TOD and Global Weirding
Global warming = Climate change
Global warming = Climate change = Global ‘weirding’
“Imagine you are driving in your car and every mile you drive you throw a pound of trash out your window. And everyone else on the freeway in their cars and trucks is doing the exact same thing.....Well, that is exactly what we are doing; you just can’t see it. Only what we are throwing out is a pound of CO2 – that’s what goes into the atmosphere, on average, every mile we drive.”

Nate Lewis, California Institute of Technology, quoted in Thomas Friedman’s Hot Flat, and Crowded
World Clock 2008

World Population 6,759,626,594

- Male: 3,396,628,288
- Female: 3,362,998,305
- Births: 77,305,973
- Deaths: 34,159,610
- India: 1,167,073,322
- European Union: 505,227,460
- United States: 306,648,510
- Under 15 yrs: 1,825,099,180
- 15-64: 4,393,757,286
- 65+ years old: 540,770,128
Current World Population: 6.8 billion

Current U.S. Population: 307 million
Oil reserves left:
14,700 days (40 years)

Carbon concentration in atmosphere:
388.8 parts per million
A few months ago, James Hansen, the director of NASA's Goddard Institute for Space Studies, in Manhattan, took a day off from work to join a protest in Washington, D.C. The immediate target of the protest was the Capital Power Plant, which supplies steam and chilled water to congressional offices, but more generally the entire capitol complex, which is the world's leading source of greenhouse gas emissions. As it happened, on the day of the protest it snowed. Hansen was wearing a black coat and a dark, woolen overcoat handed. He had forgotten to bring gloves. His sister, who lives in D.C., had seen along with the rest of the nation, the news that the capitol complex was being shut down. She called him and told him that he was not doing his job. Hansen was not worried. He was confident that his work was doing its job. He was confident that the world was doing its job. He was confident that the universe was doing its job. He was confident that the future was doing its job.

"The climate is clear. This is our chance."
“There’s no precise term for the level of CO2 that will assure a climate disaster; the best that scientists have been able to come up with is the phrase ‘dangerous anthropogenic interference’, of DAI. Most official discussions have been premised on the notion that DAI will not be reached until CO2 levels hit 450 parts per million. Hansen, however, has concluded that the threshold for DAI is much lower.”
"The bad news is that it’s become clear that the dangerous amount of CO2 is no more than 350 parts per million’ he told the crowd in Concord. The really bad news is that CO2 levels have already reached 380 parts per million. (For the 10,000 years prior to the industrial revolution, CO2 levels were about 280 parts per million, and if current emissions trends continue they will reach 450 parts by around 2035.)"
Betraying the Planet

So the House passed the Waxman-Markey climate-change bill, in political terms, it was a remarkable achievement.

But 212 representatives voted no. A handful of those no votes came from representatives who considered the bill too weak, but most rejected the bill because they rejected the whole notion that we have to do something about greenhouse gases.

And so I watched the dozen or so Republicans make their arguments, I couldn’t help thinking that I was watching a form of bravura — bravura against the planet.

To fully appreciate the irresponsibility and immorality of climate-change denial, you need to know about the green toll taken by the latest climate research.

The fact is that the planet is changing faster than even pessimists expected: ice caps are shrinking, Arctic ice is melting, and sea levels are rising, all at a terrifying rate. And according to a number of recent studies, catastrophe — a rise in temperatures so large as to be almost unthinkable — can no longer be considered a mere possibility. It is, instead, the most likely outcome if we continue along our present course.

Thus researchers at MIT, who were previously predicting a temperature rise of a little more than four degrees by the end of this century, are now predicting a rise of more than six degrees.

Why? Global greenhouse gas emissions are rising faster than expected; some mitigating factors, like absorption of carbon dioxide by the oceans, are turning out to be weaker than hoped; and there’s growing evidence that climate change is itself reinforcing — that, for example, rising temperatures will cause more Arctic ice to disappear, releasing even more carbon dioxide into the atmosphere.

Temperature increases on the scale predicted by the MIT researchers and others would create huge disruptions in our lives and our economy. As a recent authoritative U.S. government report points out, by the end of this century New Hampshire may well have the climate of North Carolina today. Illinois may have the climate of New York State, and across the country severe, deadly heat waves — the kind that traditionally occur only once in a generation — may become annual or biennial events.

In other words, we’re facing a clear and present danger to our way of life, perhaps even to civilization itself. Can anyone justify failing to act?

Well, sometimes even the most unimpeachable analysis gets things wrong. And if dissenting opinion makers and politicians based their dissent on hard work and hard thinking — if they had carefully studied the issue, consulted with experts and concluded that the overwhelming scientific consensus was misguided — they could at least claim to be acting responsibly.

But if you watched the debate on Fox News, you didn’t see people who were thought hard about a crucial issue and are trying to do the right thing. What you saw, instead, were people who have no interest in the truth. They don’t like the policy and political implications of climate change, so they’ve decided not to believe in it, and they’ll grab any argument, no matter how reprehensible, that fortifies their denial.

Indeed, if there was a defining moment in Friday’s debate, it was the statement by Representative Paul Broun of Georgia that climate change is nothing but a “hoax” that’s been “perpetuated out of the scientific community.” I’ll call this a crazy conspiracy theory, but doing so would actually be unfair to crazy conspiracy theorists. After all, to believe that global warming is a hoax you have to believe in a vast cabal consisting of thousands of scientists — a cabal so powerful that it has managed to create fake records on everything from global temperatures to Arctic ice.

Yet Mr. Broun’s declaration was met with a round of applause from his Republican colleagues. Given this contempt for hard science, I’m almost reluctant to mention the dollars dishonesty on matters economic. But in addition to rejecting climate science, the opponents of the climate bill made a point of misrepresenting the estimates of the bill’s economic impact, which all suggest that the cost will be relatively low.

Still, is it fair to call climate denial a form of treason? Isn’t it as commonsense as slash and burn? Yes, it is — and that’s why it’s unforgivable.

Do you remember the days when Bush administration officials claimed that terrorism posed an “existential threat” to America, a threat in whose absence normal rules no longer applied? That was hyperbole — but the existential threat from climate change is all too real.

Yet the declaimers are wrong, willfully, to suggest that treason, placing future generations of Americans in grave danger, simply because it’s in their political interest to pretend that there’s nothing to worry about. If that’s not betrayal, I don’t know what is.

ONLINE: OPINION TODAY

Columnist Ross Douthat "Have modern American couples let anxiety destroy their passion and romance?" nytimes.com/opinion
“The fact is that the planet is changing faster than even pessimists expected: ice caps are shrinking, arid zones spreading at a terrifying rate.... Researchers at MIT who were previously predicting a temperature rise of a little more than 4 degrees by the end of this century are now predicting a rise of more than 9 degrees. Why? Global greenhouse gas emissions are rising faster than expected; some mitigating factors, like absorption of CO2 by the oceans, are turning out to be weaker than hoped; and there’s growing evidence that climate change is self-reinforcing – that, for example rising temperatures will cause some arctic tundra to defrost, releasing even more CO2 into the atmosphere.”
“Temperature increases on the scale predicted by the MIT researchers and others would create huge disruptions in our lives and the economy. As a recent authoritative US government report points out, by the end of this century New Hampshire may well have the climate of North Carolina today, Illinois may have the climate of East Texas, and across the country extreme, deadly heat waves – the kind that traditionally occur only once in a generation – may become annual or biannual events. In other words, we’re facing a clear and present danger to our way of life. How can anyone justify failing to act?”
Transportation’s share of greenhouse gases

Million Metric Tons CO$_2$e

- Direct use of fossil fuels in homes, commercial buildings, and industry: 1,562
- Transportation: 1,985
- Electric Power Sector: 2,344

Source: Energy Information Administration
Relationship of VMT growth to population growth

- Biggest factor: increasing trip lengths (longer commutes)
Relationship of VMT growth to population growth

Source: Nate Silver, “The End of Car Culture,” Esquire Magazine, 2009
Relationship of VMT growth to population growth

Source: USDOT Research and Innovative Technology Administration
The key question: Can TOD contribute to a reduction (or slowdown in growth) of VMT/greenhouse gases?

Source: Portland Streetcar, Inc.
The 4 D’s to reduce VMT

Density
Diversity
Design
Destination accessibility
The 4 D’s to reduce VMT

- Density
- Diversity
- Design
- Destination accessibility
- Distance to transit
2002 study: Doubling density corresponds to lowering VMT by 25%
Holtzclaw/Clear/Dittmar/Goldstein/Hass: “Location Efficiency”, Transportation Planning and Technology
2004 study: Residential density within 1 mile of station increases rail ridership:

- 10 units/acre: 24.3% use transit
- 20 units/acre: 43.4% use transit
- 40 units/acre: 66.6% use transit

TCRP 102: TOD in the United States
2004 study:
Employment density within 1 mile of station increases rail ridership:
• 5 jobs/acre: 11% use transit
• 20 jobs/acre: 26.5% use transit
• 60 jobs/acre: 52.1% use transit

TCRP 102: TOD in the United States
2006 study: Compact development = lower VMT per person

Ohland/Poticha: “Streetsmart” from Portland Metro Travel Survey

Daily VMT Per Capita

- Good transit/mixed use
- Good transit only
- Remainder of county
- Remainder of region

Bar graph showing daily VMT per capita for different areas.
2008 study: Typical TOD density reduces CO2 per household by two-thirds
Allen/Criterion Planners: “Cool Spots”

Land-Use and CO2

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2008 study: High-density residential environment results in 65% carbon footprint reduction compared with typical suburban environment

Hovee: “Carbon Footprint Benefits Modeling”
2008 study: High-density employment environment results in 45% carbon footprint reduction compared with typical suburban environment

Hovee: “Carbon Footprint Benefits Modeling”
2002 study: Doubling land use mix reduces per capita auto travel by 5%
Ewing/Cervero: “Travel and the Built Environment,” Transportation Research Record 1780
2005 study: average CO2 emissions per person directly related to urban form

*Frank: King Co. LUTAQH Report*
2007 study: Compact development generates up to 1/3 fewer miles than traditional developments – the more mix and density, the greater reduction in miles driven.

Bartholomew: “Land Use-Transportation Scenario Planning: Promise & Reality,” Transportation Journal
2008 study: Compact urban development as an alternative to sprawl could reduce VMT by 20-40%.

ULI/Smart Growth America/CCAP: Growing Cooler
2004 study: Households in transit zones in cities with major transit systems own an average of 0.9 cars per household, compared with 1.6 in metro area as a whole.

*Reconnecting America: “Hidden in Plain Sight”*
2004 study: 54% of residents living in transit zones commute by car, compared with 83% in metro areas

Reconnecting America: “Hidden in Plain Sight”
2007 study: Residents in the most walkable neighborhoods drive 26% fewer miles per day than those living in the most sprawling neighborhoods.

Frank/Kavage/Appleyard: “The Urban Form and Climate Change Gamble” Planning Magazine
2008 study: TOD results in up to 50% reduction in daily trips compared with typical development

Arrington/Cervero: “Effects of TOD on Housing, Parking, and Travel,” TCRP 128
Destination accessibility
2002 study: Commute trips by transit were more than 3 times higher in the ten least sprawling metro areas compared with the most sprawling areas.

Ewing/Pendall/Chen – Smart Growth America: Measuring Sprawl and its Impact, Smart Growth America
2002 study: average daily VMT per capita was 25% less in compact urban areas
• 27 miles per capita per day in 10 most sprawling metro areas
• 21 miles per capita per day in ten least sprawling metro areas

Ewing/Pendall/Chen - Smart Growth America: Measuring Sprawl and Its Impact
2004 study: Transit accounts for about one-fifth of trips to retail sites in TODs (Walking accounts for one in ten trips)

*Lund/Cervero/Willson: “Travel Characteristics of TOD in California”*
Distance to transit
2000 study: number of vehicles per person decreases by 24% for those living within ¼ mile of a transit station vs. those living a mile or more away.

Gossen: Travel Characteristics of TOD and Non-TOD Residents in the San Francisco Bay Area
2000 study: average VMT per household within ½ mile of transit ½ that of those living one mile away

*MTC Bay Area STARS Survey*
2004 study: Residents living near transit stations are 5 times more likely to commute by transit as the average resident in the same city not living near transit.

- Employees working in TOD are 3.5 times more likely to commute by transit than others.

*BART/CalTrans: Travel Characteristics of TOD in California*
2006 study: 30%+ of Portland area TOD residents commute by light rail at least once a week, and 23-33% use transit as primary commute mode (compared with 15% of all Portland workers and 10% of those in suburbs)

Dill: “Travel and Transit Use at Portland Area TODs”
2007 study: Households within ¾ mile of transit average 11.3 fewer daily VMT and spend roughly half the typical household on auto fuel expenditures

Putting it All Together: Atlantic Station (Atlanta)
Putting it All Together: Atlantic Station (Atlanta)

- Brownfield site (former steel mill)
- 138 acres
- 5,000 residences
- 6 million square feet of office space
- 2 million square feet of retail and entertainment
- 1,000 hotel rooms
- 11 acres of public parks
VMT Generation:
• 8/day for residents, 11/day for employees (vs. 32/day for region)
• At least 50% reduction in per capita VMT
Green Design and TOD.... one more way to reduce greenhouse gases

- Saving water
- Saving energy
- Reducing pollution during construction
- Enhancing indoor air quality
- Providing alternative transportation
Green Design and TOD.... real-world examples

Bay Meadows
San Mateo, CA

• Buildings must meet sustainability checklist
• Integrated design that are energy efficient and water conserving
• Materials should be recycled, reusable, non-toxic and local
Green Design and TOD.... real-world examples

Eon at Lindbergh Station
Atlanta, GA

•Largest “EarthCraft House” certified multi-family development in Georgia
  •HVAC energy conservation
  •Material resource efficiency
  •Reduced outdoor water consumption
  •Bonus points awarded for TOD features
Cool Spots Defined

Neighborhoods with:

- Superior regional accessibility
- High-density mixed land-uses
- Multi-modal travel environment
- High-efficiency infrastructure
- Renewable energy production
- Local food production

Lower per capita CO₂ emissions
Welcome to TravelMatters, the website for those interested in learning more about how travel habits and transportation choices affect global climate change. TravelMatters offers a trio of resources—interactive emissions calculators, on-line emissions maps, and a wealth of educational content—to emphasize the close relationship between more efficient transit systems and lower greenhouse gas emissions.

In achieving a world climate balance, travel choices do matter. To learn more, click the icons below, or simply follow the sidebar menu.

Individual Emissions Calculator

The TravelMatters Individual Calculator measures how much greenhouse gas you generate as a result of your daily transportation activity. Simply enter the monthly distances you traveled by mode of transportation: on foot, by bicycle, car, bus, train, plane, or boat—and the calculator will do your "greenhouse gas accounting" for you.

You can save and later access your monthly emissions profile. You can save your emissions profile in order to compare your greenhouse gas emissions over time.

Please select the month your responses are for and answer all of the questions for this month only.

- Month: [Select month]
- Year: [Select year]

Please select the city that you live in, or that is closest to where you live:
- Select urbanized area: [Select option]
GROWING COOLER
THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE

KTED EWING
KEITH BAIRTOLOMEW
STEVE WINKELMAN
JERRY WATERS
DON CHEN

Urban Land Institute
• Compact development reduces VMT by 20-40%.
• Neighborhoods with good land use mix typically result in 5-15% lower VMT per capita.

Overall Conclusions
Overall Conclusions

- Improved regional accessibility reduces per capita VMT by 10-30%
- Residents of TODs tend to own 10-30% fewer vehicles and use alternative modes 2-10 times more than residents of auto-oriented communities
Overall Conclusions

- Residents living near and employees working near transit stations are 3-5 times more likely to commute by transit.
- Residents of TODs make up to 50% fewer daily trips than those in typical neighborhoods.
• World population has increased by 3,070 people
• In one day, we will add 295,000 people (equivalent to Riverside, CA or New Orleans)
In the past 15 minutes.....

- World oil reserves are 20 minutes closer to running out
- In one day, we will be 1,920 minutes (or 32 hours) closer to running out
In the past 15 minutes.....

• CO2 concentration in the atmosphere has increased by .0005043 parts per million
• In one day, it will increase by .0030258 parts per million
Between now and 2050...

• Our population will grow from its present number of 307 million to 450 million (by 2100 – 600 million? 1.2 billion?)
• We will construct 89 million new or replaced homes and 190 billion square feet of nonresidential buildings
• Two-thirds of the development on the ground will be built between now and 2050
What are you going to do about it?
And don’t forget......

Join Rail-Volution in 2009 where the American Revolution began!

Rail-Volution 2009 in Boston, Massachusetts
October 30 - November 1, 2009