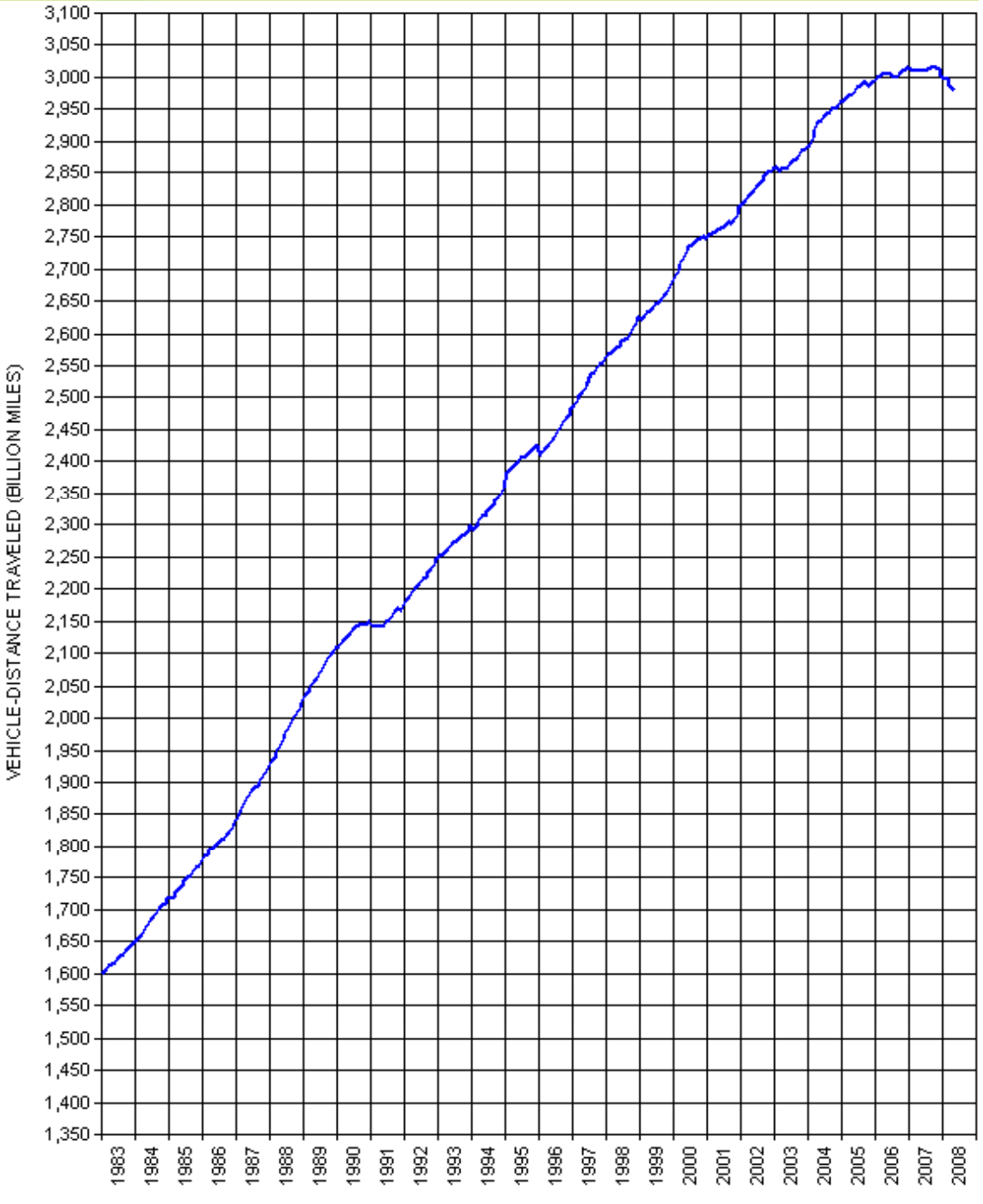


Impact of Transportation Choice on Local Affordability

- Market promotes Drive ‘til you qualify
- Keeps Housing cost deceptively low, savings wiped out by high travel demand, up to 28,000 extra vehicle-miles per year
- Providing sufficient transport choice results in 1 less car
- Locating in smaller homes, lower operating costs
- Lowers 55 percent to 40-45 percent and significant emissions reductions

The Big Drop

- 25 years of measured VMT
- Moving 12-month totals
- All roads
- Note leveling or dropping 2005-present



CNT
Sustainable Communities Attainable Results

Some Examples of Transportation Choices

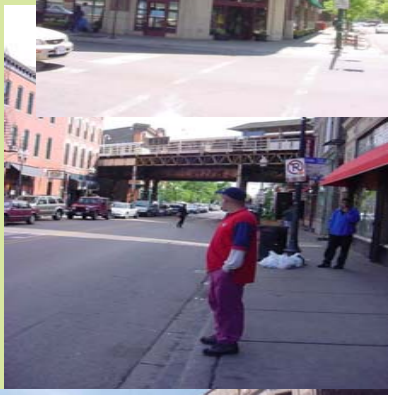
Overview: TOD

- Key Trends Driving Demand for TOD
  - Demand for Transit
  - Increased Urban and Suburban Investment
  - Changes in Consumer Demands
  - Increased Benefits on Transit Locations

CNT
Sustainable Communities
Attainable Results

TOD Is:

- *Location efficiency* —Dense, transit-accessible, & pedestrian-friendly
- *Rich Mix of Choices* —Wide range of mobility, housing and shopping options
- *Value Capture* —Good service & connections, local amenities support place-making, scorekeeping & attention to financial returns
- *Place-Making* —places for people, enriches existing qualities, provides new connections, works with landscape, builds reputation
- *Resolution of Tension between TODs as "Nodes" and "Places"*– Works to support travel networks and communities



CNT
Sustainable Communities
Attainable Results

TOD is not

- *Just for commuters* —Work-related trips just 18 percent of total travel
- *Auto-oriented transit* —Way too much land devoted to park-and-ride lots
- *Just a place to sleep at night* —People need to shop, eat, visit without getting in a car
- *Only the transit property* —All successful TODs are joint developments between cities, transit operators, private investor/owners, and communities

CNT
Sustainable Communities
Attainable Results

Transit Oriented Development

- Back to the Future
  - Development patterns of Europe, Eastern and Midwestern US
    - Walkable, mixed-use, location efficient urban development around existing or new transit—either rail or Bus rapid transit.
  - Post WWII Suburbanization
  - Auto-Dominant Development Patterns

Late 20th and 21st Centuries

- Air quality non-attainment
- Water quality and quantity problems
- Increasing costs of building major highways
- Decreasing motor fuel trust fund receipts
- Quality of life issues
- Stuck in traffic
- Auto dependent
- Family life negatives

Demographics Influencing Demand for Housing Near Transit

- Singles will soon be the new majority
- Old people will outnumber young people by mid-century
- By 2010 Echo Boomers will total 34% of the population
- Married couples with children are 24% of households

CNT

Other Demographic changes

- New immigrants
- Consumer preferences
- Revitalizations of urban communities
- Employer location strategies

Overview: H + T Affordability Index

- **What is H + T Affordability Index?**
- **Why / Purpose**
- **How does it work: Model Mechanics and Background**
- **Who: Potential Applications**
- **When: Project Timeline and Index Availability**

Background

- **Research Findings**
  - *Housing & Transportation Affordability Index Pilot*
    - CNT & Center for Transit-Oriented Development
    - Brookings Institution Urban Markets Initiative
  - *Housing/Transportation Burden on Working Households*
    - CNT & Virginia Tech
    - MacArthur Foundation and Center for Housing Policy
  - *Strategies for Diverse Transit-Oriented Neighborhoods*
    - CNT & Center for Transit-Oriented Development
    - Ford Foundation

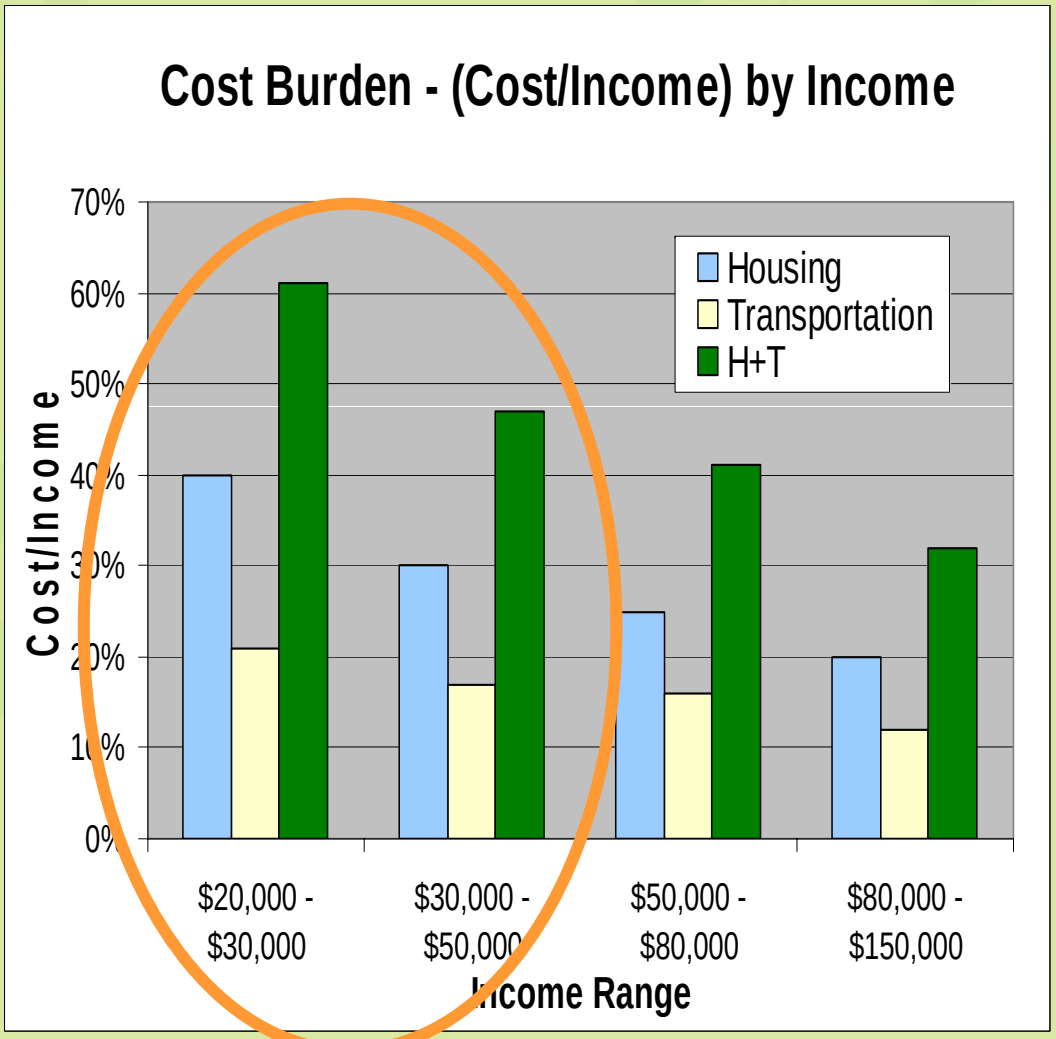
What is the Housing + Transportation Affordability Index?

A tool to measure the 2 largest household costs – *housing and transportation* – by neighborhood.

H+T Affordability Index Equation
$\text{H+T Index} = \frac{\text{(Housing Costs + Transportation Costs)}}{\text{Income}}$

By measuring these costs, the H+T Affordability Index is also measuring the quality, attractiveness, and convenience, of the neighborhood.

Transportation Costs Vary by Income

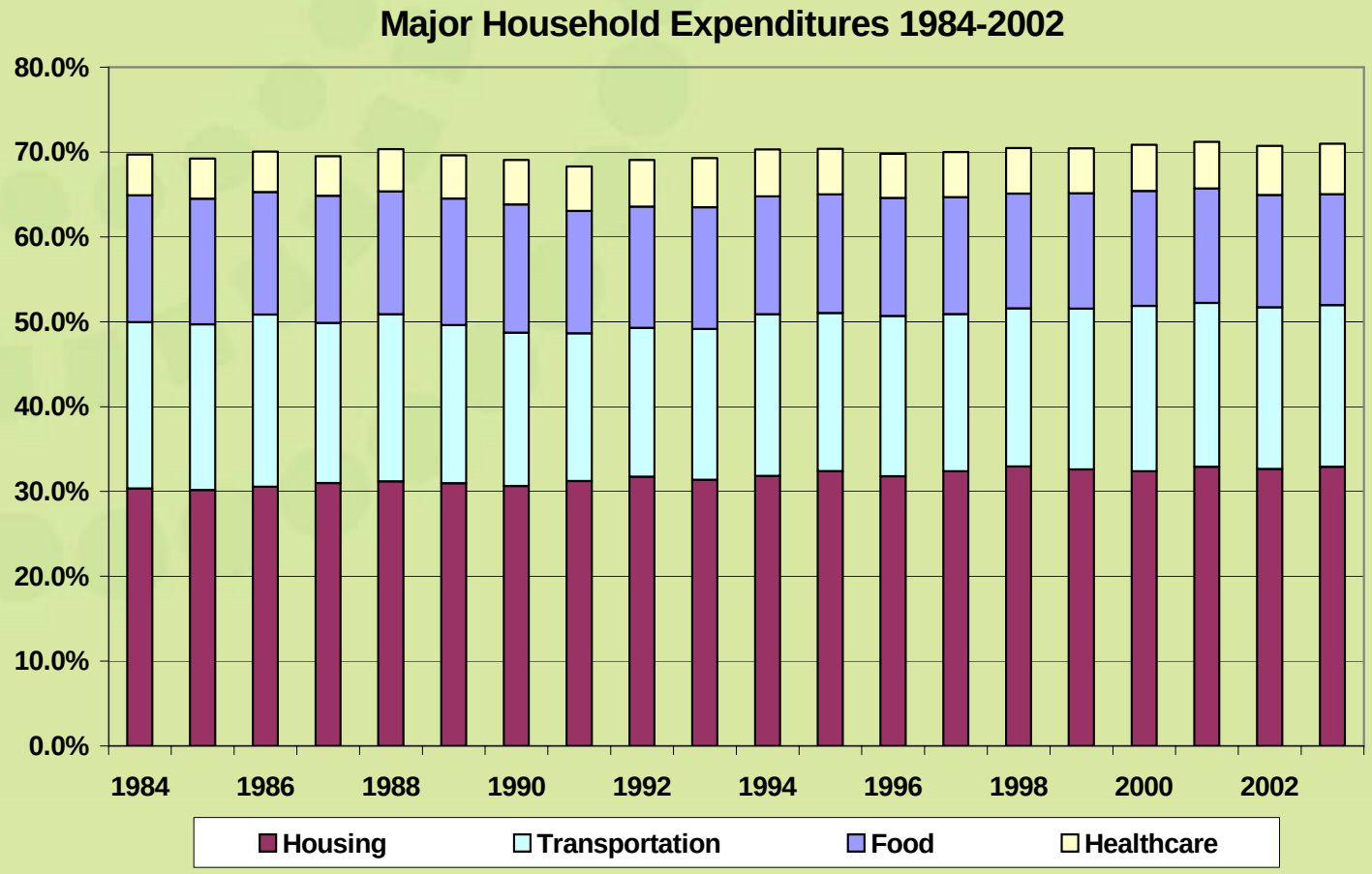


- Median U.S. household spent 18% of its budget on transportation
- Lower-income households are more burdened than higher income by transportation costs
  - **$5,005/yr - 6,827/yr T**
  - **$9,506/yr - $12,144/yr H**
- **This is the traditional view but income does not explain most of the variation in household transportation costs.**

Source: U.S. Household Expenditures by Income in 2004, Bureau of Labor Statistics

Why: To Understand affordability, its impacts, and potential solutions

- Since at least 1984, Housing and Transportation have been the 2 largest household costs– consuming at least 50% of income for the average household



Source: Consumer Expenditure Survey for all consumer units, Bureau of Labor Statistics 1984-2002

CNT

Why: To Understand affordability, its impacts, and potential solutions

- The more households spend on housing and transportation, the less they have to spend on:
  - Savings
  - Education
  - Healthcare- preventive and acute
  - Entertainment
  - Retail and other goods in the local economy
- If we can define the reasons for high neighborhood transportation costs, we can understand:
  - What to build?
  - Where to build, and where to live?
  - Who benefits?

What drives H+T Costs?

- **We know *housing* costs and what drives them:**
  - *Location, location, location; and*
  - Housing size, construction, materials, amenities; and
  - Fees, taxes

- **What about *transportation* costs? ….It's more than the price at the pump or the price of the car:**
  - *Location, location, location; and*
  - Car costs, annual miles, gasoline costs, transit fares
  - Household size and income

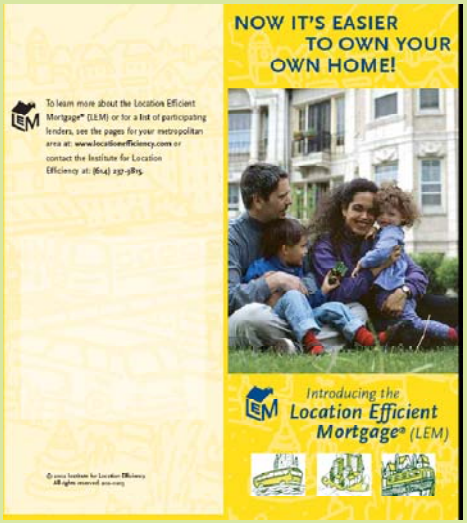
But total transportation costs by location are not reported …until now

Background and Model Mechanics

What about Location?

- **Transportation costs vary by place, depending on:**
  - Access to services
  - Walkable destinations
  - Extent and frequency of transit
  - Access to jobs
  - Density
- **Households who live in "location efficient" neighborhoods—regardless of size and income—**
  - **"own fewer vehicles and drive fewer miles, and therefore have lower transportation costs"**
    (Location Efficiency Study. CNT, STPP, NRDC, 2000)

Photo Credit: NorthstarTrain.org



CNT

Modeling the "T" of the H&T Index

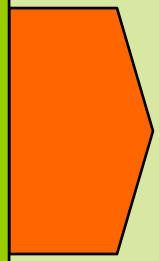
We analyze the Urban Form and the Household Characteristics of neighborhoods to predict the three major components of total household transportation costs.

7 Neighborhood Variables:

1. HHS/residential acre **(net density)**
2. HHS/total acre **(gross density)**
3. Avg. **block size** in acres
4. **Transit** Connectivity Index
5. Distance to **employment centers**
6. **Job** density
7. Access to **amenities**

2 Household Variables

1. Household income
2. Household size



Autos Owned
+
Auto Use
+
Transit Use

Can be adjusted to current prices, fares, auto types

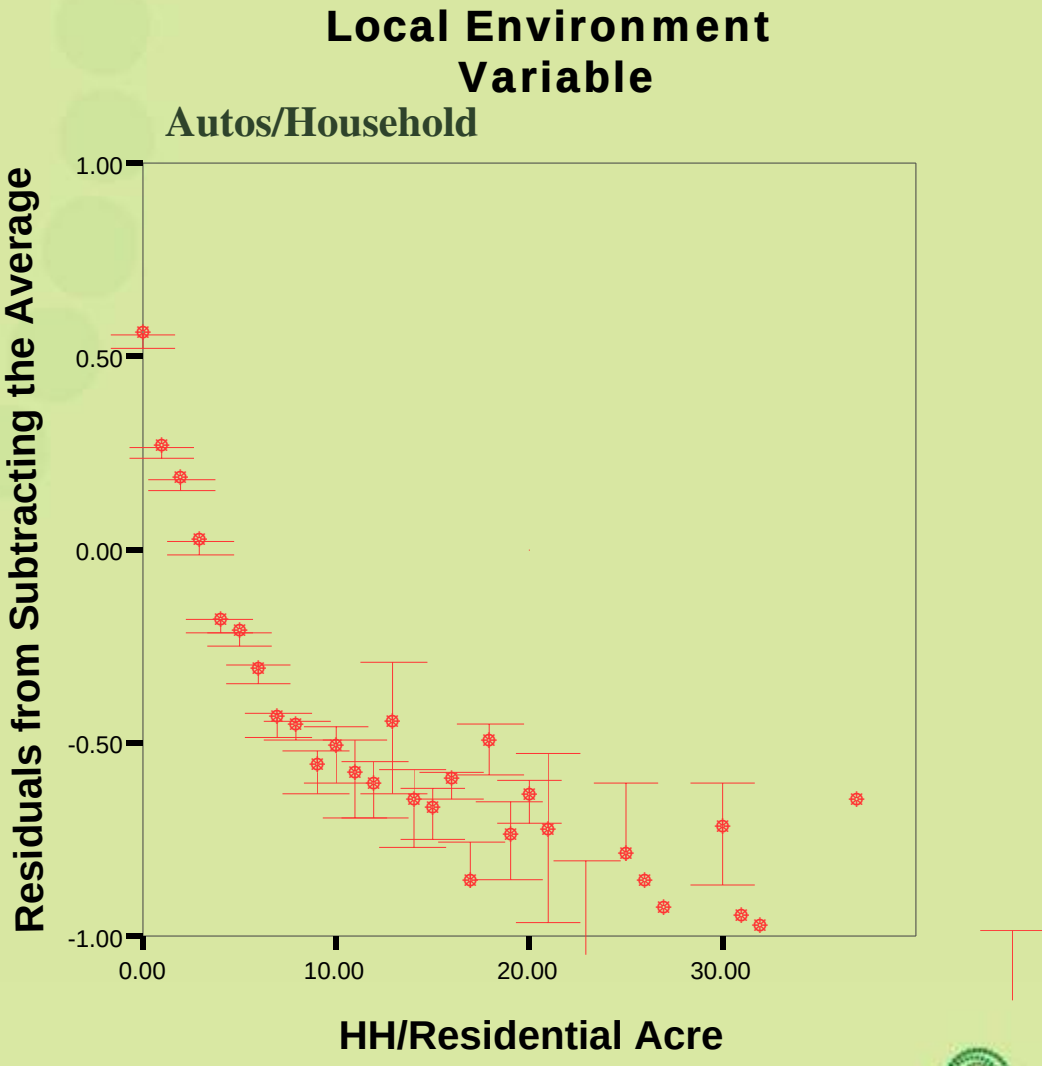
x price = /unit

Total Transport Cost

CNT

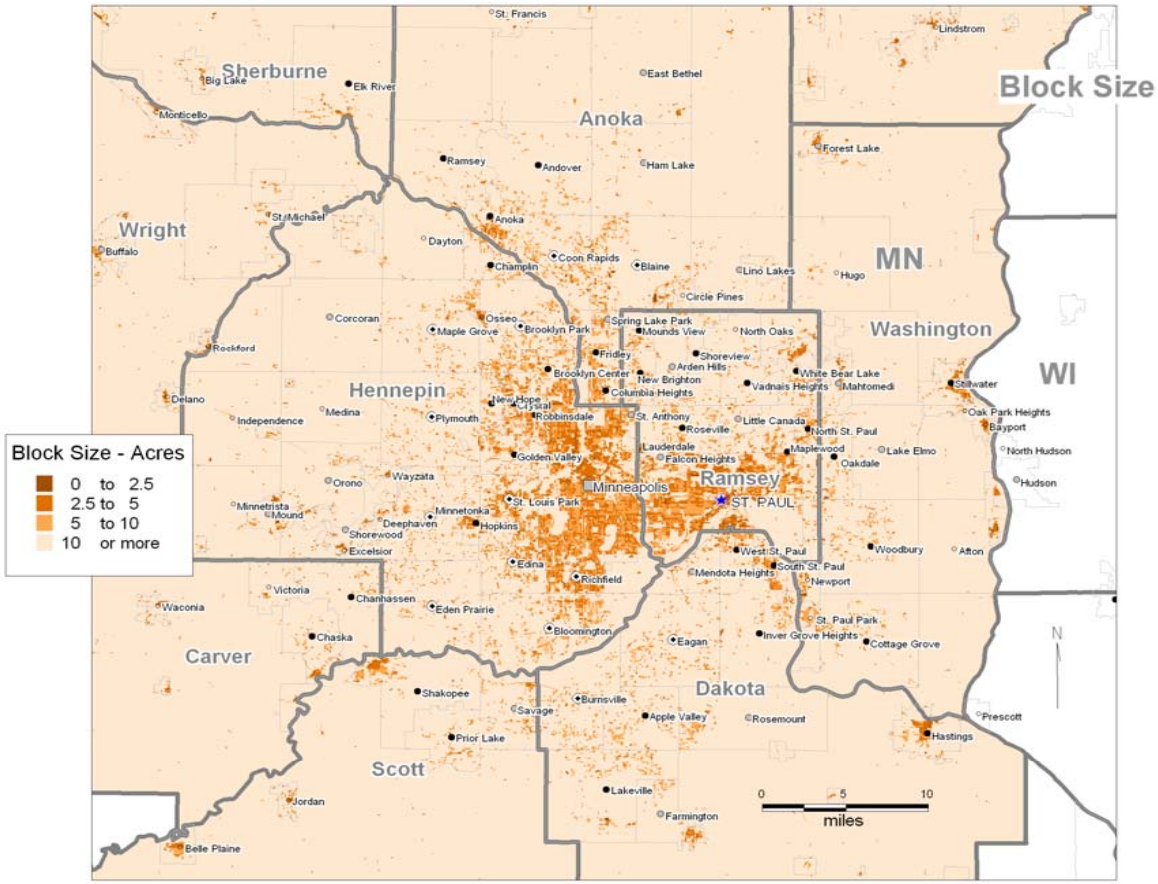
Independent Local Environment Variables – Density Measures

Variable	Source
Households per residential acre	Census 2000
Households per total acre	Census 2000



Independent Local Environment Variables – Mobility

Variable	Source
Average block size in acres	Census/ TIGER/Line®
Transit Connectivity Index	FTA 1995 Bus Routes Transit Database, local transit agency system data
Access to amenities	Service jobs in CTPP 2000

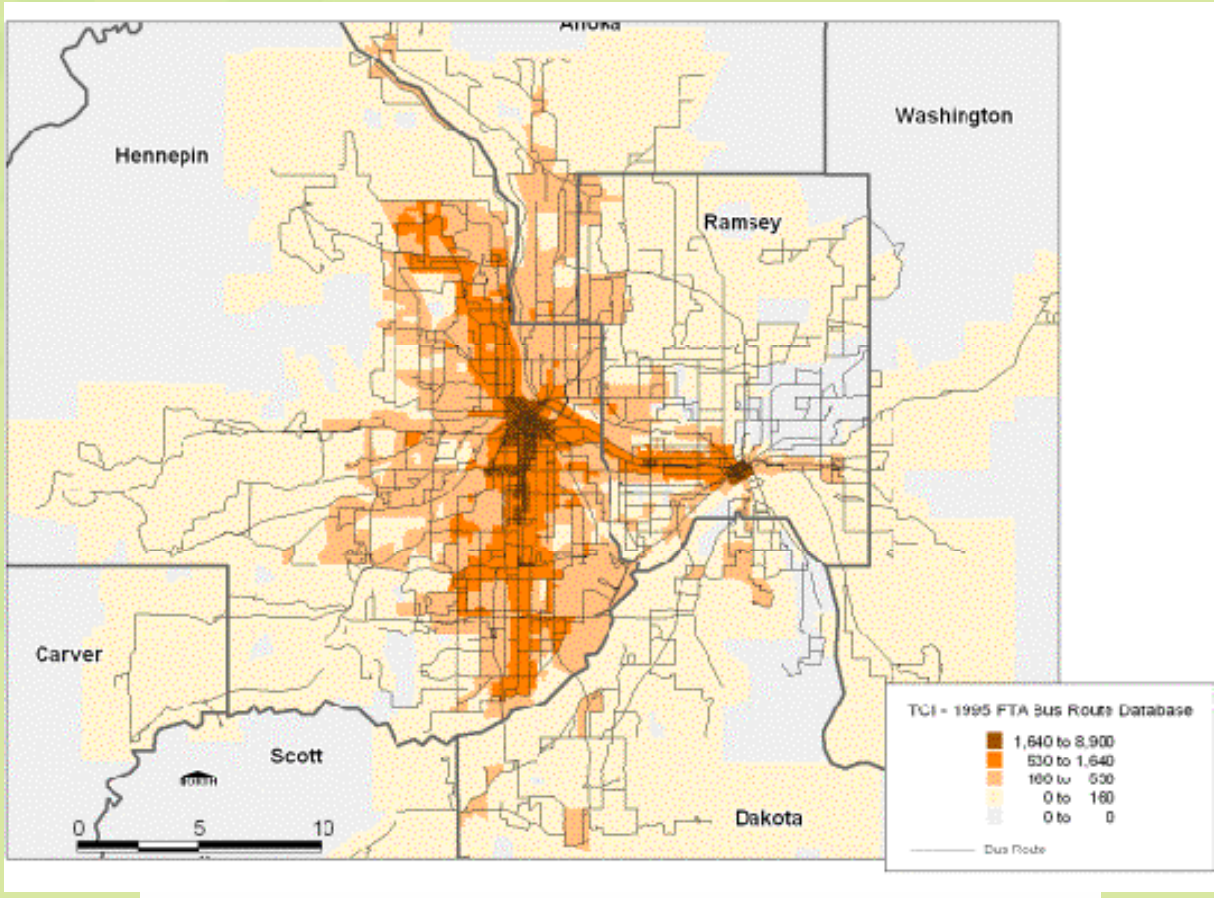


Source: U.S. Census Bureau, TIGER/Line Files

CNT

Independent Local Environment Variables – Mobility

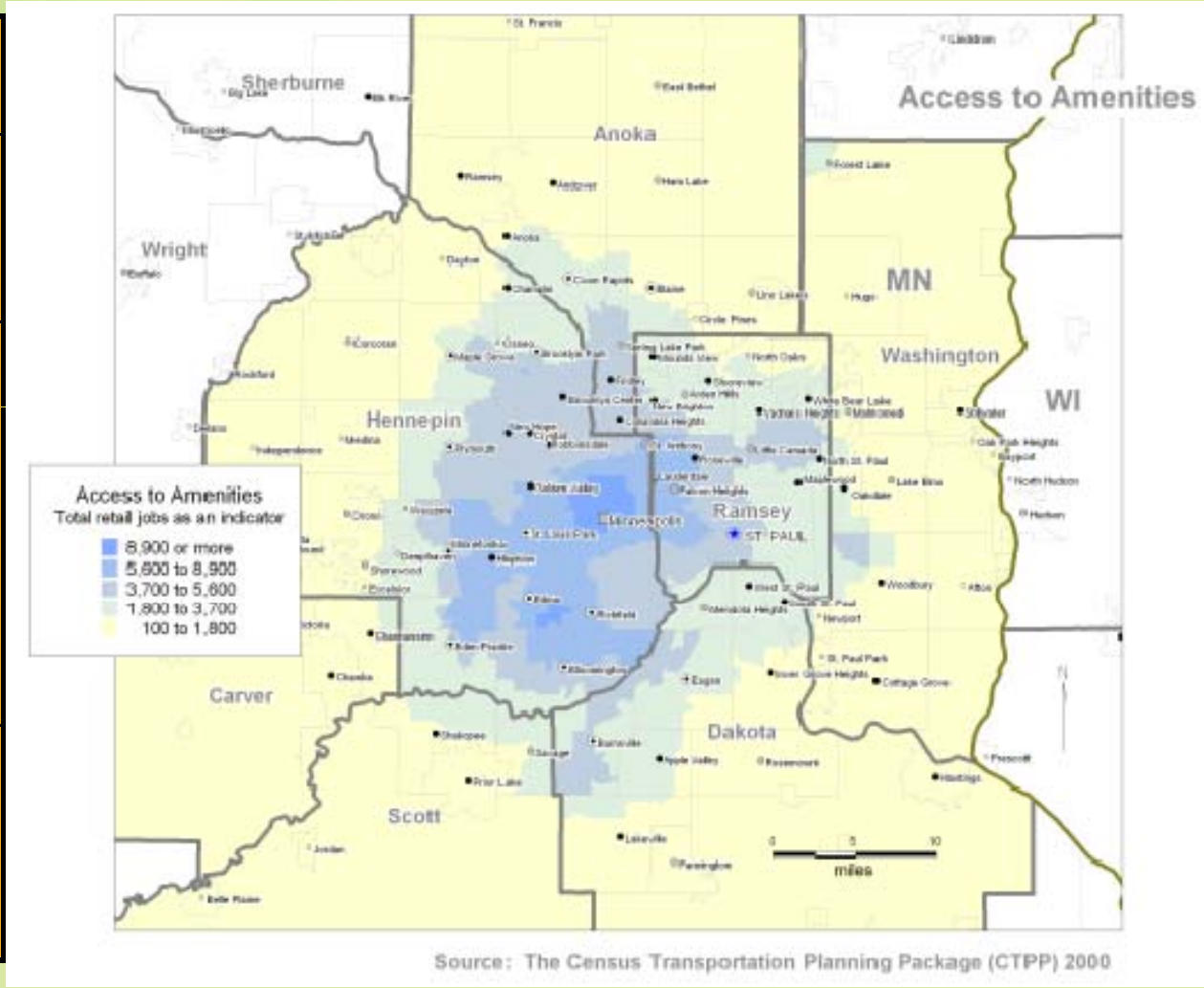
Variable	Source
Average block size in acres	Census/ TIGER/Line®
Transit Connectivity Index	FTA 1995 Bus Routes Transit Database, local transit agency system data



CNT

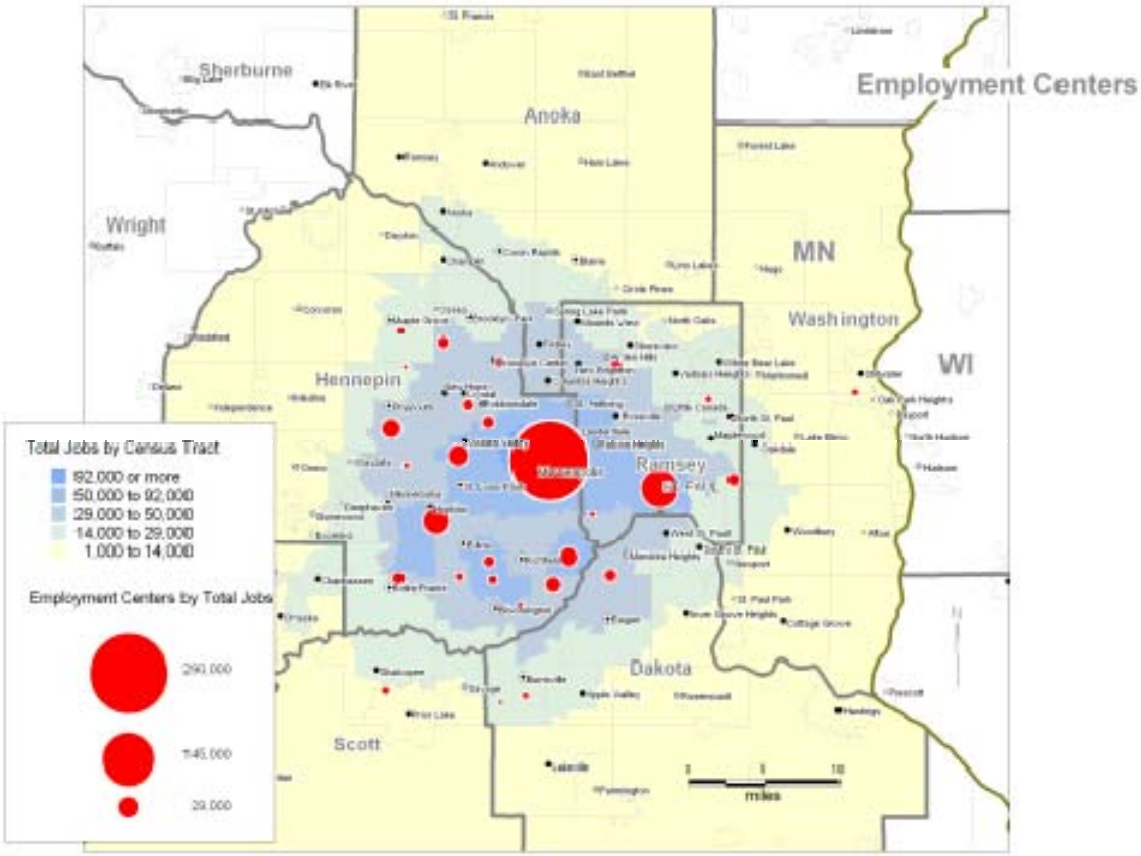
Independent Local Environment Variables – Mobility

Variable	Source
Average block size in acres	Census/ TIGER/Line®
Transit Connectivity Index	FTA 1995 Bus Routes Transit Database, local transit agency system data
Access to amenities	Service jobs in CTPP 2000



Independent Local Environment Variables – Access to Jobs and Amenities

Variable	Source
Distance to Employment Centers	Census Transportation Planning Package (CTPP) 2000
Job Density- Number of jobs per square mile	Jobs and locations from CTPP 2000
Access to amenities	Service jobs in CTPP 2000

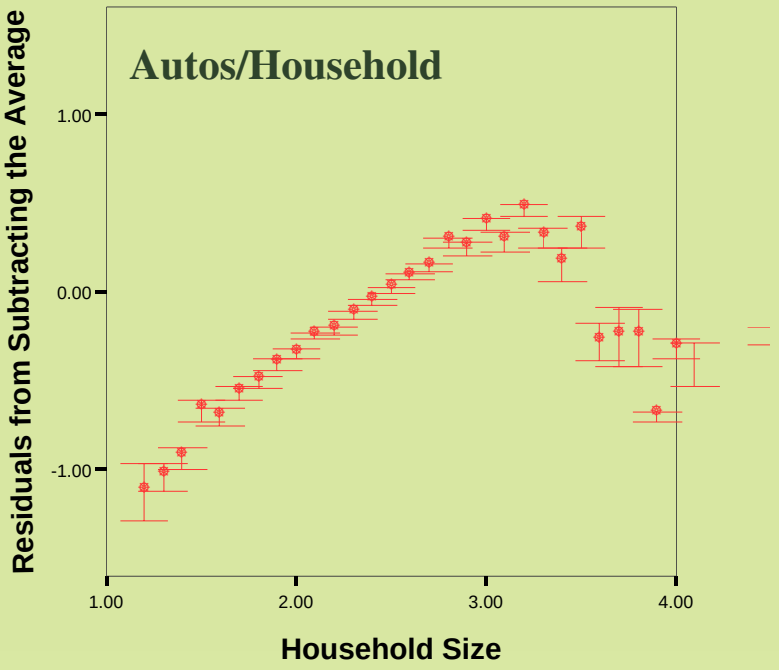


Source: The Census Transportation Planning Package (CTPP) 2000

CNT

Independent Household Variables

Variable	Source	Model Use
Household Income	Census 2000	Influences auto ownership and use
Household Size	Census 2000	Influences auto ownership and use



CNT

Dependent Variables

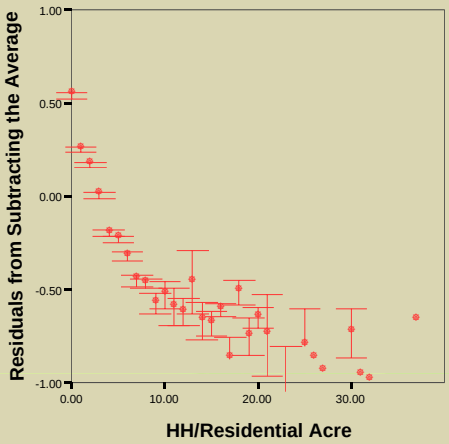
Variable	Source
Auto Ownership Costs (vehicles per household)	Modeled from independent household and local environment variables
Auto Use Costs (annual miles driven per household)	Modeled using the 2001 NHTS reported VMT fitted to the independent variables
Transit Costs (Rides per day)	Modeled from independent household and local environment variables

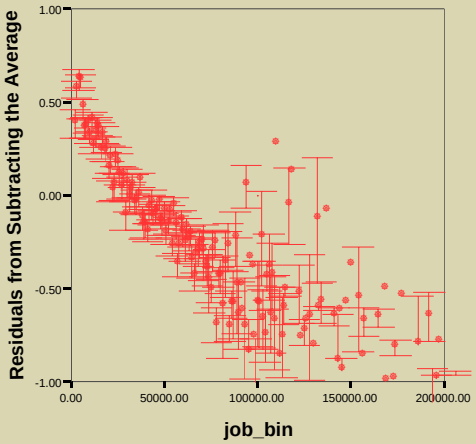
Optimizing the Model

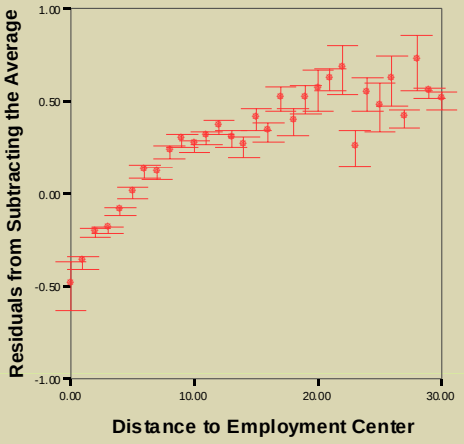
- **Combining the variables into a model:**
  - Multiple regression modeling to "fit" each of the 3 dependent variables to the 7 independent urban form variables;
  - Then same modeling is used to "fit" the 2 household variables to the 7 urban independent variables;
  - for a total of 21 fits to create the pilot model
- **Model development corroborates with Location Efficiency Study:**
  - The 7 urban form variables, **and** the two household variables were all needed to optimize the model;
  - the Urban Form variables are more important than Household variables (in large urban areas)

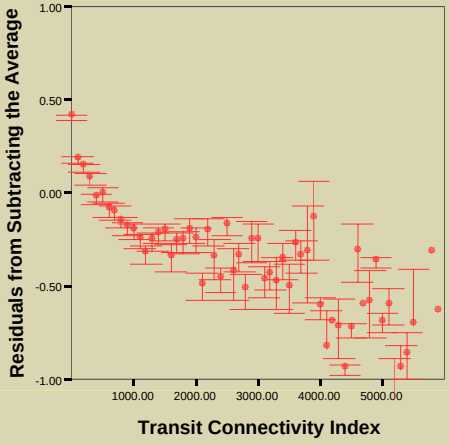
Seven Urban Form Variables

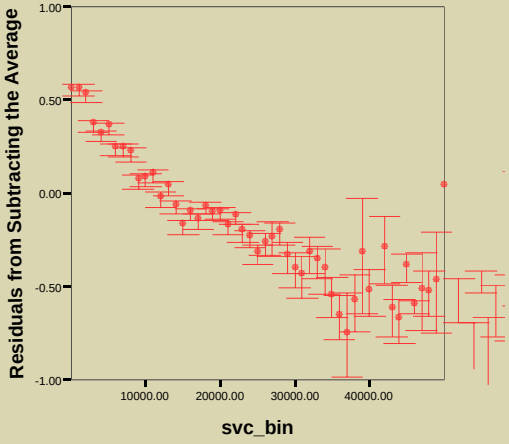
VS.
Auto Ownership

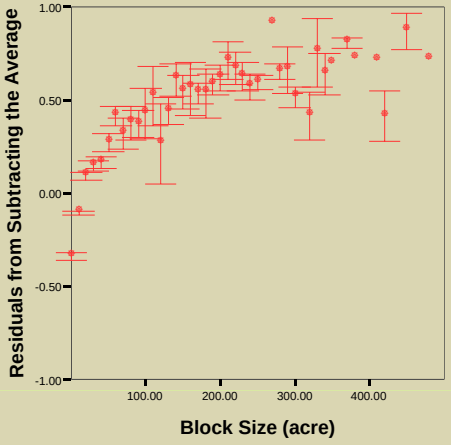








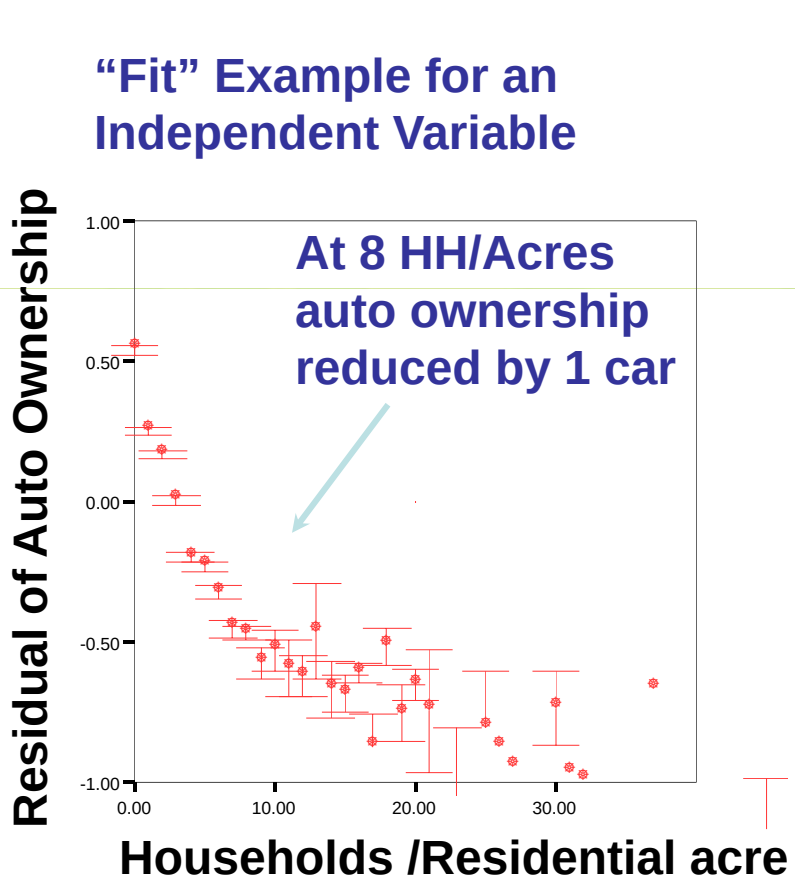


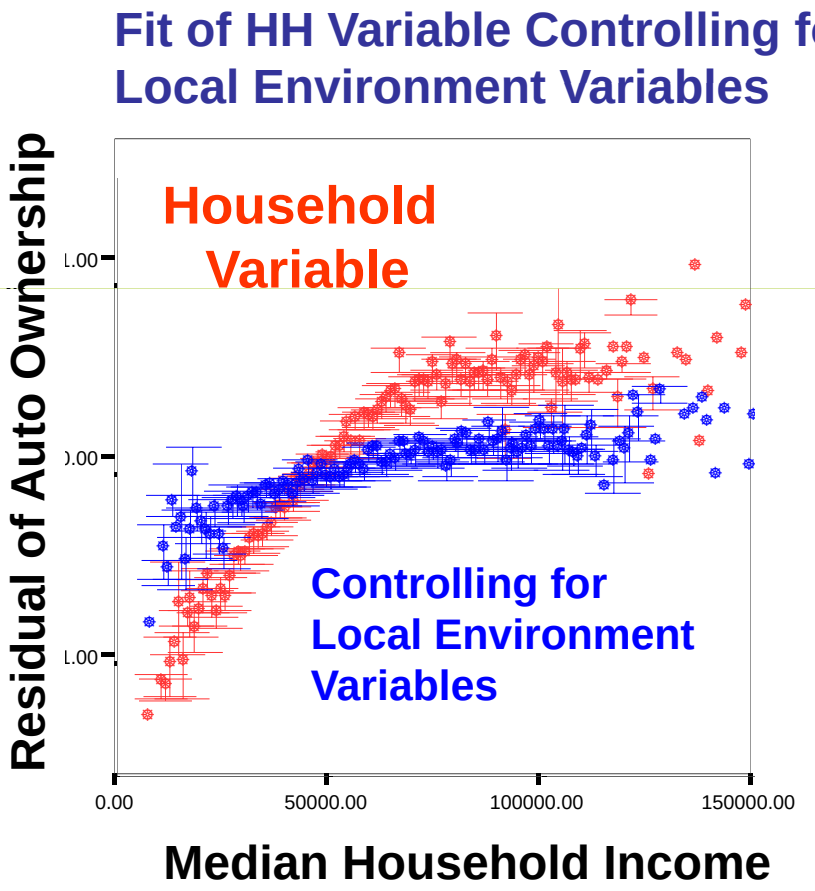


CNT

Model Mechanics

- Example of fit for Auto Ownership:

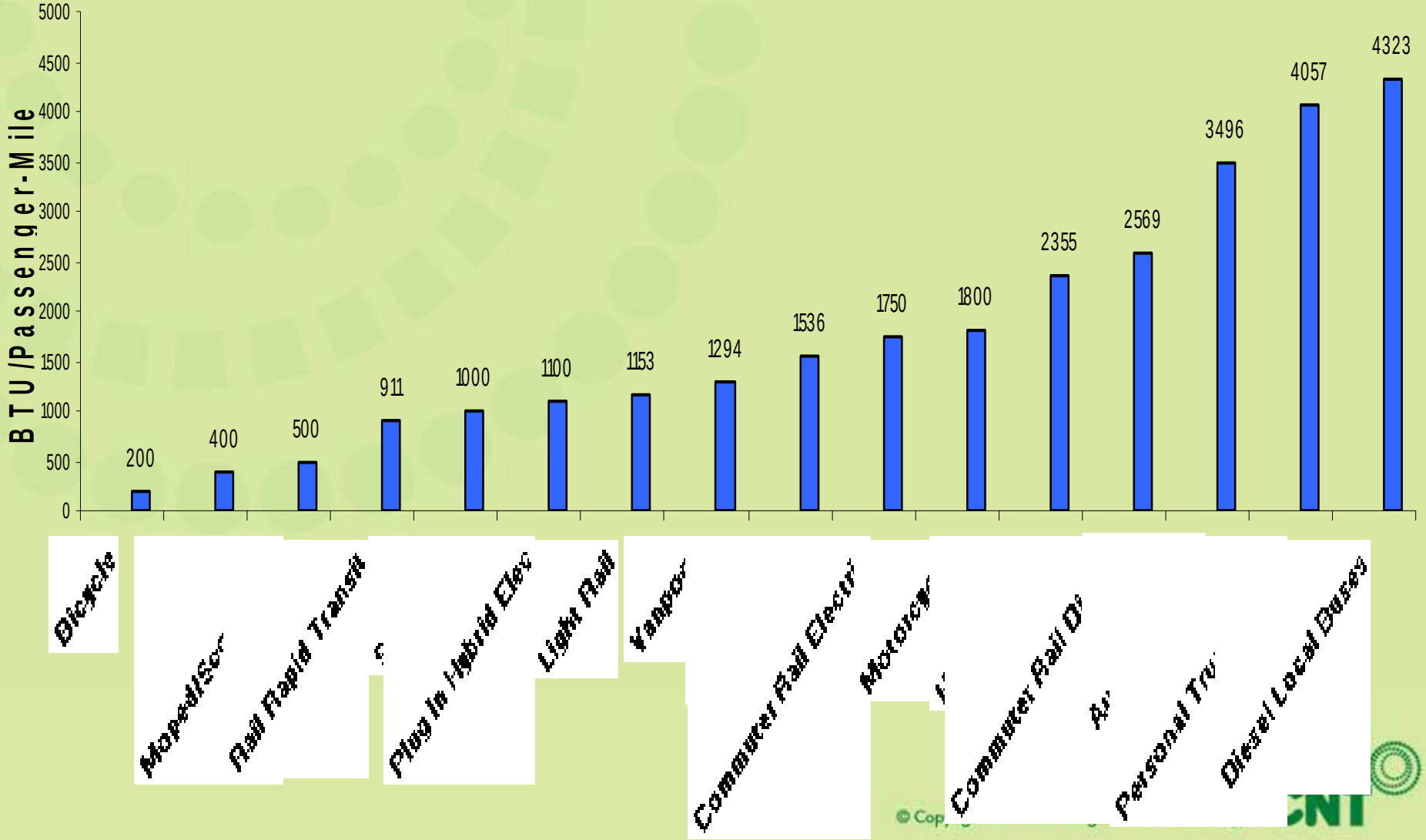




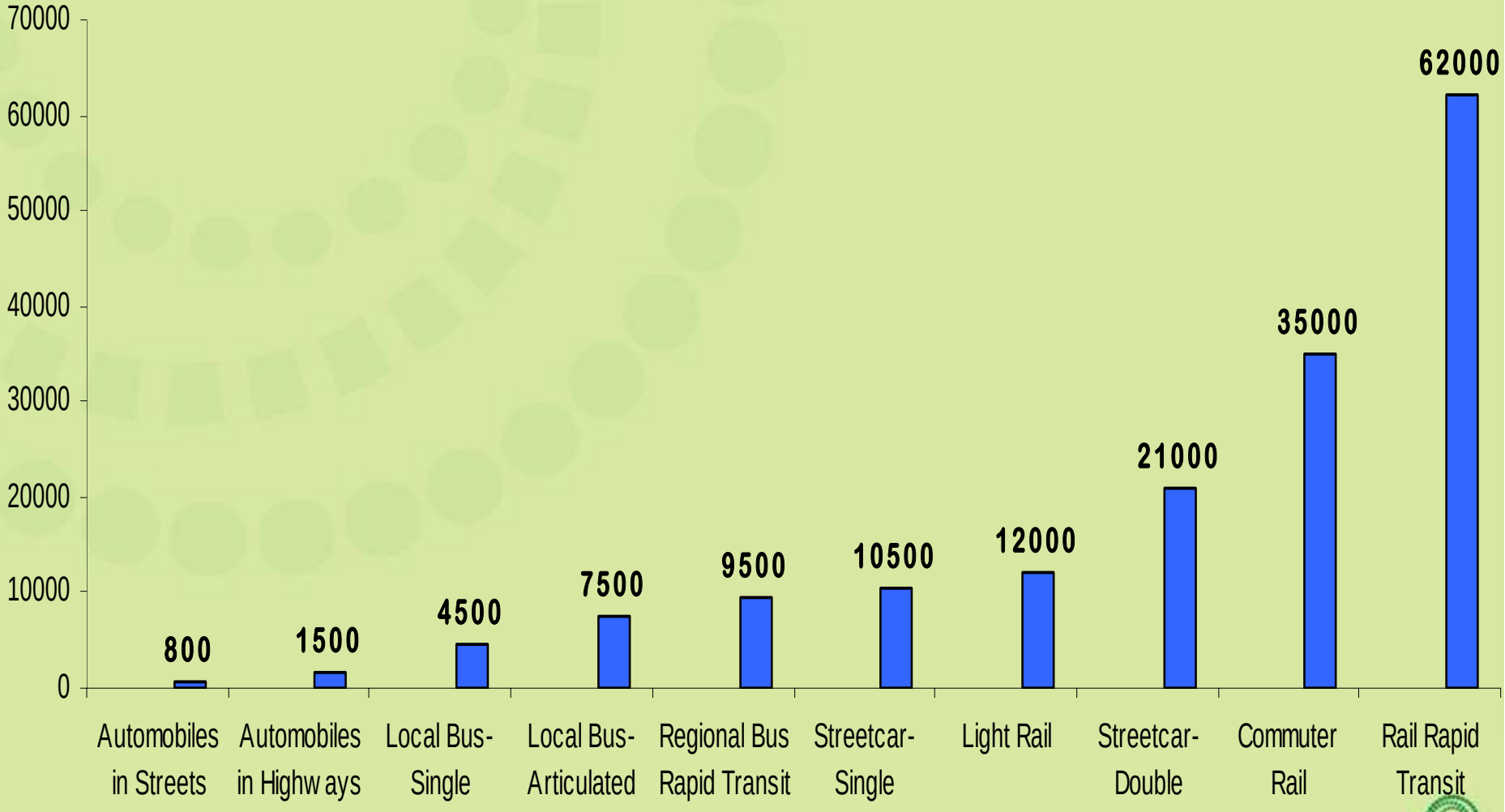
Key Findings

- Housing and transportation gives more *complete picture of affordability* than just housing alone
- Transportation costs are driven more by *neighborhood characteristics* than by household size or income
- Housing *and* transportation affordability requires **multiple and targeted strategies and coordination**
- *Underutilized transit stations* present an opportunity for more affordable and diverse neighborhoods

Range of Energy Intensities for Local/Regional Transport Options



Carrying Capacities for Local/Regional Transport Options Hourly Passengers/Lane-Direction



CNT

Filling In Missing Links by
Adding Streetcar Circulation—
Reduced Portland VMT & Transport Carbon 67%
Part of Portland Climate Plan (From Street Smart, CTOD 2006)

CNT
Sustainable Communities Attainable Results

STREETCARS ARE DEVELOPMENT-ORIENTED TRANSIT

DEVELOPERS SAY THAT the permanence of the fixed guideway helps mitigate the risk, and the higher densities and lower parking ratios typically permitted in downtowns make projects more profitable. These densities would not be possible, however, if there was no streetcar. Before the alignment was selected for the Portland streetcar land in the Pearl only captured 19 percent of all development in the CBD; after it was chosen the land captured 55 percent.

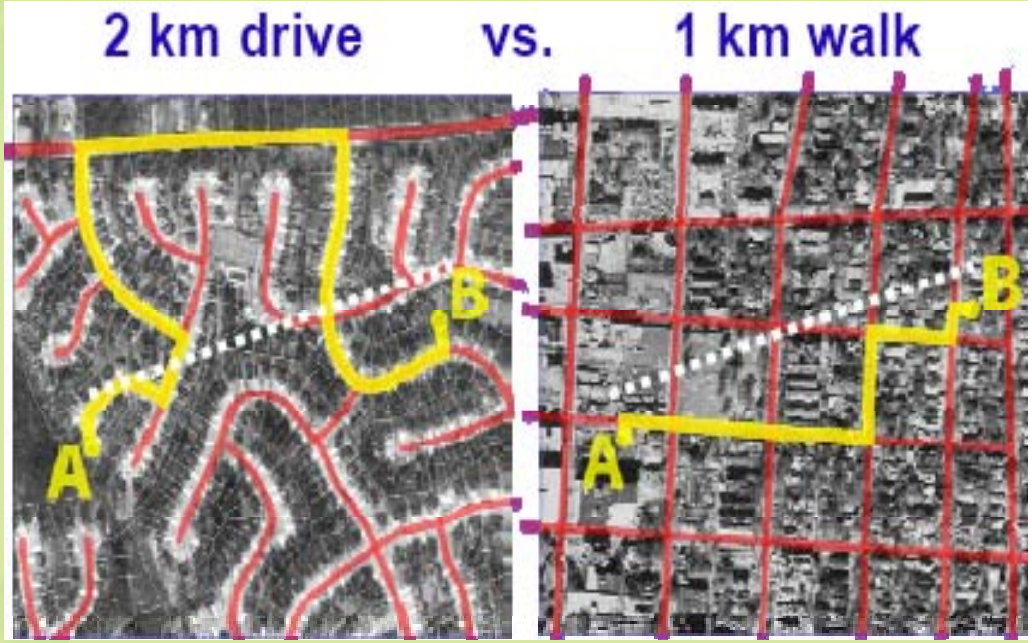
	Start of Service	Initial Track Miles	Initial System Cost Per Track Mile	Initial System Cost	Development Investment	Return on Investment
Kenosha	2000	2.0	3.10	6.20	150	2319.35%
Little Rock	2004	2.5	7.84	19.60	200	920.41%
Tampa	2003	2.4	20.13	48.30	1000	1970.39%
Portland (1)	2001	4.8	11.50	55.20	1046	1794.93%
Portland (Ext.)	2005	1.2	14.83	17.80	1353	7501.12%

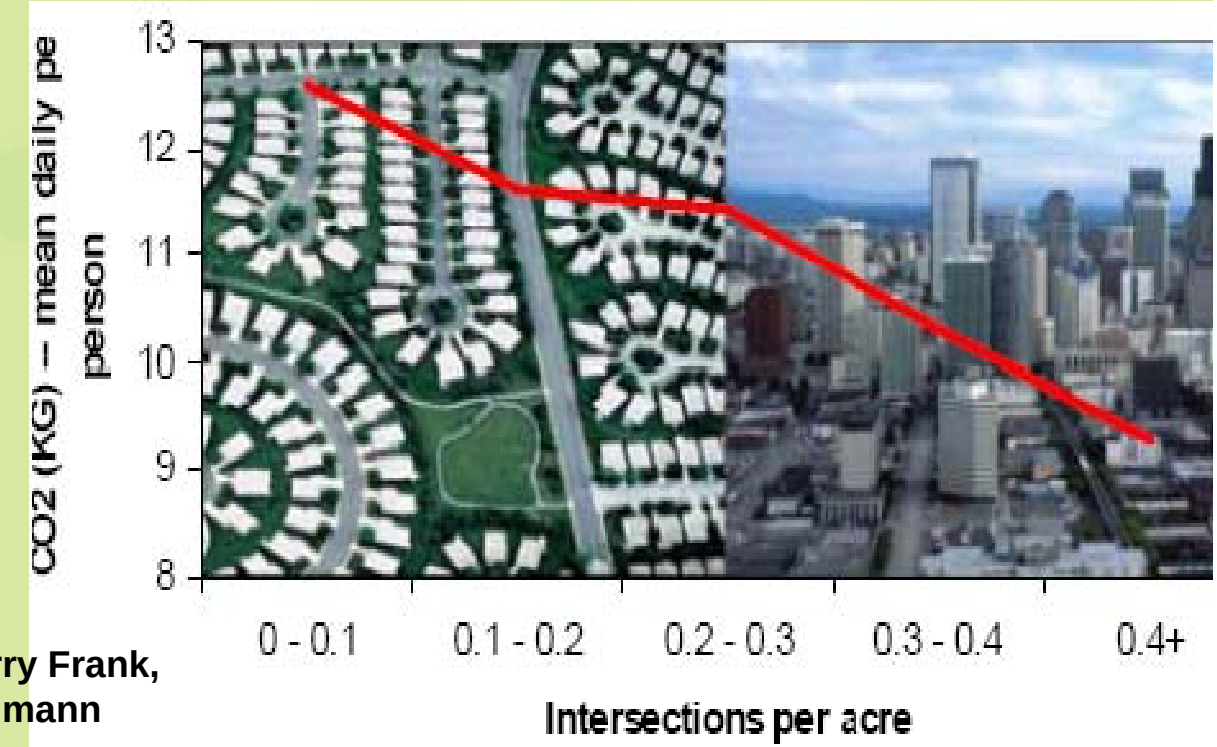
Source: Reconnecting America

TABLE 1: *Private Returns on the Public Investment*

Urban Form Supports Low-Carbon Travel: A Convenient Remedy to an Inconvenient Truth

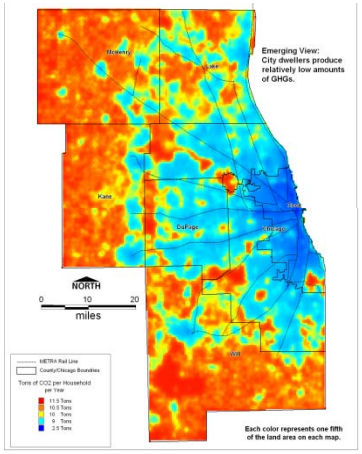
- Chicago area has dense networks of sidewalks and streets
- The higher the connectivity, the lower the CO2 per HH
- Supports walking, biking, mixed-use land uses
- Helps avoid unnecessary car trips
- Cited in recent studies, awards



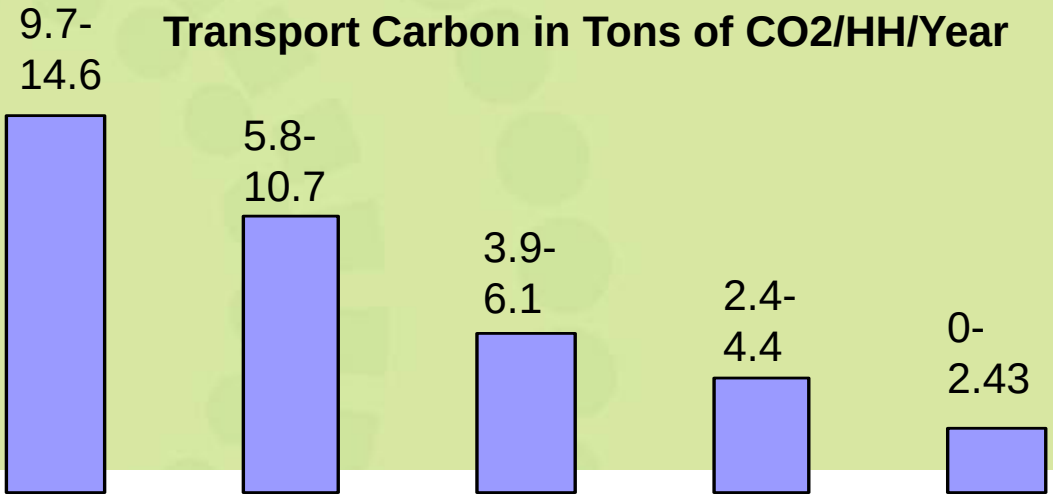


Courtesy Larry Frank, Steve Winkelmann

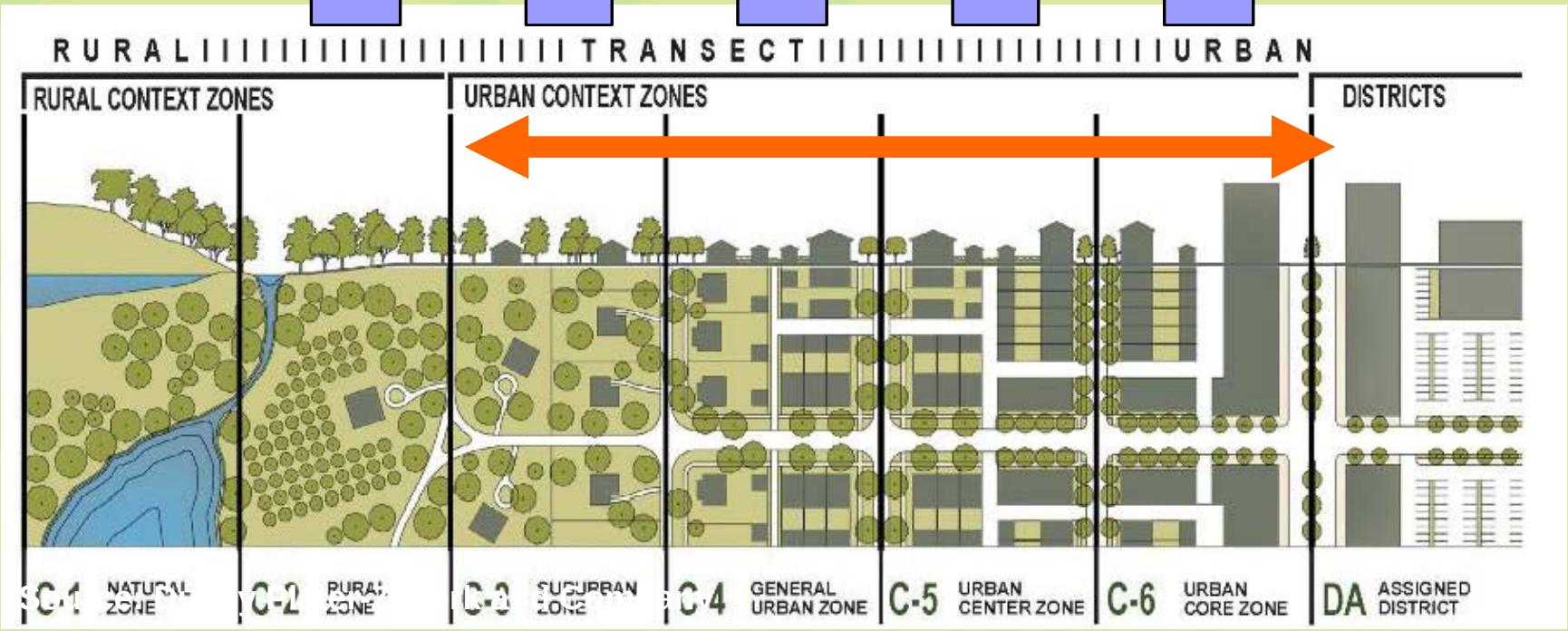
CNT
Sustainable Communities Attainable Results



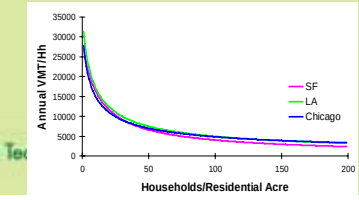
Transport Carbon in Tons of CO2/HH/Year



This Place Has the Disappearing Carbon Blues...♫

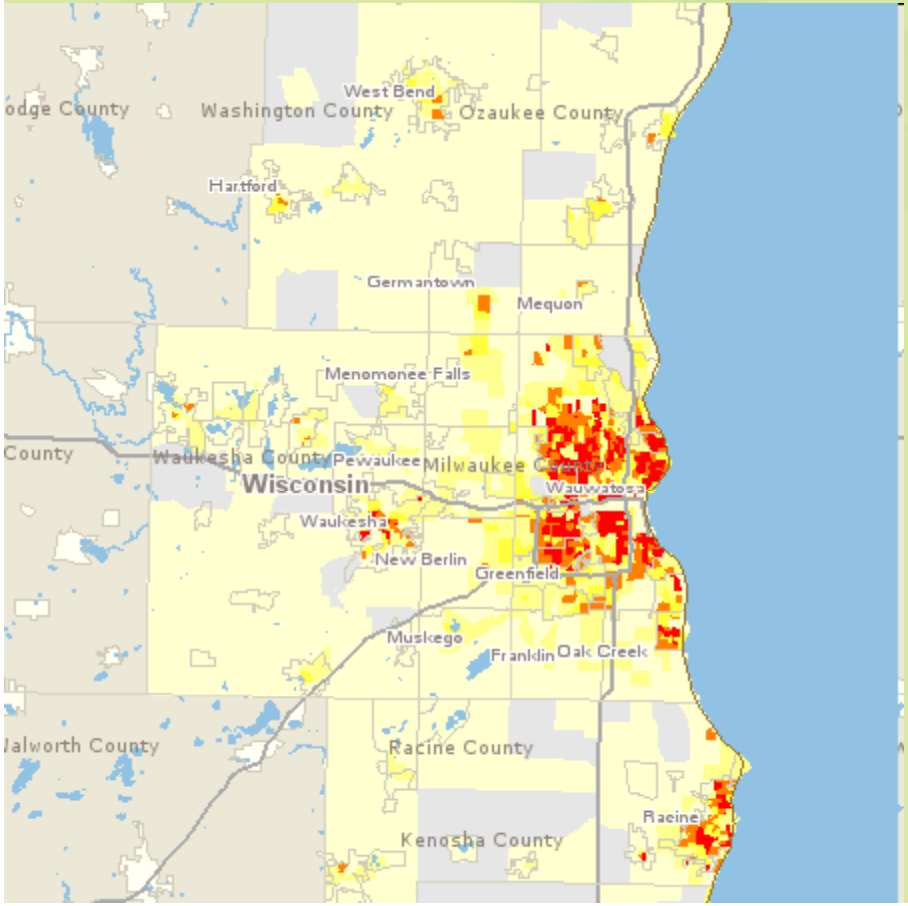


Location Efficiency & the Transect Reveals Carbon Benefits of Good Urban Form

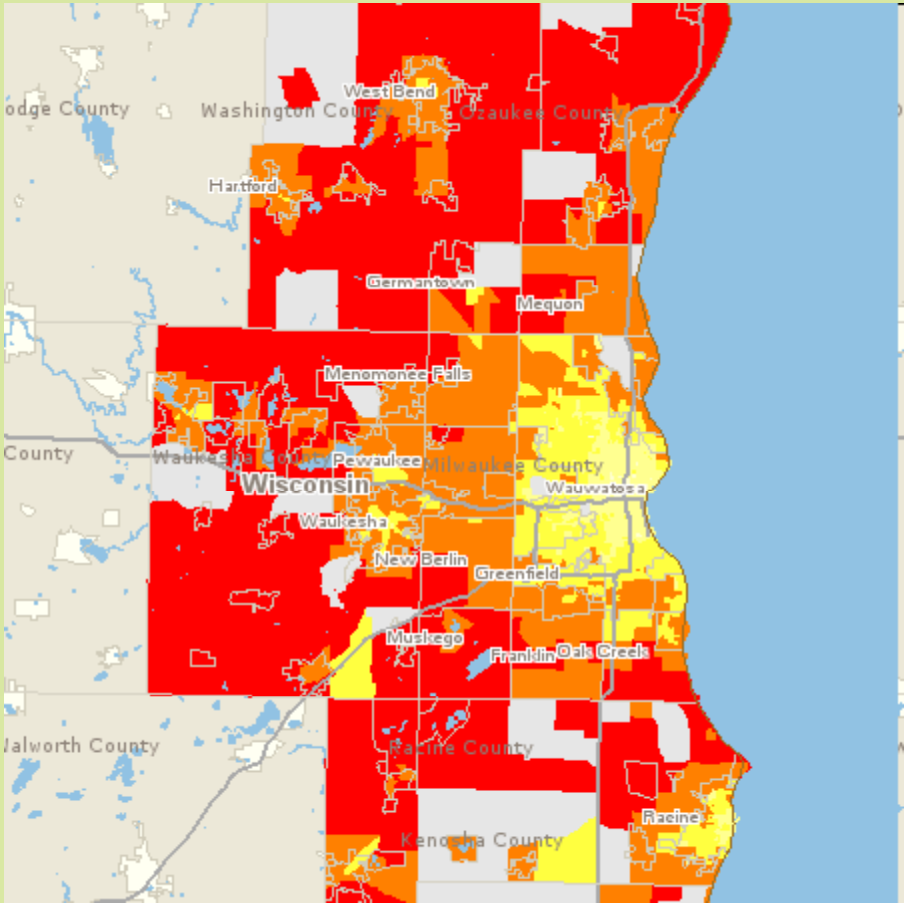


Two Views of Cities and CO2 in the Milwaukee-Racine-Kenosha Metro Area— Changes "Cities are the Problem" to "Cities Are the Solution"

0.45 to 94.73 Tons of CO2/Acre



2.55 to 10.55 Tons of CO2/HH



Calgary CA—500 passengers, 5-25 miles, 15-40 minute trips, no oil, zero GHGs—1st 100 % Wind Powered Transit System

CNT
Sustainable Communities
Attainable Results

Dresden—Revived old US practice of using transit assets to solve local freight challenge

Avenue B Trolley from River North Charrette—Low-Rise, High Density, Mixed-Use Character

Electric Trolley Buses

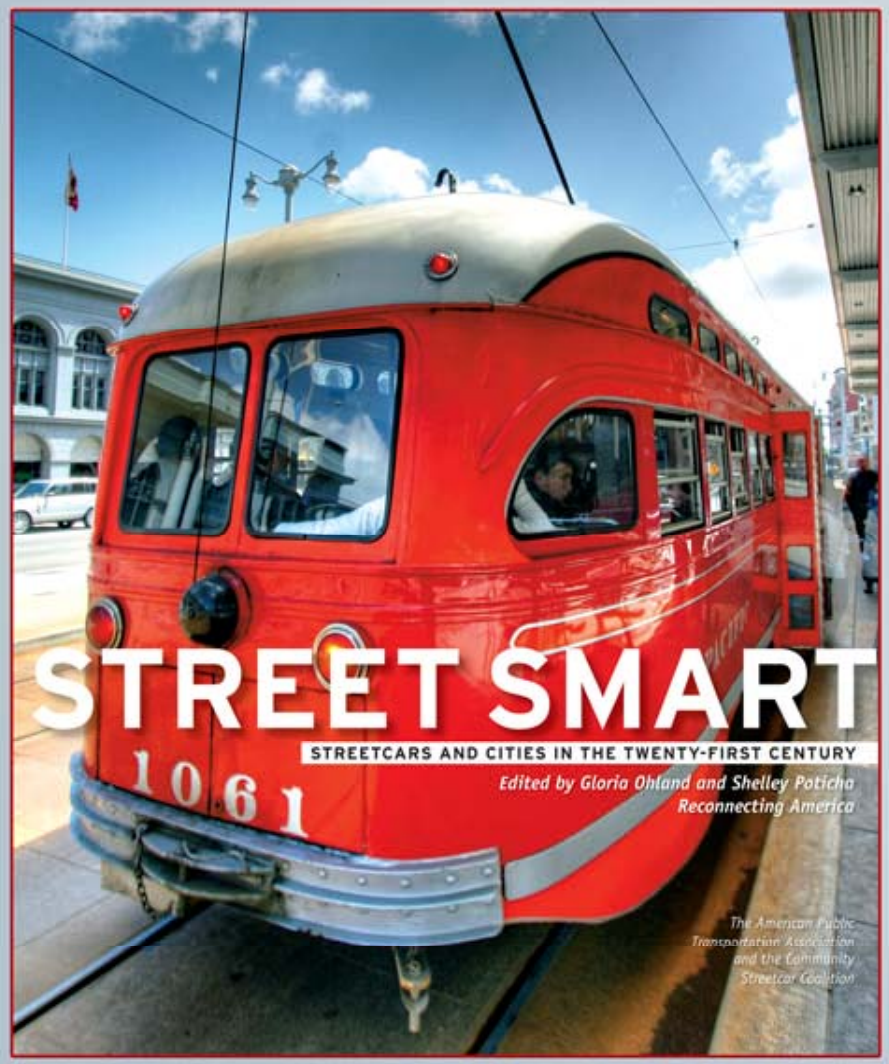
- Can operate on trolley lines or independently
- Same cost as hybrid diesels
- More fuel efficient
- Operating in Seattle, Boston, Philly, SF, Vancouver
- 10-15 % more revenue/bus

Why Not Just Add Better Buses? We Will, But We Also Need Transit That Can

- Generate private financing
- Organize development
- Deeply reduce emissions & fuel cost exposure
- Attract tourists and occasional riders
- Offer “legibility”
- Operate better in pedestrian environments.

CNT
Sustainable Communities. Attainable Results.

WHY STREETCARS AND WHY NOW?
BECAUSE STREETCARS ARE:



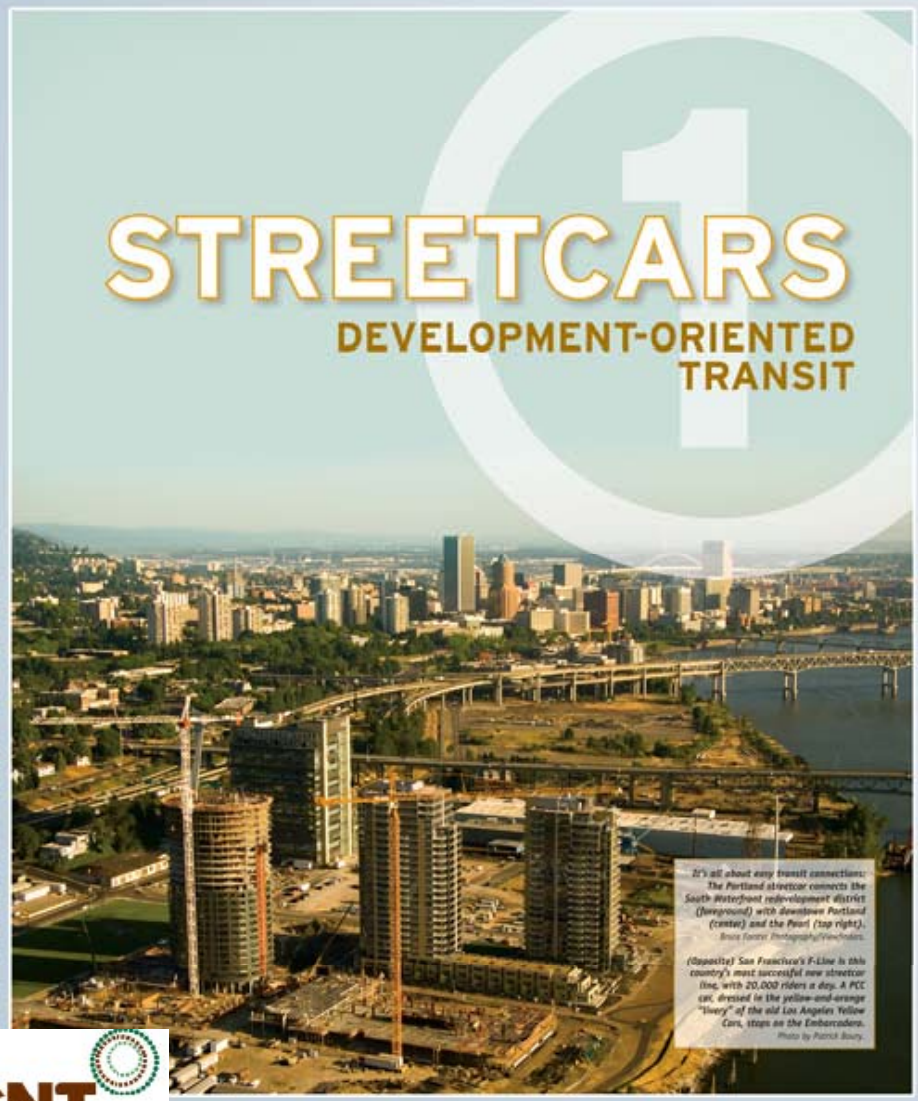
- relatively inexpensive -- recent streetcar systems have ranged in price from $6 million (Kenosha) to $55 million (Portland, Phase 1)
- uniquely suited to serve all the higher-density development occurring in downtowns across the U.S.
- hugely successful in promoting intense development and vibrant streetlife
- easily integrated into built environments because they can run in mixed traffic and share stops with buses (and don't require the massive infrastructure of stations, parking structures, bus bays and exclusive rights-of-way that make bigger rail systems difficult and expensive to build)
- and they feed regional transit systems, making transit more convenient by providing the "last mile" connection.

CNT
Sustainable Communities. Attainable Results.

- Streetcar links several distinct districts
- Fares interchangeable with TriMet LRT and bus and with South Waterfront Tram
- $1.75 or $100 annual
- Operated by Portland Streetcar Inc.
- Runs every 13 minutes

Portland Streetcar

THE STREETCAR WAS A WATERSHED EVENT IN PORTLAND'S DOWNTOWN



In the Pearl:

- 100 projects worth $2.3 billion, including 7,248 housing units and 4.6 million sq. ft. of commercial space
- 25 percent of housing is affordable
- Developers built at 90 percent of allowable density next to the line, twice as high as 3 blocks and further away
- Portland achieved its 20-year housing goal in 7 years, and issued a record number of building permits 7 years in a row

In South Waterfront:

- Connects to downtown via streetcar and to OHSU via aerial tram
- An even more ambitious redevelopment effort with 5,000 jobs and 3,000 housing units planned
- 4 residential towers are out of the ground

CNT
Sustainable Communities Attainable Results

Portland South Waterfront Opening 2007

- Serves residential, recreational, business, institutional uses
- Links to LRT, bus and aerial tram
- Mixed income, mixed use TOD

CNT
Sustainable Communities Attainable Results

Filling In Missing Links by Adding Streetcar Circulation—Mixed Use/Mixed Income Reduced Portland VMT & Transport Carbon 67% Part of Portland Climate Plan (From Street Smart, CTOD 2006)

STREETCARS ARE DEVELOPMENT-ORIENTED TRANSIT

DEVELOPERS SAY THAT the permanence of the fixed guideway helps mitigate the risk, and the higher densities and lower parking ratios typically permitted in downtowns make projects more profitable. These densities would not be possible, however, if there was no streetcar. Before the alignment was selected for the Portland streetcar land in the Pearl only captured 19 percent of all development in the CBD; after it was chosen the land captured 55 percent.

	Start of Service	Initial Track Miles	Initial System Cost Per Track Mile	Initial System Cost	Development Investment	Return on Investment
Kenosha	2000	2.0	3.10	6.20	150	2319.35%
Little Rock	2004	2.5	7.84	19.60	200	920.41%
Tampa	2003	2.4	20.13	48.30	1000	1970.39%
Portland (1)	2001	4.8	11.50	55.20	1046	1794.93%
Portland (Ext.)	2005	1.2	14.83	17.80	1353	7501.12%

TABLE 1: *Private Returns on the Public Investment*

Source: Reconnecting America

Kenosha WI—
State DOT Paying for Expansion

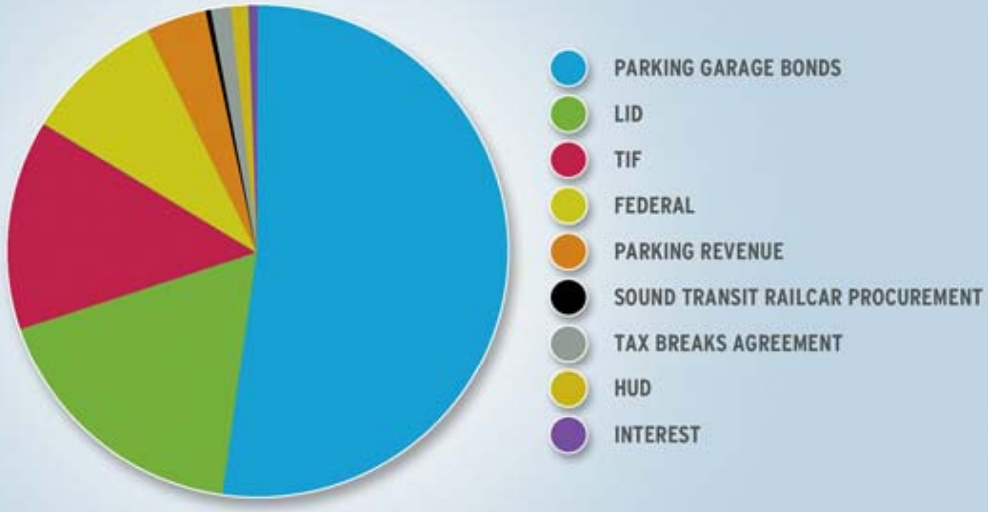
Oregon Governor Kulongonski At Recent Streetcar Opening

CNT

LESSONS LEARNED IN PORTLAND

- One or more large development sites are needed with owners willing to work with the public sector.
- Master development agreements can be used to leverage significant public benefits.
- Local improvement districts can help fund the streetcar and other public improvements.
- Involving stakeholders is critical. Without public support projects of this magnitude can get bogged down.
- The success of early projects demonstrated market demand for higher-density housing with greatly reduced parking.
- Higher-density development does not always equate to a livable community. Affordable housing, high-quality urban design and public art are necessary.

PORTLAND STREETCAR INITIAL FUNDING SOURCES



CNT
Sustainable Communities
Attainable Results

KENOSHA: SMALL TRANSIT FOR SMALL CITIES

- As in Portland, the streetcar connected Kenosha's downtown with a large redevelopment site
- The city dusted off a 1925 plan to connect downtown and the waterfront with a grand boulevard, sidewalks and streetcars, and created a new neighborhood on the waterfront
- The streetcar runs between this new development and a Metra commuter rail station with service into Chicago
- Kenosha is growing rapidly as people leave Chicago in search of more affordable housing. The streetcar enables Kenosha to accommodate this growth sustainably and without significant increases in traffic.

CNT

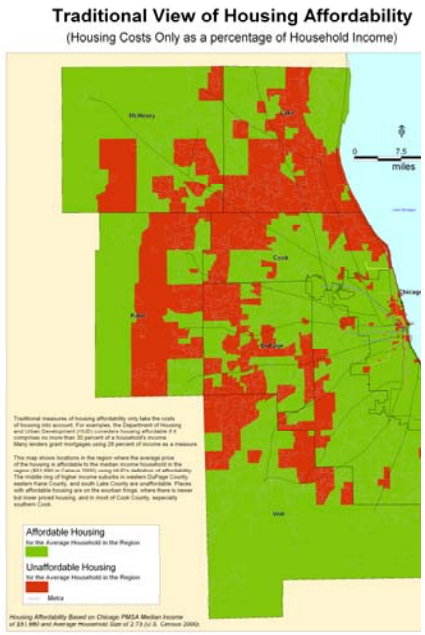
Seattle South Lake Union Streetcar

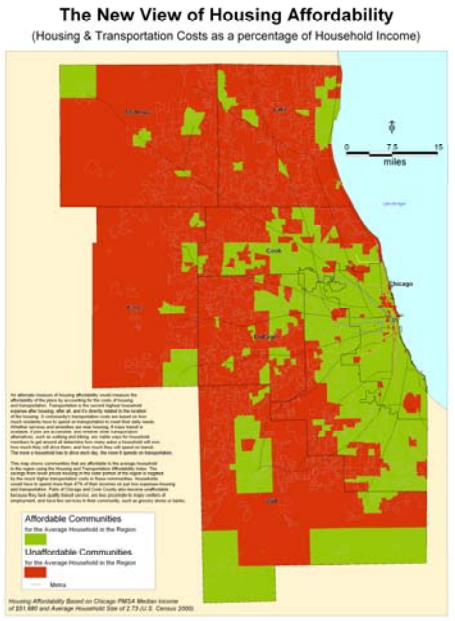
- Large waterfront development at north end of downtown
- Developer wanted link to main rail station
- Started December 2007
- City holding hearings on four more routes

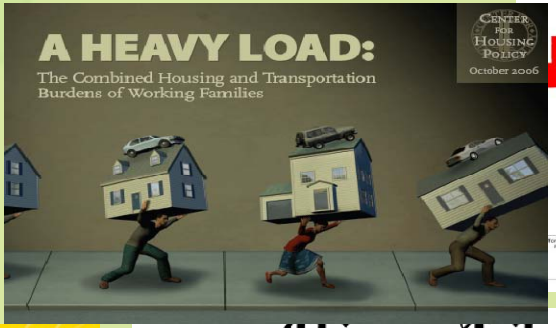
CNT

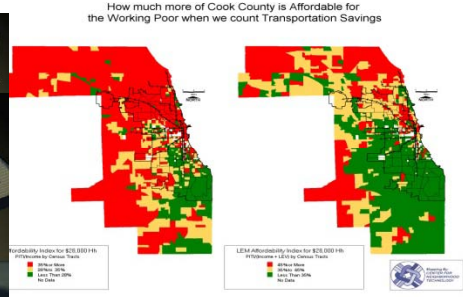
Tandem Economic Benefits

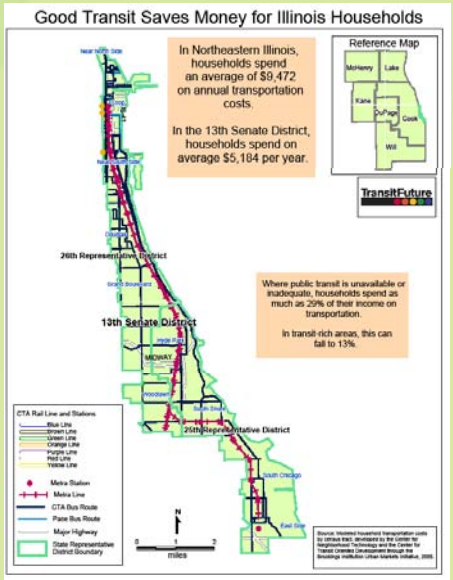
- Reduced household cost of living, 10 to 20 percent of income tax-free
- Increased savings rate and wealth creation
- Increased property values and reliable improved tax base
- Reduced travel delays
- Improved use of scarce public capital

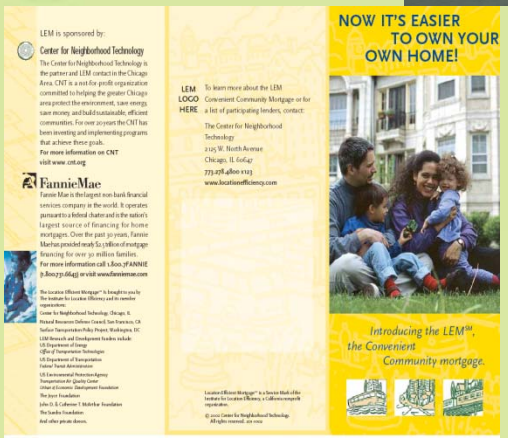












Chicago Tribune

18 Section 1 Sunday, June 4, 2000

Skip the car, buy a house

There's a lot of hand-wringing nowadays about suburban sprawl and the need for "smart growth."

But like the weather, nobody's doing much about it.

Much of the home-buying public still opts for wide-open spaces along the metropolitan fringe. And despite thoughtful warnings from civic and regional groups, political realities in Illinois militate against significant governmental action.

Now comes a modest but innovative pilot program that just might make a small difference. Maybe even a big difference—*if* it educates the public about the true cost of living "out there."

It's called the Location Efficient Mortgage, or LEM, and it has been developed by environmental groups such as Chicago's Center for Neighborhood Technology along with Fannie Mae, the government-chartered, stockholder-owned repurchaser of home mortgages.

It works like this: Participating lenders, in evaluating applicants, take into consideration how close the dwelling is located to public transportation. If it's so close the applicant can live without a car, or a working couple can get by with just one, the estimate of disposable income is increased, and with it, the size of the mortgage for which they qualify.

A couple jointly earning $60,000 and buying into Chicago's transit-rich Edgewater neighborhood, for instance, would qualify for a home selling for $212,218. Out in the boonies, under traditional guidelines, the limit would be $158,364.

And there are sweeteners. LEMs are not subject to income limits and they offer more flexibility, including lower down payments, than conventional mortgages. The City of Chicago, moreover, is offering vouchers worth $900 toward the purchase of energy-efficient appliances to the first 100 LEM borrowers.

Downsides? There's mandatory counseling. And for now it's limited to Chicago and three West Coast cities.

The ultimate value of LEM, however, may be to show, in ways people readily understand, that sprawl does impose costs. Some of that cost is paid, knowingly and gladly, by those who choose to live "out there." Much of it, however, is hidden, and paid indirectly by those who live "back here."

For more information about LEMs call 1-800-732-6643.

CNT

Big Opportunities to Get this Right Regionally

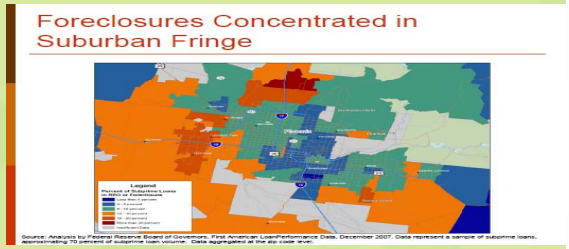
- Highway re-build choices
- Build out streetcar and electric trolley bus systems
- Provide creative local choices—car-sharing, incent better local shopping choices
- Link all this to household information systems for real time feedback

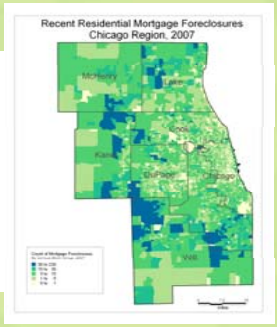
Observations

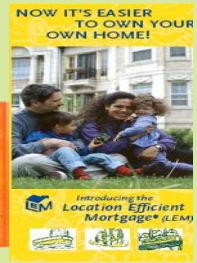
- Transportation costs families about as much as housing
- This cost is excluded from everyday decisions and public policies
- Compounds financial stress
- Current proposals to mitigate mortgage crisis don't take transportation costs into account
- Crisis isn't over yet, gas prices are rising, and drive 'til you qualify seems part of the landscape

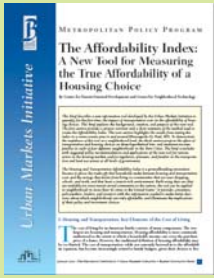
Looking Ahead

- Foreclosures in metro areas increasingly suburban
  - Improved counseling to include transportation costs + linkages to alt services
  - Adopt Location Efficient Mortgages®

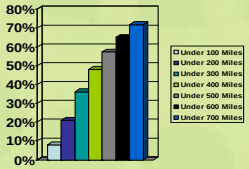








- Continued airline distress and dependence on short-trip intercity travel
  - Secure intercity coach service at airport curbs
  - Develop air-rail service



- Transit operators have record demand but can't afford fuel prices
  - Help with fuel purchases and/or price hedging
  - Help restructure transit operators to qualify for federal financial services industry bailout assistance

CNT

A Ladder of Opportunity

Lead the Chorus: Reconnected, Vital, "Cool" and a Framework that the Market Is Seeking

Manage the Course: Build Capacity to React To Changing Market

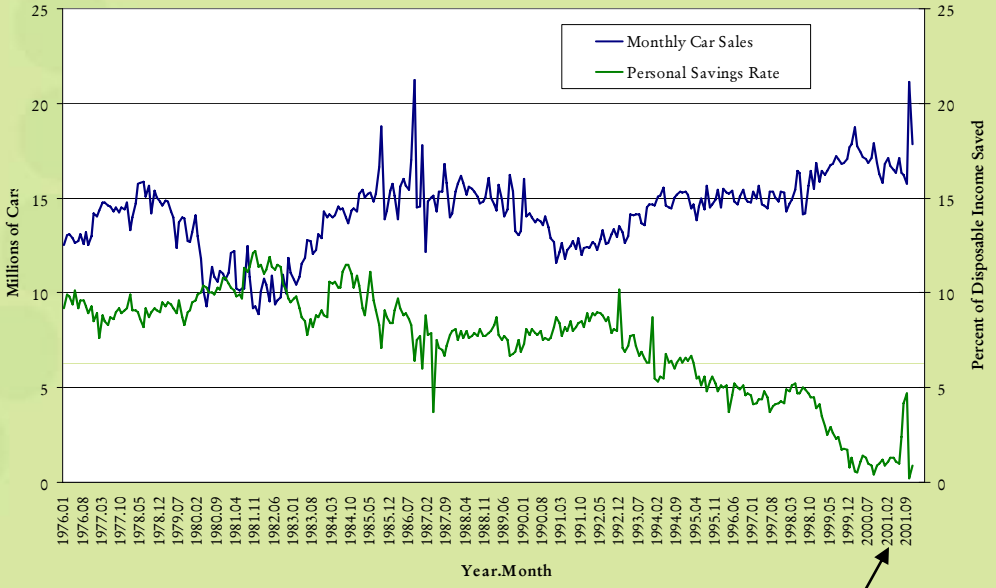
Stay the Course: Disconnected, More of the Same

Significant Trends We Cannot Avoid

- Energy prices—peak oil within 5 and possibly 2 years; today's oil price will rise to between $177 and $504/barrel as early as 2012
- Climate change—increased electricity demand, crop cycle disruption, limits on water supplies and shipping season, possible limits on aviation
- Demographics—aging population, smaller households, immigration
- Technology—continued automation, information system integration
- Workforce—Demand for trained and skilled growing in excess of capacity
- Globalization—competition increasingly Bangalore and Shanghai not just Los Angeles, Phoenix and New York

Buy Cars or Build Wealth?

- **Car sales and savings move in opposite directions**
- **Will Rogers—"We'll be the first generation in the history of the planet that drove to the poorhouse in an automobile" (1931)**



No-cost car loans after 9/11
Made it worse

CNT

Thank You!

- jacky@cnt.org
- www.cnt.org
- http://htaindex.cnt.org