

An aerial photograph of a rugged mountain range. In the foreground, a calm lake reflects the sky, surrounded by steep, rocky slopes. The background shows more distant, snow-capped peaks under a clear sky. The overall tone is naturalistic and scenic.

Sustaining the Next 100 Million

**Arthur C. (Christian) Nelson, Ph.D., FAICP
Director, Metropolitan Institute
Virginia Tech – Alexandria Center**

**Rocky Mountain Land Use Institute
March 6, 2008**



Themes

- **Growth is coming → and you can't duck it**
- **America's metropolitan areas are merging**
- **Demographics are changing needs profoundly**
- **Most growth will be redevelopment**
- **Metropolitan areas can accommodate large share of all growth on existing parking lots**
 - **with room for parking if we are smart**
- **Sustainability is plausible**
- **America can become more sustainable with the next 100 Millions Americans**

Planning Goals 101

- **Preserve public goods**
- **Minimize taxpayer costs**
 - **Mixed uses, higher density = lower costs**
- **Minimize adverse land-use interactions**
- **Maximize positive land-use interactions**
 - **Houston's beltways cost 100k retail & service jobs**
- **Prevent disproportionate burden shifting**
 - **Attractive cell towers even in low income neighborhoods**
- **Elevate quality of life:**
 - **Accessibility regardless of health or wealth**
 - **Neighborhood stability**
 - **Timely delivery of quality public services**



America Grows

200 million in 1968

300 million in 2006

400 million in 2032

500 million in 2050

**America adds 100 million people faster
than any other nation except India and
Pakistan – But *faster* than China.**

Source: Arthur C. Nelson, Metropolitan Institute at Virginia Tech.

Buildings to go up like never before

Study: Half needed for 2030 don't exist

By Haya El Nasser
USA TODAY

Residential and commercial development in the next quarter-century will eclipse anything seen in previous generations as the nation moves to accommodate rapid population growth, according to a Brookings Institution report today.

About half the homes, office buildings, stores and factories that will be needed by 2030 don't exist today, says Arthur C. Nelson, author of the report for the think tank in Washington, D.C.

The U.S. population is expected to increase 33% to 376 million by 2030, according to Nelson's analysis. That's 94 million more people than in 2000.

To serve that population, almost 60 million housing units will have to be built. About 20 million of these units will replace destroyed or aging homes. In addition, half of the largest metropolitan areas will have to add as much or more commercial and industrial space as existed in 2000, the report says.

The projections are startling for a nation already coping with sprawl, traffic congestion and the strains they put on the environment. Phenomenal growth in the South and



New housing needed

■ Your state by 2030, 4A

nominal growth in the South and West has turned deserts and soybean fields into cities. The report projects that these regions, which face water limitations, will experience the greatest surge in construction in the next 25 years.

"That kind of statistic is either terrifying or a wonderful opportunity," says David Goldberg, spokesman for Smart Growth America, a national coalition of groups that support managing growth.

If development patterns don't change, subdivisions will continue to sprout on farmland farther from metropolitan areas, requiring more

roads and sewer lines.

"We need to get this message out to planners so that they see the big numbers," says Nelson, director of urban affairs and planning at the Metropolitan Institute at Virginia Tech in Alexandria, Va. "There may be no better time than now to plan the shape of the landscape."

For generations, Americans favored single-family homes on larger lots. Development spread to where land is cheaper but within commuting distance to jobs.

Communities must decide if they "want to develop policies consistent with those preferences or constrain them," says John Kasarda, director of the Kenan Institute of Private Enterprise at the University of North Carolina-Chapel Hill. "Sprawl is a choice."

John McIlwain, senior housing fellow at the Urban Land Institute, a research group that works with developers: "We're going to wind up with about 40% to 45% and 70% of development occurring where it's always occurred since World War II: on the outer edge."

USA
TODAY
.com

Front Page

December 4,

2004

BUSINESS 2.0

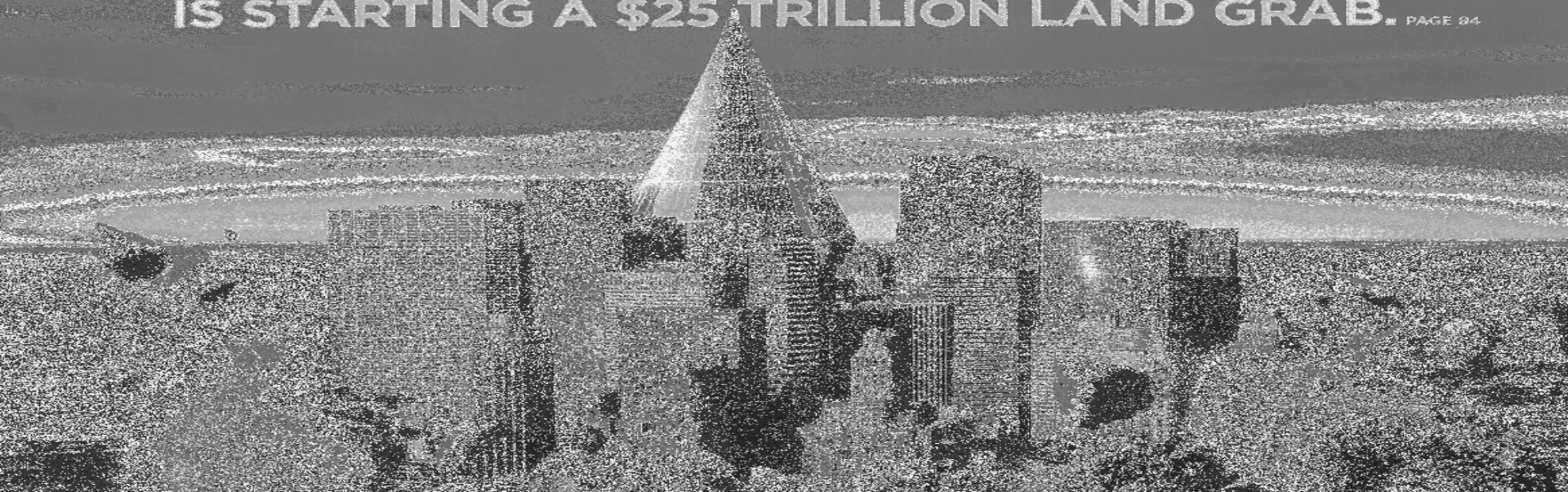
THE PLAYBOOK FOR A NEW GENERATION OF LEADERS | WWW.BUSINESS2.COM

THE NEXT REAL ESTATE BOOM

SHORT-TERM BUBBLE? MAYBE.

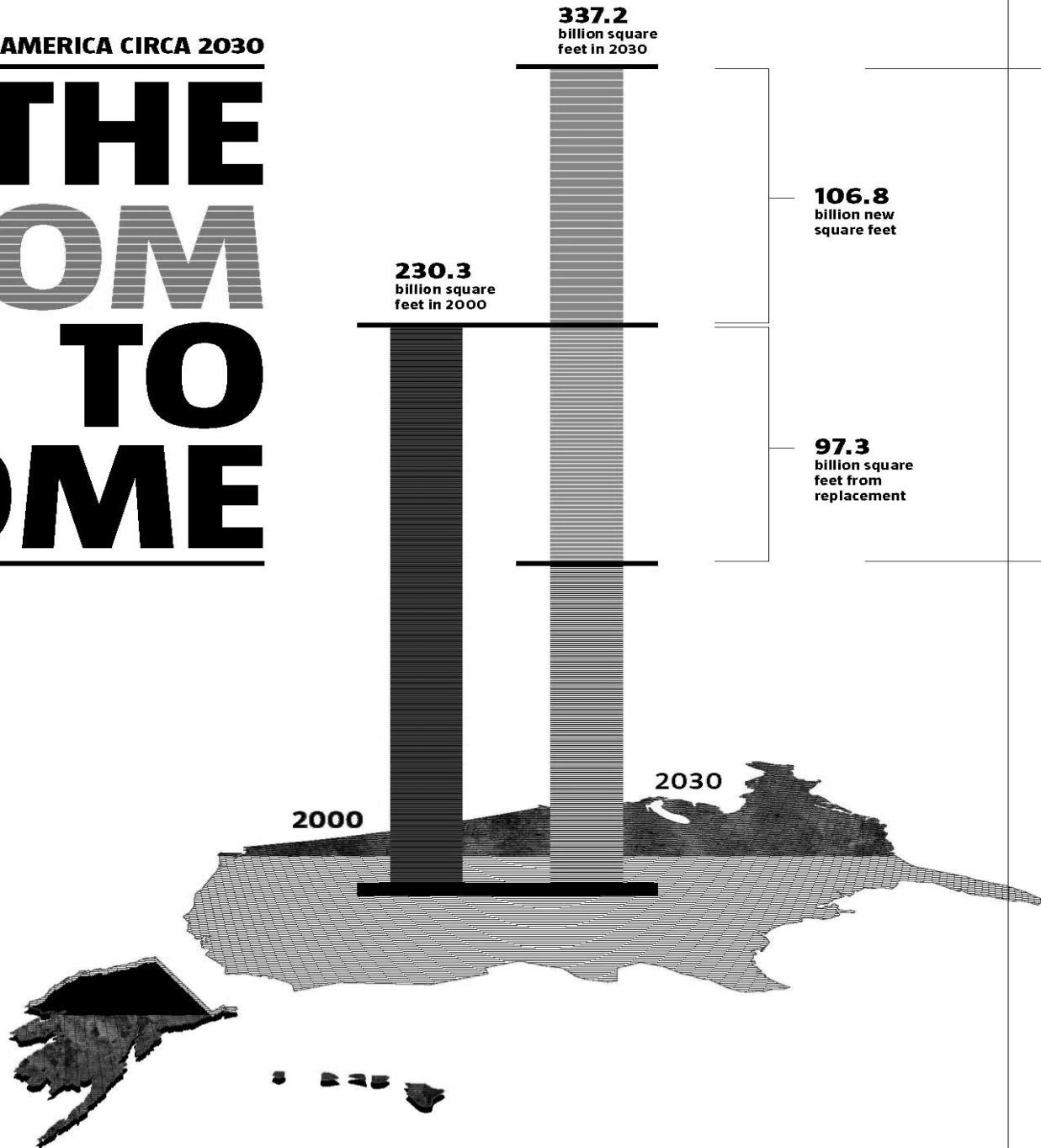
LONG-TERM OPPORTUNITY? DEFINITELY.

HOW THE HYPERGROWTH OF 10 "MEGAPOLITANS"
IS STARTING A \$25 TRILLION LAND GRAB. PAGE 94

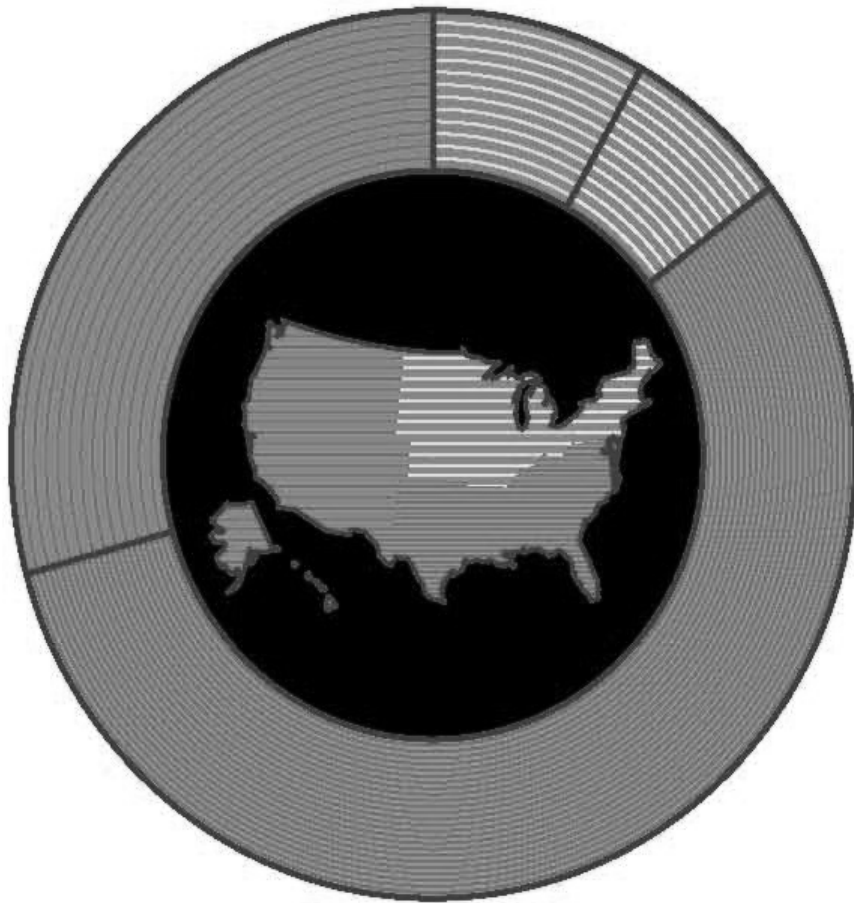






AMERICA CIRCA 2030

THE BOOM TO COME

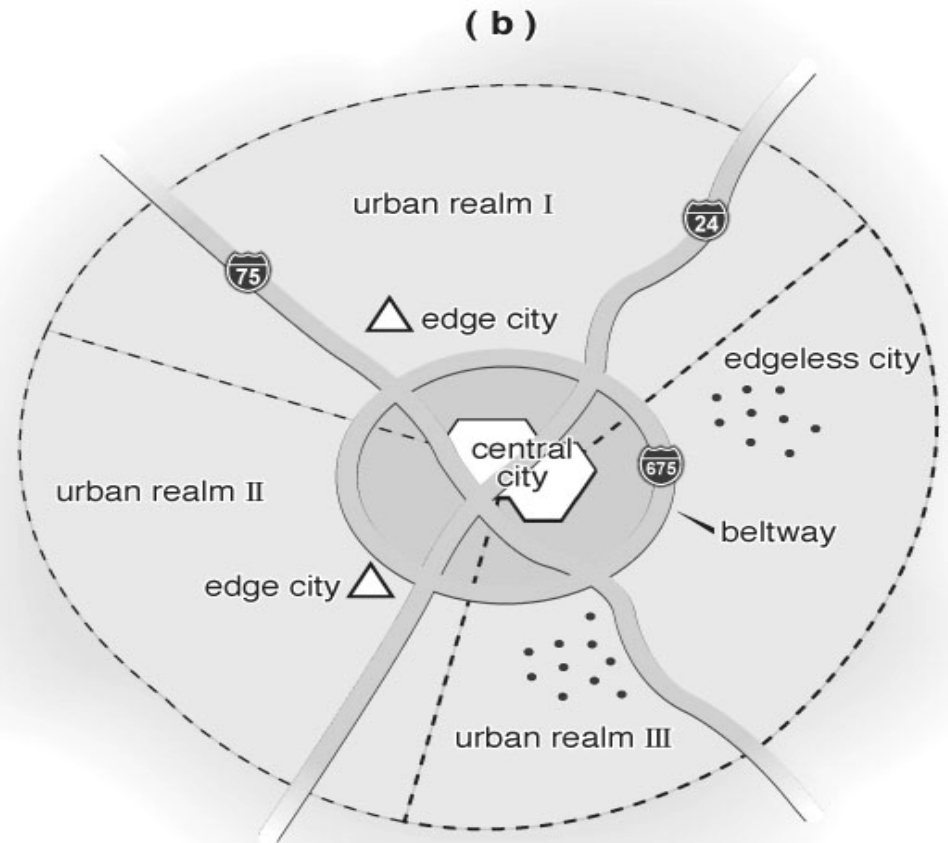
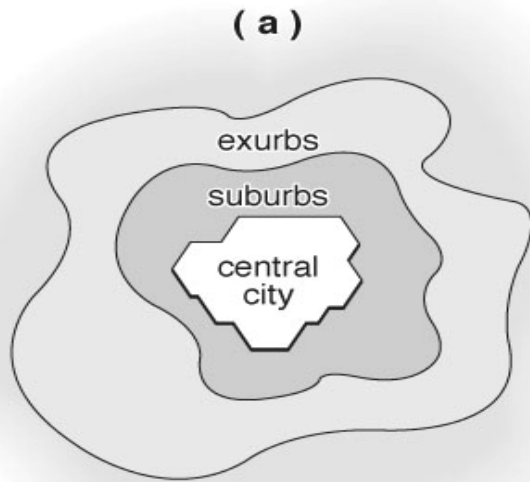


SHARE OF TOTAL GROWTH BY REGION, 2000–2030

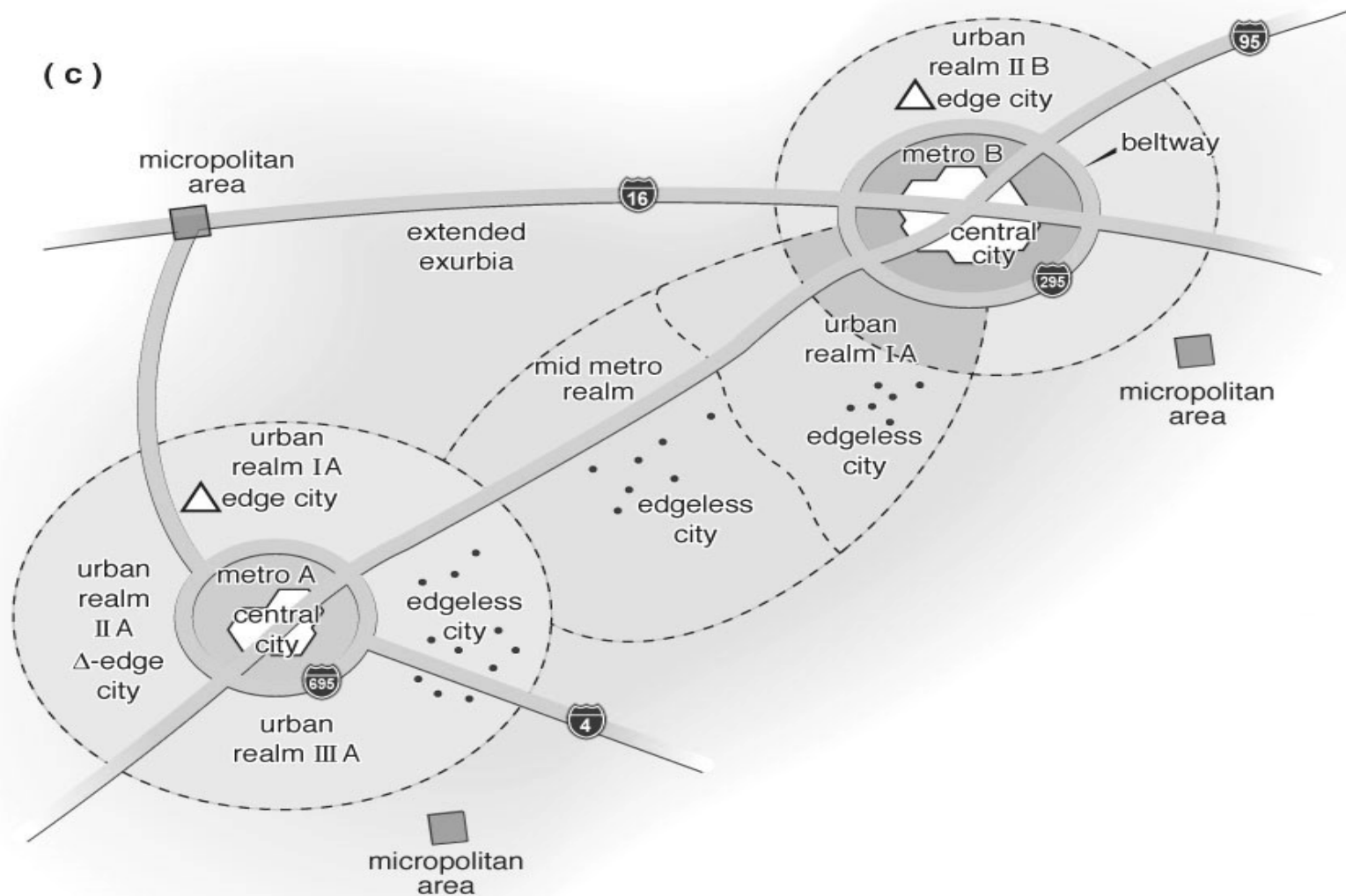


-  **MIDWEST: 8.2 %**
-  **NORTHEAST: 6.5 %**
-  **SOUTH: 56 %**
-  **WEST: 29.4 %**

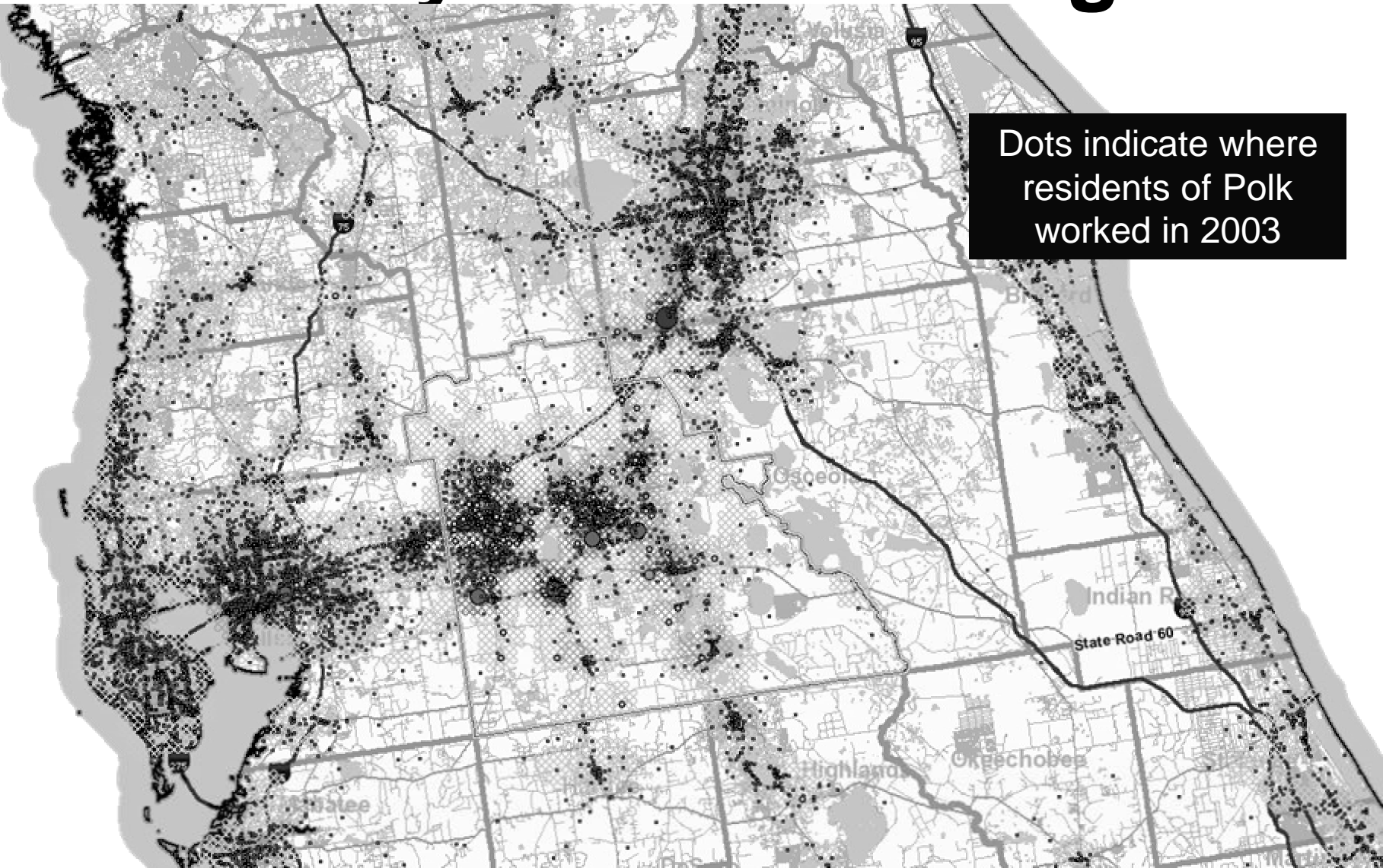
20th Century Metropolitan Form



21st Century Megapolitan Form

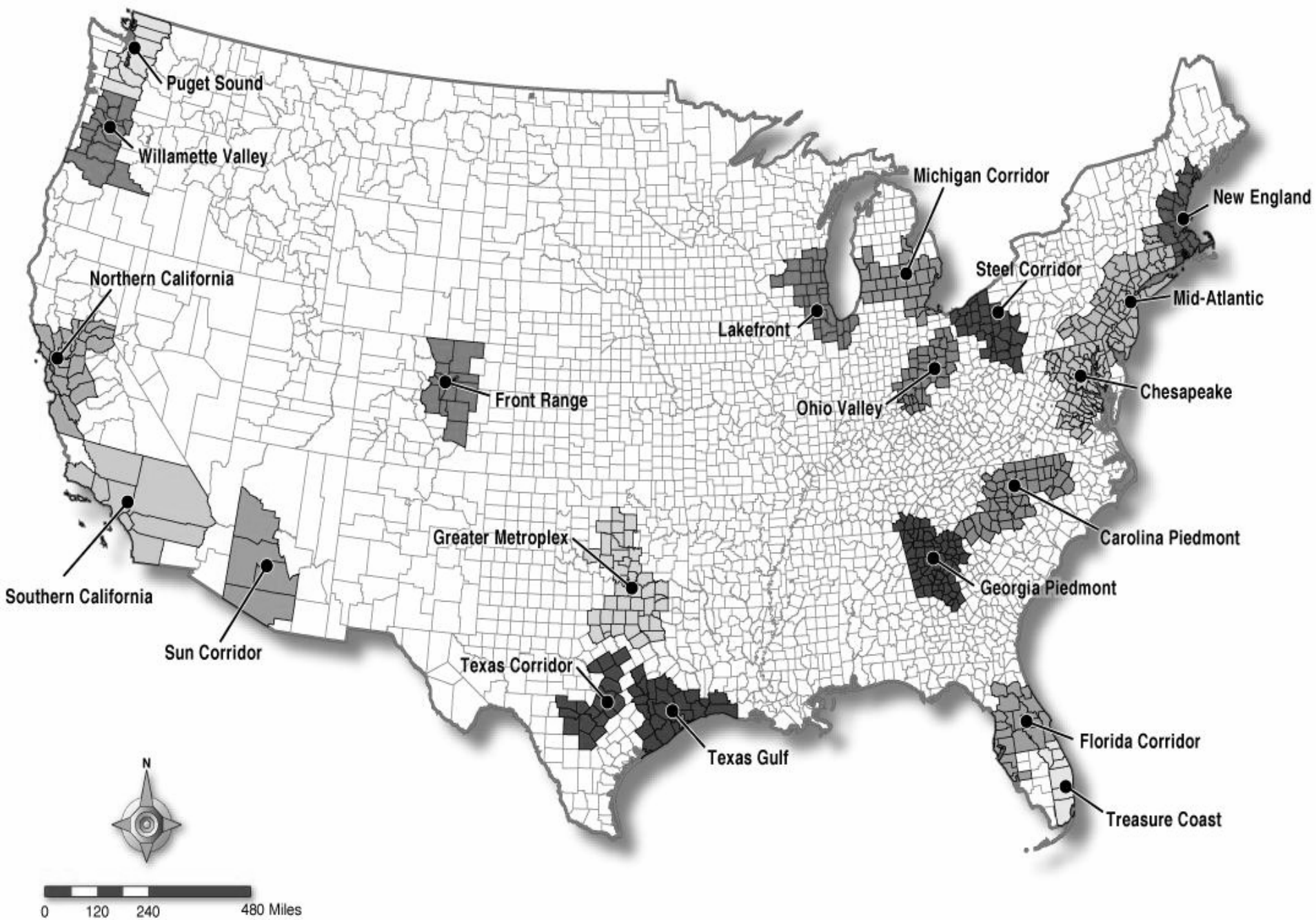


Polk County FL Commuting Shed



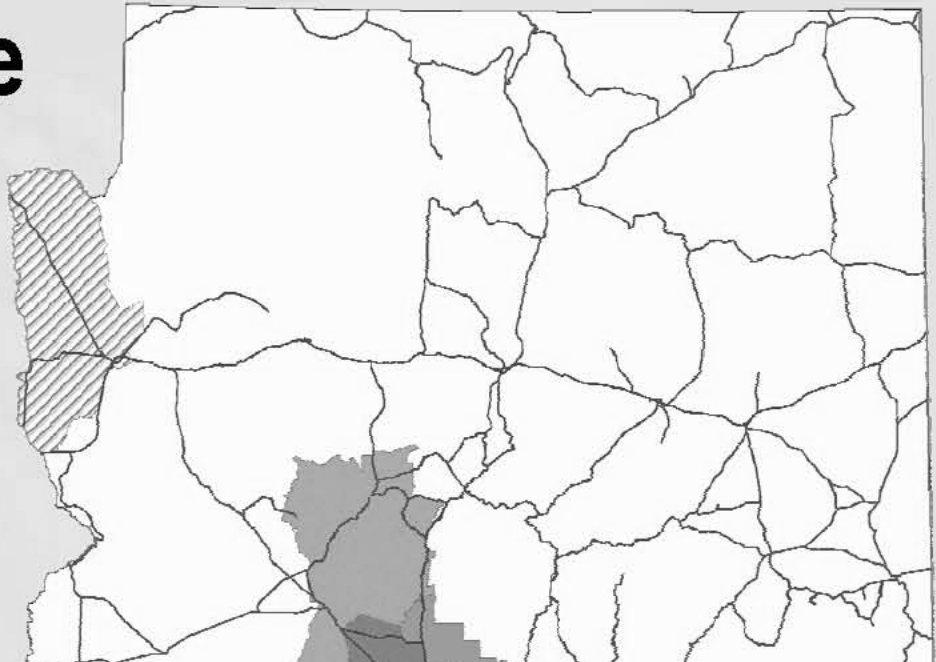
Dots indicate where
residents of Polk
worked in 2003

Source: Dwayne Guthrie, Metropolitan Institute at Virginia Tech, *based on Longitudinal Employer-Household Dynamics*, US Census Bureau.



Realms of the Sun Corridor

Highlands
West Valley
Central Valley



Upper East Valley
East Valley
Mid Corridor
Foxhills
Tucson Valley
Gateway
Southco





Getting Ahead of the Curve

US	2000	2040
Population	281 million	433 million
Housing Units	116 million	178 million
Jobs	166 million	249 million

Source: Arthur C. Nelson, Metropolitan Institute at Virginia Tech



Residential Development

US	2000 to 2040
Growth-Related Units	50 million
Replaced Units	39 million*
Total Units	89 million

****Loss rate = ~ 6% per decade compounded.***



Nonresidential Development

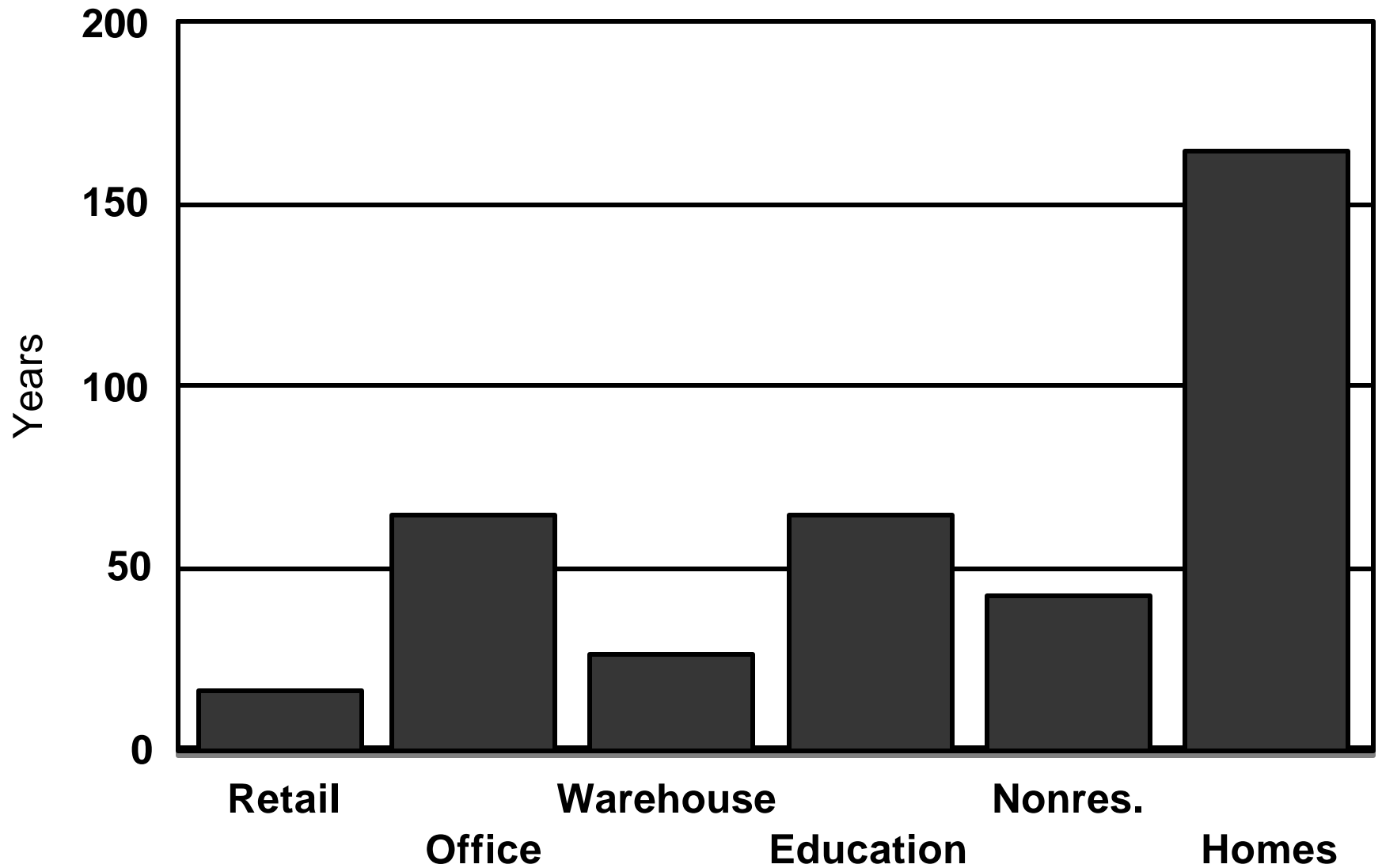
US

2000 to 2040

Growth-Related Square Feet	33 billion
Replaced Square Feet	94 billion*
Total Square Feet	127 billion

****Loss rate = ~ 24% per decade compounded.***

Life-Span of Building Space





What About?

- Telecommuting?
- Internet retailing?
- Emerging technologies?

And their effect on future space needs?



Telecommuting Promises

- Higher productivity
- Reduce traffic congestion
- Reduce air pollution

Telecommuting Reality

- Cabin fever reduces productivity
- Cabin fever increases trips in am, noon, pm.
- Cabin fever increases peak emissions with “cold” starts.
- Census “work at home” telecommuting indicator:

1990 = 3.0%

2000 = 3.3%

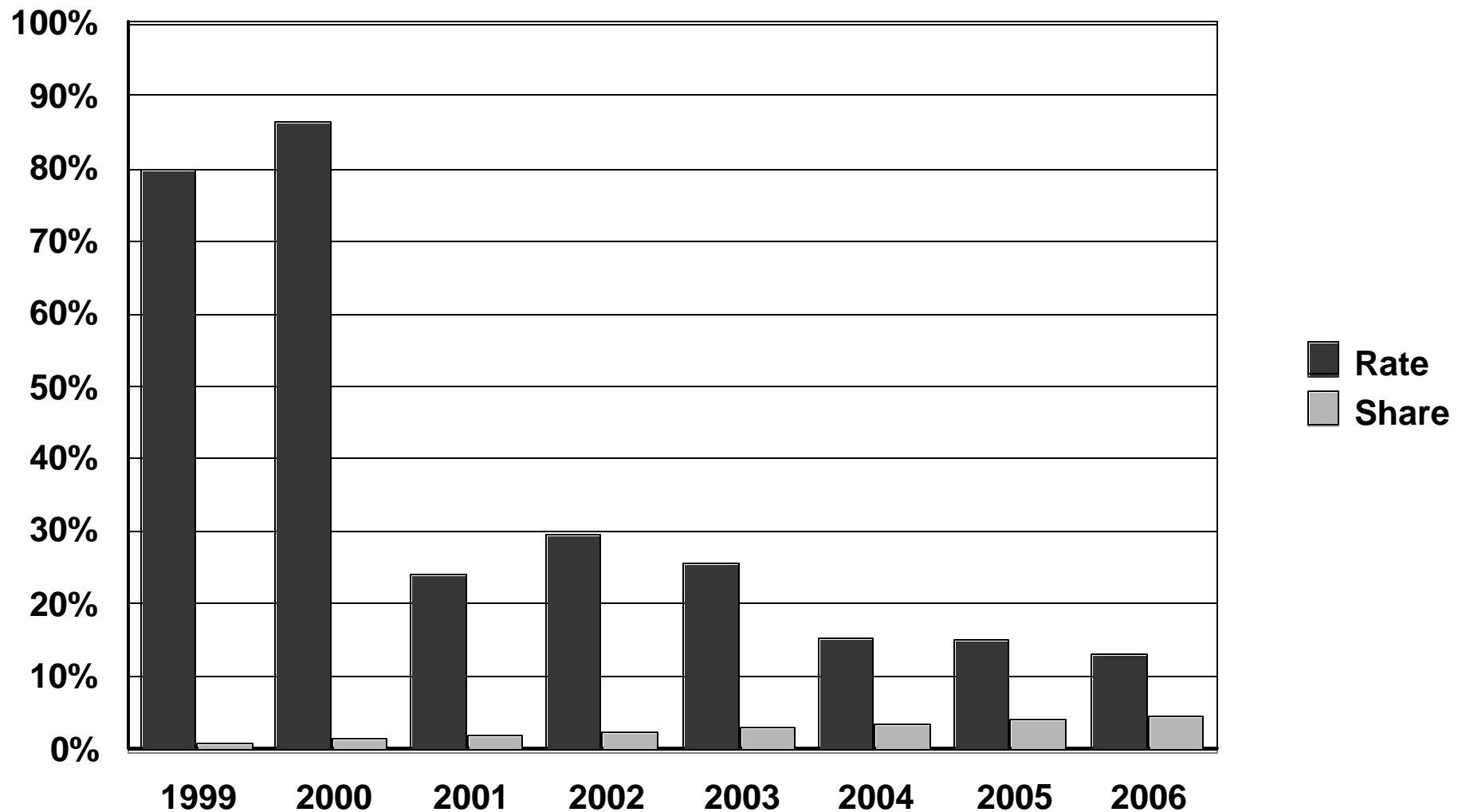


Internet Retail Sales Growth Rate and Share Figures, 1998-2006

<u>Year</u>	<u>Share</u>
1998	0.46%
1999	0.83%
2000	1.54%
2001	1.92%
2002	2.48%
2003	3.11%
2004	3.59%
2005	4.14%
2006	4.69%

Source: Dept. of Commerce; analysis by Arthur C. Nelson

Internet Retail Sales Growth Rate and Share, 1998-2006





Retail Center Space Growth

<u>Year</u>	<u>GLA/Cap</u>
1986	14.7
1990	17.6
1995	18.9
2000	20.3
2005	20.5

Source: Compiled by Arthur A. Nelson, Metropolitan Institute, from National Research Bureau Shopping Center Database, CoStar Subsidiary.



Reality Check

<u>Space Class</u>	<u>1992</u>	<u>2003</u>	<u>%Dif</u>
Total <i>Glamour</i> Space	145	149	+3%
Warehouse & Storage	45	35	-23%
All Other	75	63	-16%

Non-percentage figures per capita based on Census estimates.

Source: Energy Information Administration, *Commercial Buildings Energy Consumption Surveys* for 1992 and 2003.



Bottom Line

New Construction 2000-2040

Construction

<i>Residential</i>	\$24 Trillion
<i>Nonresidential</i>	\$22 Trillion
<i>Infrastructure</i>	\$ 9 Trillion
<i>Total</i>	\$55 Trillion



How Does It Grow?



What is the Resale Market Telling Us?

- ▶ **Resale price analysis better than new sale analysis as it strips out the “sizzle”.**
- ▶ **Resale prices of condominiums are approaching resale prices of single-family homes for first time ever**
- ▶ **Appreciation of condominiums is higher than single-family homes nationally and every region**



Emerging Resale Price Evidence Trends 2006-2007

<u>Region</u>	<u>SF%</u>	<u>CC%</u>
US	-1.2%	1.9%
NE	2.4%	2.9%
MW	-3.2%	4.2%
S	-2.1%	0.8%
W	-1.5%	0.0%

SF includes detached and townhouse units. CC includes condominium and cooperative units.

Source: Adapted from National Association of Realtors, March 2008, by Arthur C. Nelson, Metropolitan Institute at Virginia Tech.



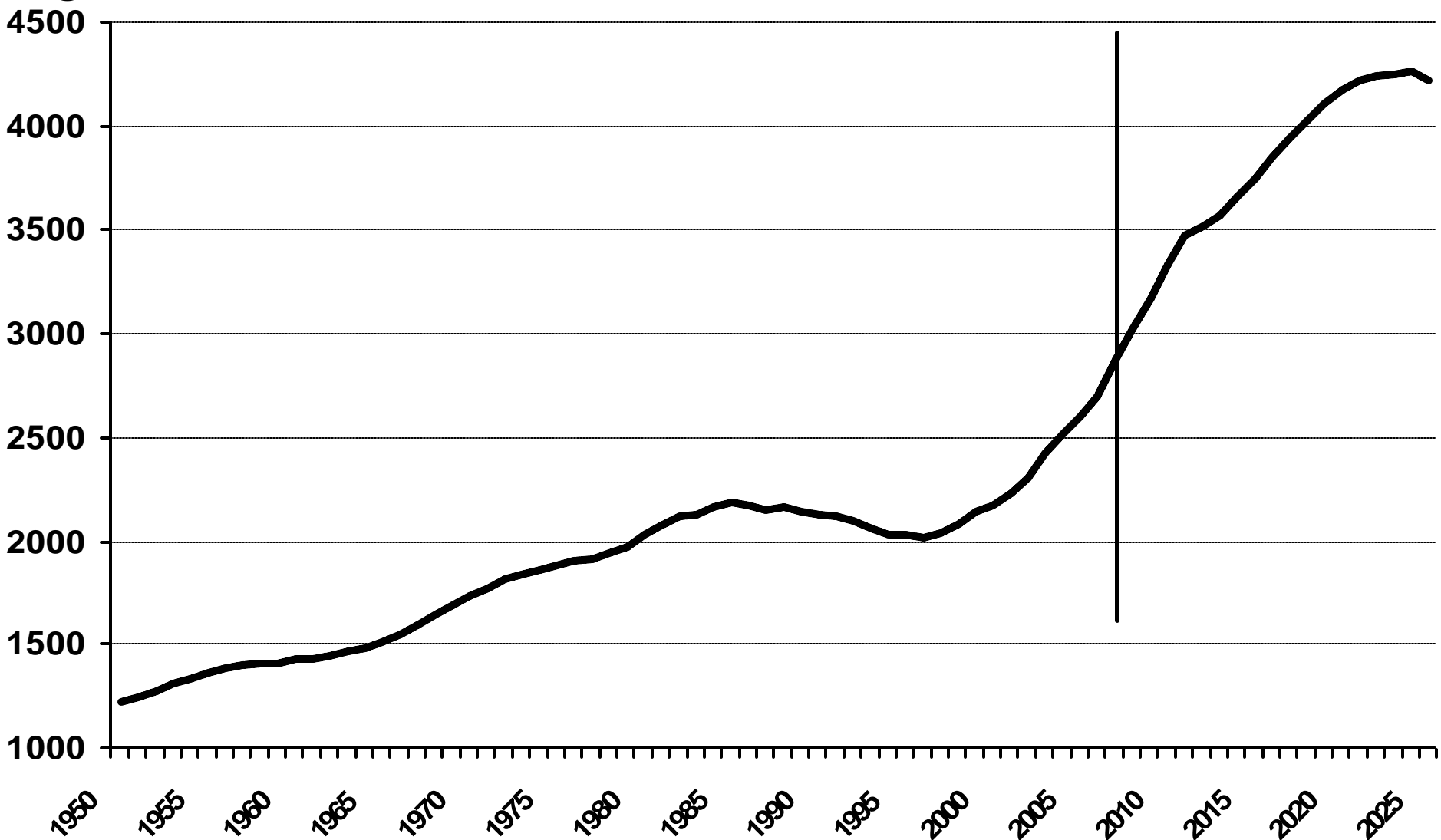
“Traditional” Households on the Wane

<u>Household Type</u>	1960	2000	2040
HH with Children	48%	33%	27%
Single-Person HH	13%	27%	30%

Source: Census calculations by Arthur C. Nelson, Metropolitan Institute at Virginia Tech.

People Turning 65 *Each Year*

[Figures in 000s]



Source: US Census Bureau – 65+ in the United States: 2005; Wan He, Manisha Sengupta, Victoria A. Velkoff, & Kimberly A DeBarros. December 2005.



Share of Growth 2000-2030

<u>HH Type</u>	<u>Share of Growth</u>
With children	13%
Without children	87%
Single-person	38%

Figures in millions of households.

Source: Adapted and extrapolated from Martha Farnsworth Riche, How Changes in the Nation's Age and Household Structure Will Reshape Housing Demand in the 21st Century, HUD (2003).



What Futurists Tell Us

Bio-medical advances extend lifetimes.

Insurance actuarial tables extend to 120.

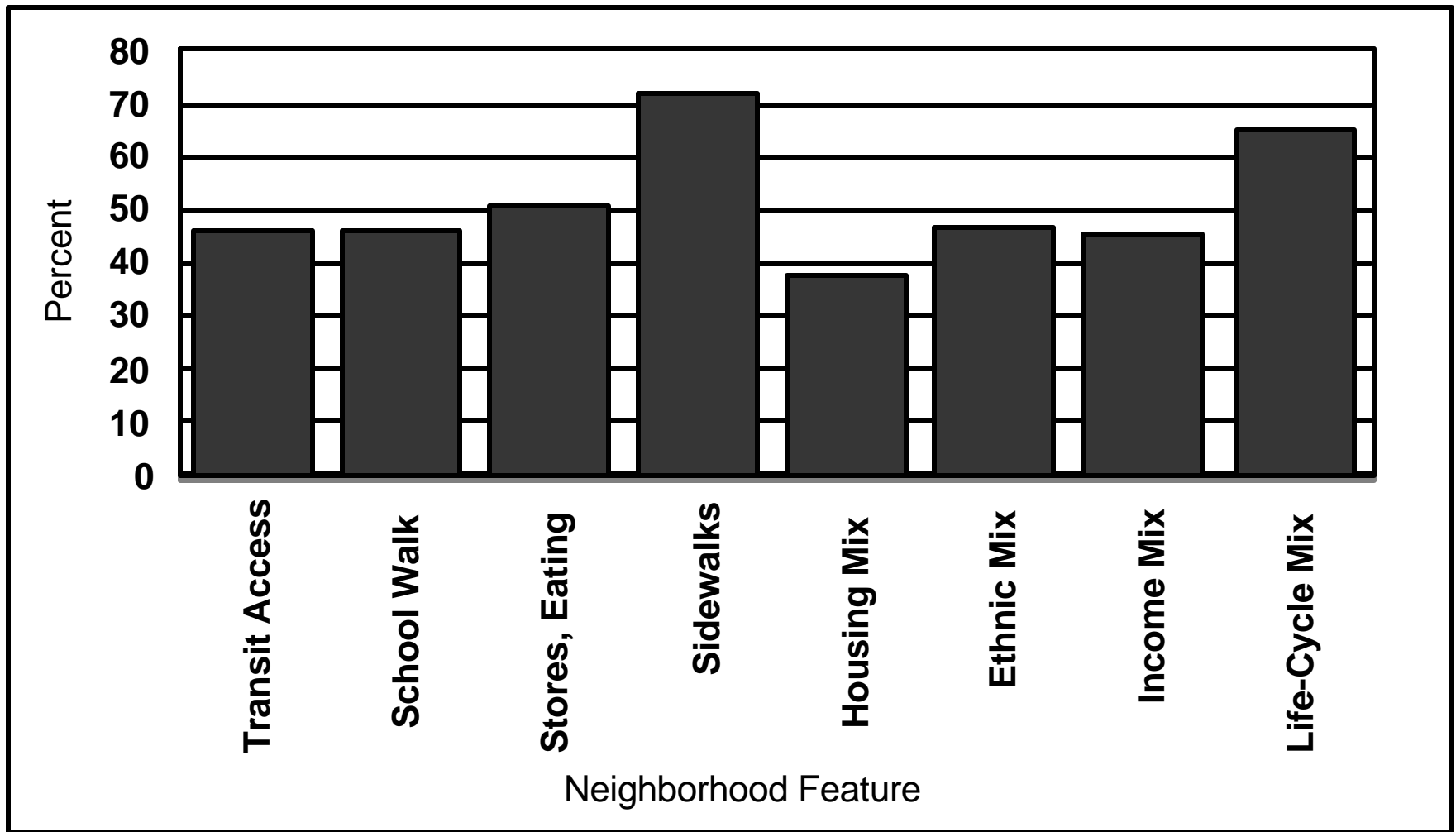
Another 20 years added – minimum →

Census says 76 to 96

Adulthood nearing 75% without child-rearing

Gen-X & -Y making “family” location decisions differently from their parents

Neighborhood Feature Preferences



Source: National Association of Realtors, American Preference Survey 2004.



Unmet *Walkable* Demand

Residential Form	Boston	Atlanta
% want drivable suburbs	30%	41%
% of those who have	85%	95%
% want walkable suburbs	40%	29%
% of those who have	70%	35%

Source: Jonathan Levine, *Zoned Out*, Resources for the Future, 2006.



Unmet Smart Growth Demand

One-third of households want smart growth^a
165M households in 2040 @ 33% = demand for
55M smart growth homes

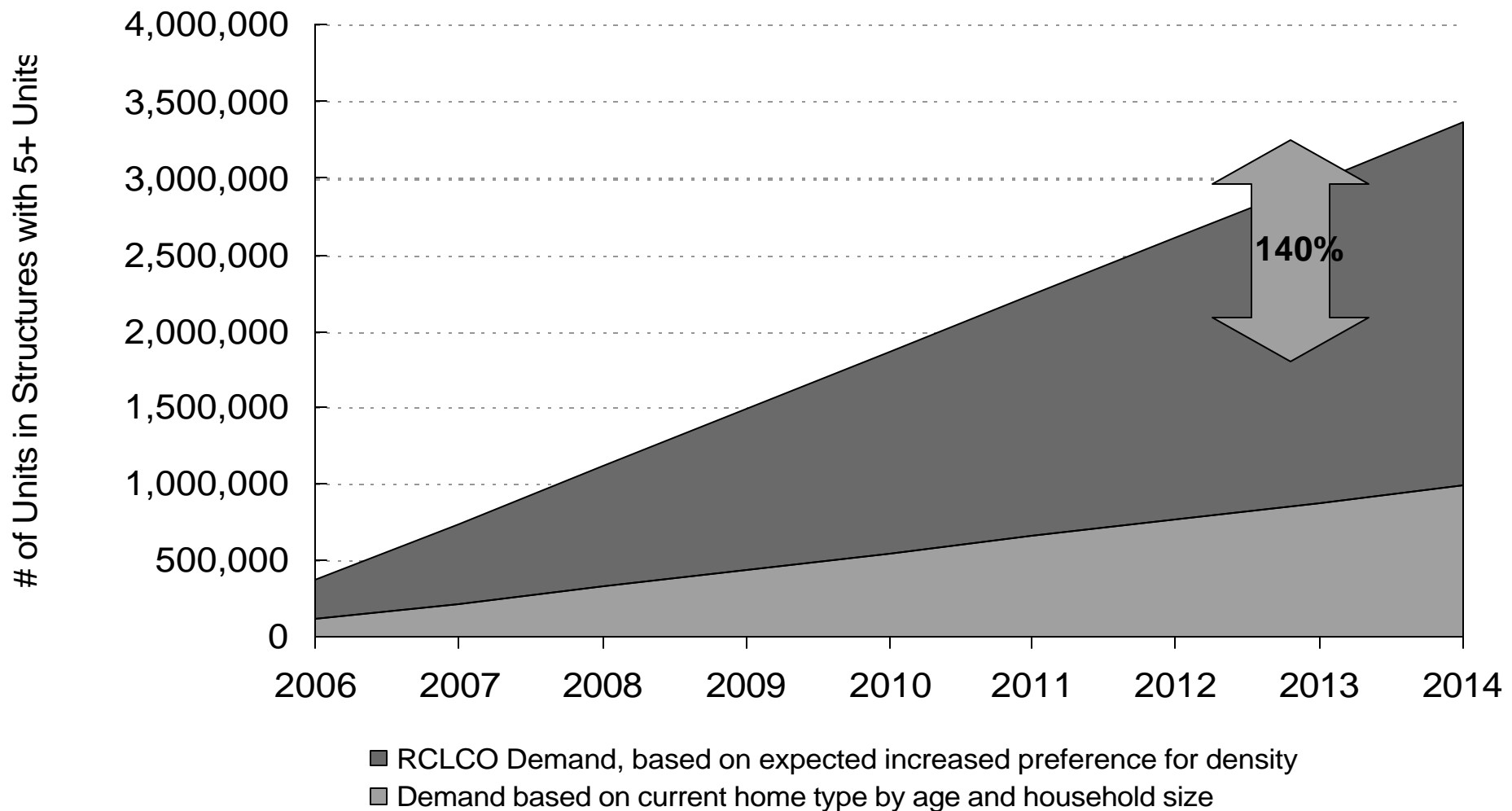
New housing demand 2000-2040 = 50M units

Even if all new residential units were “smart
growth” the new supply would fail to meet
demand.

Next 100 million = the 33% who want smart
growth now.

^aGregg Logan, EPA Large-Production Builders Conference, January 31, 2007.

Demographic Shift + Preference Shift = Higher Demand for Density





Retired Location Preference

In a city 14%

In a suburb close to a city 37%

Total “urban” 51%

In a suburb away from a city 19%

In a rural community 30%

Suburbs away from cities are the losers

Source: National Association of Realtors & Smart Growth America,
American Preference Survey 2004.



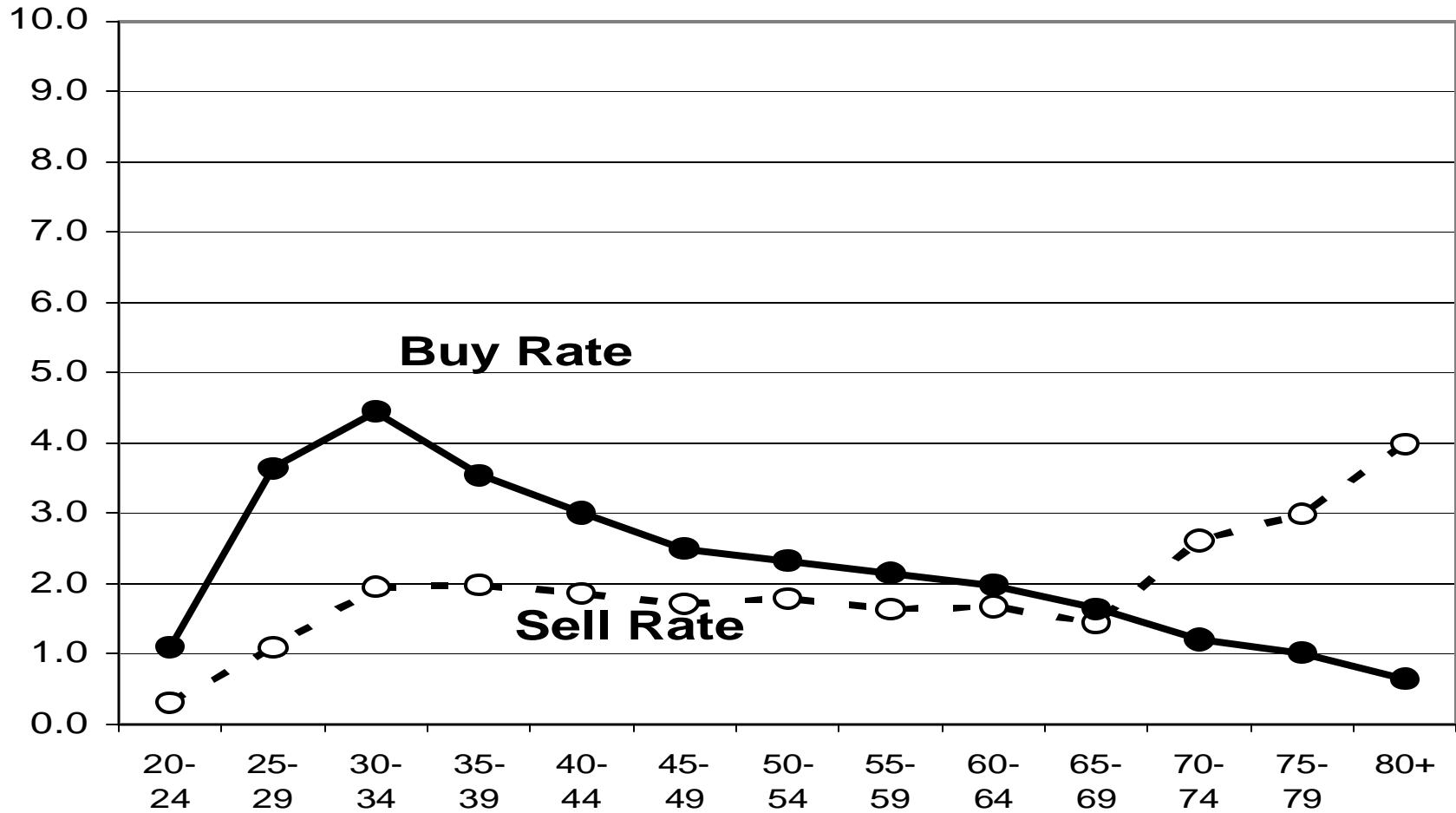
Housing Type Choices of Seniors

<u>Housing Type</u>	<u>All Seniors</u>	<u>Senior Movers</u>
Detached	69%	35%
Attached	24%	54%
Owner	80%	41%

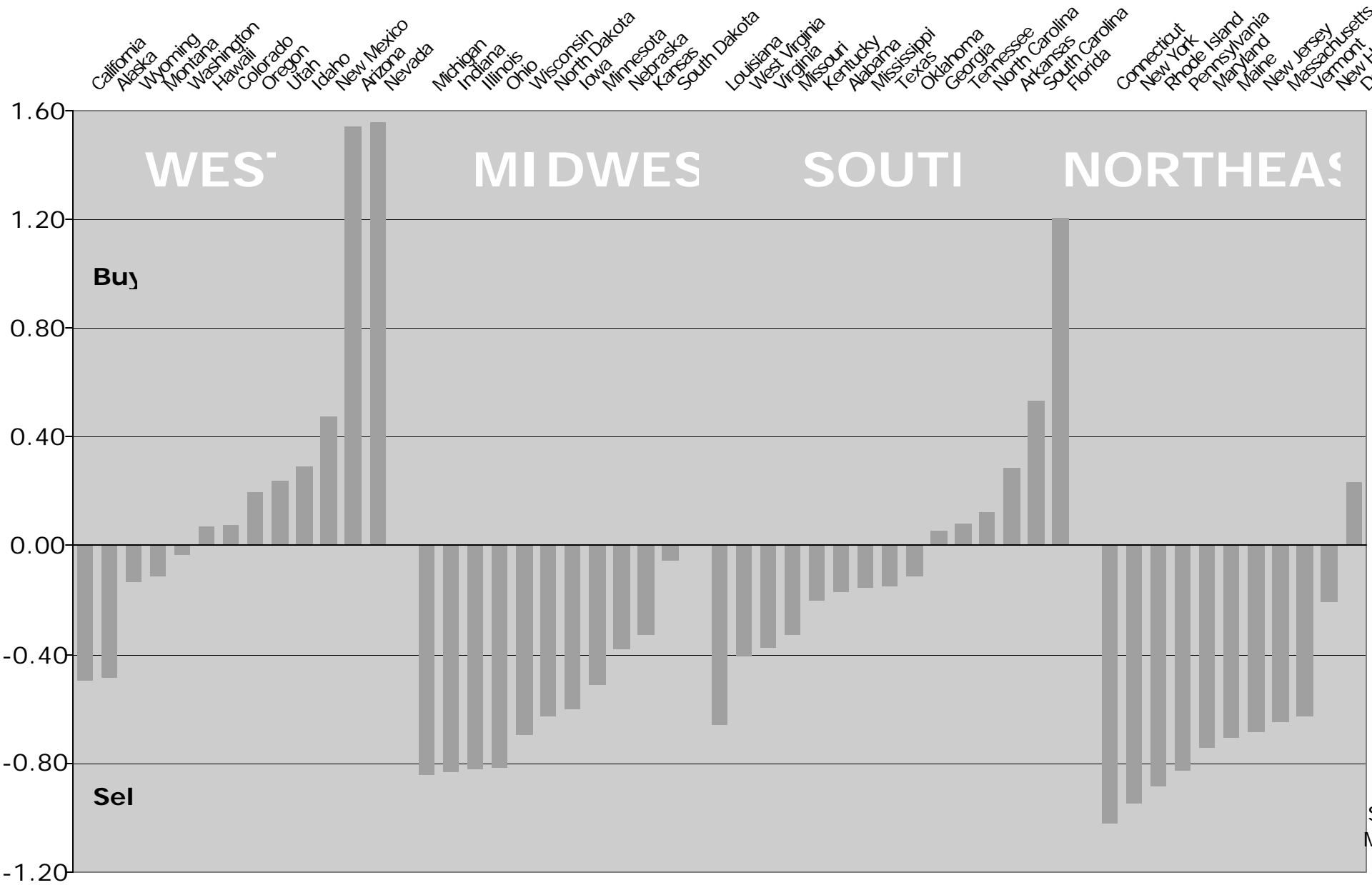
Source: American Housing Survey 2003. New movers means moved in past year. Annual senior movers are about 5% of all senior households; 75%+ of all senior will change housing type between ages 65 and 80.

Buy-Sell Rates by Age Cohort

AHS



Source: Dowell Myers, Univ, of Southern Cal., testing Nelson (2006) hypothesis.



Dowell Myers & SungHo Ryu, "Aging Baby Boomers and the Generational Housing Bubble: Foresight and Mitigation of an Epic Transition", *Journal of the American Planning Association* 74(1): 1-17 (2007). Figures for net buying or selling rate age.

Housing Preference Surveys by Type, 1995-2004

<u>Unit Type</u>	<u>Share</u>
Attached	38%
<i>Apartments</i>	14%
<i>Condos, Coops</i>	9%*
<i>Townhouses</i>	15%
Detached	62%
<i>Small Lot (<7,000 sf)</i>	37%
<i>Large Lot (>7,000 sf)</i>	25%

Source: **Low range** of surveys reviewed by Arthur C. Nelson, "Planning for a New Era," *Journal of the American Planning Association*, Fall 2006.

*Toll Brothers shifting product mix to 15% condominium; *WSJ* 12/06.



Trend Demand 2005 - 2040

50% Attached (apartment, TH, condo, etc.)

30% Detached small/cluster/zero-lot

20% Conventional large-lot subdivision

80% = Traditional Urban Density

Even in Plano, Texas



Home Ownership Bias Can Backfire

Headlines →

Buffalo “most affordable” metro in 2004. But ...

Median Home Value in 1991 = \$123,000

Median Home Value in 2005 = \$ 85,000

Change, 2005 Dollars = -\$ 38,000

Rate of Return Over Period = -31%

Source: Adapted from National Association of Home Builders, 2006. All figures in 2005 dollars.



Home Ownership Bias Can Backfire

Headlines →

Indianapolis “most affordable” metro in 2005.

But ...

Median Home Value in 1991 = \$143,000

Median Home Value in 2005 = \$125,000

Change, 2005 Dollars = -\$ 20,000

Rate of Return Over Period = -13%

Source: Adapted from National Association of Home Builders, 2006. All figures in 2005 dollars.

Second-Home Market Overrated?

- Only 4% of HH have second homes
- 70% of second home owners aged 35-64
- Detached new second home demand:

1990s = 900k

2000s = 600k

2010s = 300k

2020s = 200k

2030s = 100k

Source: Estimated by Arthur C. Nelson, Metropolitan Institute at Virginia Tech, from *American Housing Survey* and *Second Homes: What, How Many, Who and Where?* Harvard Joint Center for Housing (2001).

Large-Lot Oversupply 2030

Unit Type	Supply 2005	Preference Change	Mid-Point Change
Attached	39M	15M	13M
Small Lot	12M	40M	22M
Large Lot	58M	- 23M	- 3M

Large lots subdivided, redeveloped = 7M.

Figures in millions of units.

Preference change based on low-range of preference survey averages.

Mid-point is mid-percentage distribution between 2005 and low-range estimate of preference surveys and supply of occupied units in 2005.

Houston Housing Market Based on Demographic Trends, 2000-40

<u>Unit Type</u>	Supply	Demand in 2040		
	2000	Total	Change	Percent
Attached	370k	720k	350k	95%
Small Lot*	210k	360k	150k	70%
Large Lot**	200k	120k	-80k	-40%
Totals	780k	1.2M	420k	55%

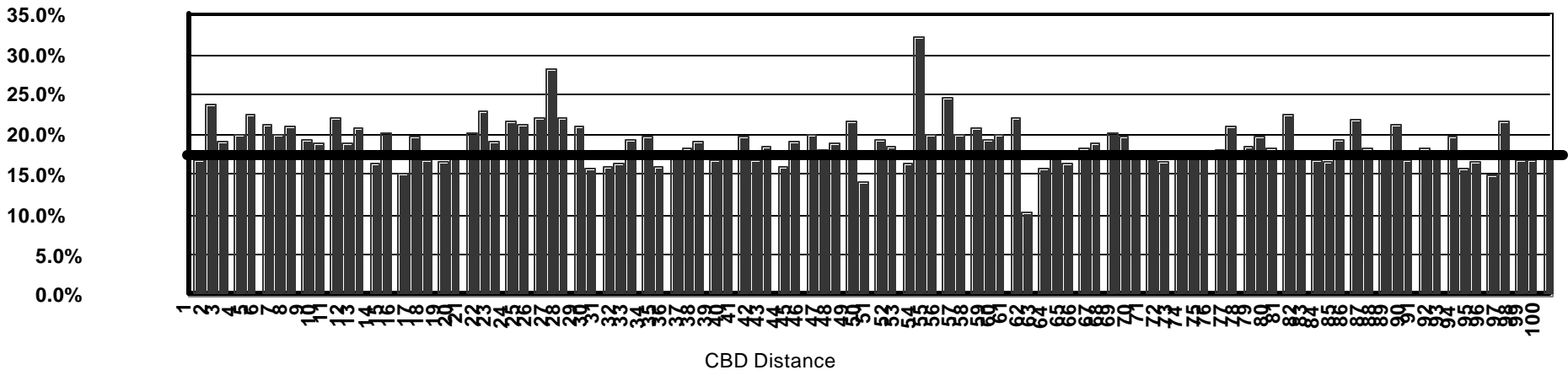
*"Small lot" <7k square feet; estimate from American Housing Survey 1998.

** ***Up to 70k "large lot" homes may be subdivided, redeveloped.***

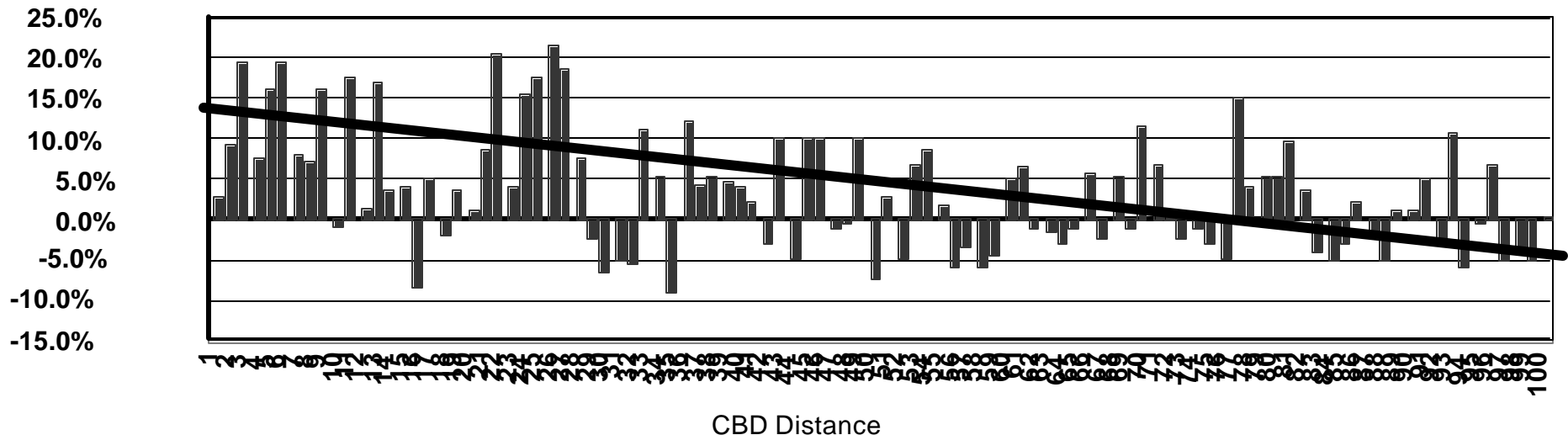
Source: Arthur C. Nelson, Metropolitan Institute at Virginia Tech.

Phoenix Appreciation

Average Annual Appreciation 2004-2006



Appreciation 2006-07



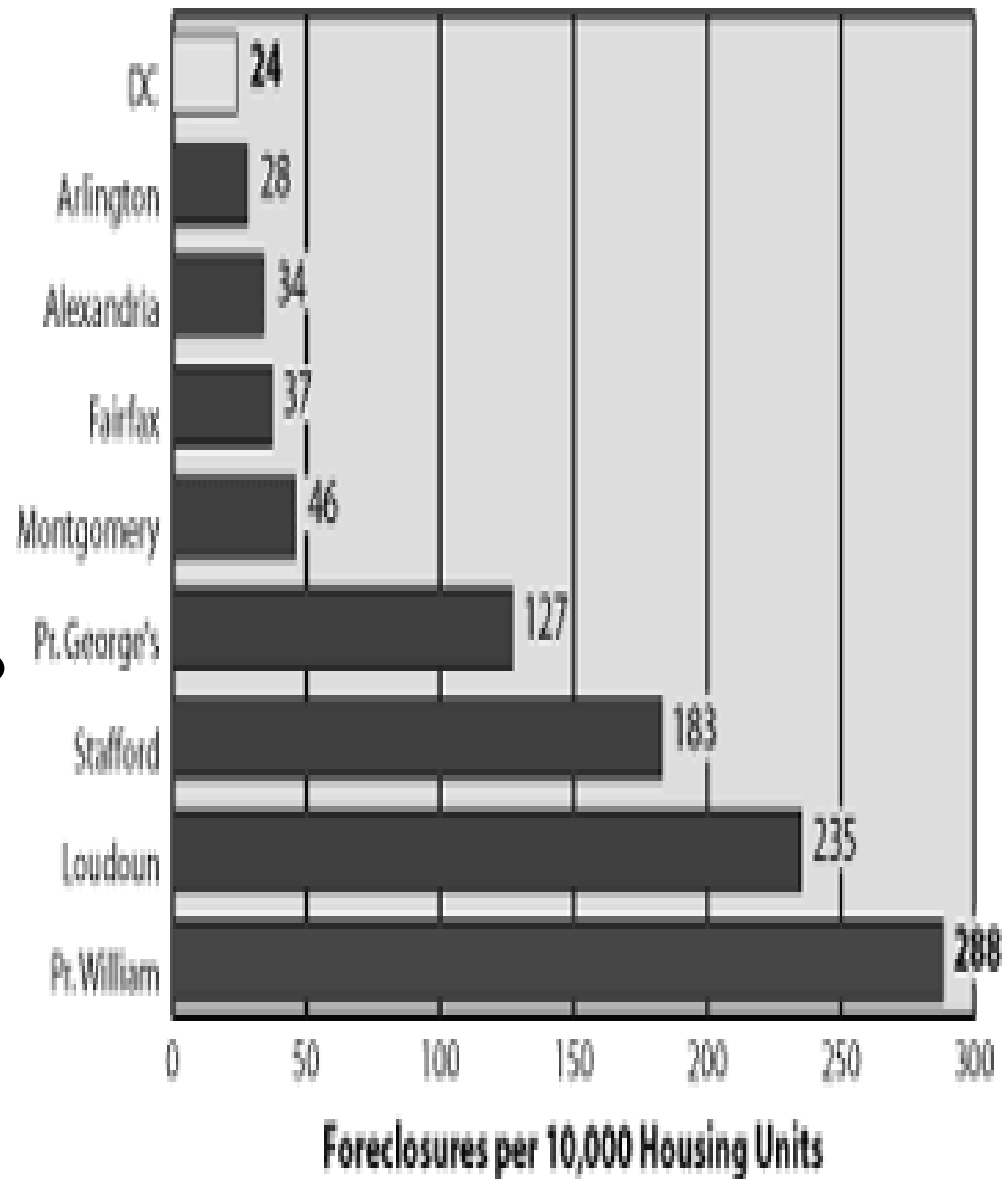
Source: Arthur C. Nelson, Metropolitan Institute based in Zillow analysis by Ceylan Oner.

DC Metro Foreclosures

4th Q 2007

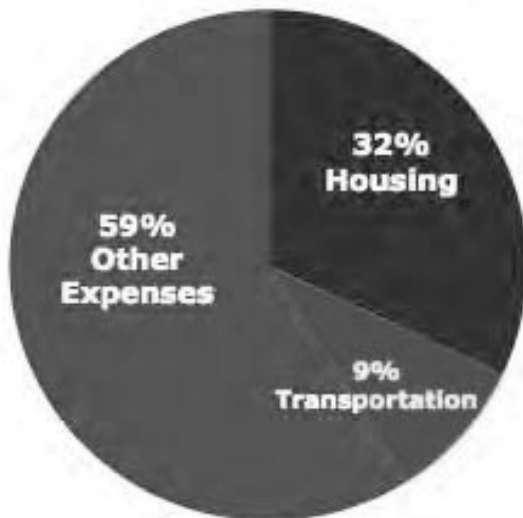
Reasons?

- Subprime meltdown?
- Over construction?
- Suburban devaluation?
- “Highway robbery?”



Highway Robbery

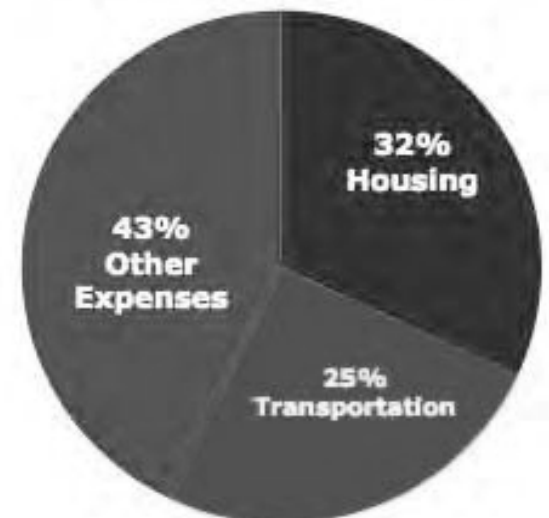
Transit Rich
Neighborhood



Average American
Family

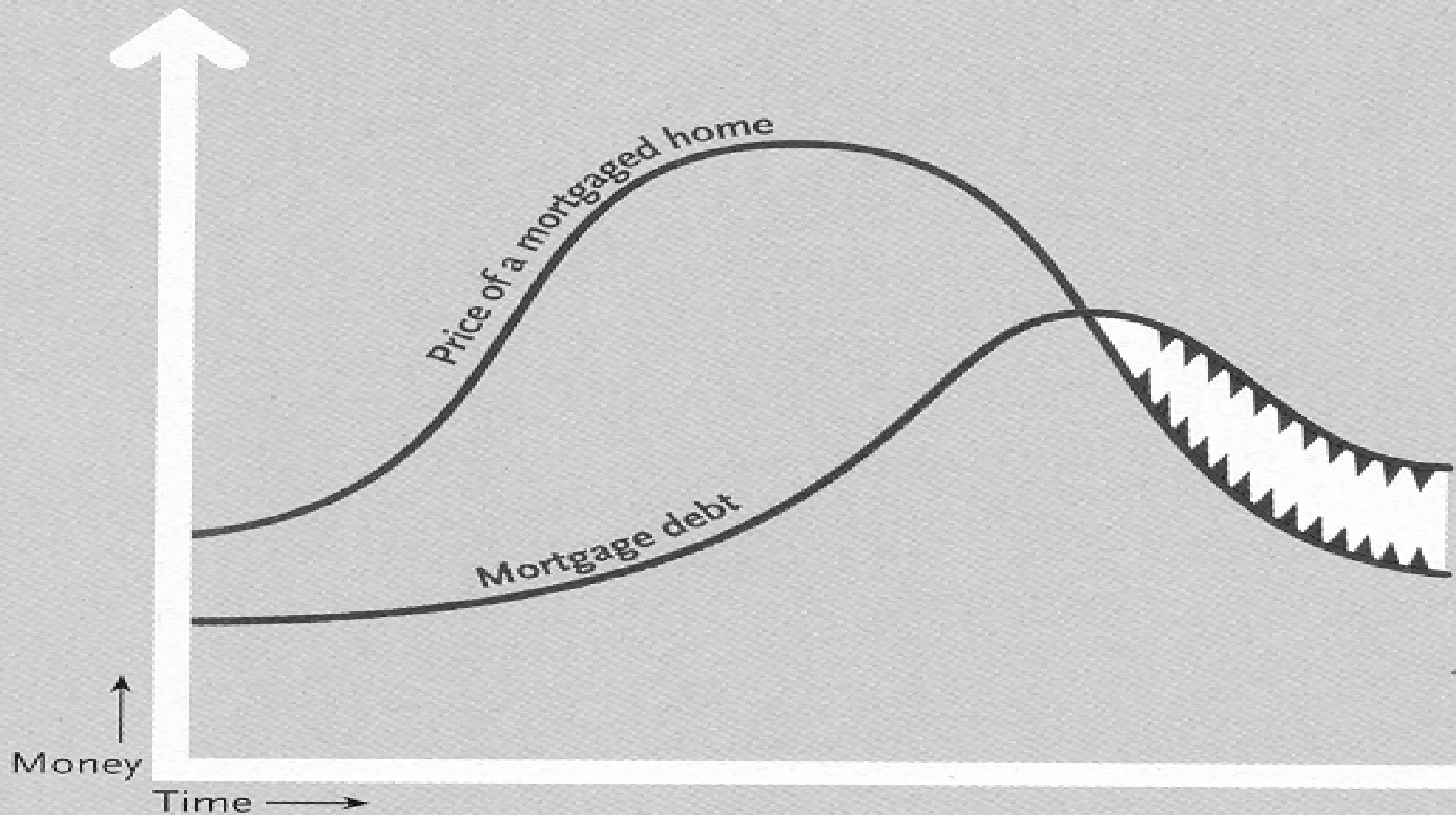


Auto Dependent
Neighborhood



Source: Center for TOD Housing + Transportation Affordability Index, 2004 Bureau of Labor Statistics

Fringe/Exurban Mortgage Time Bomb?



Source: Michael Hudson, "The New Road to Serfdom." *Harpers* (May 2006), p. 46. This graph depicts the total mortgage market as viewed by Hudson.



Housing Challenges

- Long-term mismatch of short-term housing production
- Growing demand for housing accessible to transit but transit supply is lagging
- Large-lot homes may soon not be worth their mortgages
- Detached second home falling every decade
- Inducing home-ownership is already harming millions



The New Promise Land?



Tear Up a Parking Lot, Rebuild Paradise

Large, flat and well drained

Major infrastructure in place

4+ lane highway frontage → “transit-ready”

“*Kelo*” problems avoided

Committed to commercial/mixed use

Can turn NIMBYs into YIMBYs

Slide title phrase adapted from Joni Mitchell, *Big Yellow Taxi*, refrain: “Pave over paradise, put up a parking lot.”





Re-Building Capacity

Calculation	Result
“Ripe” Redevelopment Acres by 2040	6.0M
Percent Assumed Redeveloped	25%
Redeveloped Acres	1.5M
15-25 dwellings @ 1,800sq.ft.	
30-50 jobs @ 500sq.ft.	1.5FAR
Percent Residential Absorption	min. 67%
Percent Employment Absorption	min. 75%



Houston Parking Lot Opportunity

Calculation	Result
Estimated Low Intensity Acres ($FAR < 0.25$)	40,000
Assumed Percent Redeveloped	25%
Redeveloped Acres	10,000
25-35 du/ac @ 1,500sq.ft.	
30-50 jobs/ac @ 500sq.ft.	1.5FAR
<i>(3-4 floor, no parking decks, "smart" parking)</i>	
Residential Growth Absorption	<i>Min.75%</i>
Employment Growth Absorption	<i>Min.50%</i>



Actions Needed

- Systematically evaluate existing low-intensity commercial areas for their conversion ripeness time-frame.
- Assess redevelopment parameters, needs.
- Evaluate feasibility of creating transit corridors out of existing commercial highways.
- Engage stakeholders now; create “sector” and “form-based code” plans.
- Explore win-win financial tools to bridge rate-of-return gap.







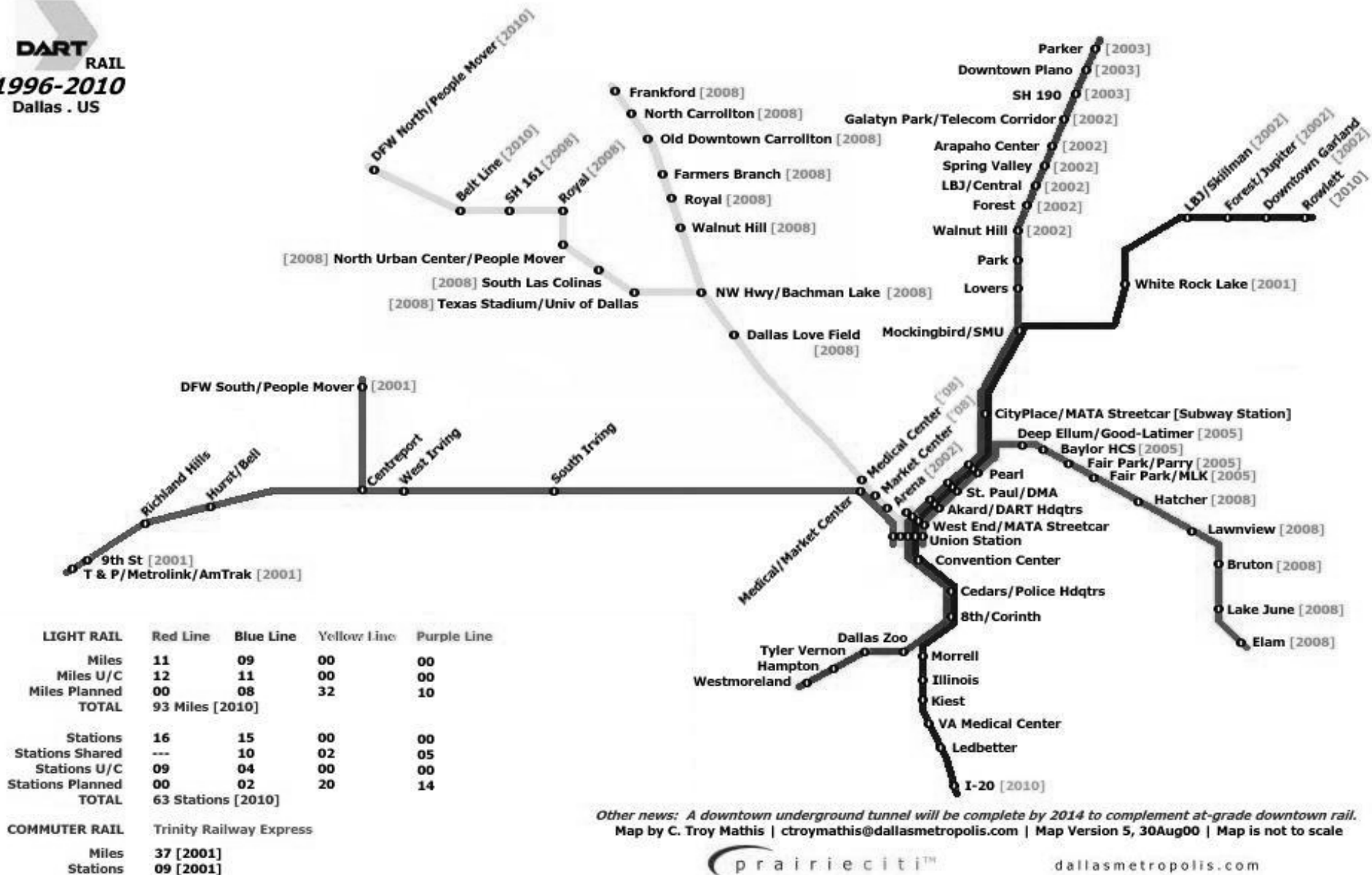
Suburban Downtown Types

	Infill Setting	Greenfield Setting
	<i>With Rail</i>	<i>With Rail</i>
<i>Small</i>	Urban Village	TOD Village
<i>Large</i>	Urban Center	TOD High Rise
	<i>Without Rail</i>	<i>Without Rail</i>
<i>Small</i>	Main Street	Lifestyle Center
<i>Large</i>	Suburban Center	New Town Center

Source: Metropolitan Institute at Virginia Tech

Dallas Area Rapid Transit

DART
RAIL
1996-2010
Dallas - US



“Downtown” Plano, TX



Portland, Oregon Metro Area Rail Transportation Expansion Past-Present-Future

Existing rail system & Extensions
(solid lines-Year opened in parenthesis)

Extensions in active planning
(dotted lines, status in parenthesis)

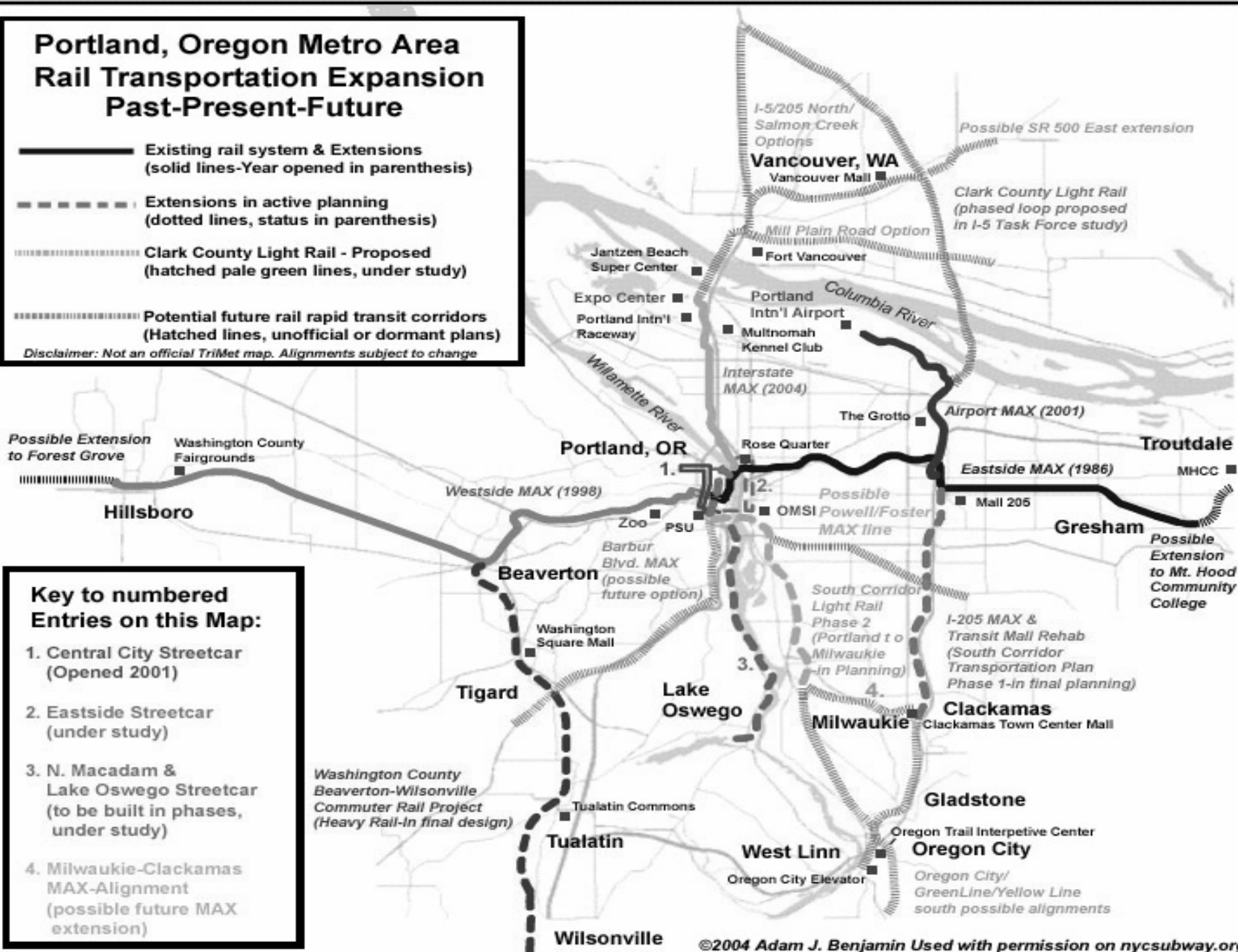
Clark County Light Rail - Proposed
(hatched pale green lines, under study)

Potential future rail rapid transit corridors
(Hatched lines, unofficial or dormant plans)

Disclaimer: Not an official TriMet map. Alignments subject to change

**Key to numbered
Entries on this Map:**

1. Central City Streetcar
(Opened 2001)
2. Eastside Streetcar
(under study)
3. N. Macadam &
Lake Oswego Streetcar
(to be built in phases,
under study)
4. Milwaukie-Clackamas
MAX-Alignment
(possible future MAX
extension)



Hillsboro, OR – “TOD Village” Orenco Station “Green Field” Project



(c)2006 Andrew Hall, PortlandBridges.com

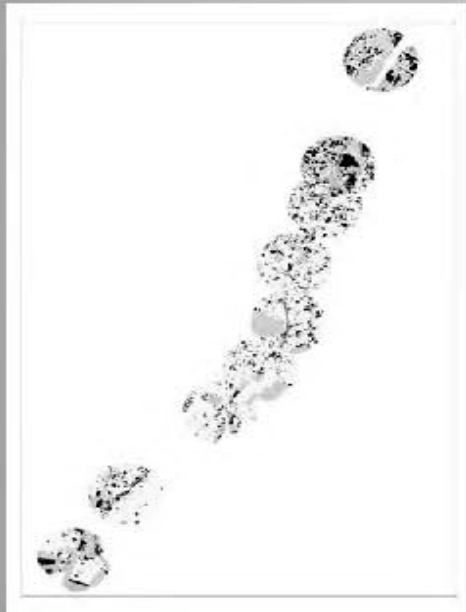
Re/Development Opportunity

Underdeveloped Parcels in ½ Mile Station Areas (BLACK)

Boston

Commuter Corridor

**Transit 1986, Future
Expansion**



Minneapolis

Destination Connector

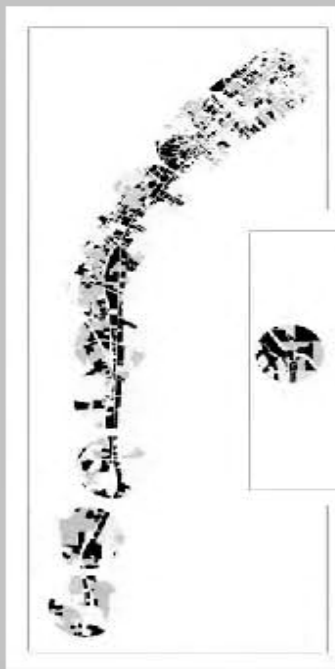
Transit 2004



Charlotte

Planned Growth Corridor

Transit 2008



Denver

Destination Connector

Transit 2012



Boston

9

Portland

38

Minneapolis

17

Charlotte

15

Denver

11

Total Stations in Corridor

**Underutilized Acreage in 1/2M
Radius of Each Station**

345 acres

N/A

542 acres

1,295 acres

1,026 acres

Acres “ripe” for redevelopment by 2040 (est)

6,000

5,500

4,000

Share of metro growth absorbed @ 3.0 FAR

35%

35%

20%

Source: Figure from Reconnecting America, Realizing the Potential: Expanding Housing Opportunities Near Transit.

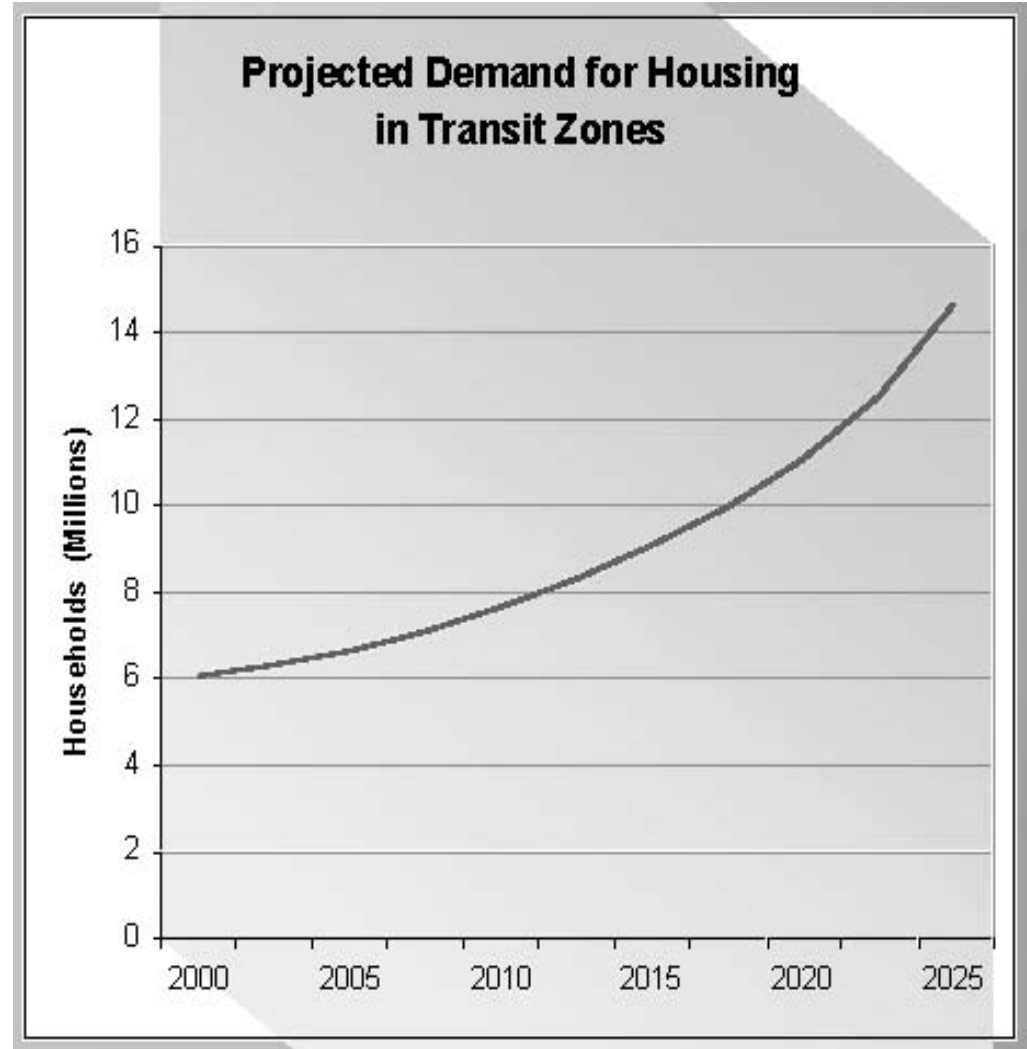
National TOD Opportunity

**Rail transit accessed
6M HH in 2000**

**By 2025 existing &
planned rail may
access 15M HH.**

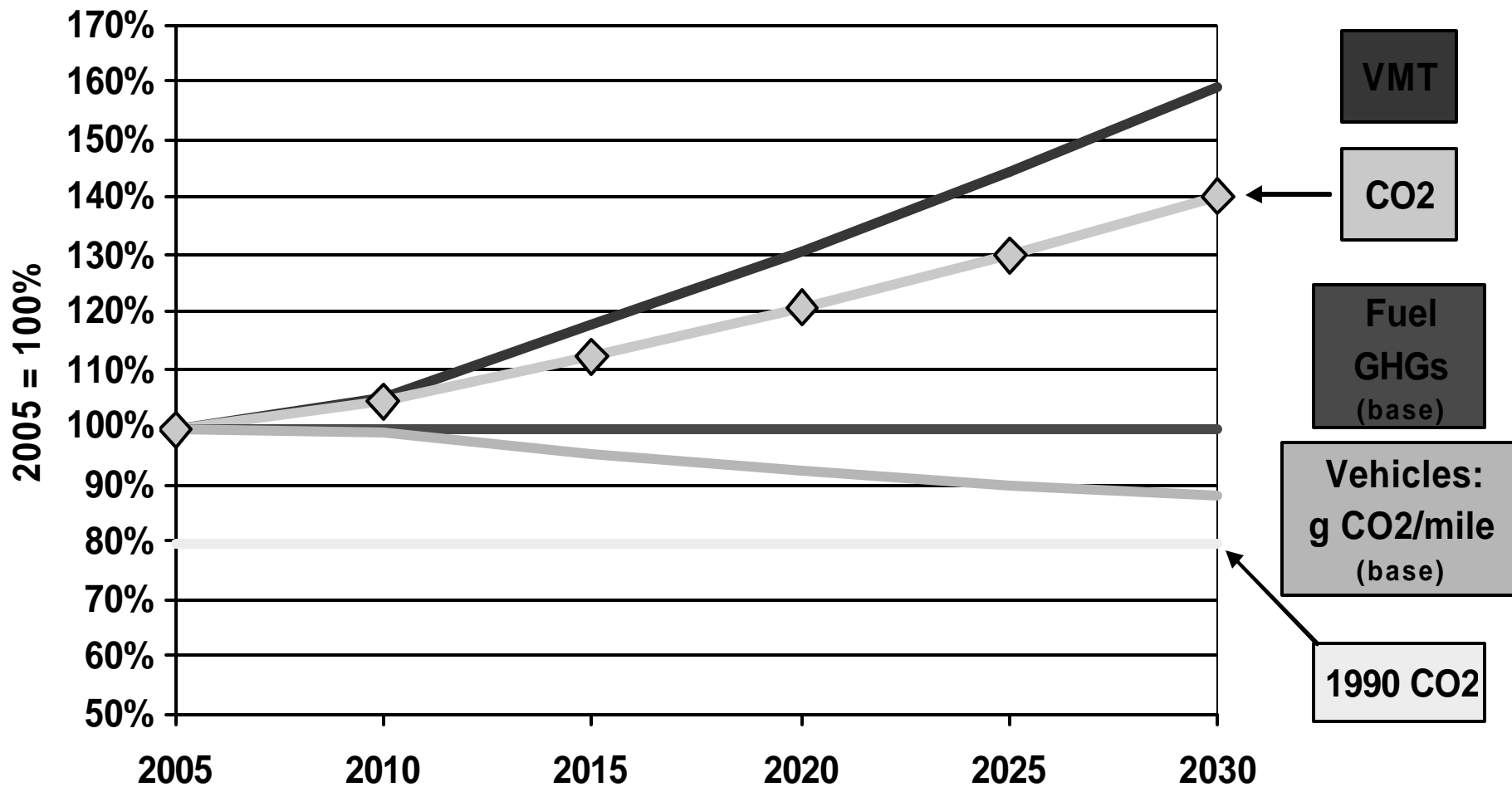
**By 2040, rail may
access 30M HH.**

**This is 60% of total
new housing needed.**



Source: Figure from Reconnecting America, *Realizing the Potential: Expanding Housing Opportunities Near Transit*.

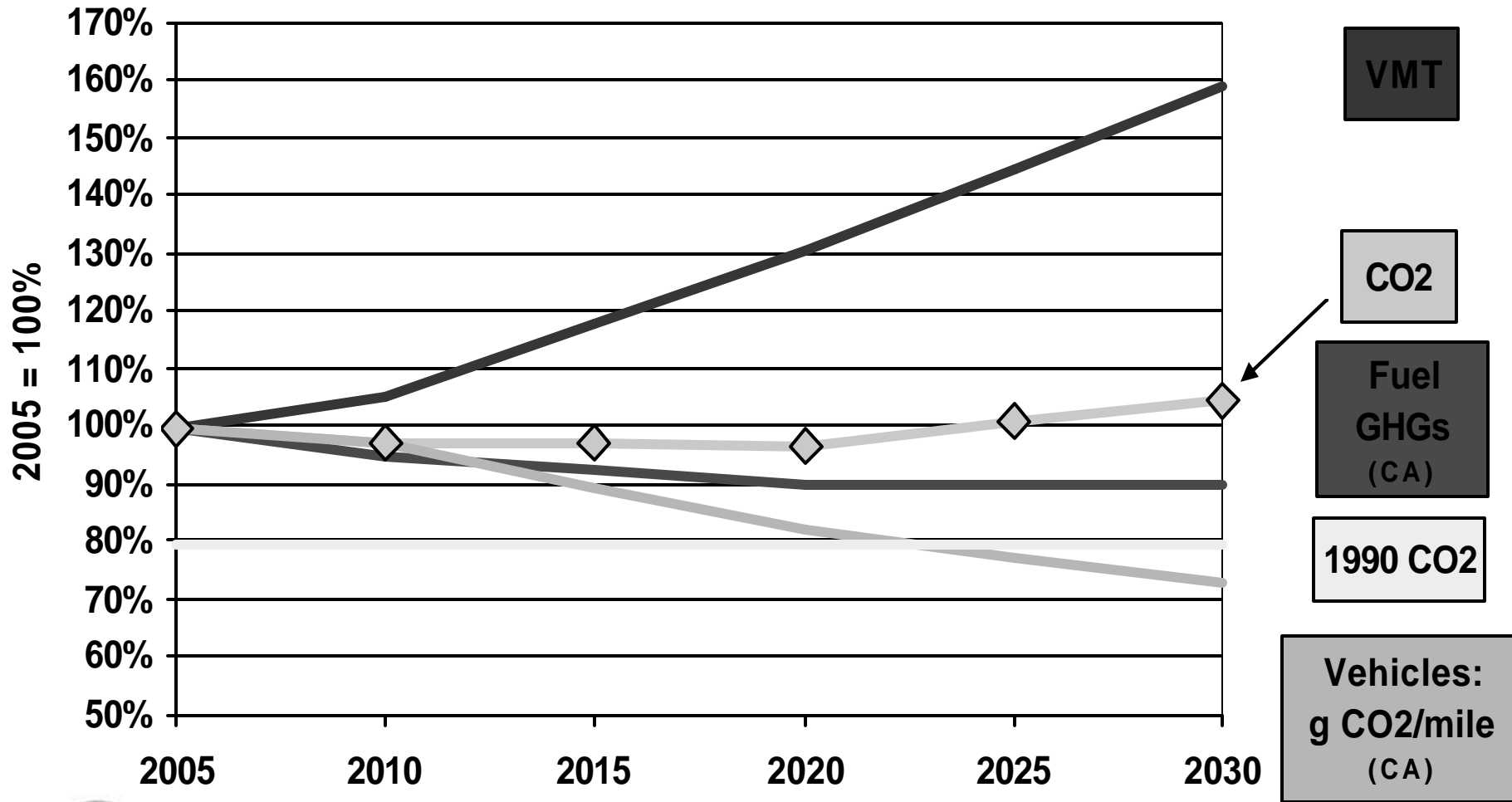
VMT Growth: 2005-2030



Data source: EIA AEO 2007

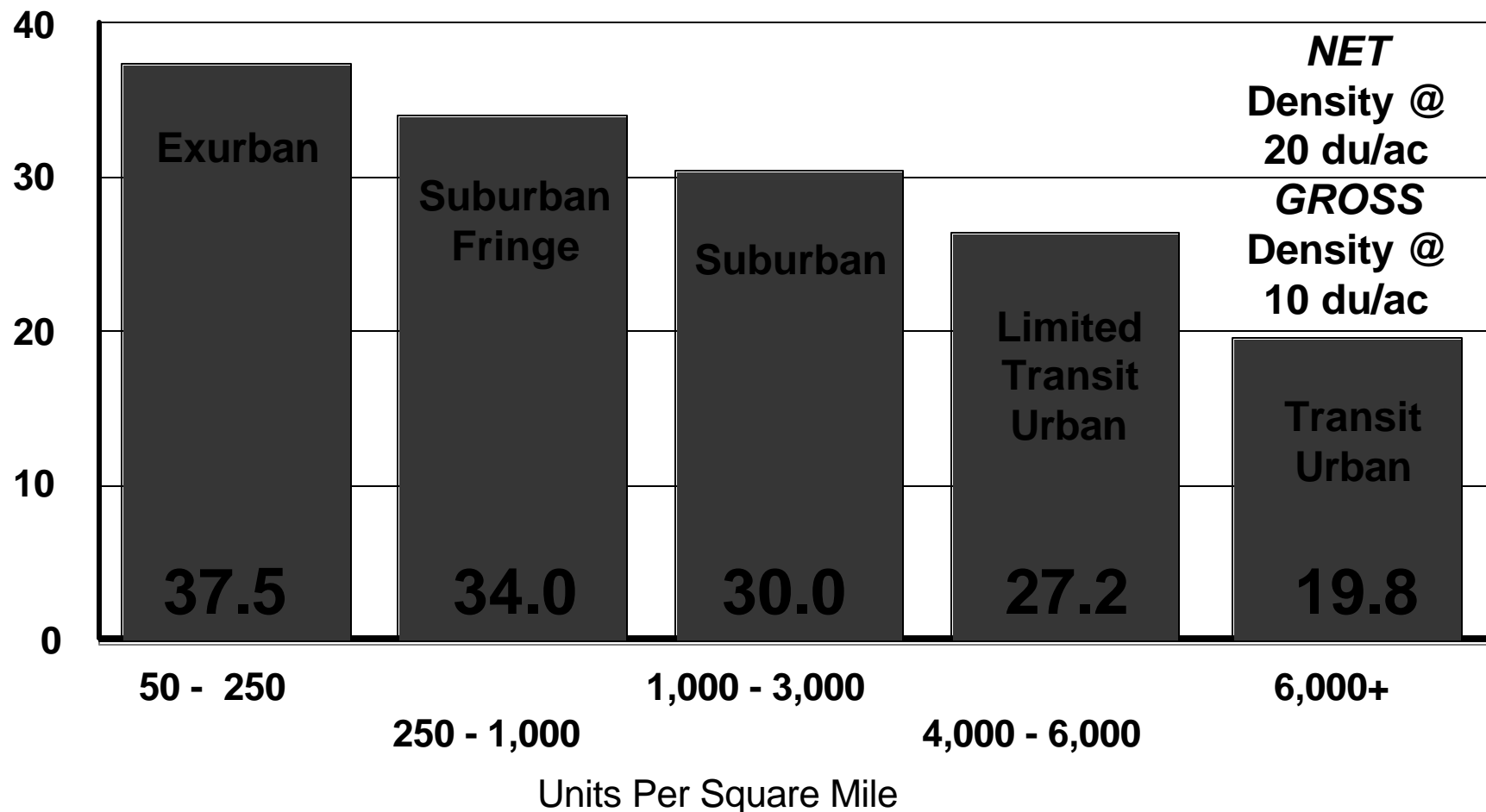
Source: Ewing et al. *Growing Cooler*, ULI 2008.

If California Standards Adopted



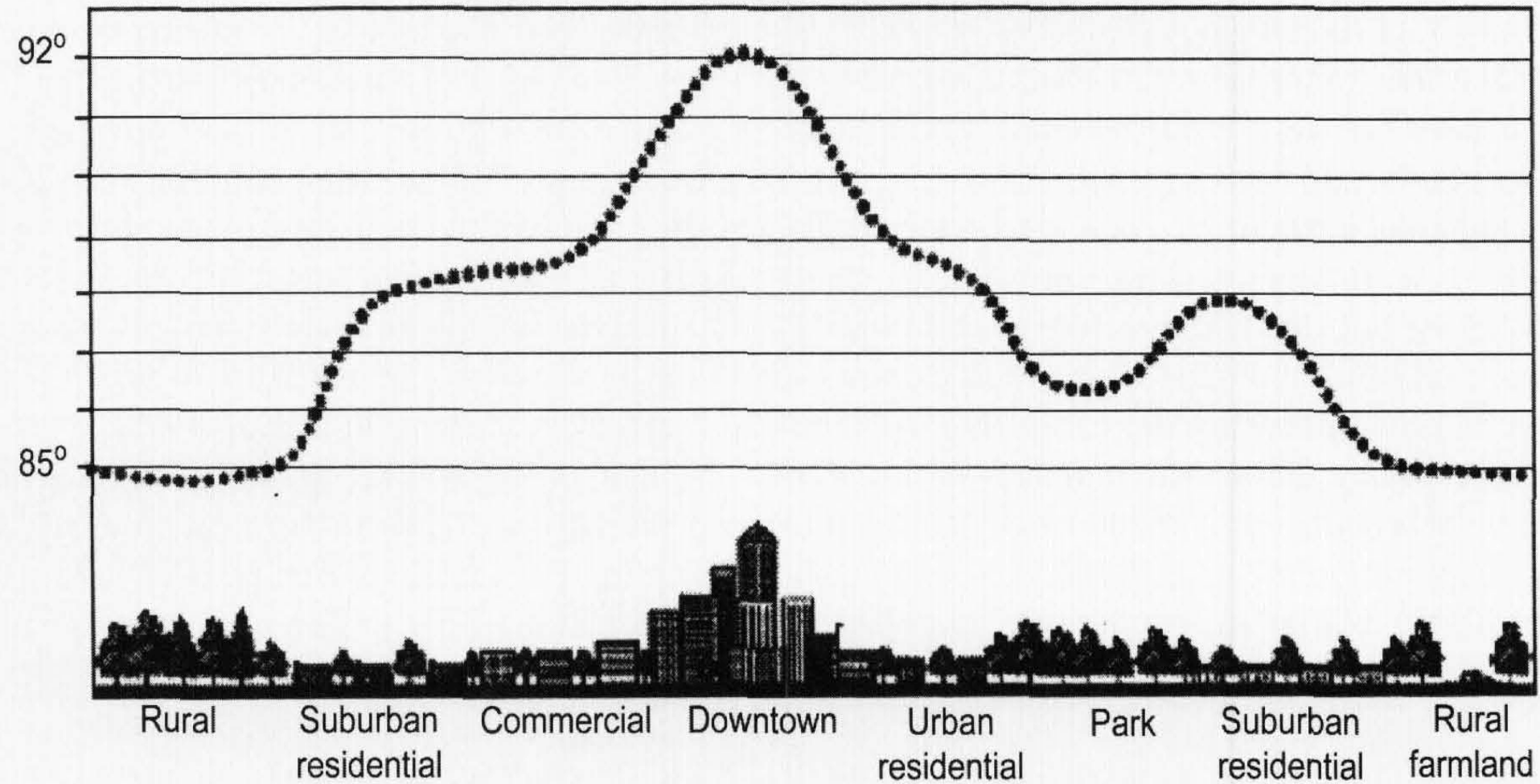
Based on EIA and CARB data

Suburban Center + TOD Densities Offset VMT Gains of Growth

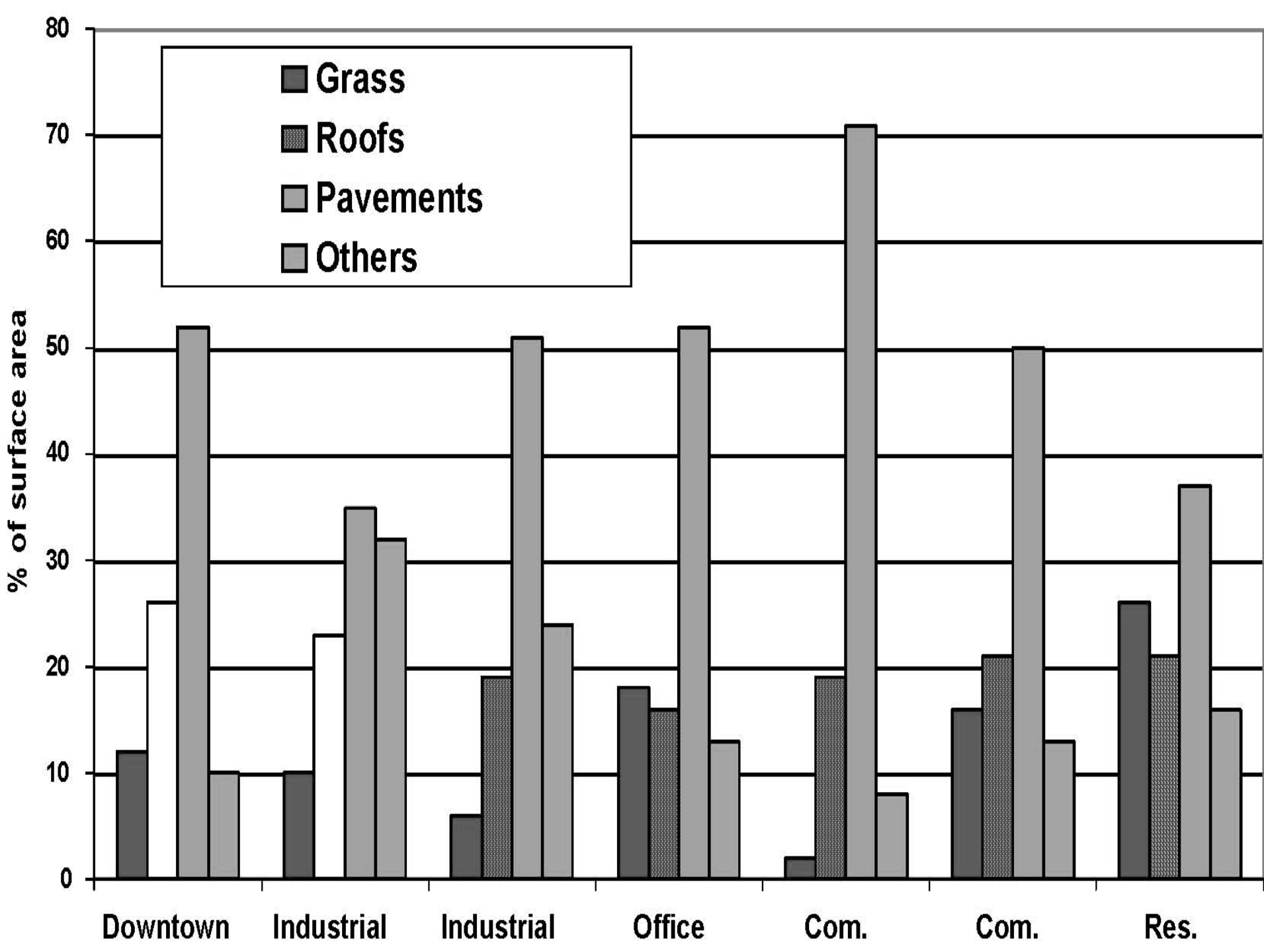


Source: Arthur C. Nelson, Metropolitan Institute at Virginia Tech, based on *Nationwide Household Transportation Survey*, USDOT, 2001. Figure is VMT per driver.

Sketch of an Urban Heat Island Profile



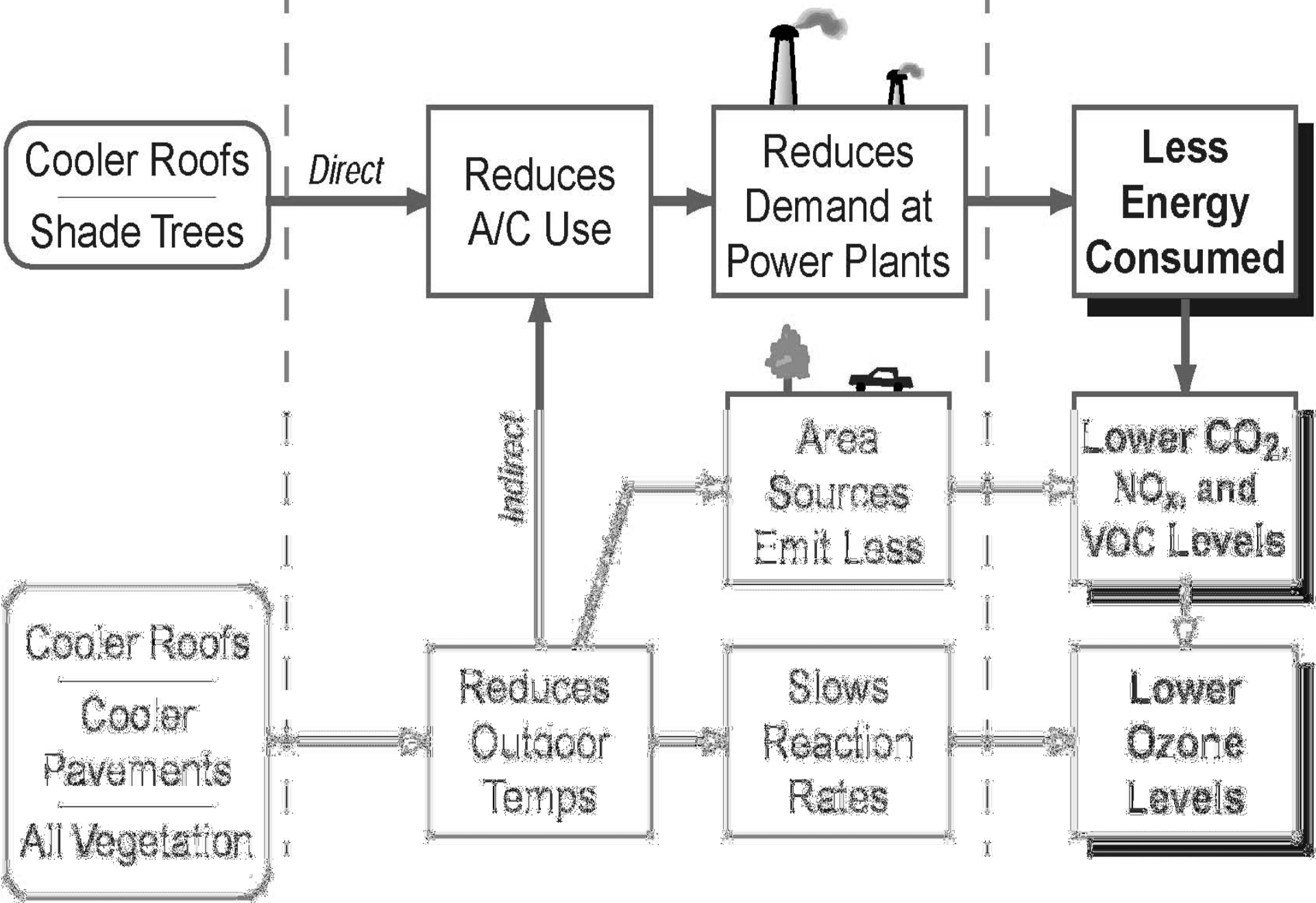
Source: U.S. Environmental Protection Agency, 1992.



Strategies

Processes

Results





Urban Heat Island Strategies

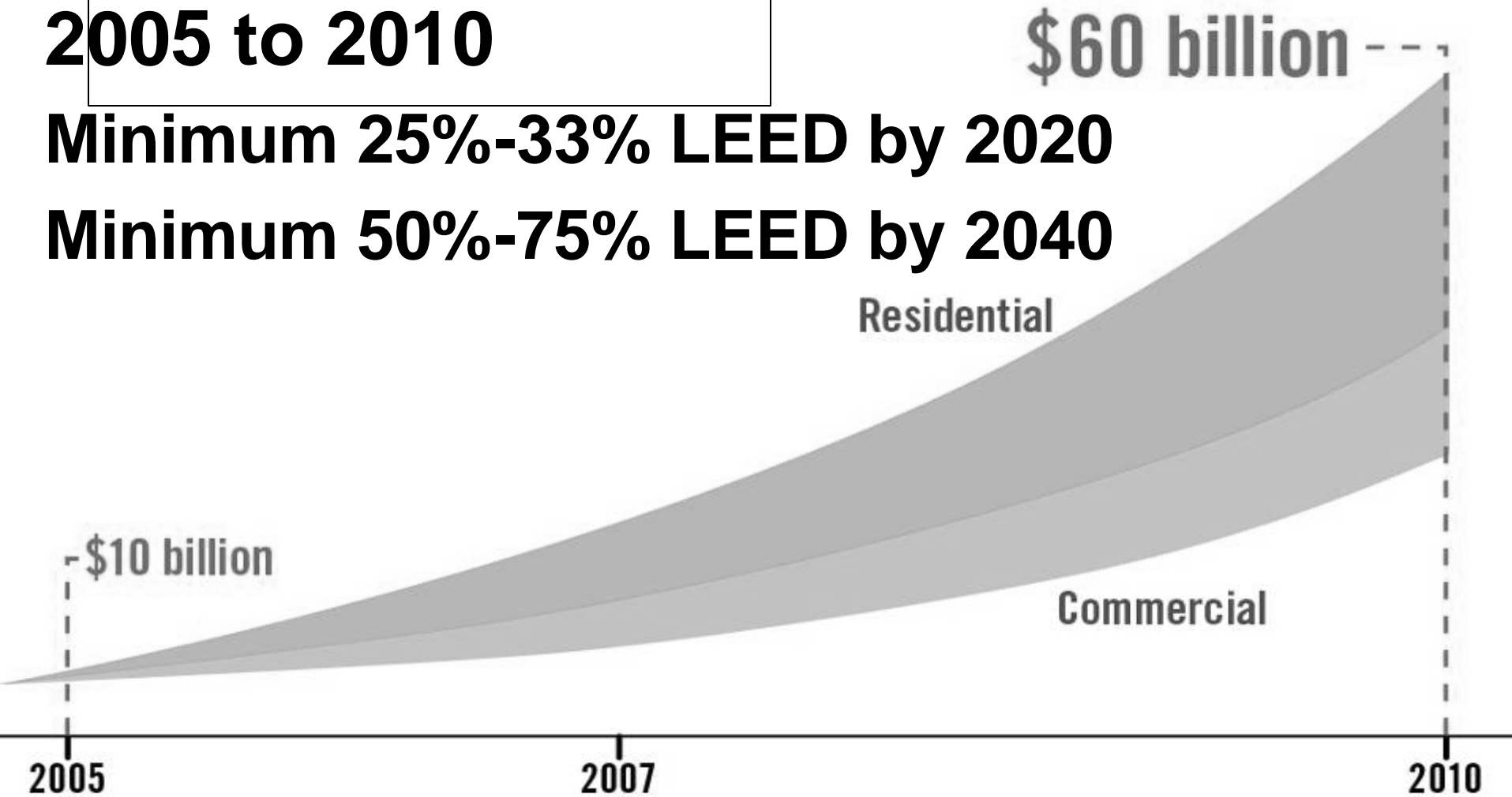
- High albedo-rated new roofs
- High albedo-rated refoofing (within 30 years)
- Pavements replaced within 20 years; high albedo concrete or asphalt additives
- Street trees added strategically
- Building heat waste reduced → LEED approach
- CO₂ emissions cut by **15%-25%**
- Ozone-inducing critical mass eliminated?

Value of LEED Projects

2005 to 2010

Minimum 25%-33% LEED by 2020

Minimum 50%-75% LEED by 2040



Source: Figure from US Green Building Council, downloaded 3/4/08.



The New Urban Economics

■ Old School

- People locate where jobs are
- The “employment-centric” model

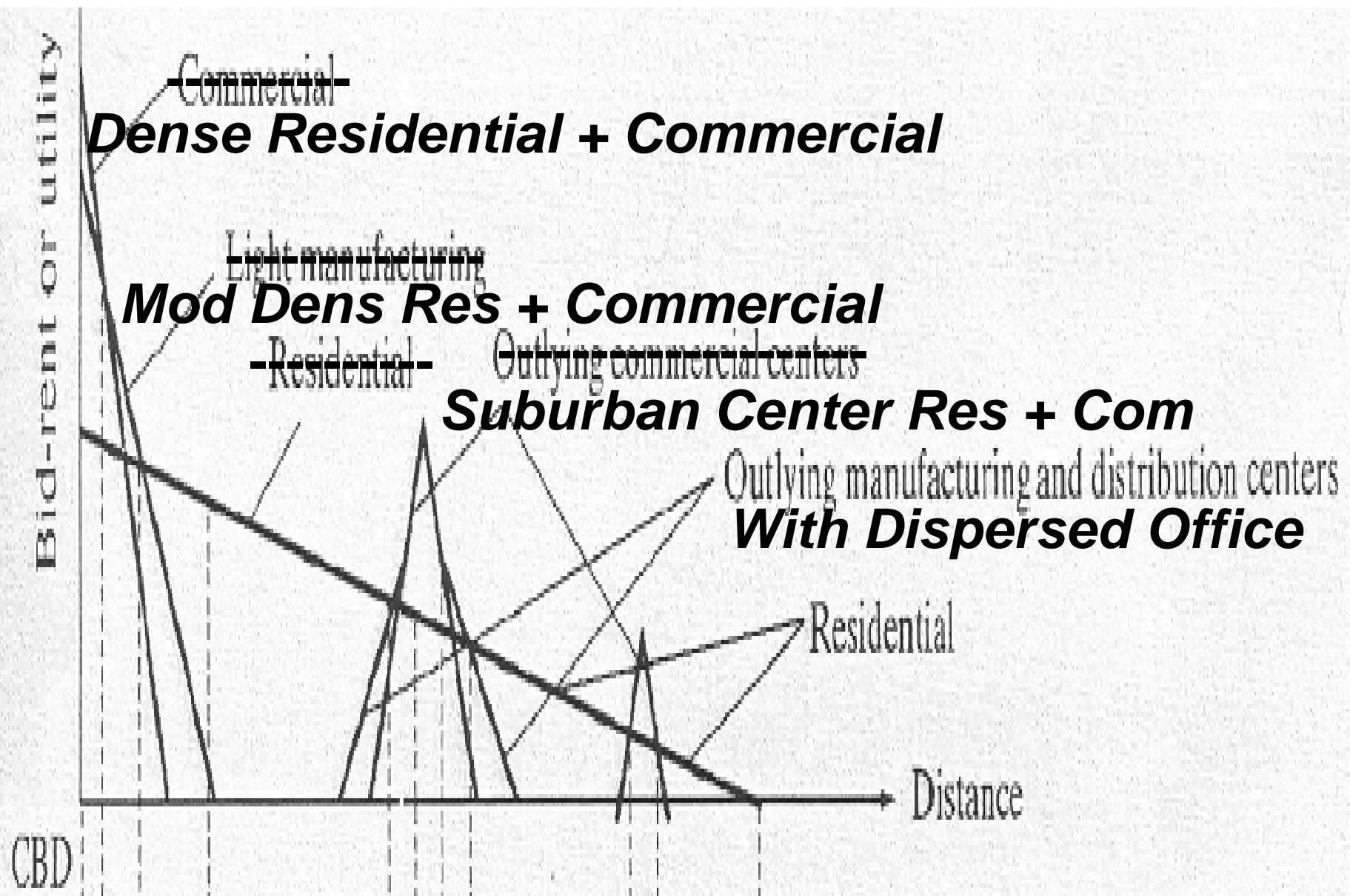
■ New School

- Jobs locate where people are
- The “homo-centric” model

■ The New Urban Economics

- Real estate development follows people
- ***Where are people going? Toward Urbanity***

The New Metropolitan Form?





Invest Where the People Will Be


- 71% of elderly want transit options (AARP)
- 50% want expanded transit investment (NAR)
- Large-scale home builders want transit options
- ULI, PriceWaterhouseCoopers, others advise:
 - Do not invest in suburban fringe
 - Highest rates of return in redevelopment, infill
- Understand changing preferences →
 - Affluent elderly who want urbane opportunities
 - Young professions who delay child-rearing
 - Some shifting preferences even in families with children



The Sustainable 100M

- **No net increase in VMT**
- **No net increase in water consumption**
- **No net increase in energy consumption**
- **No further expansion of the suburban fringe**
- **Reduction in urban heat island**
- **Increased economic interaction as retail & service thresholds increased**

The challenge is to reduce the footprint of the current 300M

An aerial, black and white illustration of a city. In the foreground, there's a large circular plaza with a fountain or circular structure in the center. Surrounding it are various buildings, including a large one with a curved roof on the right. A road with cars runs through the middle. The background shows a dense urban landscape with many buildings and trees. Overlaid on the center of the image is the text 'THANK YOU!' in a large, bold, italicized font.

THANK YOU!