Planning for A New Energy and Climate Future

...and Why Where You Build Matters

Jan Mueller
Environmental & Energy Study Institute
www.eesi.org

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Winter Conference
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Environmental and Energy Study Institute

Innovative Solutions for a Sustainable World

EESI

- Founded in 1984, by a bipartisan Congressional caucus
- Provides timely information for policymakers and their constituents on energy and environmental issues
- Builds coalitions and stakeholder networks
- Special focus on climate, energy efficiency, renewable energy, bio-energy, green buildings, and transportation

Planning for a New Energy and Climate Future

Joint Project with the American Planning Association

Goal: To Help Planners and Communities...

» Promote Energy Security
» Reduce GHGs
» Adapt to a Changing Climate

Location, Location, Location….and Context

Greenhouse Gas Footprint Differences:

- Among States
- Among Metropolitan Areas
- Within Metro Regions
- Among Neighborhoods

Science and Impacts

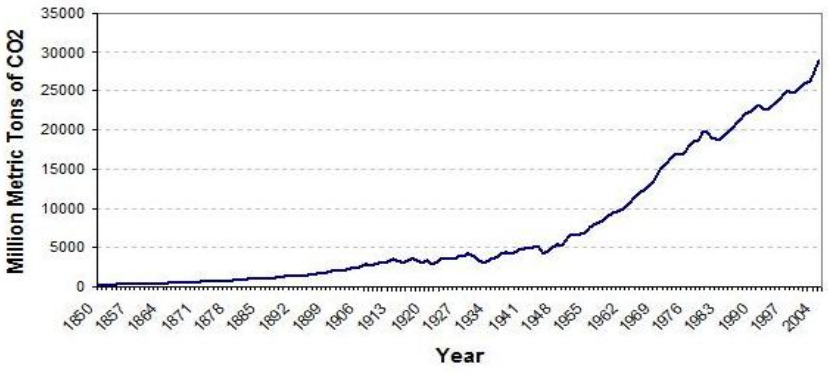
The Challenge

Defining Greenhouse Gas Footprint

Implications for Planning

Strategic Points of Intervention

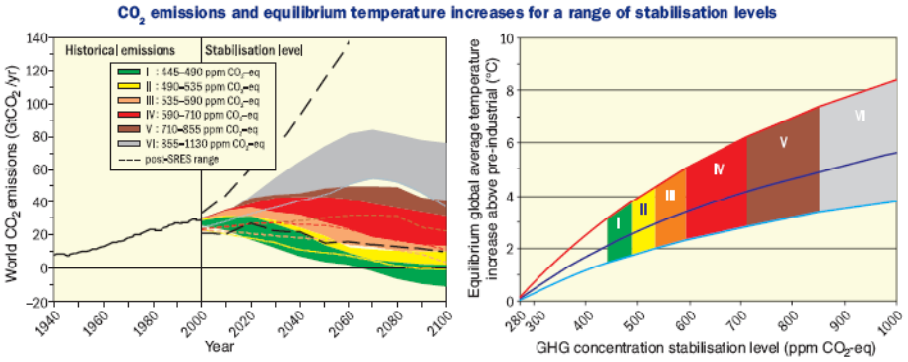
Historical Global CO_2 Emissions* (1850-2004)



*from Fuel Burning, Cement Manufacture, and Gas Flaring

Source: Marland et. al (2007) Global, Regional, and National CO_2 Emissions. In Trends: A Compendium of Data on Global Change. CDIAC U.S.A.

Emissions need to peak soon!



Source: IPCC Fourth Assessment

Impacts

- Increased temperature extremes
- Some areas wetter= increased flood and storm damage, especially in coastal areas, population displacement
- Some areas drier = decreased water availability, increased drought in mid-latitudes, arid areas
- Some areas may experience both extremes
- Agricultural productivity?
- Ecosystem upheaval
  - Species extinction
  - Species migration
  - Increased wildfire risk

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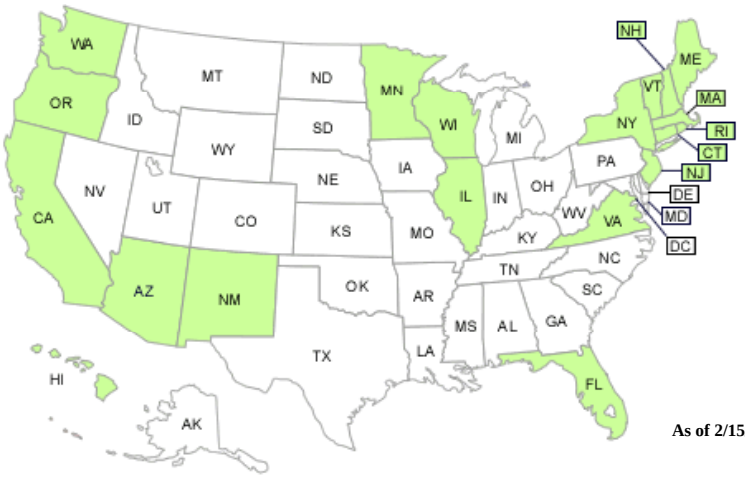
Reduce greenhouse gas emissions:

- **80%** below 2000 levels by 2050 ("**80 x 50**")
- From **7 billion** metric tons CO2 eq year to less than **2 billion** metric tons/year
- From **24 metric tons** CO2eq per American per year to **5 metric tons** per person/year

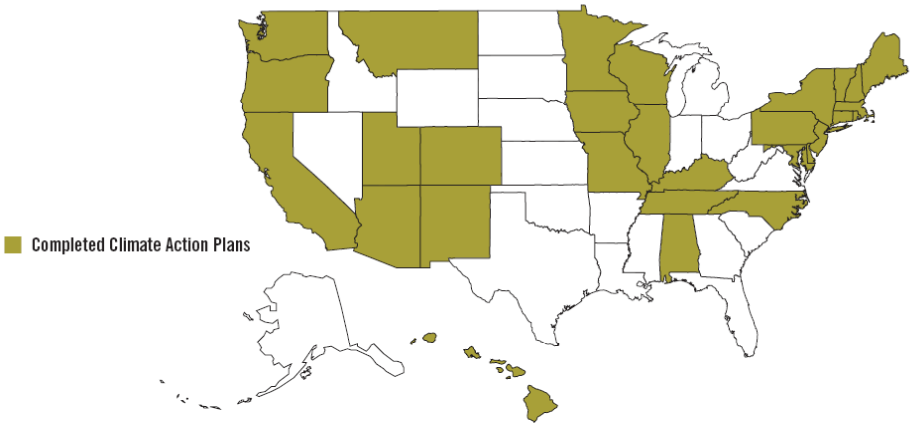
Statewide GHG Targets



As of 2/15/08.

Figure 6

Climate Action Plans



State Climate Change Action Programs

State	Plan Status	Date Released	GHG Reduction Targets	Trans/ Land Use Element?	Includes VMT/TOD?	Includes Infill?	Includes MU/GB?	Regional Plan?	Highlights
PUBLIC									
AL	Recommended actions	Dec 1997	None given	Yes	No	No	No	None	Suggestions for increased efficiency standards, more public transportation
AZ	Advisory Group; Action Plan	Feb 2005; Aug 2006	2000 levels by 2020; 50% below 2000 levels by 2040	Yes	TOD	Yes	MU, GB	WCI	Alternative fuel standards, promote smart growth planning, increased efficiency standards
CA	Public Law AB 32; E.O. S 1-07	Aug 2006; Jan 2007	1990 levels by 2020; 80% below 1990 levels by 2050	Yes (see highlights)	No	No	No	WCI	E.O. S 1-07 created Low-carbon Fuel Std (10% less carbon intensity by 2020)
CO	Action Plan	Nov 2007	20% below 2005 levels by 2020; 80% below 2005 levels by 2050	No	No	No	No	WCI Observer	No dedicated land use element
CT	Advisory Group; Action Plan	Spring 2002; Feb 2005	1990 levels by 2010; 10% below 1990 levels by 2020	Yes	VMT, TOD	No	No	RGGI, NEG-ECP	Plan to increase transit development, VMT reduction incentives, smart growth to penetrate 25% of future development
DE	Action Plan	Jan 2000	7% below 1990 levels by 2010	Yes	VMT	No	GB	RGGI	Raise energy efficiency standards, CAFE standards, develop land use policies
HI	Action Plan	Nov 1998	1990 levels by 2020	Yes	TOD	No	GB	None	Encourage alternative-fuel vehicles, land use policies to reduce congestion, more mass transit
IA	Action Plan (new one in progress); Advisory Group	Dec 1996; April 2007	None given	Yes	No	No	No	MRGGRA	Improve fleet efficiency through feebate program, promote mass transit use

State Climate Action Plans

- Goals, targets vary widely
- Most focused on electricity, energy tech
- Transportation, land use included in some
- Most overlook full range of planning areas

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Defining Greenhouse Gas Footprint

- Direct Energy Use—Electricity, Transportation, Heating and Cooling
- Indirect Energy Use or Energy “Embedded" in the Production of Goods, Services, and Materials
- Agriculture and Land Use Change
- Industrial Processes

GHG emissions per capita, 2000 (excludes land use change)

- Qatar 54.7 Mt/person
- Kuwait 30.4
- Australia 25.3
- USA 24.3
- Canada 22.1
- Japan 10.8
- European Union 10.5
- China 3.9

Figure 2-1

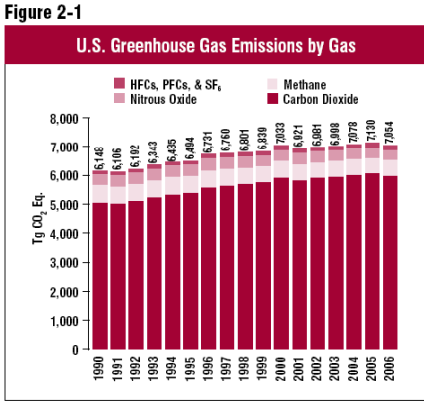
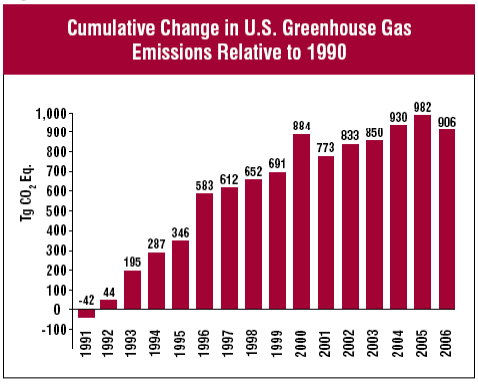
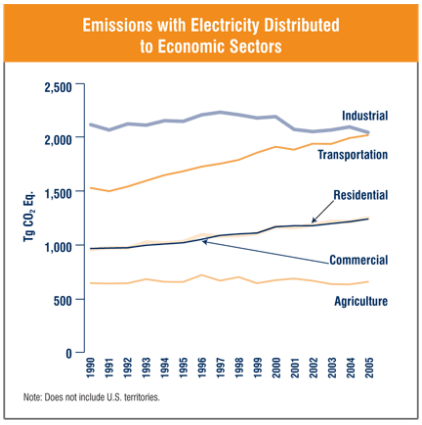


Figure 2-3



Source: US EPA



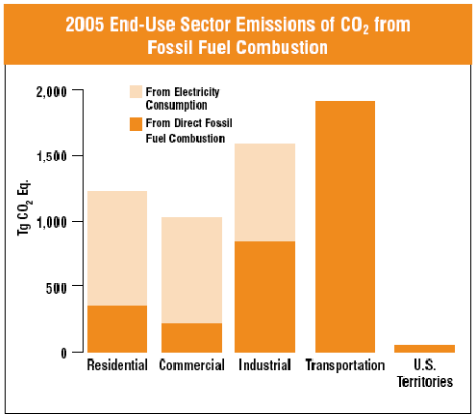
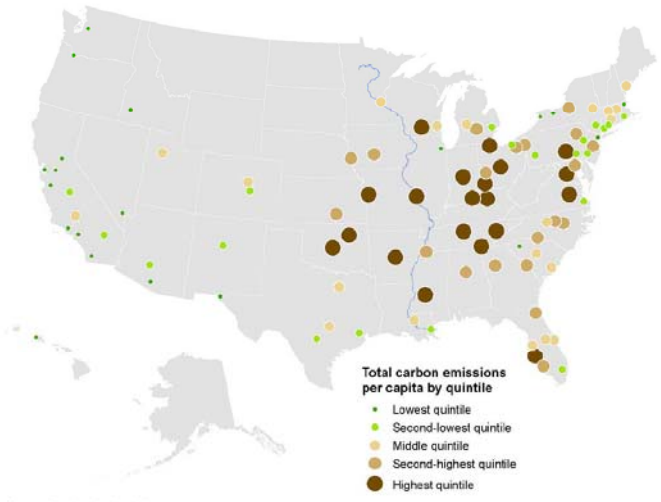
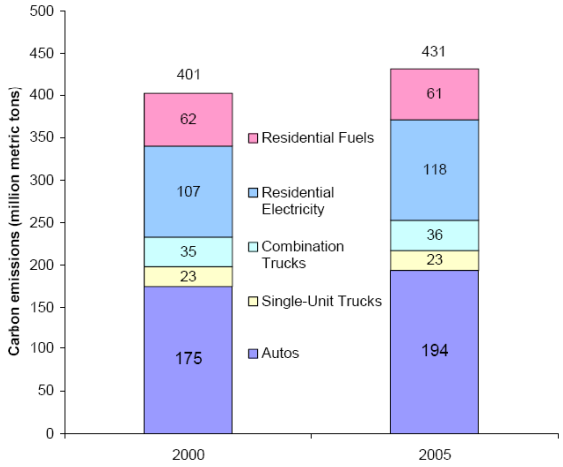


FIGURE 8
All Metro Areas with the Largest Per Capita Footprints Were Located in the East-Central and Eastern United States in 2005, While Most of the Metro Areas with the Smallest Per Capita Footprints Were Located in the West



Source: Authors' calculations

FIGURE 6
The Nation's 100 Largest Metro Areas Produced 431 Million Metric Tons of Carbon from Highway Transport and Residential Buildings in 2005, Up from 401 Million Metric Tons in 2000

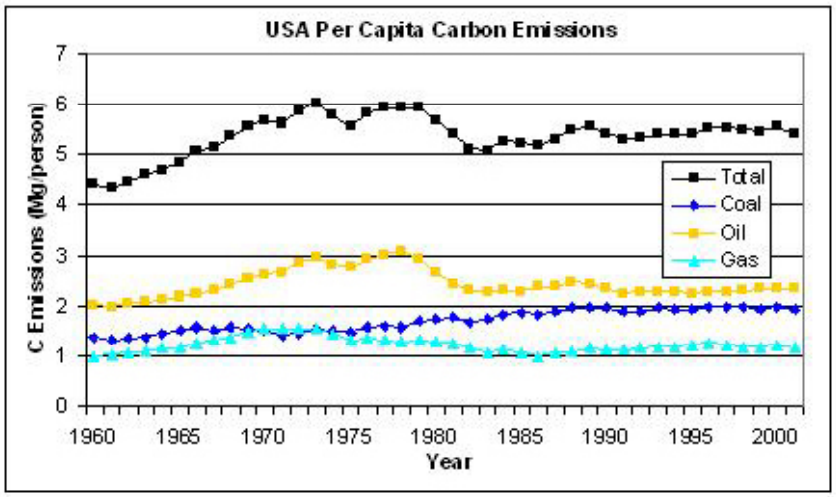


Source: Authors' calculations

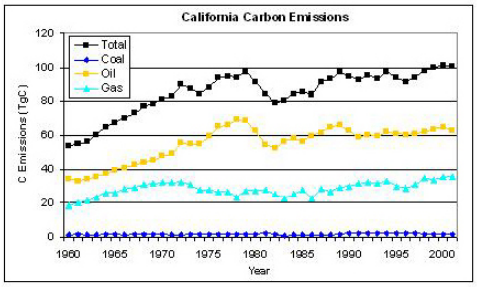
Despite impressive efficiency gains, the total energy used in buildings almost doubled between 1970 and 2005

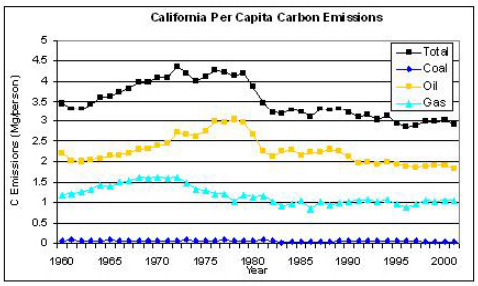
Building energy consumption is projected to increase by 0.8 percent per year through 2030

U.S. per capita carbon emissions : ~22 Mt/yr

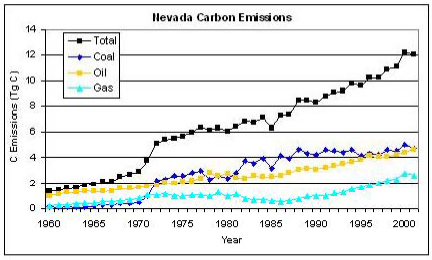


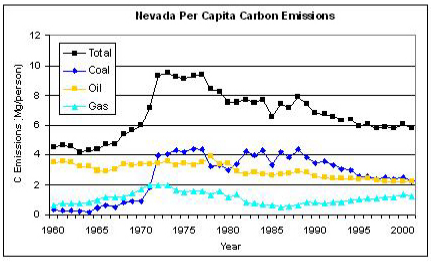
Source: Oak Ridge National Laboratory, USDOE



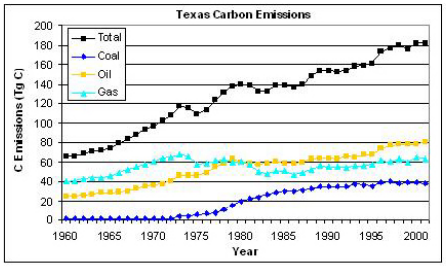


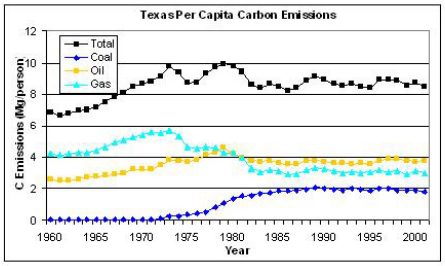
California/New York: ~12 Mt/yr per person





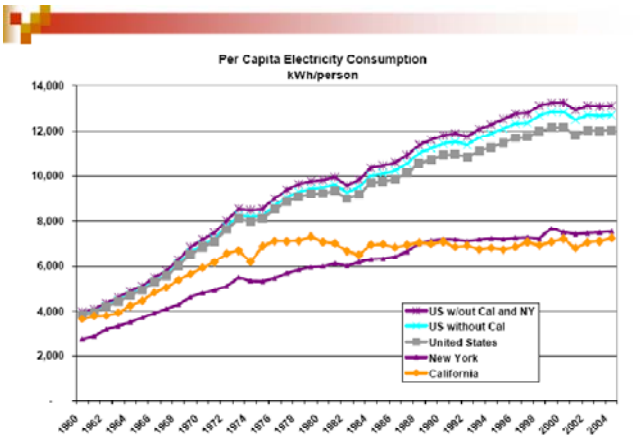
Nevada, Ohio:
~24 Mt/yr per person





Texas/Oklahoma:
~32 Mt/yr per person

Energy/Carbon Intensity



Getting there

- **Efficiency**
  - Technology + Behavior + Planning/Design = Smart systems
- **Low-carbon energy sources**
  - Renewables mostly

Science and Impacts

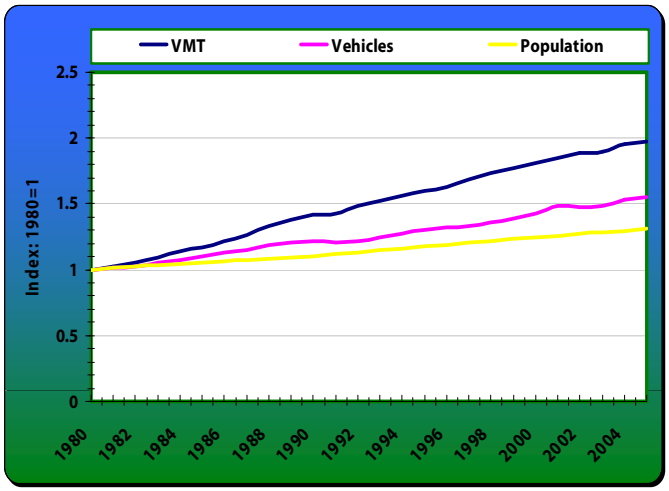
The Challenge

Defining Greenhouse Gas Footprint

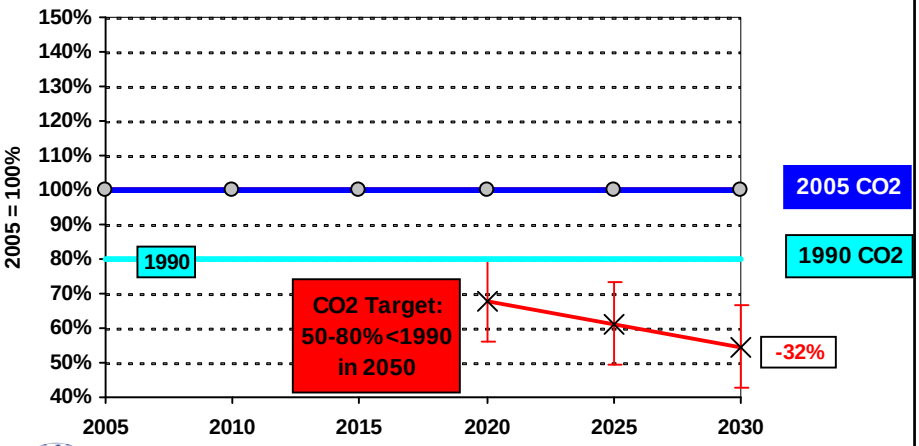
Implications for Planning

- **Development Patterns**
- **Transportation**

Strategic Points of Intervention



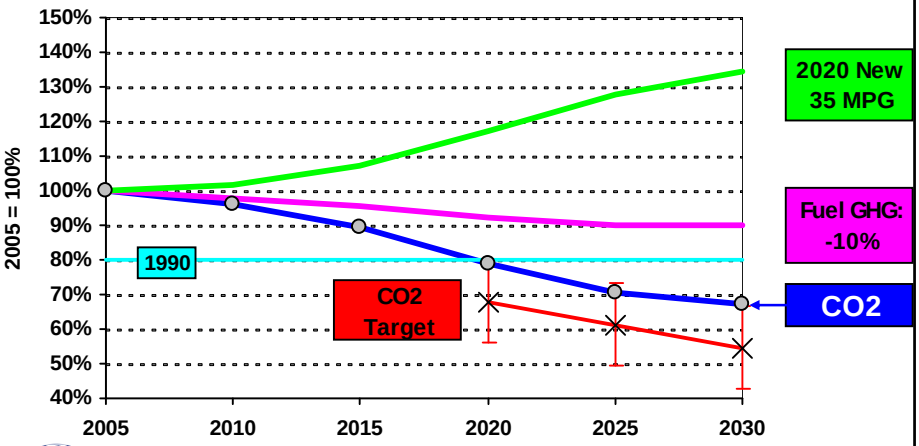
CO2 Targets: 50-80% < 1990 in 2050
≈30% < 1990 in 2030 or "30 by 30"



Center for Clean Air Policy

Source: S. Winkelman based on EIA AEO 2008 and sources cited in *Growing Cooler* .

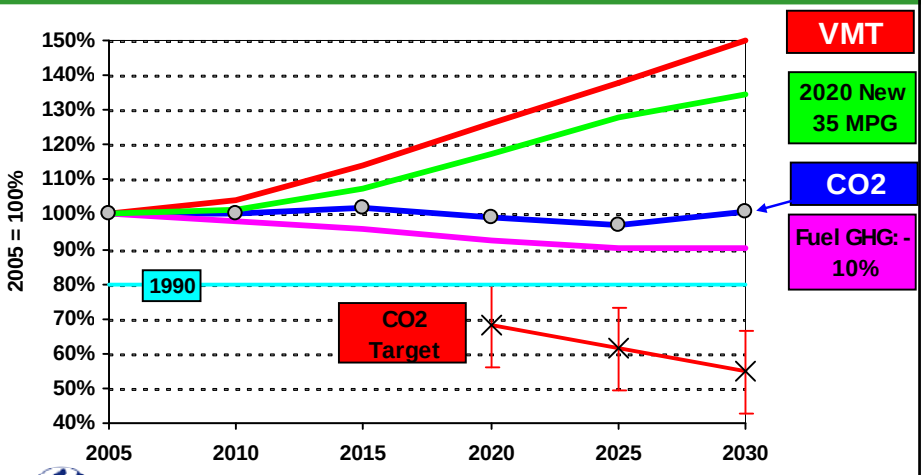
Energy Bill: CAFE & -10% Fuel GHG
by 2025 → 2030 CO2 is 16% < 1990



Center for Clean Air Policy

Source: S. Winkelman based on EIA AEO 2008, HR6, stock model calculations and sources cited in *Growing Cooler* .

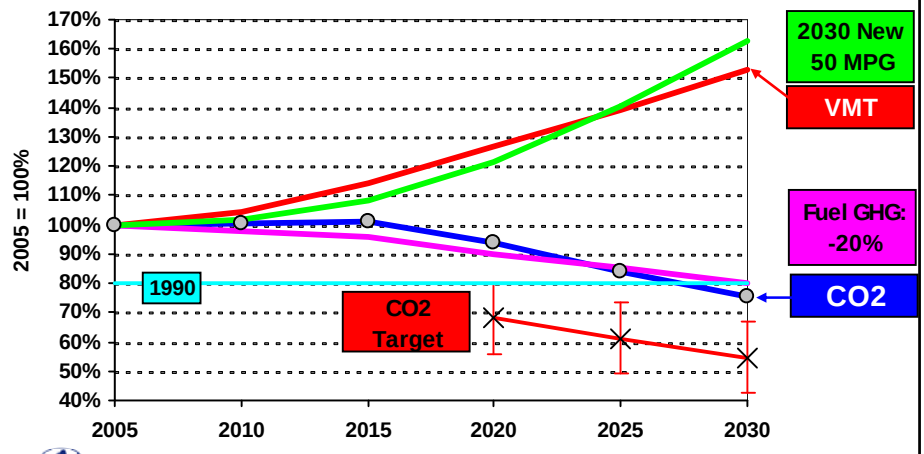
VMT Growth to Wipe Out Energy Bill Savings → 2030 CO2: 26% above 1990



Center for Clean Air Policy

Source: S. Winkelman based on EIA AEO 2008, HR6, stock model calculations and sources cited in *Growing Cooler*.

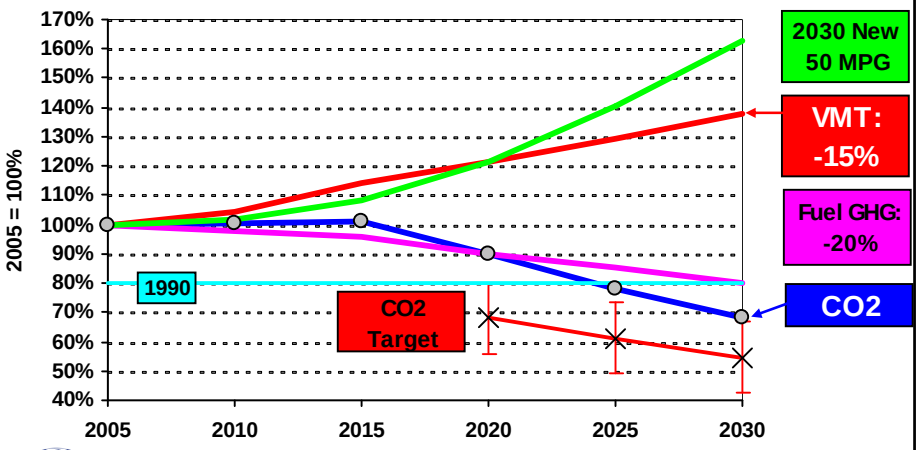
Aggressive Case: 50 mpg in 2030 & -20% Fuel GHG → CO2 6% < 1990



Center for Clean Air Policy

Source: S. Winkelman based on EIA AEO 2008, HR6, stock model calculations and sources cited in *Growing Cooler* .

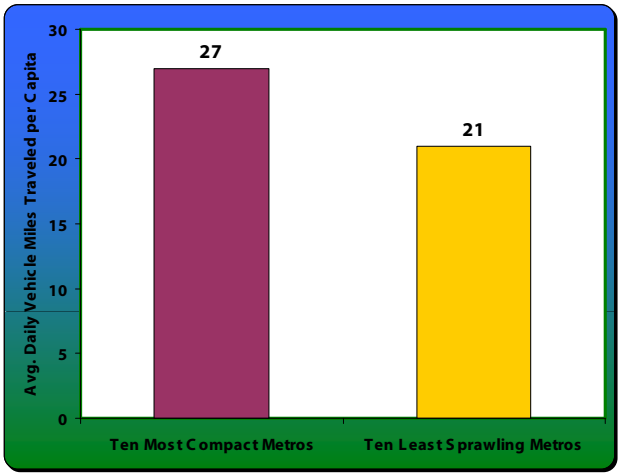
Add Smart Growth -15% VMT → 2030 CO2 is 15% below 1990



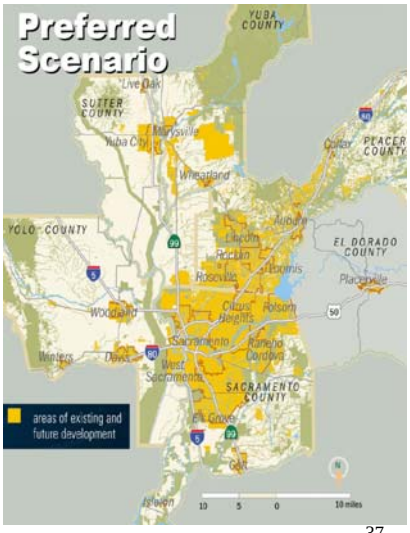
Center for Clean Air Policy

Source: S. Winkelman based on EIA AEO 2008, HR6, stock model calculations and sources cited in *Growing Cooler* .

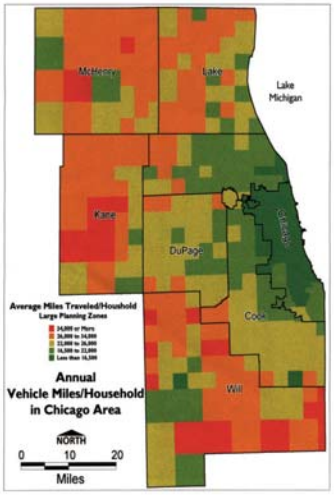
25% Less VMT with Compact Development



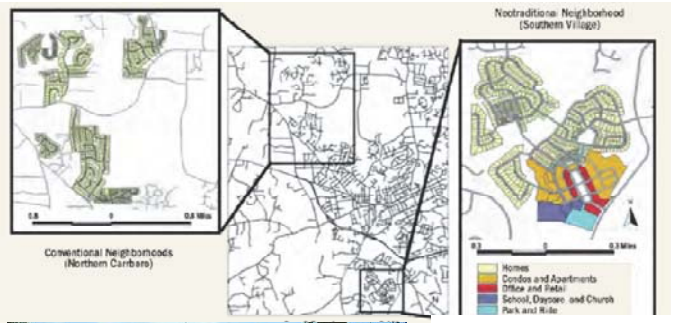
Regional Simulations

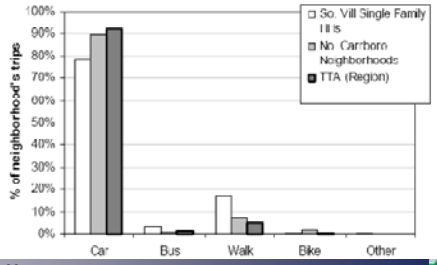


Disaggregate Travel Studies



Southern Village (40% less VMT)





Science and Impacts

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Implications for Planning

- Development Patterns
- Transportation
- **Infrastructure and Utilities**

Strategic Points of Intervention

Infrastructure & Utilities

COMMUNITY ENERGY =

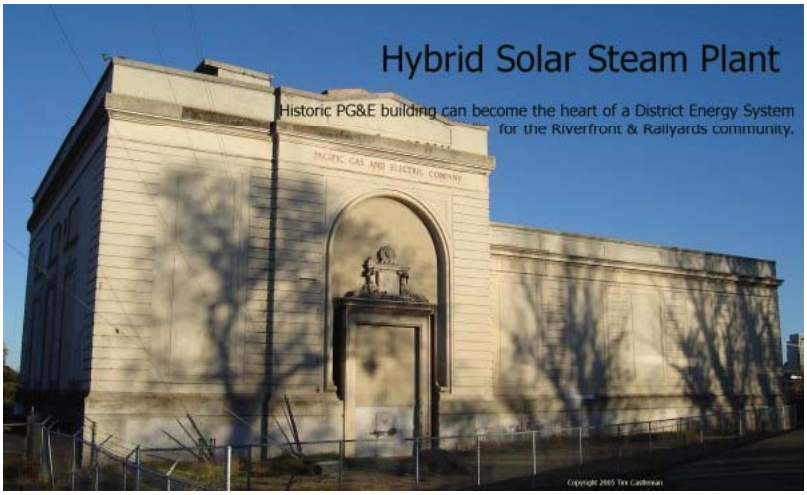
- Community Wind
- Community Solar
- District Heating and Cooling, and
- Combined Heat and Power Using Renewables

Community Wind

- Can reduce cost per installed kilowatt from 30 to 50 percent over small residential wind projects
- Needs minimum wind speed of 10-11 mph
- Payback period as low as six years.

Community Solar

- Chelan County PUD (WA) SNAP Program
- Customers agreed to pay $2.50 to $50 to purchase solar power/
- Grid-connected installations on 26 schools and 8 non-profit organizations
- Generates 95 kW for 900 participants
- Alcoa donated labor = more than $600,000



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- Development Patterns
- Transportation
- Infrastructure and Utilities
- **Economic Development**

Strategic Points of Intervention

SAFEWAY

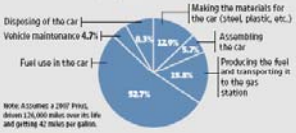
patagonia

Measuring the Footprints

Greenhouse-gas emissions associated with six common products*

CAR Toyota Prius

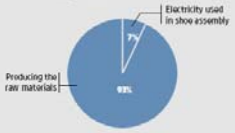
TOTAL FOOTPRINT: **97,000 pounds**



Note: Assumes a 2007 Prius, driven 120,000 miles over its life and getting 42 miles per gallon.

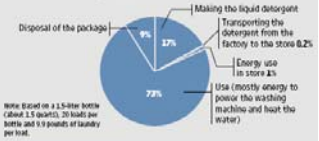
PAIR OF HIKING BOOTS Timberland Winter Park Slip On Boots

TOTAL FOOTPRINT: **121 pounds**



LAUNDRY DETERGENT Tesco Non-Biological Liquid Wash

TOTAL FOOTPRINT: **31 pounds**



Note: Based on a 1.5-liter bottle (about 1.5 quarts), 20 loads per bottle and 1.9 pounds of laundry per load.

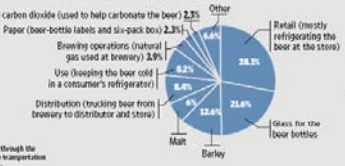
FLEECE JACKET Patagonia Talus Jacket

TOTAL FOOTPRINT: **66 pounds**†

† Includes emissions from producing the oil that's used to make the polyester through the jacket's arrival at Patagonia's distribution center in Reno. Nev. Doesn't include transportation from the distribution center to retail stores, which Patagonia says is negligible.

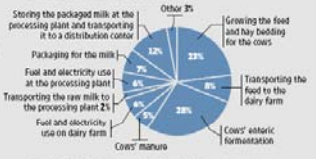
SIX-PACK OF BEER Fat Tire Amber Ale

TOTAL FOOTPRINT: **7 pounds**



HALF-GALLON OF MILK Aurora Organic Dairy

TOTAL FOOTPRINT: **7.2 pounds**††



†† Data for a half-gallon of Aurora organic milk; number for other milks may vary

*Footprints are expressed in carbon-dioxide-equivalent pounds. Percentages may not total 100% due to rounding.

Sources: Toyota; Kreidler & Associates; Timberland; Tesco; Patagonia; New Belgium Brewing Co.; Aurora Organic Dairy; University of Michigan's Center for Sustainable Systems

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- Development Patterns
- Transportation
- Infrastructure and Utilities
- Economic Development
- **Building and Site Design**
- **Natural Resources**

Strategic Points of Intervention

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Strategic Points of Intervention

- Vision and Goal-Setting
- Plan Development
- Policies and Incentives
- Project Development
- Education, Coordination, and Leadership

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