

SUSTAINABLE & RESTORATIVE COMMUNITY DEVELOPMENT WITH

# FORM-BASED CODES

APA California 2011 Conference

*{ Kaizer Rangwala, Rangwala Associates  
Stefanos Polzoides, Moule & Polyzoides  
Dan Parolek, Opticos }*



the  
**rational**e  
Form-Based Codes



**Rangwala Associates**  
Planning, Urban Design, & Economic Development

NEPA

Climate



**Executive Order (EO) 13514:**  
"Federal Leadership in Environmental, Energy, & Economic Performance,"  
October 2009.

requires agencies to identify & analyze impacts from energy usage & alternative energy sources in all EIS

CEQA

Climate Change



**AB 32:**  
Intends to reduce CA GHGs to 1990 levels by 2020 & to 80 percent below 1990 levels by 2050.

**SB375:**  
Establishes a process for CARB to develop the GHG emissions reductions targets for each region

**CEQA Incentive**  
Attractive streamlining provisions



Sustainability  
Defined

# Sustainability Definitions



1987 Brundtland Report: Development that  
*“meets the needs of the present  
without compromising the ability  
for future generations to meet their  
own needs.”*

Business community:

*“the triple bottom line --  
People, Planet, & Profits”*

You must satisfy all three needs to be sustainable.



The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation **increased** ... in value.

-- Teddy Roosevelt, from "The New Nationalism" (1910).

*TEDxMidAtlantic 2010 - Storm Cunningham - 11/5/10*



# 3 points

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1. Sustainable development is at least 200 years too late.
2. We & future generations can make healthier, wealthier, & more beautiful places
3. The process of restoring our planet & revitalizing our communities is finally becoming a rigorous discipline with proper education & tools.

storm cunningham

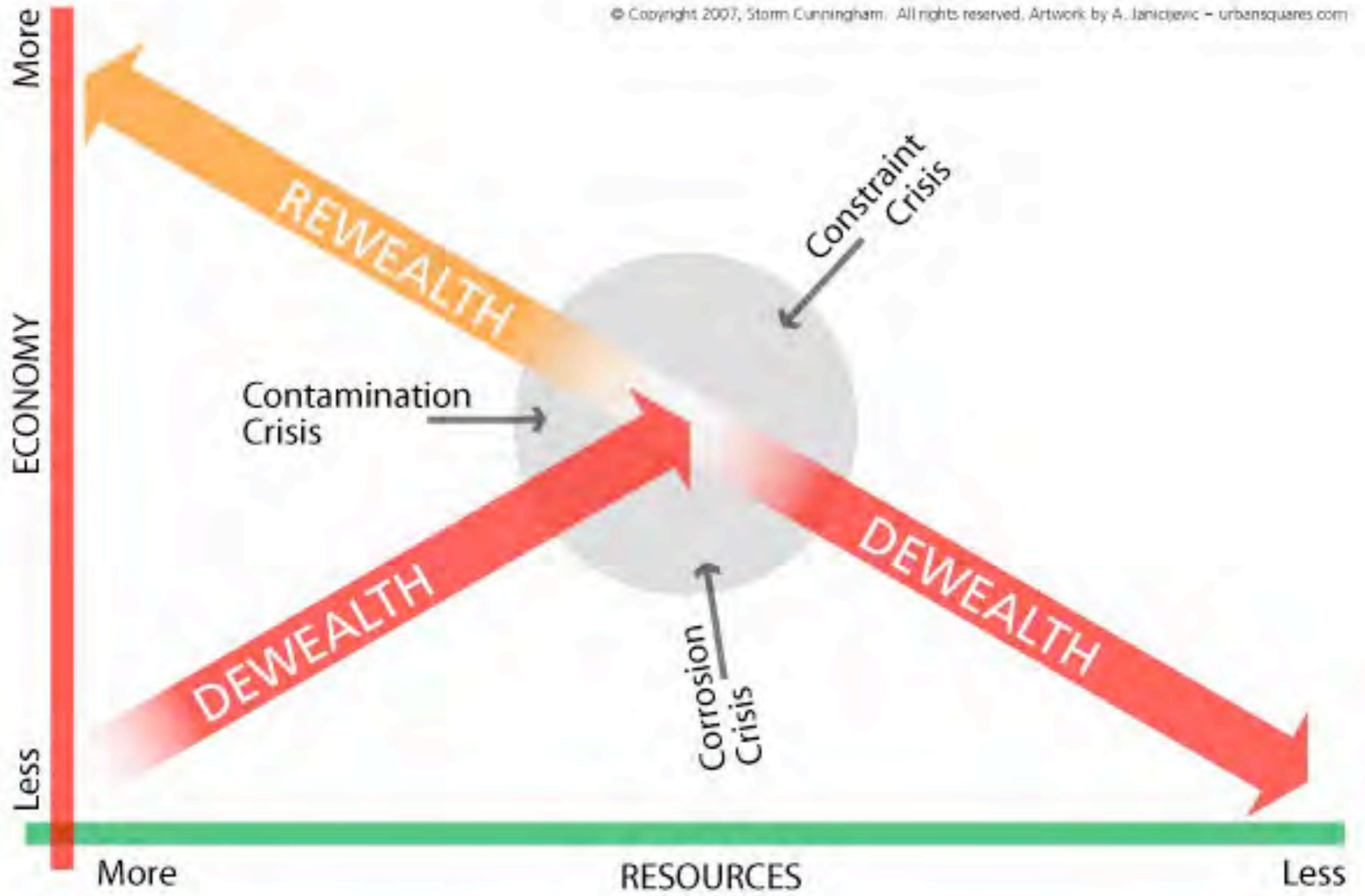
Foreword by William H. Hudnut, III  
Former four-term Mayor of Indianapolis  
Senior Resident Fellow, Urban Land Institute

# reWealth!

Stake Your Claim in the \$2 Trillion **re**Development  
Trend That's Renewing the World








# Butchart Gardens, Victoria, BC







Zoning  
Subdivision &  
Gizmo Green

'Linear economy'

Take - Make - Dispose

Technical and biological  
nutrients all mixed up



something useful



'Circular economy'

Technical nutrients

Biological nutrients



Living systems

after W. McDonough and M. Braungart

Conventional Zoning & Subdivision Standards function in linear fashion

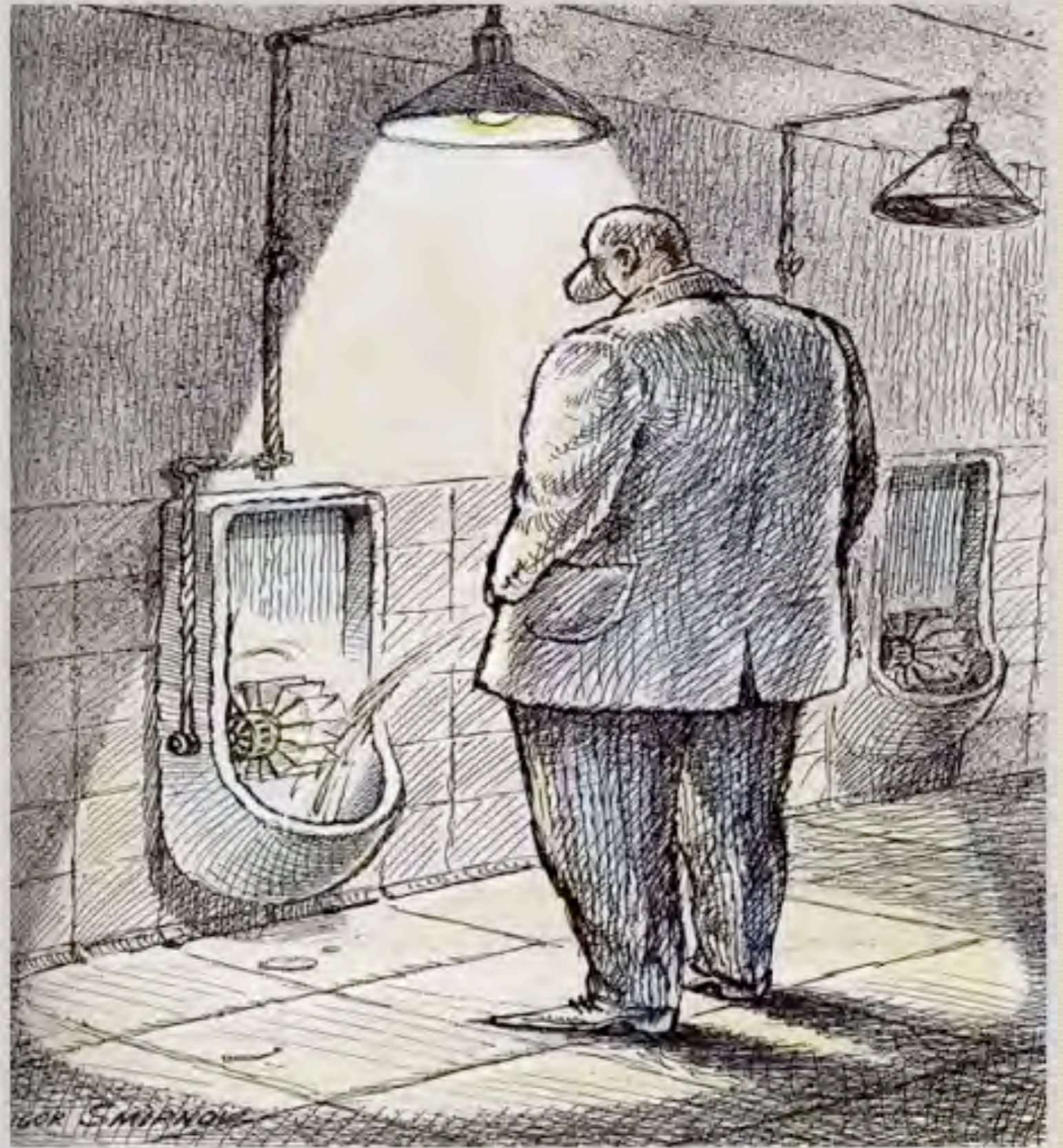


# Gizmo Green

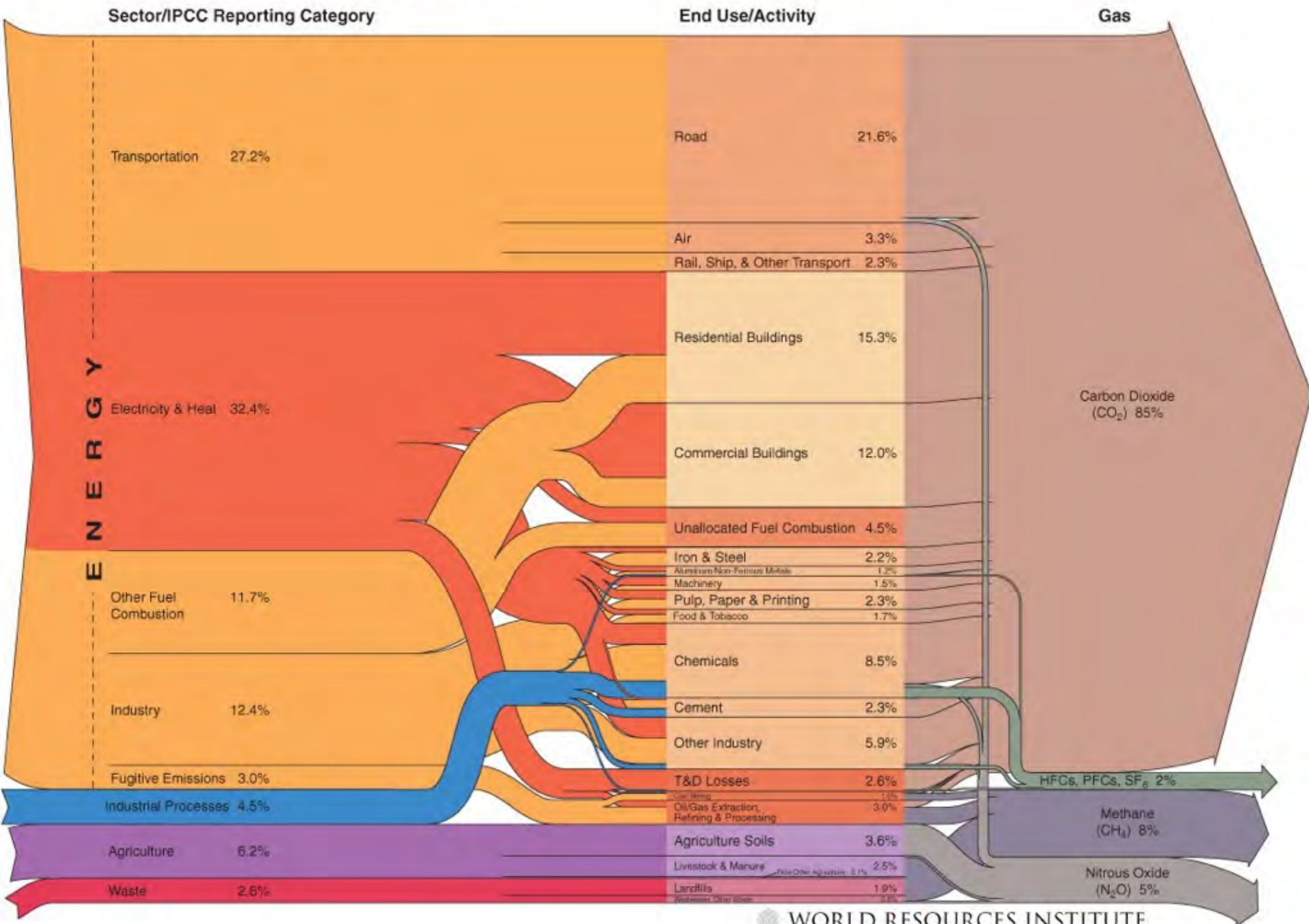
Sole reliance on equipment &  
materials -- rating systems



*Image Courtesy of Steve Mouzon*



# U.S. GHG Emissions Flow Chart





# Urbanism & Climate Change



# Sustainability & Urban



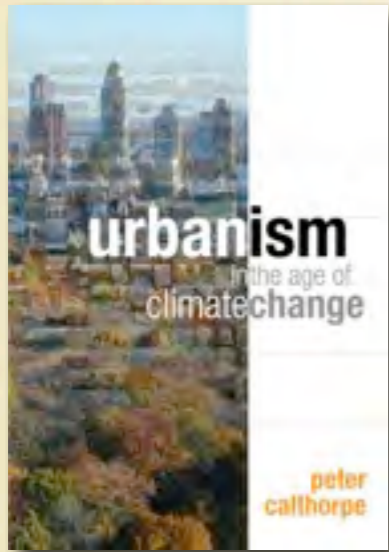
Photograph by Steve Mouzon

*“Urbanism is our single most potent weapon against climate change, rising energy costs, & environmental degradation.”*

-- Peter Calthorpe

## Examples:

- Party wall is more cost efficient than a solar collector in reducing home heating needs.
- Well placed windows & high ceilings are offer better lighting than efficient fluorescents in the office.
- Walk or bike ride is less expensive & less carbon intensive than a hybrid car even at 50 mpg.
- Urbanism has fewer people consuming fewer resources & emitting less GHGs -- New Yorkers emit just a third of the GHG of an average American.



“Each person must on average emit only 12% of their current rate

BY 2050, THE U.S. MUST EMIT 10 BILLION TONS PER YEAR LESS than projected. As our population increases we must reduce our total greenhouse gas emissions, which means each person must produce only 12% of current output.

23

METRIC TONS PER PERSON

296

U.S. POPULATION IN MILLIONS

THE YEAR 2005

2.7

METRIC TONS PER PERSON

448

U.S. POPULATION IN MILLIONS

THE YEAR 2050

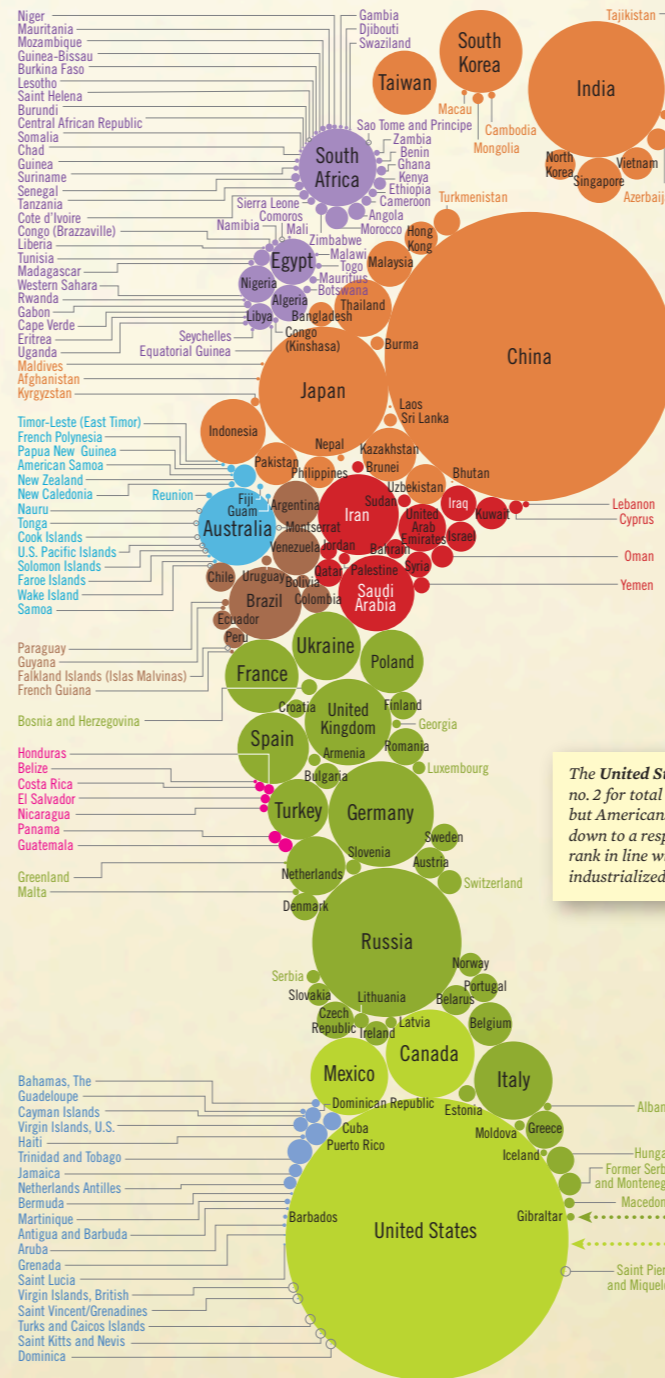
# Tracking Carbon Emissions

A footprint comparison of total carbon dioxide emissions by nation and per capita shows there's plenty of room for smaller countries to reduce their carbon footprints.

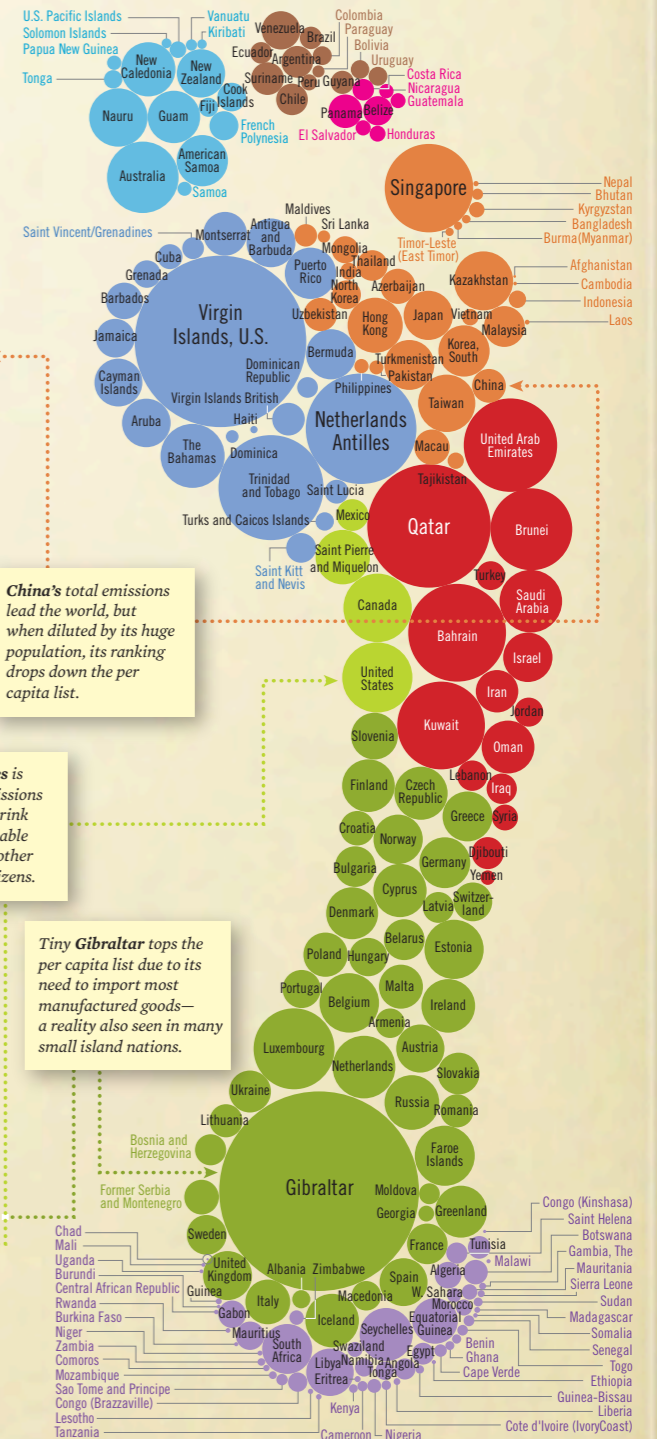
By Stanford Kay

China, U.S., India, Japan, Russia & the European Union will have to reduce their carbon footprints. Smaller countries must also reduce their per capita contributions.

## Total Carbon Emissions by Nation



## Per Capita Carbon Emissions by Nation

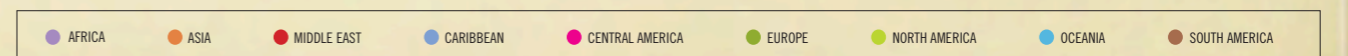


China's total emissions lead the world, but when diluted by its huge population, its ranking drops down the per capita list.

The United States is no. 2 for total emissions but Americans shrink down to a respectable rank in line with other industrialized citizens.

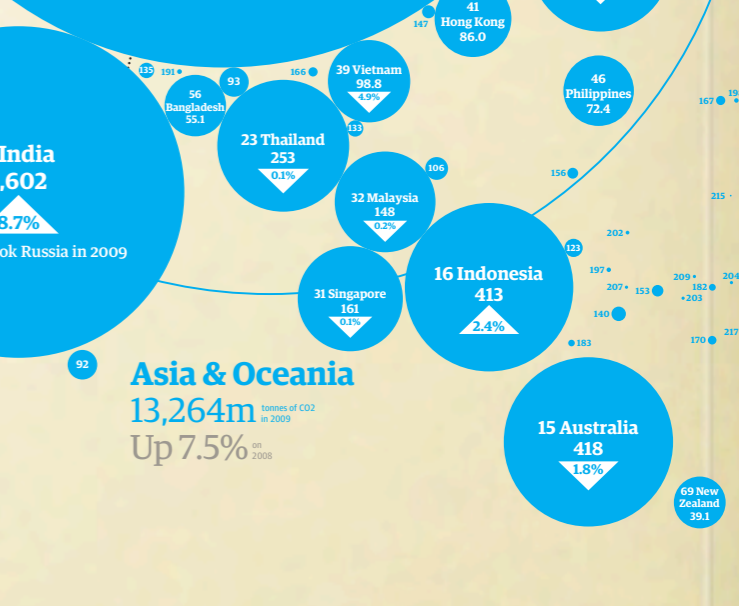
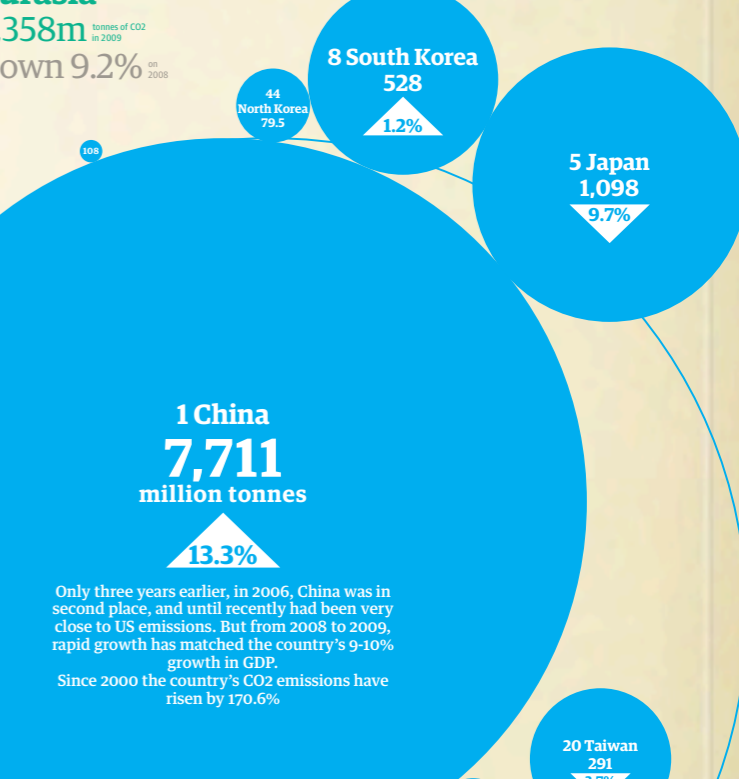
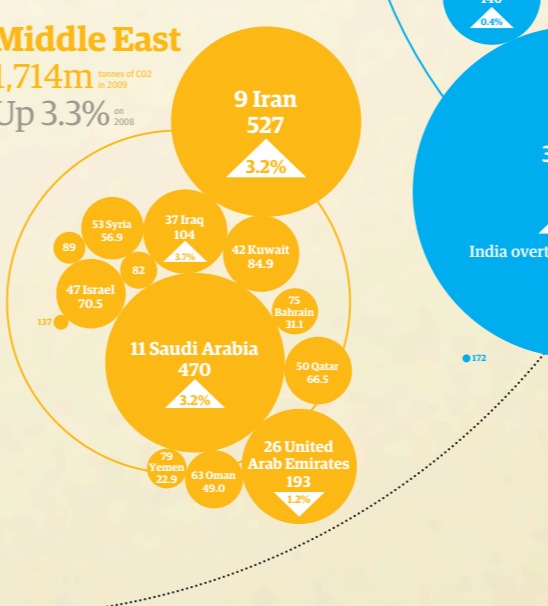
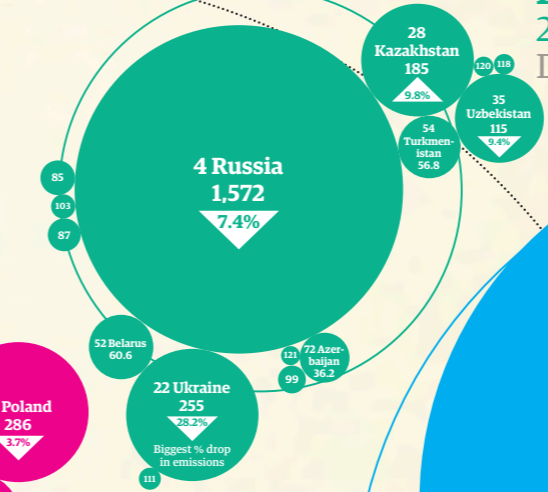
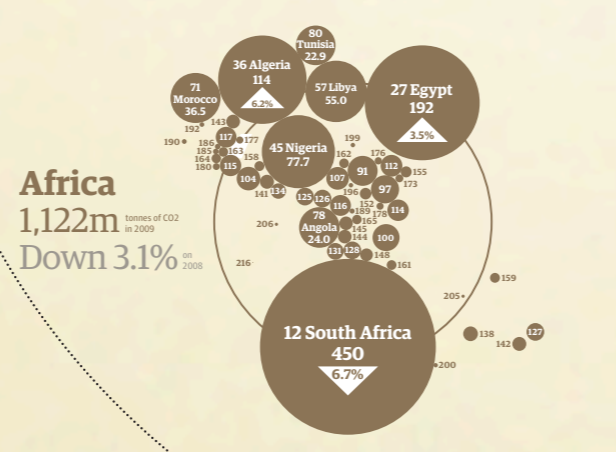
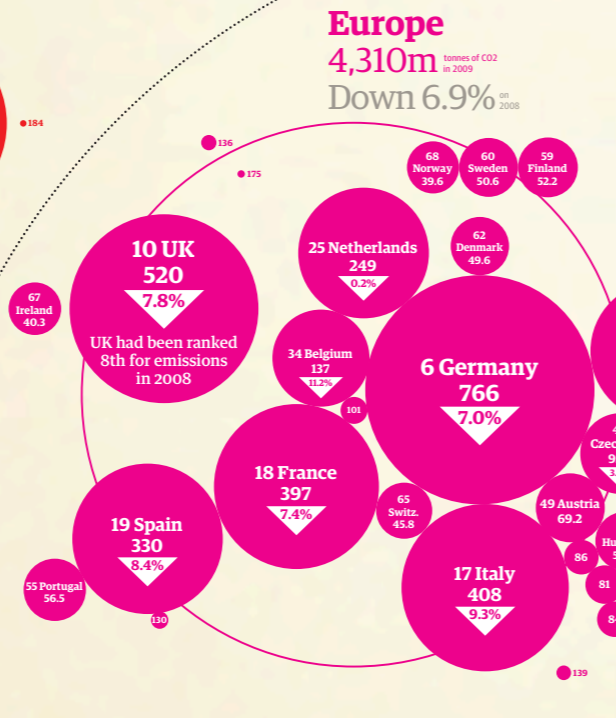
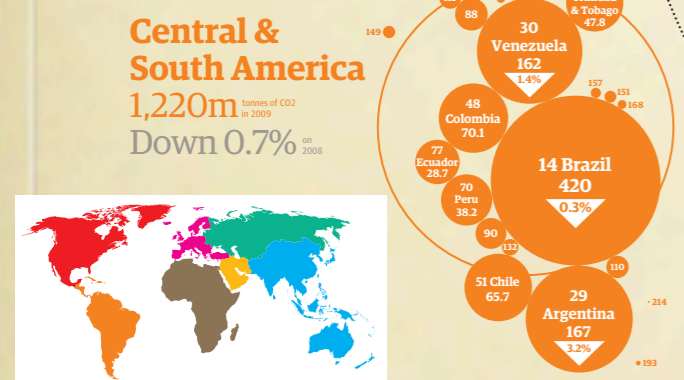
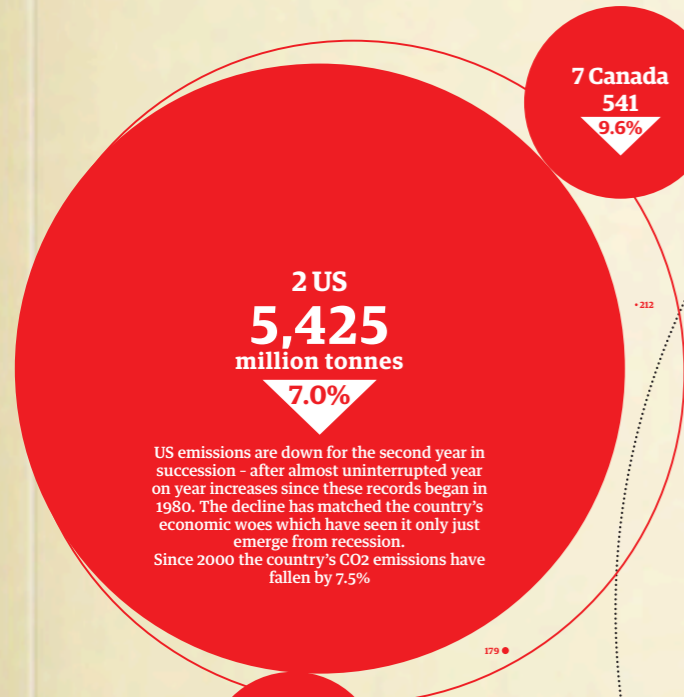
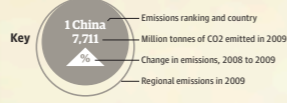
Tiny Gibraltar tops the per capita list due to its need to import most manufactured goods—a reality also seen in many small island nations.

### KEY



# An atlas of pollution: the world in carbon dioxide emissions

Latest data published by the US Energy Information Administration provides a unique picture of economic growth - and decline. China has sped ahead of the US, as shown by this map, which resizes each country according to CO2 emissions. And, for the first time, world emissions have gone down



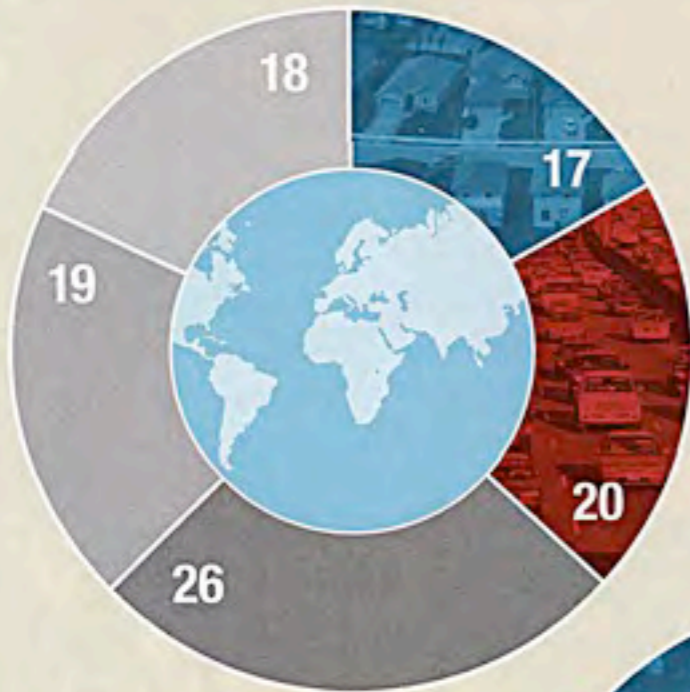
## Detailed data

Full list of each country's CO2 emissions and movement in the world emissions league table

Rank/ change on 2008	Country	Million tonnes 2009	Percent change 08-09	Rank/ change on 2008	Country	Million tonnes 2009	Percent change 08-09	Rank/ change on 2008	Country	Million tonnes 2009	Percent change 08-09	Rank/ change on 2008	Country	Million tonnes 2009	Percent change 08-09	Rank/ change on 2008	Country	Million tonnes 2009	Percent change 08-09
1	China	7,711	13.3	23	Thailand	253	-0.1	45	Nigeria	77.7	-22.4	67	Ireland	40.3	-11.2	89	Moldova	7.1	-4.1
2	US	5,425	-7.0	24	Turkey	253	-7.3	46	Philippines	77.7	-22.4	68	Norway	39.6	-0.3	90	Bolivia	6.9	7.1
3	India	1,602	8.7	25	Netherlands	249	-0.2	47	Israel	70.5	4.8	69	New Zealand	39.1	-1.1	113	Costa Rica	6.9	-4.4
4	Russia	1,572	-7.4	26	United Arab Emirates	193	-1.2	48	Colombia	70.1	7.9	70	Peru	38.2	4.0	114	Tanzania	6.7	7.1
5	Japan	1,098	-9.2	27	Egypt	192	-2.5	49	Austria	69.2	-2.5	71	Morocco	36.5	-2.2	115	Ivory Coast	6.6	2.2
6	Germany	766	7.0	28	Kazakhstan	185	9.8	50	Qatar	66.5	4.8	72	Azerbaijan	36.2	-8.9	116	Congo	6.6	3.8
7	Canada	541	-9.6	29	Argentina	167	-3.2	51	Chile	65.7	-3.8	73	Slovakia	35.8	-4.5	117	Senegal	6.2	1.8
8	South Korea	528	1.2	30	Venezuela	162	-1.4	52	Belarus	60.6	-9.5	74	Puerto Rico	33.3	-3.2	118	Tajikistan	6.1	-0.4
9	Iran	527	3.2	31	Singapore	161	-0.1	53	Syria	56.9	6.1	75	Bahrain	31.1	1.6	119	El Salvador	5.9	0.0
10	UK	520	7.8	32	Malaysia	148	-0.2	54	Turkmenistan	56.8	-1.2	76	Cuba	30.4	4.7	120	Kyrgyzstan	5.7	-0.4
11	Saudi Arabia	470	3.2	33	Pakistan	140	0.4	55	Portugal	56.5	1.5	77	Ecuador	28.7	1.7	121	Georgia	5.3	-4.9
12	South Africa	450	6.7	34	Belgium	137	-1.2	56	Bangladesh	55.1	9.8	78	Angola	24.0	-1.8	122	Bahamas	5.2	3.1
13	Mexico	444	1.9	35	Betium	137	-1.2	57	Libya	55.0	5.0	79	Yemen	22.9	13.5	123	Papua New Guinea	4.8	6.7
14	Brazil	420	-0.3	36	Algeria	114	0.2	58	Serbia	52.3	-3.2	80	Tunisia	22.9	5.7	124	Albania	4.6	-3.8
15	Australia	418	1.8	37	Iraq	104	3.7	59	Finland	52.2	-4.9	81	Croatia	21.5	-4.7	125	Equatorial Guinea	4.6	-2.1
16	Indonesia	413	2.4	38	Greece	100	-5.3	60	Sweden	50.6	-7.7	82	Jordan	20.0	2.4	126	Gabon	4.6	-3.2
17	Italy	408	-9.3	39	Vietnam	98.8	-4.9	61	Hungary	50.0	-0.7	83	Dominican Republic	19.9	2.1	127	Mauritius	4.6	-1.0
18	France	397	7.4	40	Czech Republic	95.3	-3.8	62	Denmark	49.6	-8.6	84	Bosnia and Herzegovina	18.3	-15.9	128	Botswana	4.5	7.7
19	Spain	330	8.4	41	Hong Kong	86.0	10.3	63	Oman	49.0	9.9	85	Estonia	17.5	-11.8	129	Nicaragua	4.5	-2.9
20	Taiwan	291	3.7	42	Korea	84.9	6.3	64	Trinidad and Tobago	47.9	-4.1	86	Slovenia	17.4	-0.5	130	Ghana	4.4	-3.6
21	Poland	286	-3.0	43	Romania	80.5	-16.6	65	Switzerland	45.8	1.0	87	Lithuania	15.5	-12.8	131	Namibia	4.4	3.7
22	Ukraine	255	-28.2	44	North Korea	79.5	14.3	66	Bulgaria	44.5	-11.9	88	Panama	15.5	1.7	132	Paraguay	4.0	3.7

Table shows total carbon dioxide emissions from the consumption of energy. GRAPHIC: MARK MCCORMICK, PAUL SCRUTTON. SOURCE: EIA

# the impact of urbanism



## GLOBAL CARBON EMISSIONS

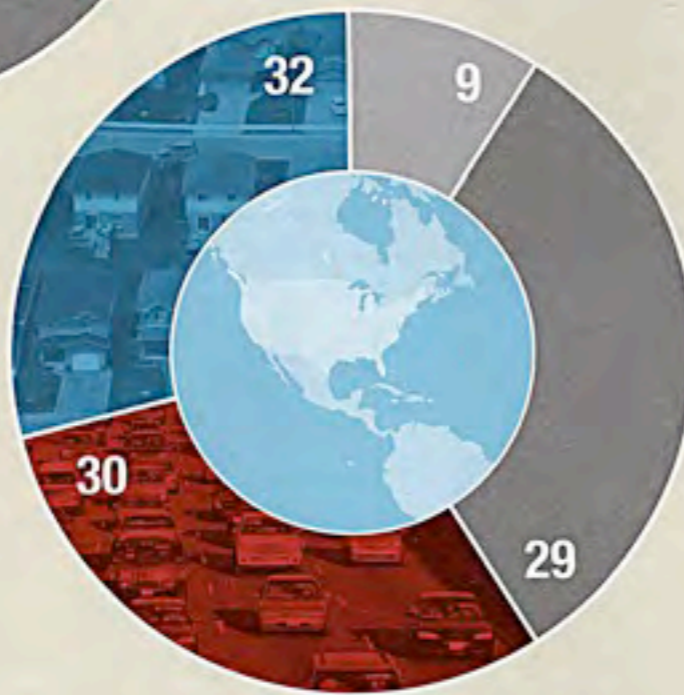
- 17% BUILDINGS
- 20% TRANSPORTATION
- 26% INDUSTRY
- 19% AGRICULTURE/WASTE
- 18% DEFORESTATION

Source: World Resources Institute

## U.S. CARBON EMISSIONS

- 32% BUILDINGS
  - 30% TRANSPORTATION
  - 29% INDUSTRY
  - 9% AGRICULTURE/WASTE
  - 0% DEFORESTATION
- 62% (Buildings + Transportation)

Source: EPA

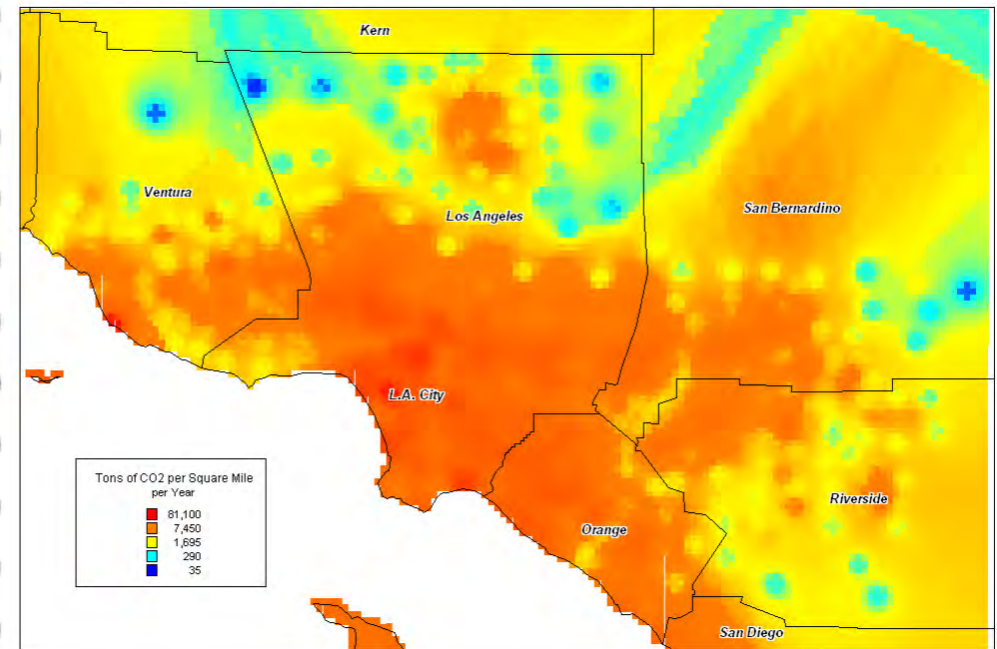


## Two Views of Cities and CO<sub>2</sub>

CO<sub>2</sub> Generated by Automobiles in the Los Angeles Region per Year

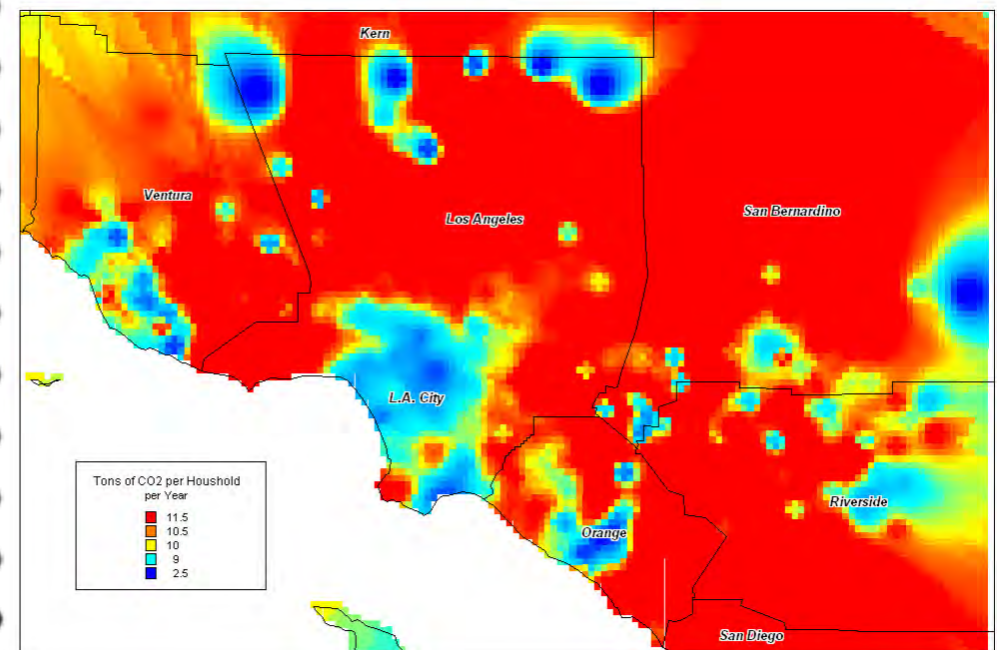
### Traditional View:

Cities produce large amounts of GHGs.



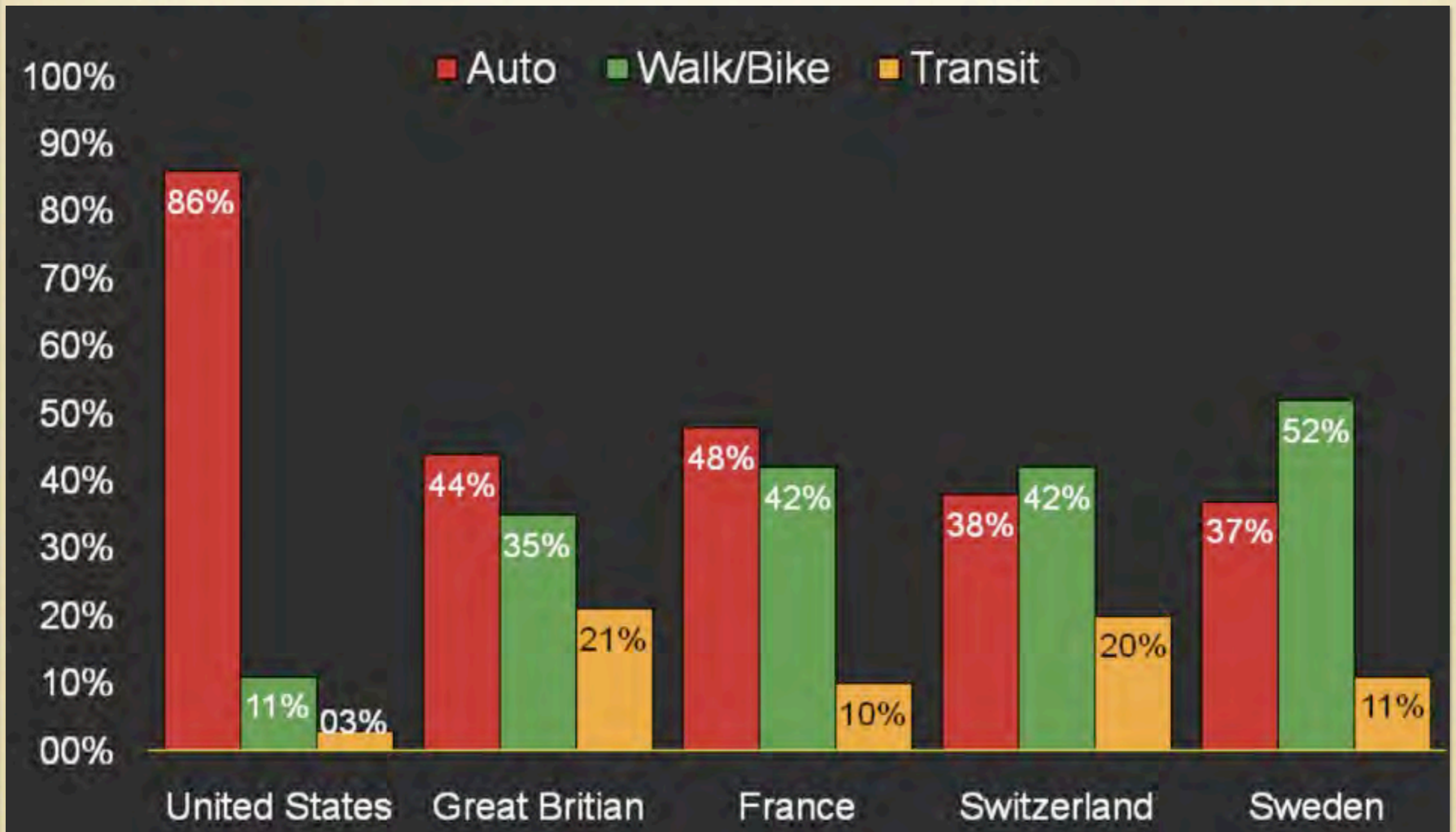
### Emerging View:

City dwellers produce relatively low amounts of GHGs.

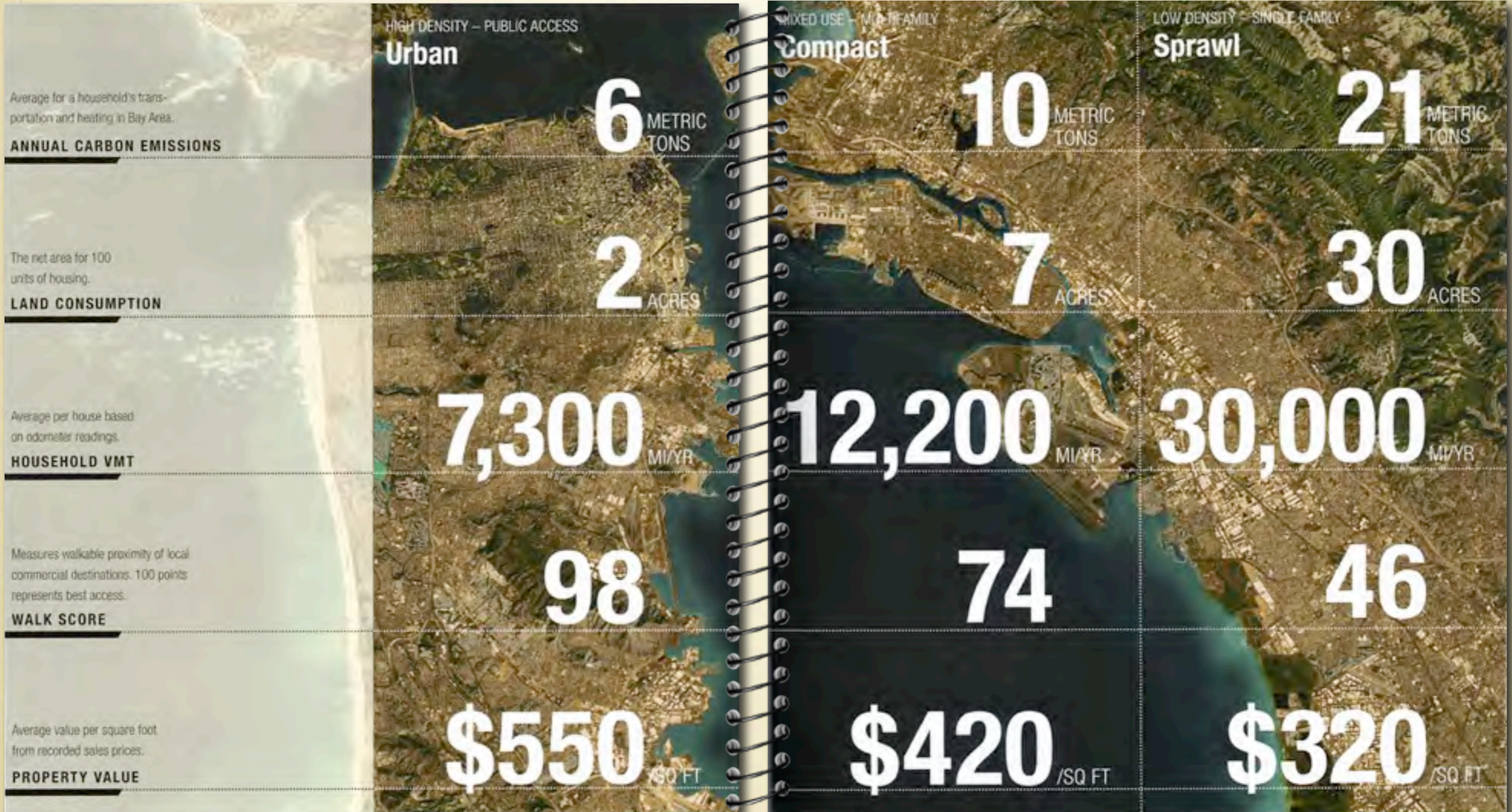


Each color represents one fifth of the land area on each map.

# Transportation Mode by Country



# Comparing NEIGHBORHOODS



Russian Hill, San Francisco

Rockridge, Oakland

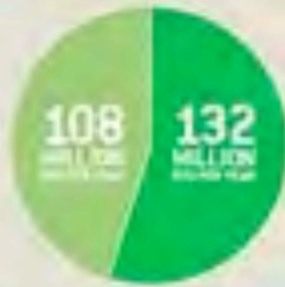
San Ramon, East Bay

Source: Urbanism in the Age of Climate Change, Peter Calthorpe

## CSD | SINGLE FAMILY DETACHED



TRANSPORTATION ENERGY USE



HOME ENERGY USE

**DAVID** >>

HOUSING TYPE:  
*Single Family Detached*

TRANSPORTATION:  
*Automobile*

HIS BTU SCORE:

**240**

AMOUNT HE SPENDS ON ENERGY / YEAR:

**\$5,595**



## A DAY IN THE LIFE OF DAVE

TRIP	MILES
Home to Starbucks	5
Starbucks to Office	42
Office to Gym	20
Gym to Grocery Store	18
Grocery Store to Home	5
<b>TOTAL MILES</b>	<b>90</b>
<b>TOTAL TIME</b>	<b>100</b>



## TOD | MULTI FAMILY



TRANSPORTATION ENERGY USE



HOME ENERGY USE

**KAREN** >>

HOUSING TYPE:  
*Multi Family*

TRANSPORTATION:  
*Automobile and Transit*

HER BTU SCORE:

**95**

AMOUNT SHE SPENDS ON ENERGY / YEAR:

**\$2,079**



## A DAY IN THE LIFE OF KAREN

TRIP	MILES
Home to Café	.05
Café to Train	.1
Train to Office	6
Office to Gym	.05
Gym to Train	.1
Train to Grocery Store	6
Grocery Store to Home	.1
<b>TOTAL MILES</b>	<b>12.4</b>
<b>TOTAL TIME</b>	<b>54</b>



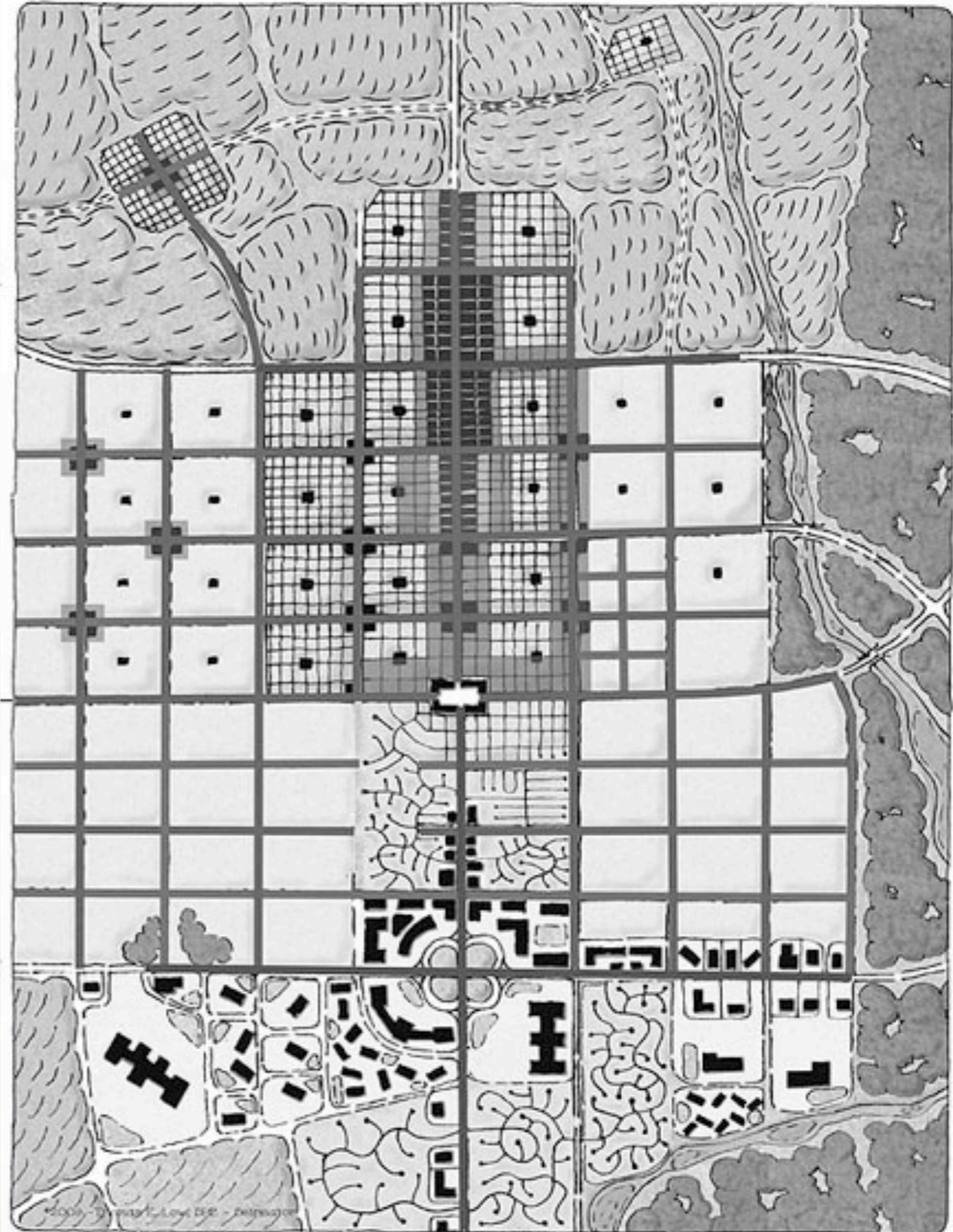
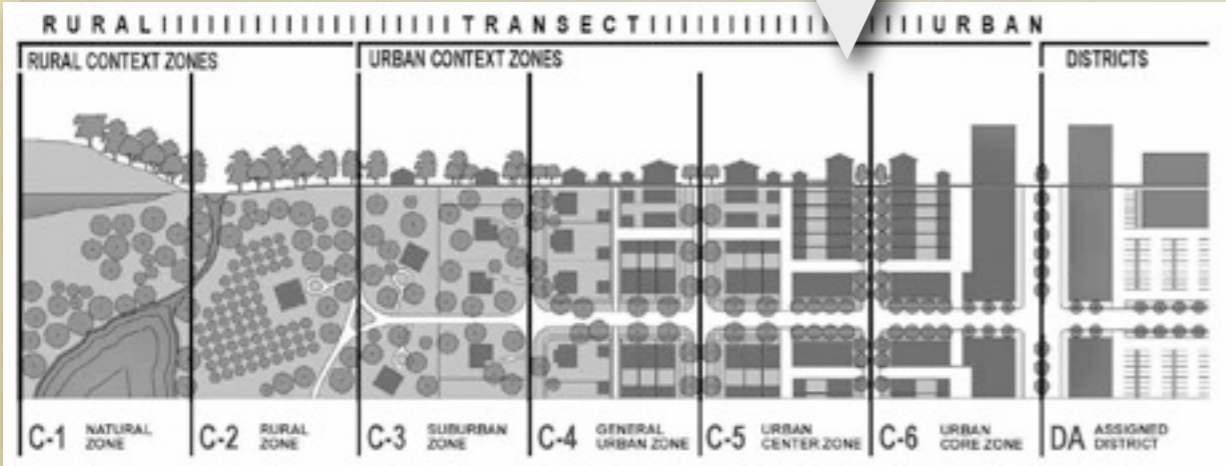




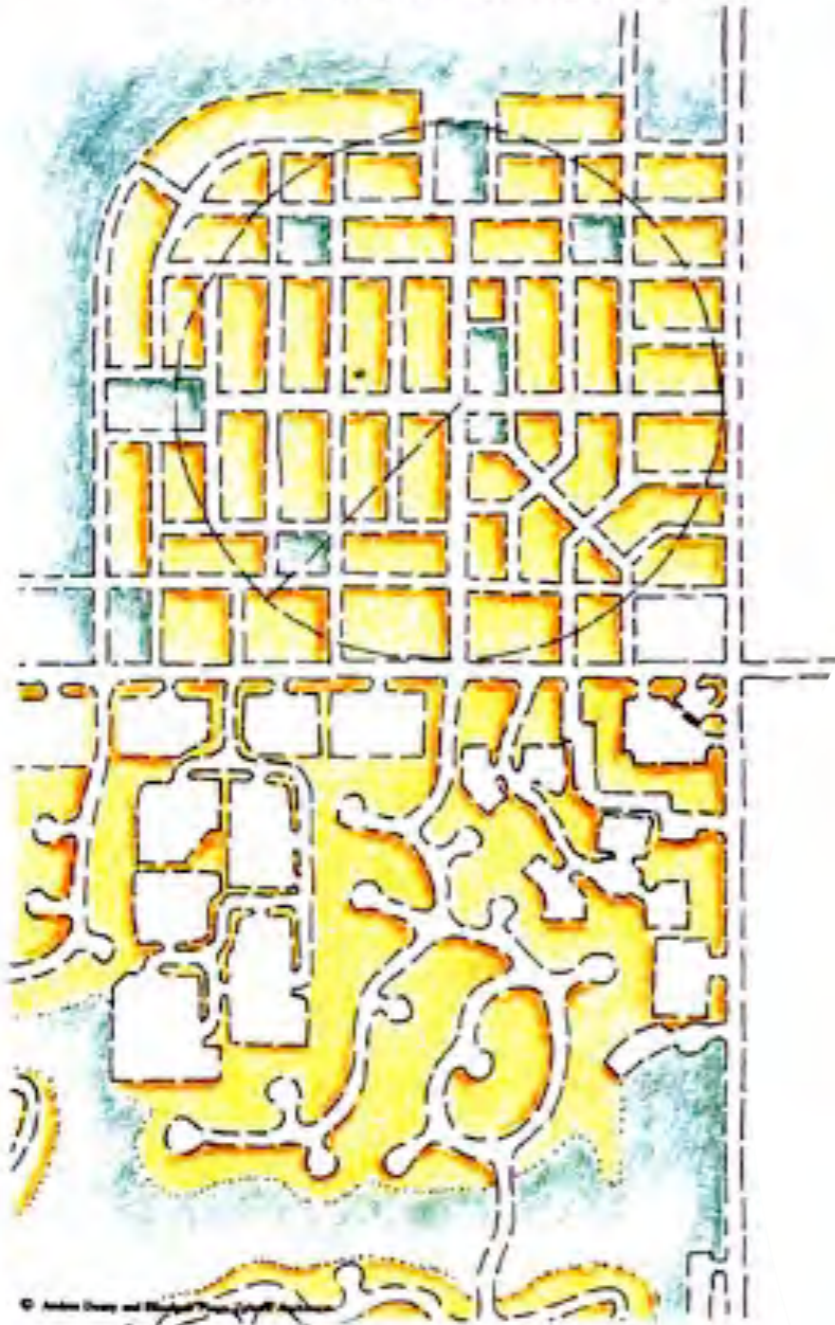
# Context

ASSHTO 2004 Rural & Urbanized

ITE's Designing Walkable Urban Thoroughfare A Context Sensitive Approach



IN THE TRADITIONAL NEIGHBORHOOD PEDESTRIANS AND CARS  
SHARE A VARIETY OF ROUTES.



SUBURBAN SPRAWL IS CHARACTERIZED BY ITS CONVENIENCE  
TO THE CAR AT THE EXPENSE OF THE PEDESTRIAN.

# Connectivity

Source: DPZ



An interconnected street system when combined with reasonable density & fine grain of land uses such that commercial areas & transit is within 5 mins walk, the per capita GHG emission is reduced by 40%

Venice, Italy

1,500 intersections/square mile



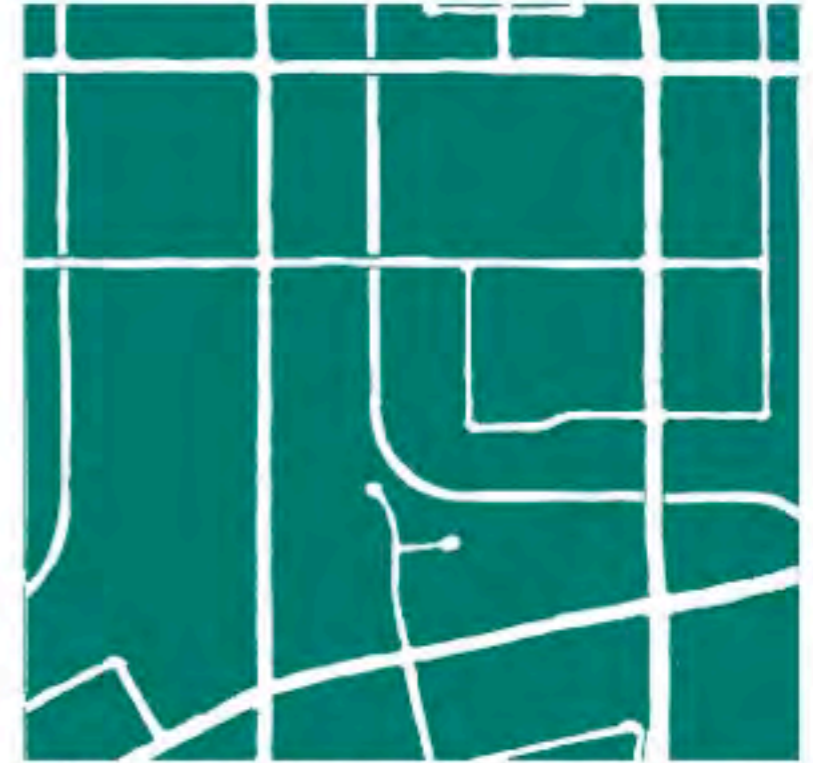
Los Angeles, CA

150 intersections/square mile



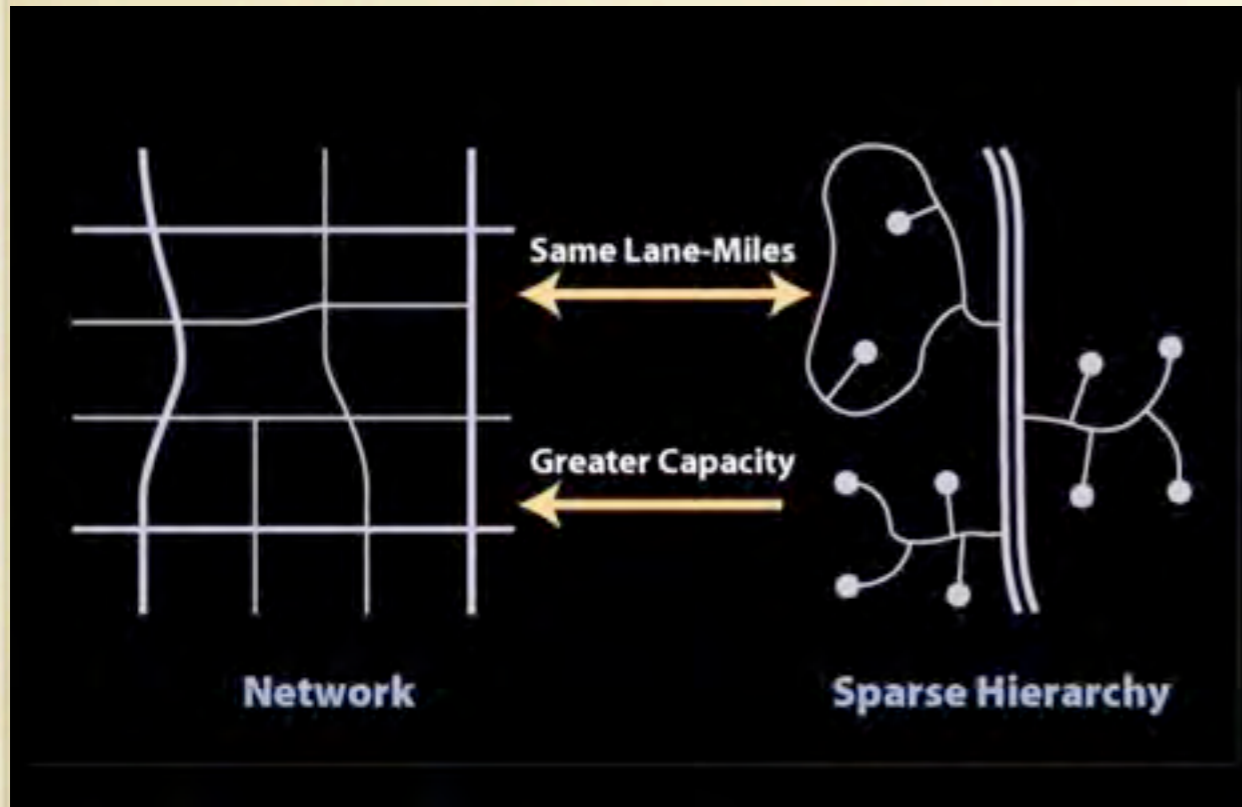
Irvine, CA

15 intersections/square mile



Source: Allan B. Jacobs, *Great Streets*, MIT Press, Cambridge, MA, 1993, pp. 221, 225, 249. Reprinted in Reid Ewing, *Pedestrian and Transit-Friendly Design: A Primer for Smart Growth*, Smart Growth Network, August 1999, p. 4. <[http://www.epa.gov/dced/pdf/ptfd\\_primer.pdf](http://www.epa.gov/dced/pdf/ptfd_primer.pdf)>

# Intersections

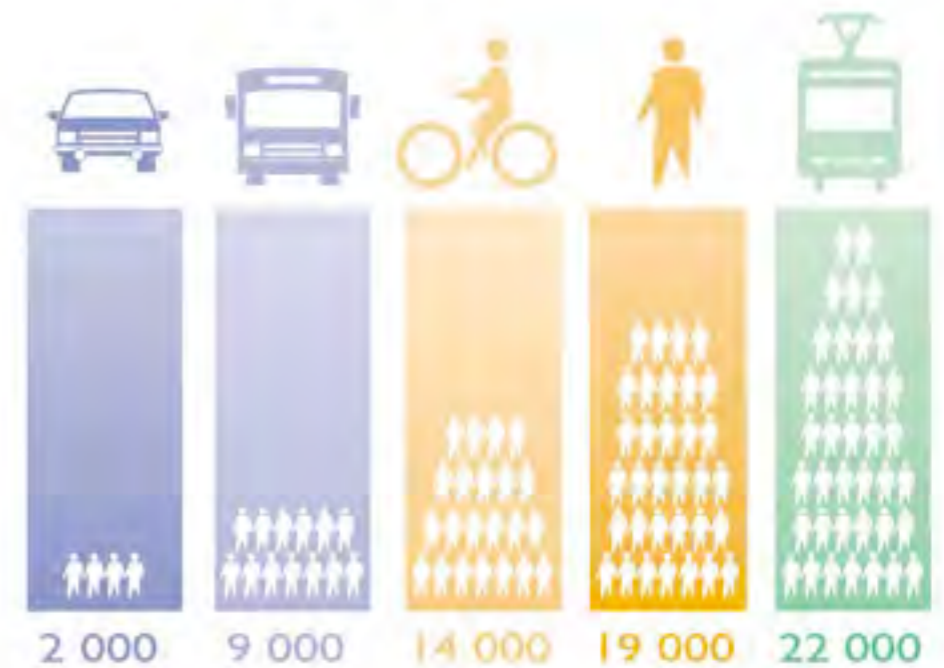


Thoroughfare connectivity comparison. Image from presentation titled "Narrow Streets, Timely Response" by Dan Burden

# Space Efficiency



## Person Capacity per Lane-Equivalent



Number of people crossing a 3.5-meter-wide space in an urban environment during a one-hour period.

Source: *Ticket to the future: 3 Stops to Sustainable Mobility*. UITP, International Association of Public Transport, Brussels, 2003, based on Botma & Pependrecht, *Traffic operation of bicycle traffic*, TU Delft, 1991.

Source: <http://pedshed.net>. Photo credit: Phil Sheffield, Tampa Tribune

# Livable Cities

Less space for cars  
more for people



*Times Square, NYC*



Why

Form-Based Codes?

**i** FBCs offer a comprehensive & integrated framework  
to facilitate urbanism

*Images Courtesy of Dover Kohl*



**Private**

**Pedestrian**

**Vehicular**

**Pocket Park**

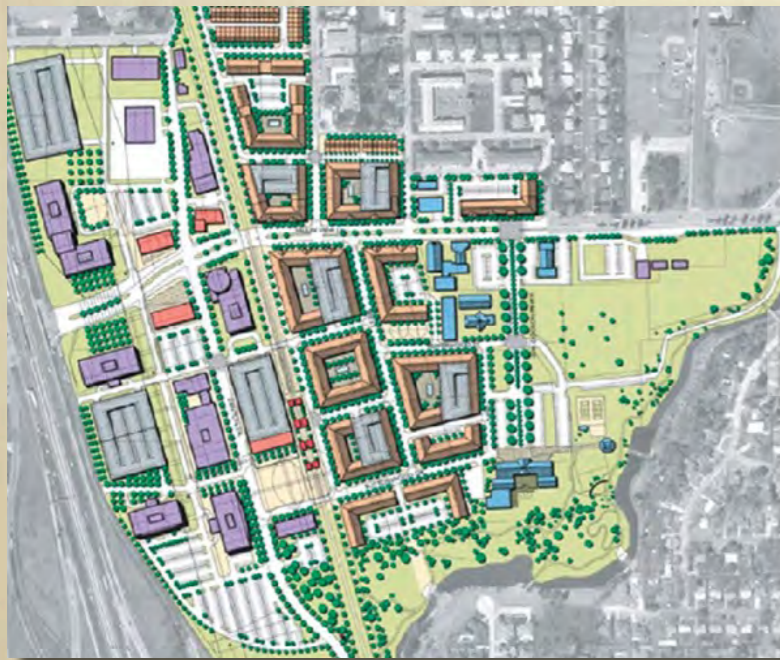
**“** FBCs foster predictable built results & a high quality **public realm** by using **physical form** as the organizing principle for the code.

*-- Form-Based Code Institute*



# Elements of FBCs

## *1. Regulating Plan*

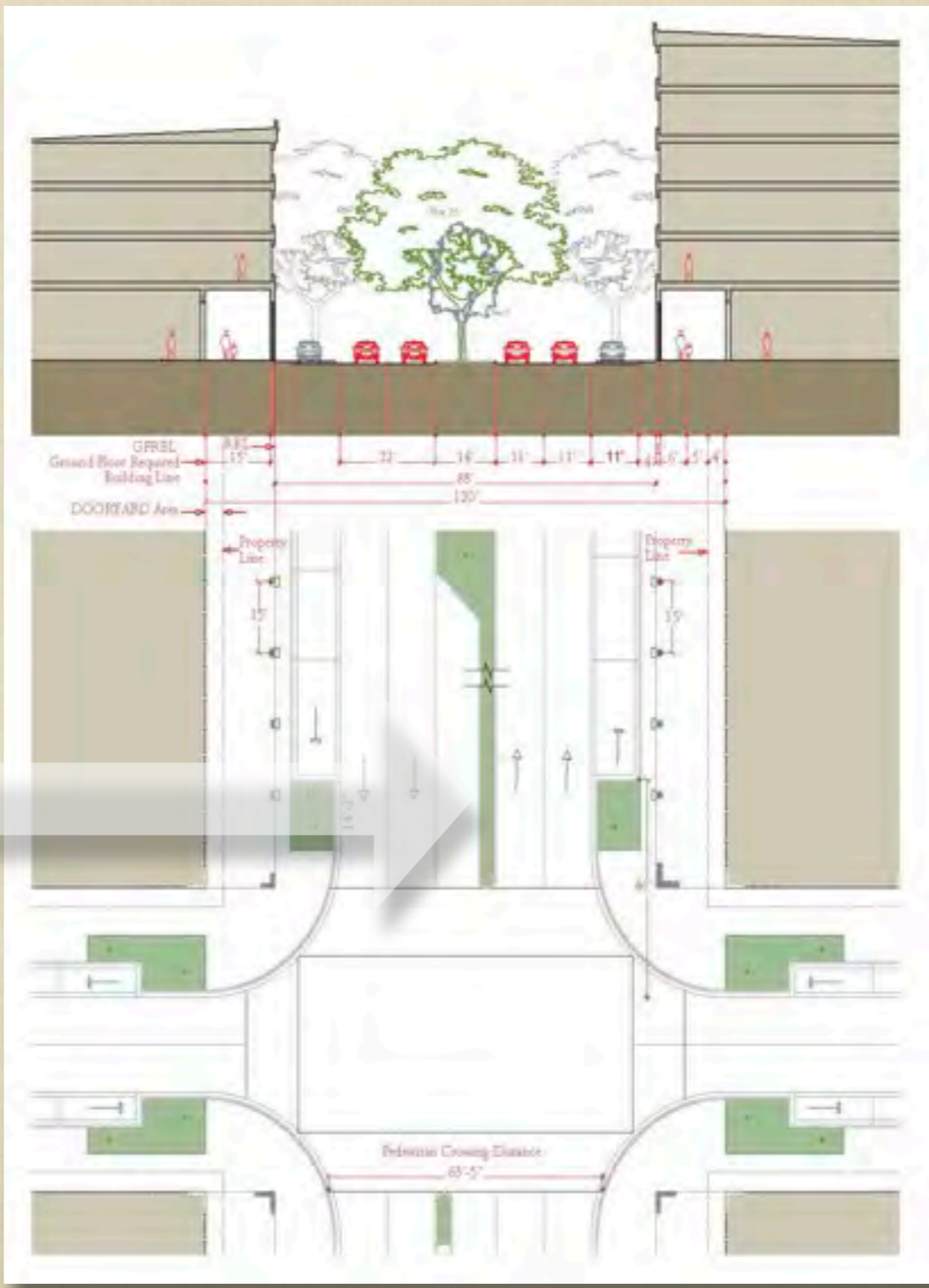
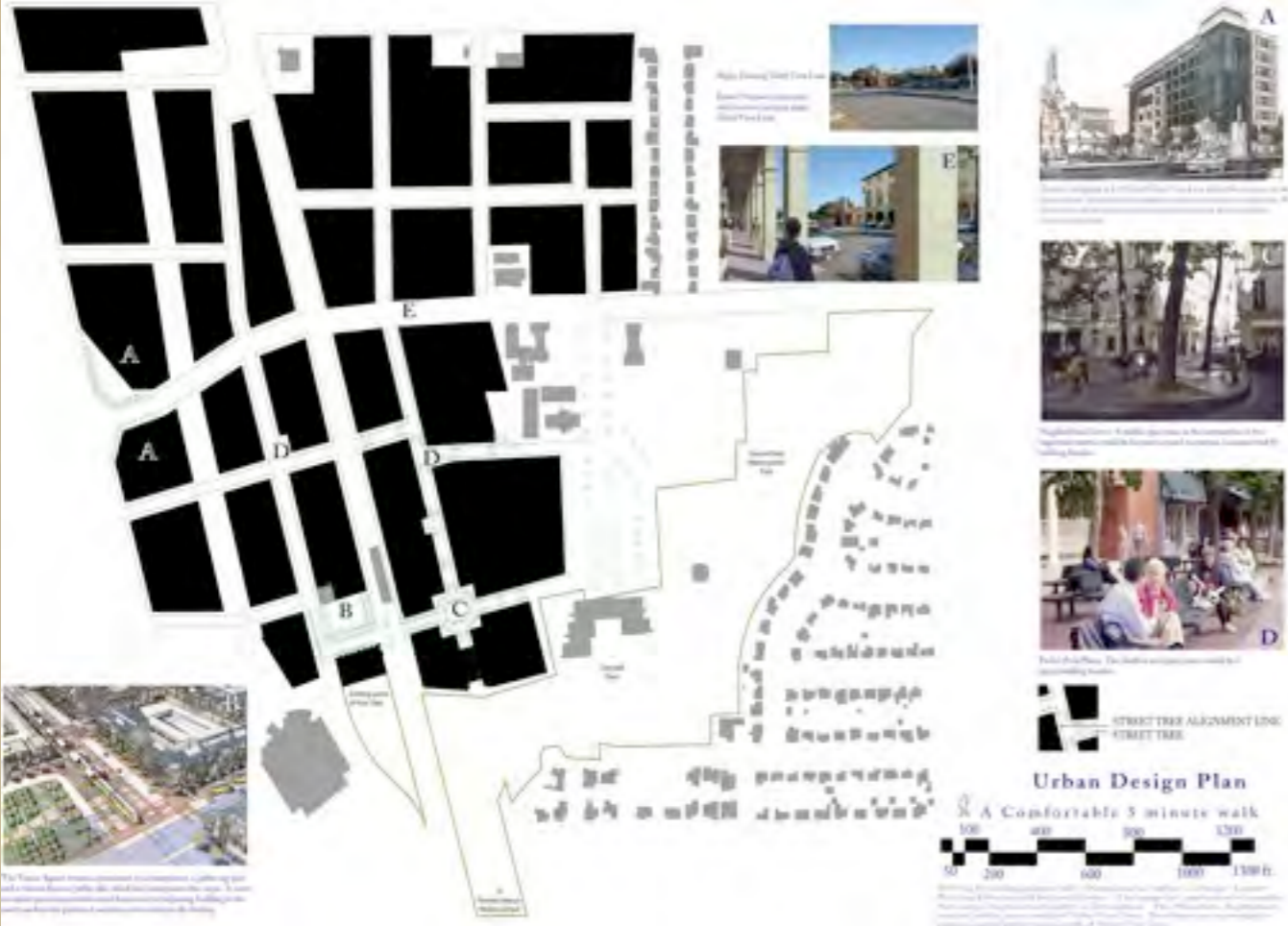


VISION



# Elements of FBCs

## 2. Public Space Standards

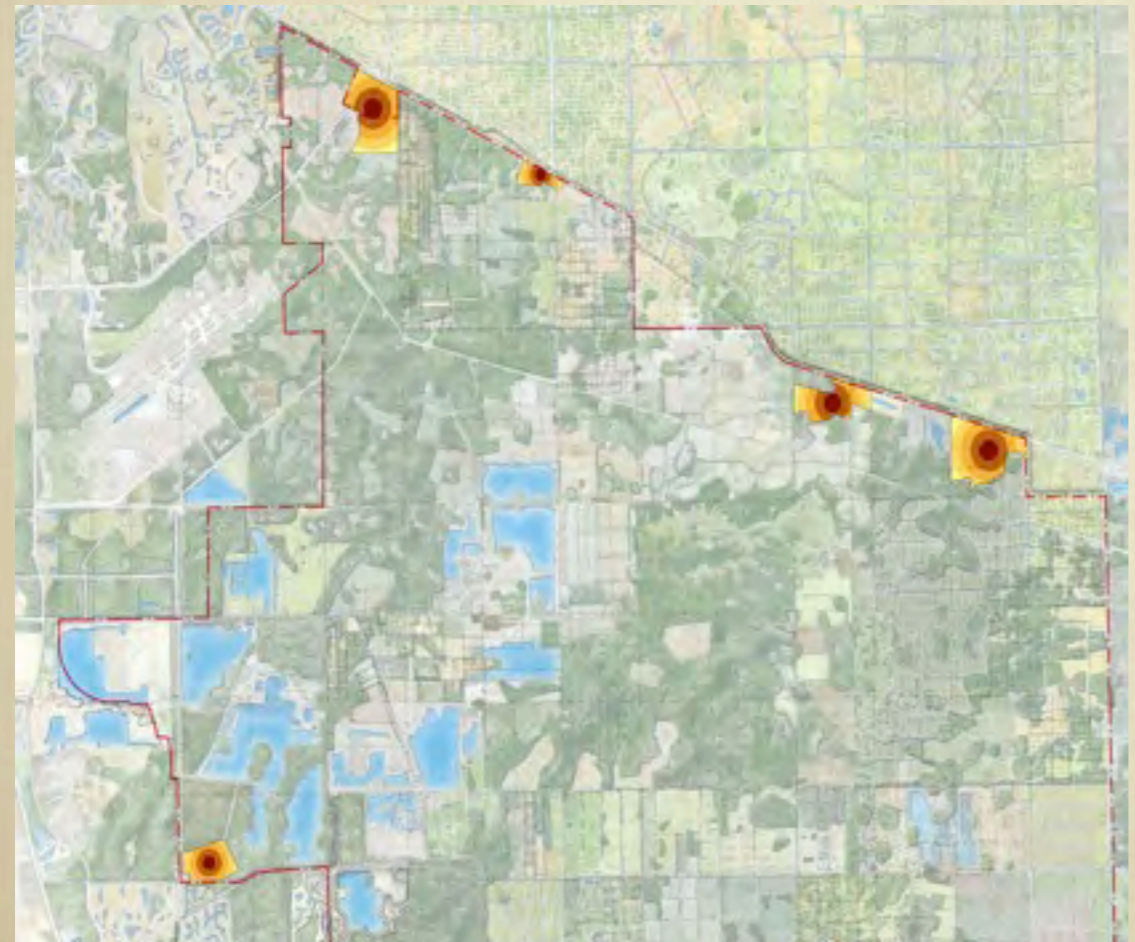
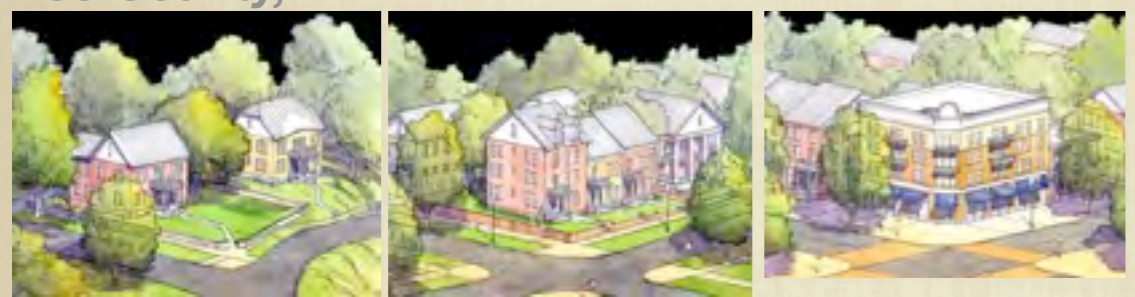




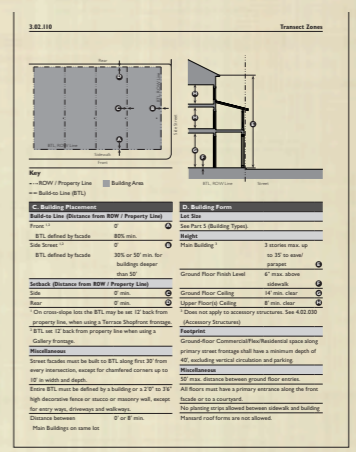
2 FBCs operate at different scales & intensities of urbanism, allowing a seamless framework to integrate transportation choices that reduce trips & preserve the environment.



Lee County, FL



Livermore, CA



Development Code  
City of Livermore, CA

2011 Driehaus Award Winners

# VENTURA'S URBAN FOOTPRINT

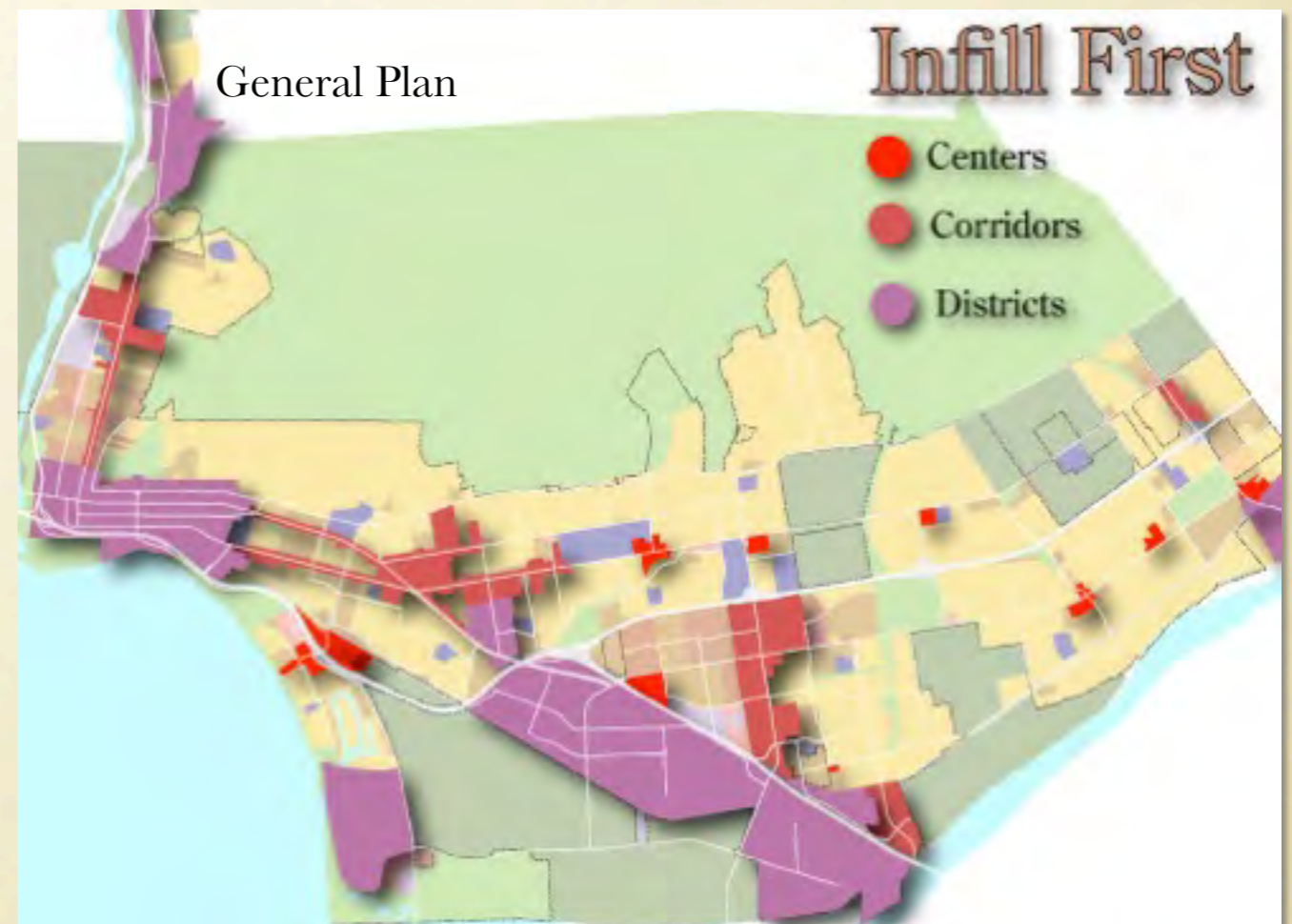
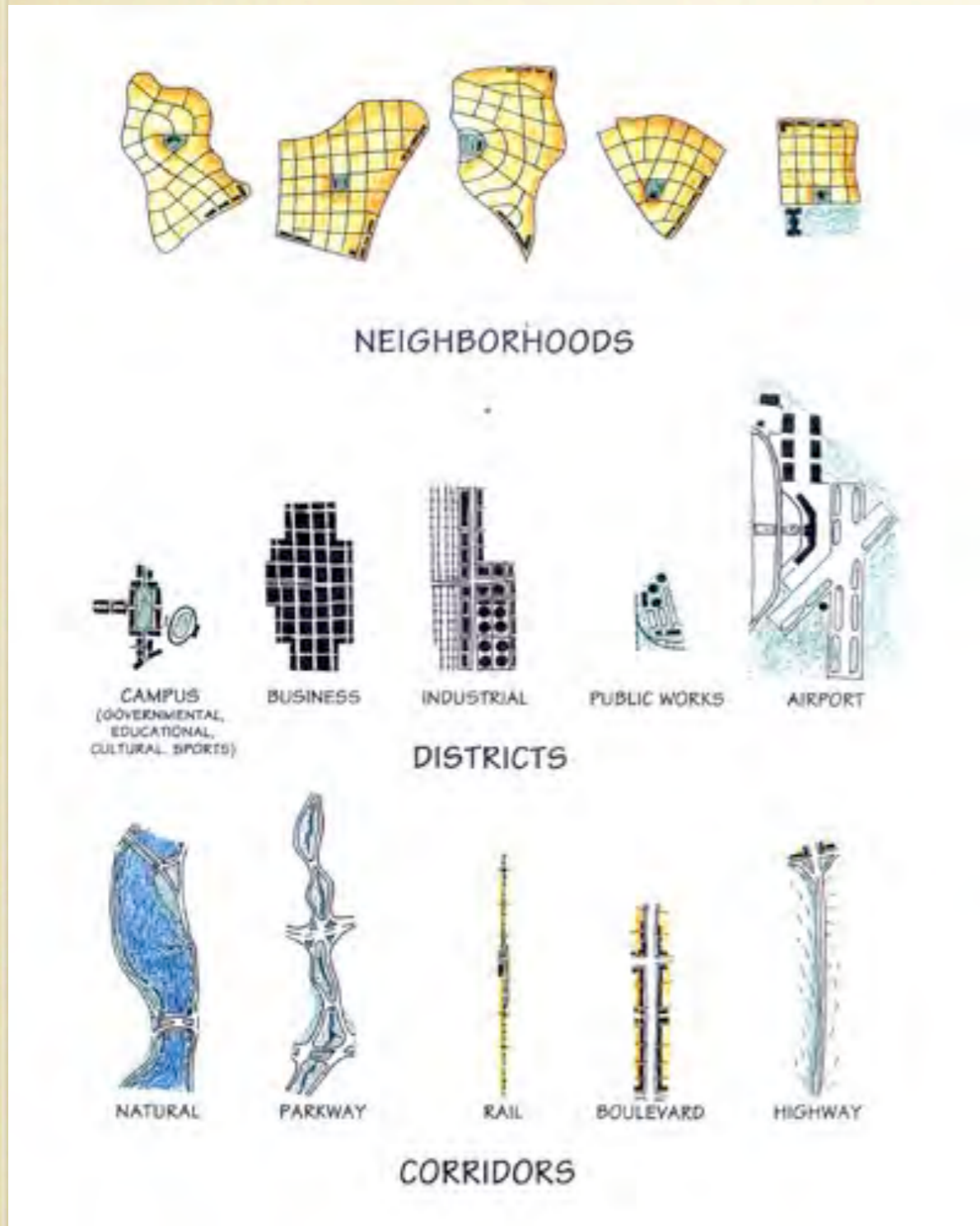
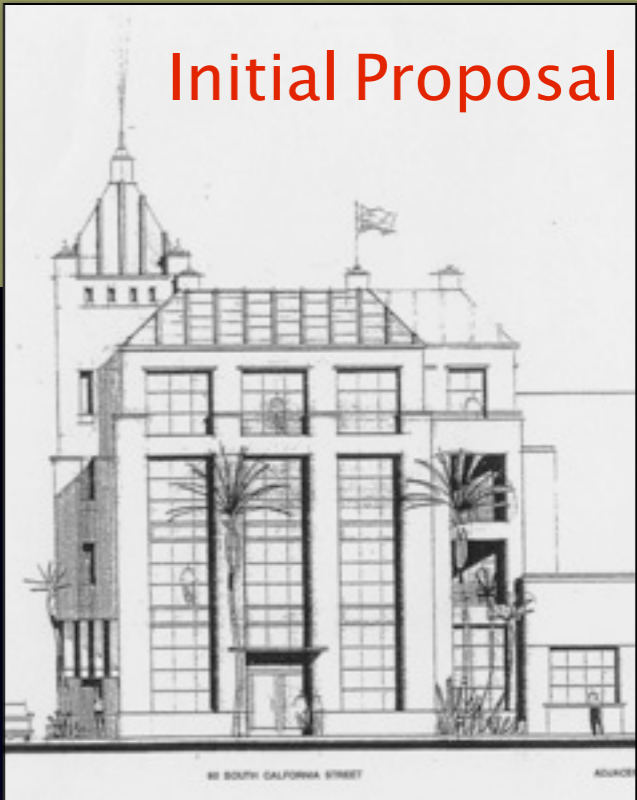


Image Courtesy of DPZ

3 FBCs produce “lovable places”



A repeatable architecture



- \$57 Million
- 54 Affordable Units for Artists
- 15 Supportive Housing Units
- 13 Market Rate
- Gallery/Theater Space
- 6100 sq. ft. Retail

