Reducing CO2 and Energy Use Through Livable Communities: What's Possible and Next Steps

November 12, 2010

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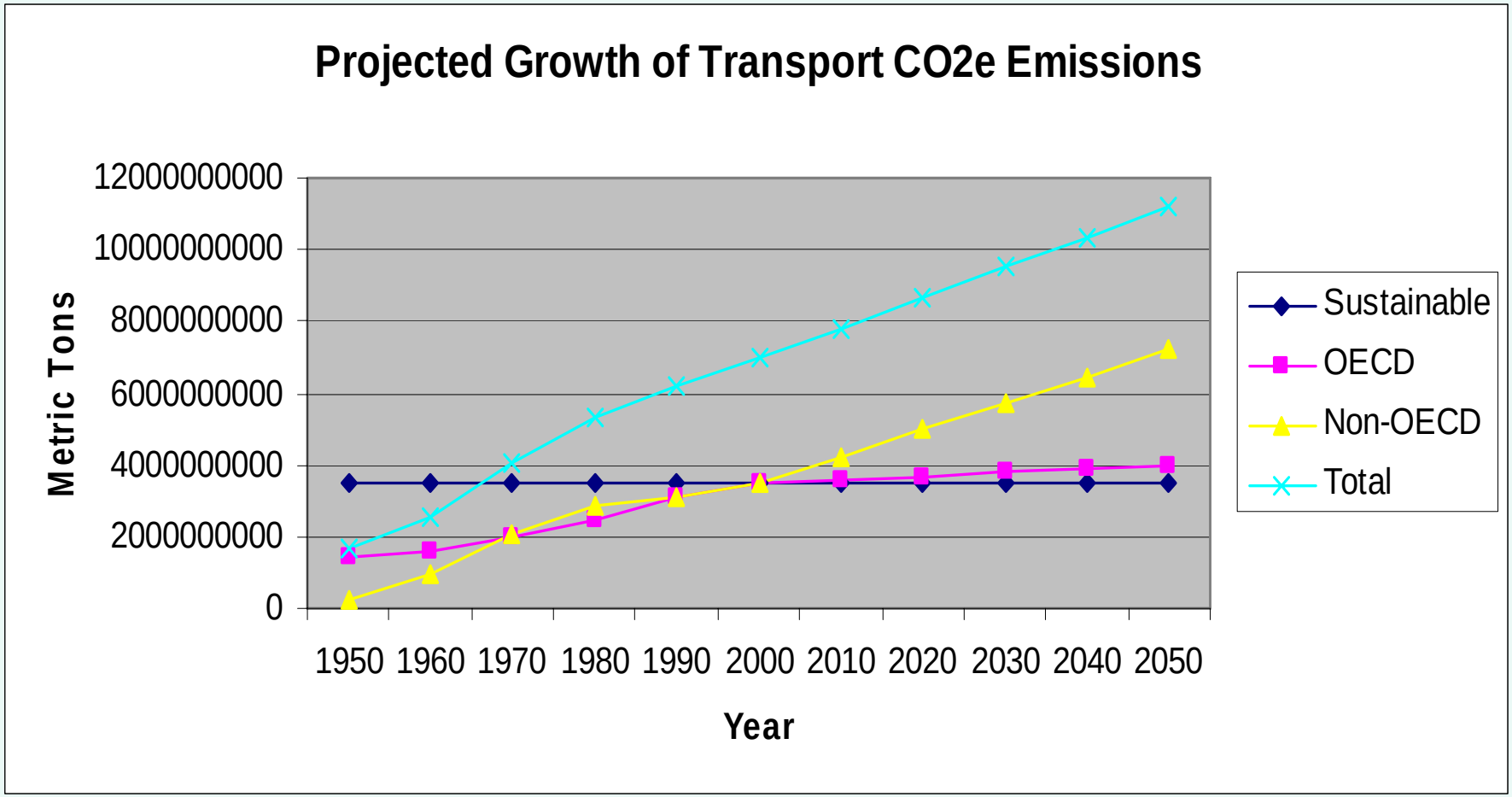
Institute for Transportation and Development Policy
ACEEE 30th Anniversary Symposium, Washington, DC

ITDP
Institute for Transportation & Development Policy

Converging Forces Driving Transportation Transformation

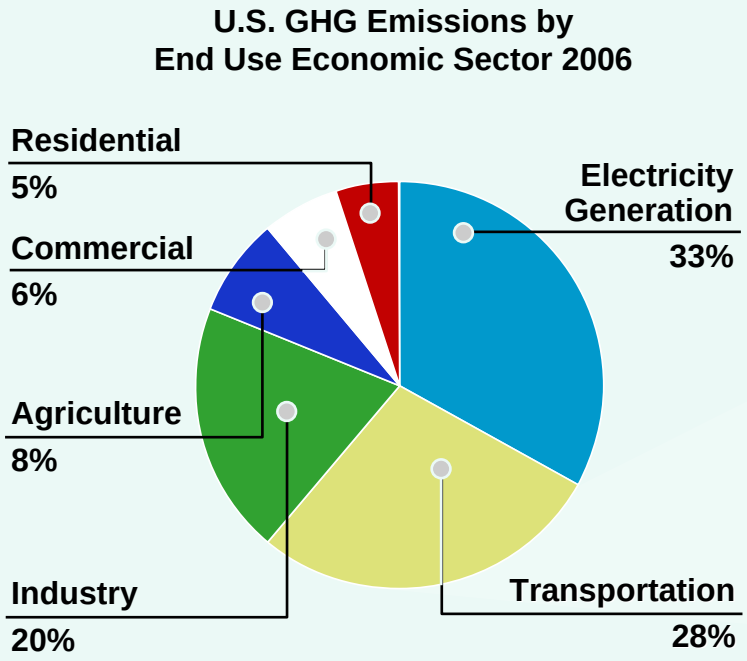
- Rising motorization
- Growing congestion
- Climate change
- Finance challenges
- Public health & safety
- Economic competitiveness
- Growing income inequality

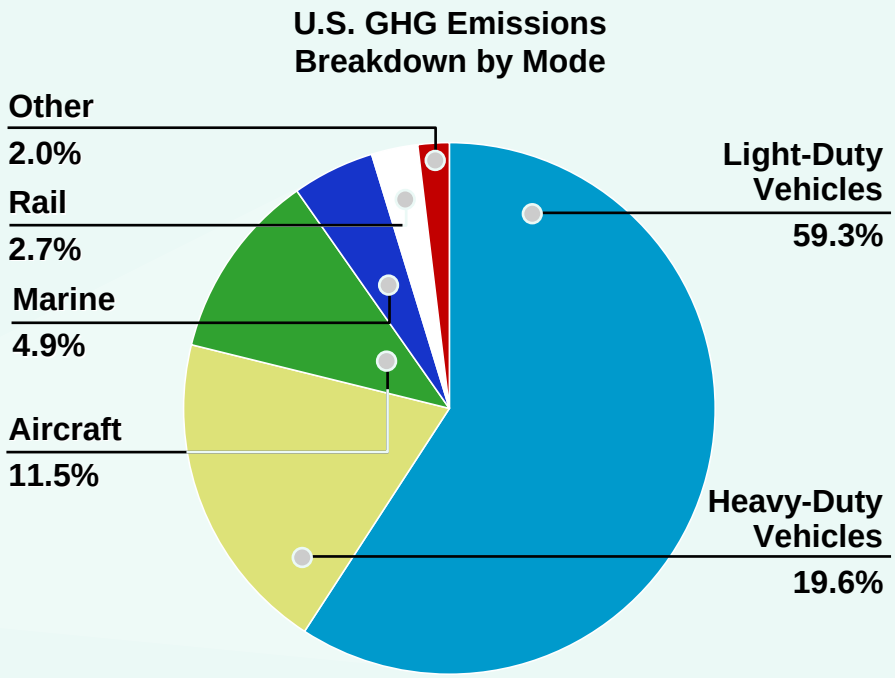
Global transportation CO_2 emissions predicted to grow from 4.6 gT to 11 gT by 2050



50% global reduction from 1990 levels needed by 2050

Transportation's Contribution to U.S. GHGs





From 1990 to 2006, transportation GHG emissions increased 27%, accounting for almost half the increase in total U.S. GHG emissions.

Source: Environmental Protection Agency (EPA). "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007," April 2009, http://epa.gov/climagechange/emissions/usinventory.html.

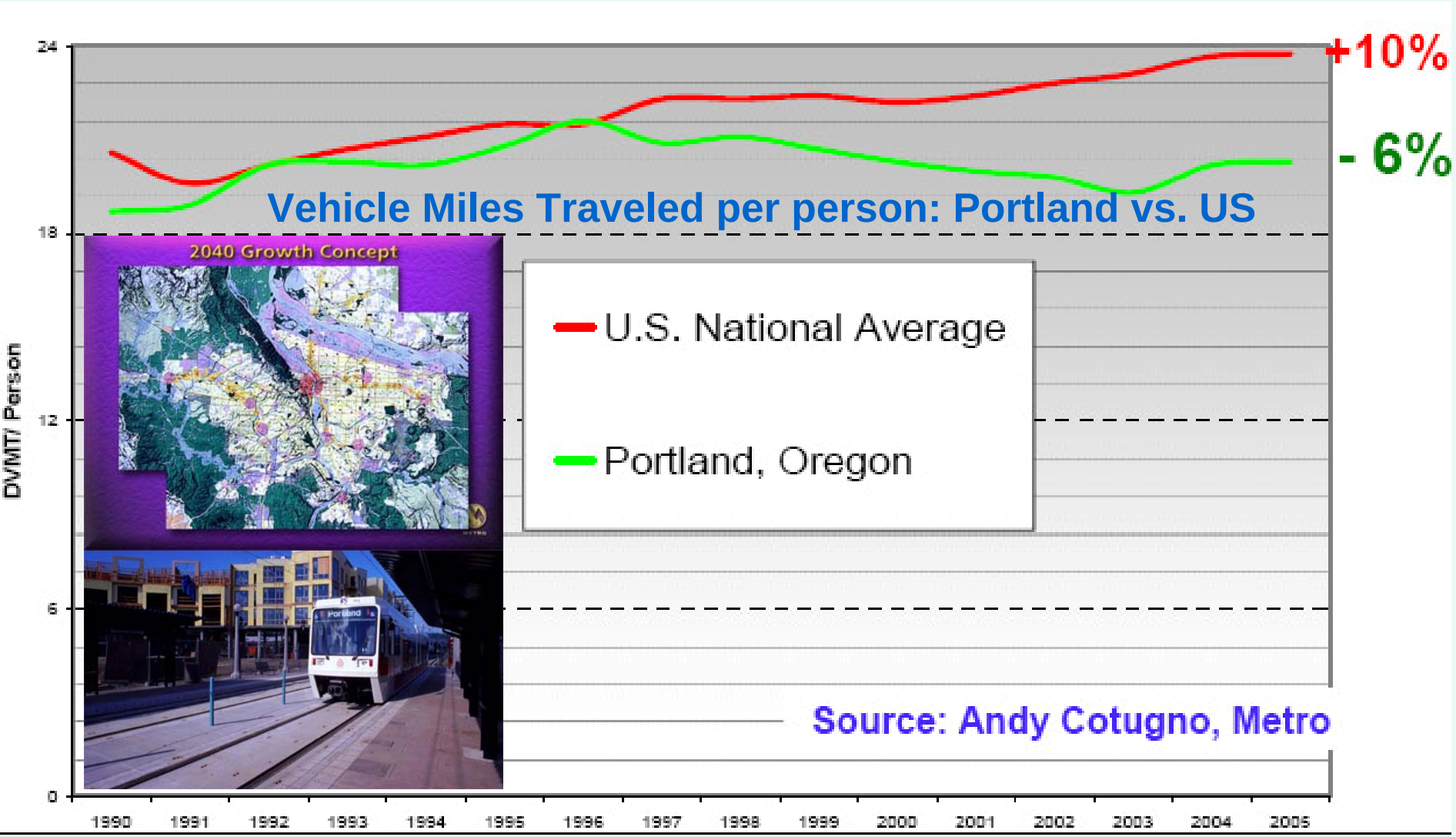
Growth Choice: High or Low Carbon Footprint?

- What growth rate for motor vehicle travel?
- How efficient are transportation networks?
- What implications for overall long-term building and community energy efficiency?

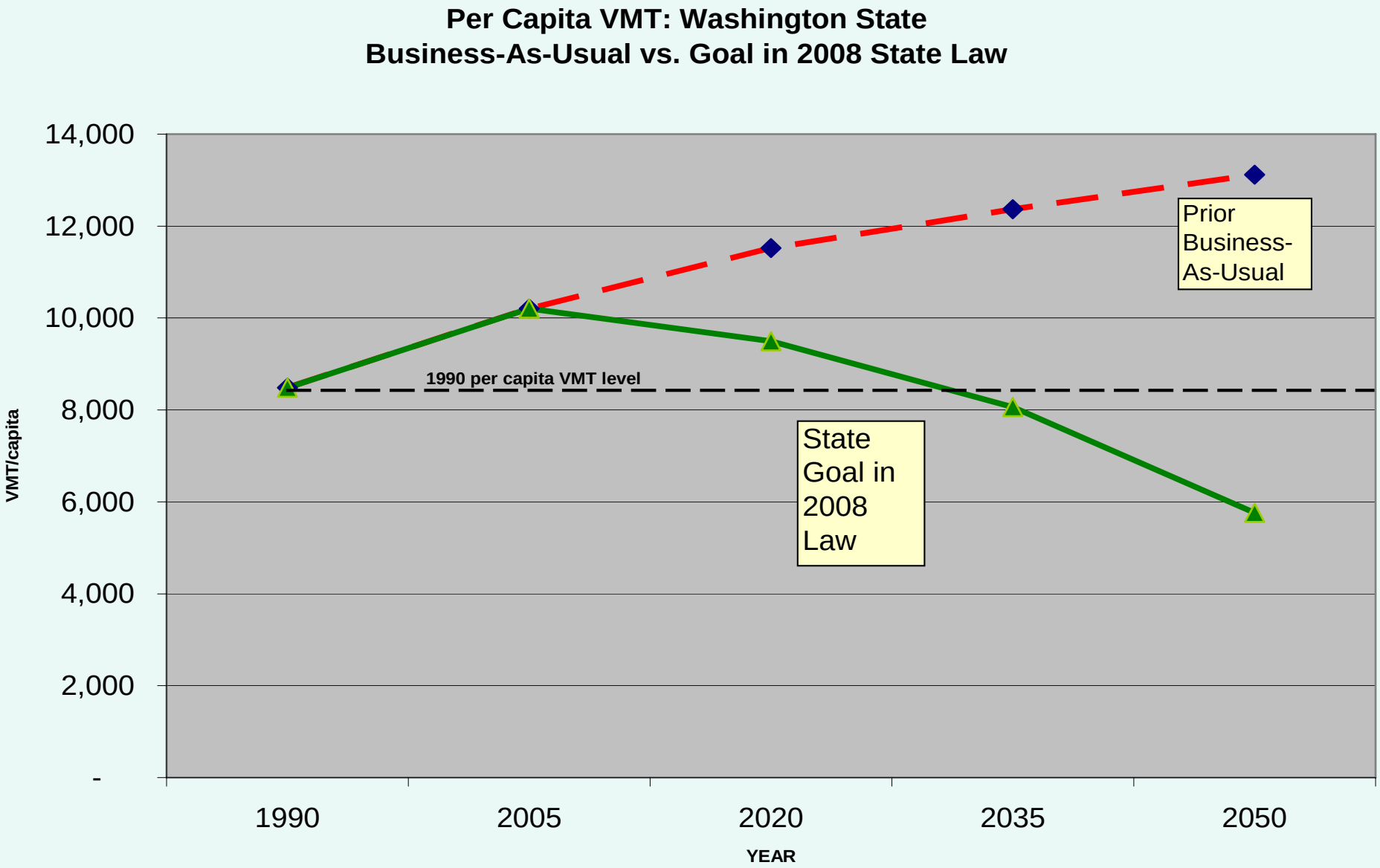
To cut carbon emissions from traffic

- Cut emission rate/mile traveled:
  - Operate roads for peak efficiency (optimal speeds, less congestion)
  - Use more efficient vehicles
  - Use lower carbon fuels
- While cutting distance traveled:
  - Shorten trip lengths
  - Use more efficient modes
  - Reduce need to travel

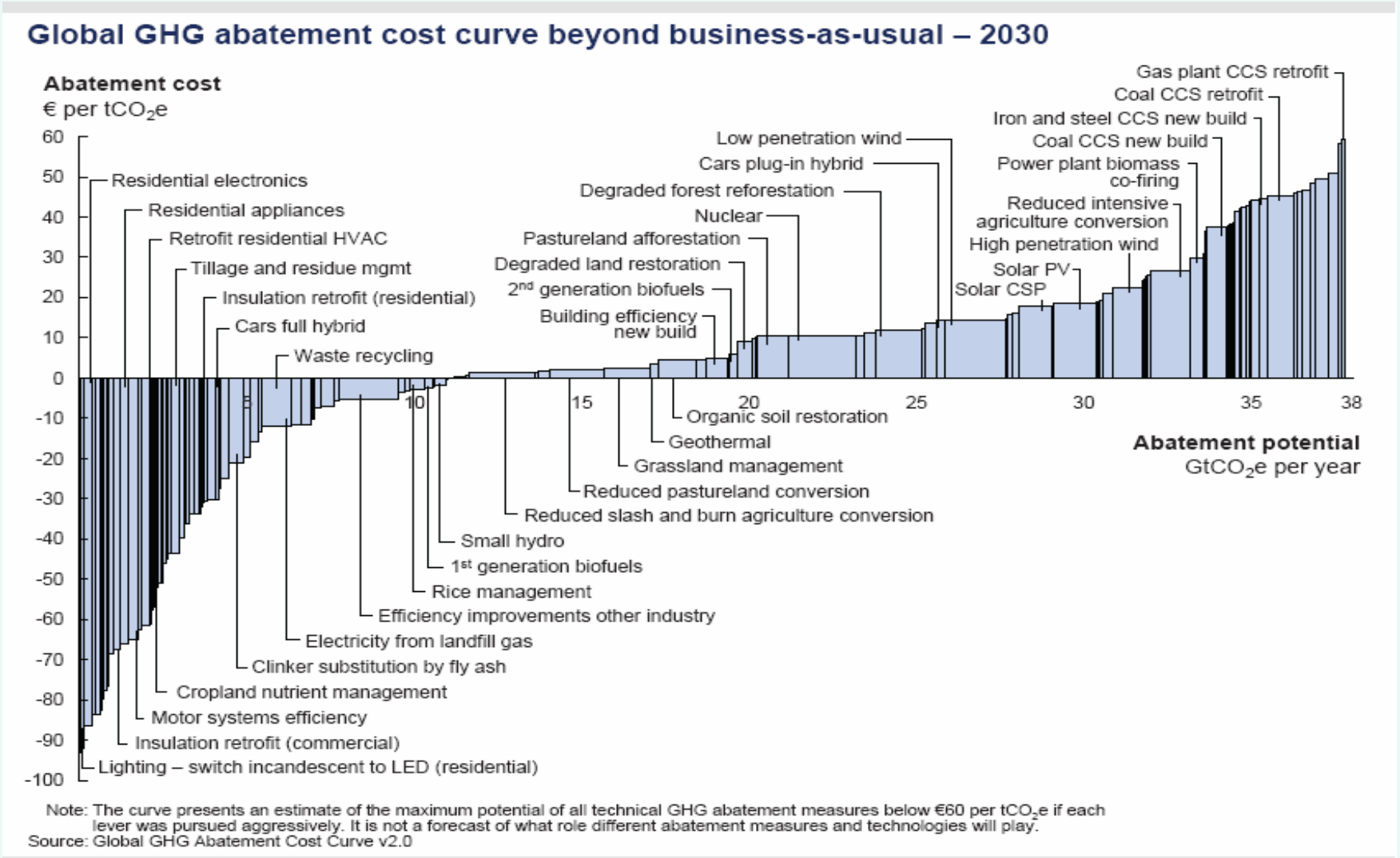
Oregon Transportation Planning Rule
VMT goals on way to being met



Washington State Climate Action VMT Reduction Goal

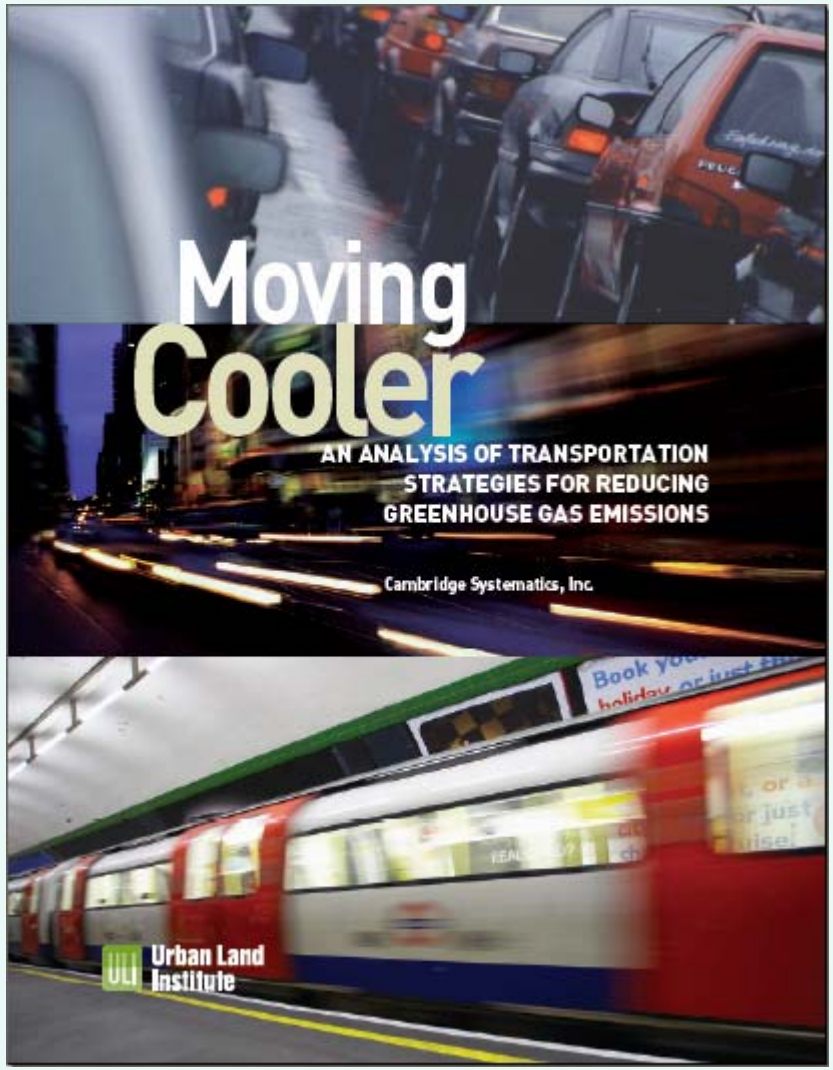


Knowledge Gap:
McKinsey - Pathway to a Low-Carbon Economy Did Not Consider Transportation Management, Smart Growth



Filling the Gap: Moving Cooler

- Fill a gap left by McKinsey and others who analyzed future technologies and fuels but not travel behavior
- Goal of consistent analysis across strategy types



Moving Cooler Study

- **Analytic Team: Cambridge Systematics**
- **Multiple Partners on Steering Committee:**
  - U.S. Environmental Protection Agency
  - U.S. Federal Highway Administration
  - U.S. Federal Transit Administration
  - American Public Transportation Association
  - Environmental Defense
  - ITS America
  - Shell Oil
  - Natural Resources Defense Council
  - Kresge Foundation
  - Surdna Foundation
  - Rockefeller Brothers Fund
  - Rockefeller Foundation
  - Urban Land Institute

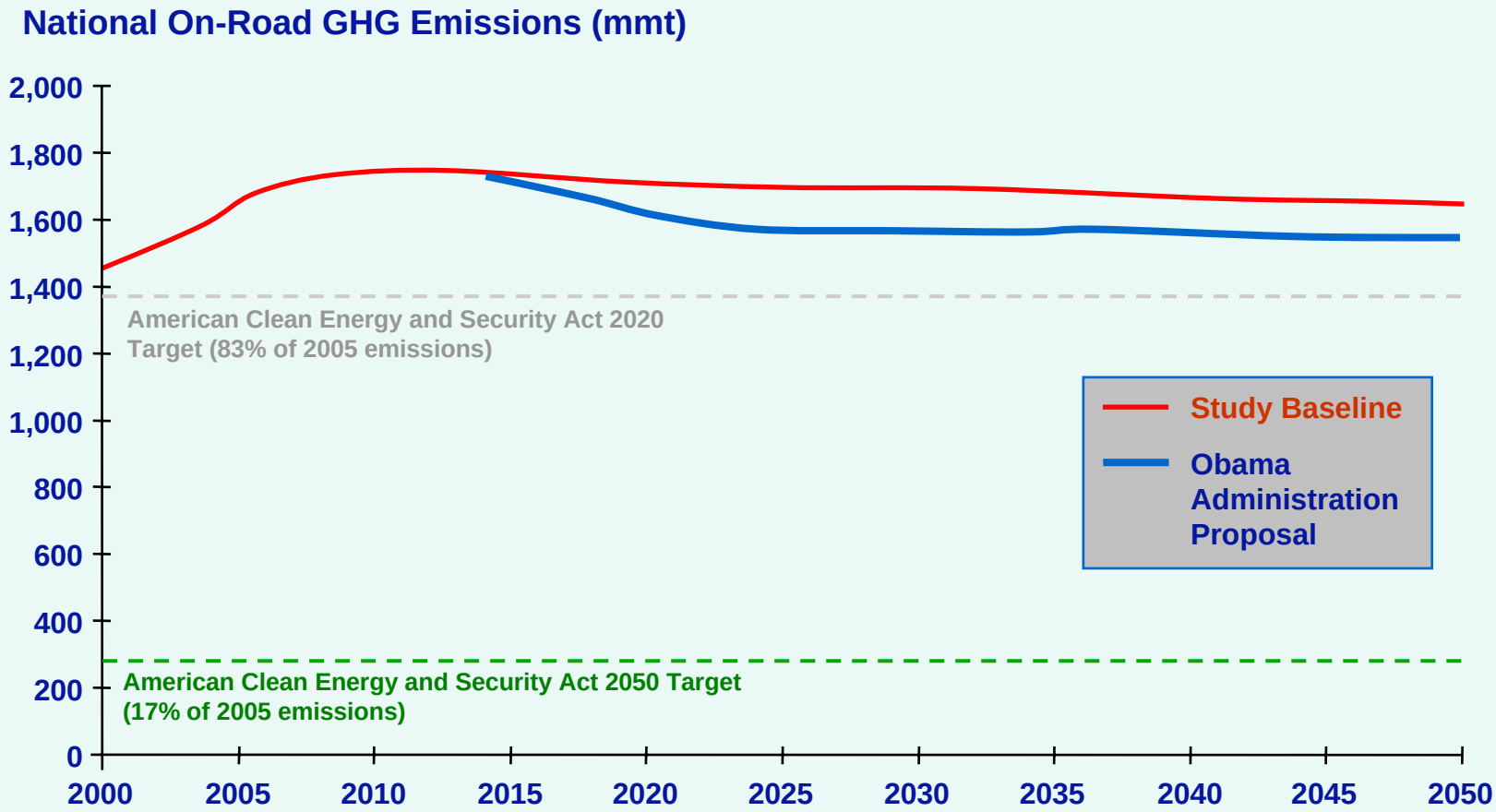
Moving Cooler

Moving Cooler

Baseline Assumptions

- **Travel continues to grow**
  - **VMT growth of 1.4% per year**
  - **Transit ridership growth 2.4% / year**
- **Fuel prices increase**
  - **1.2% per year, beginning at $3.70 / gallon in 2009**
- **Fuel economy improves steadily**
  - **Light duty vehicles at 1.91% annually**
  - **Heavy duty at 0.61%**

Moving Cooler Baseline to 2050

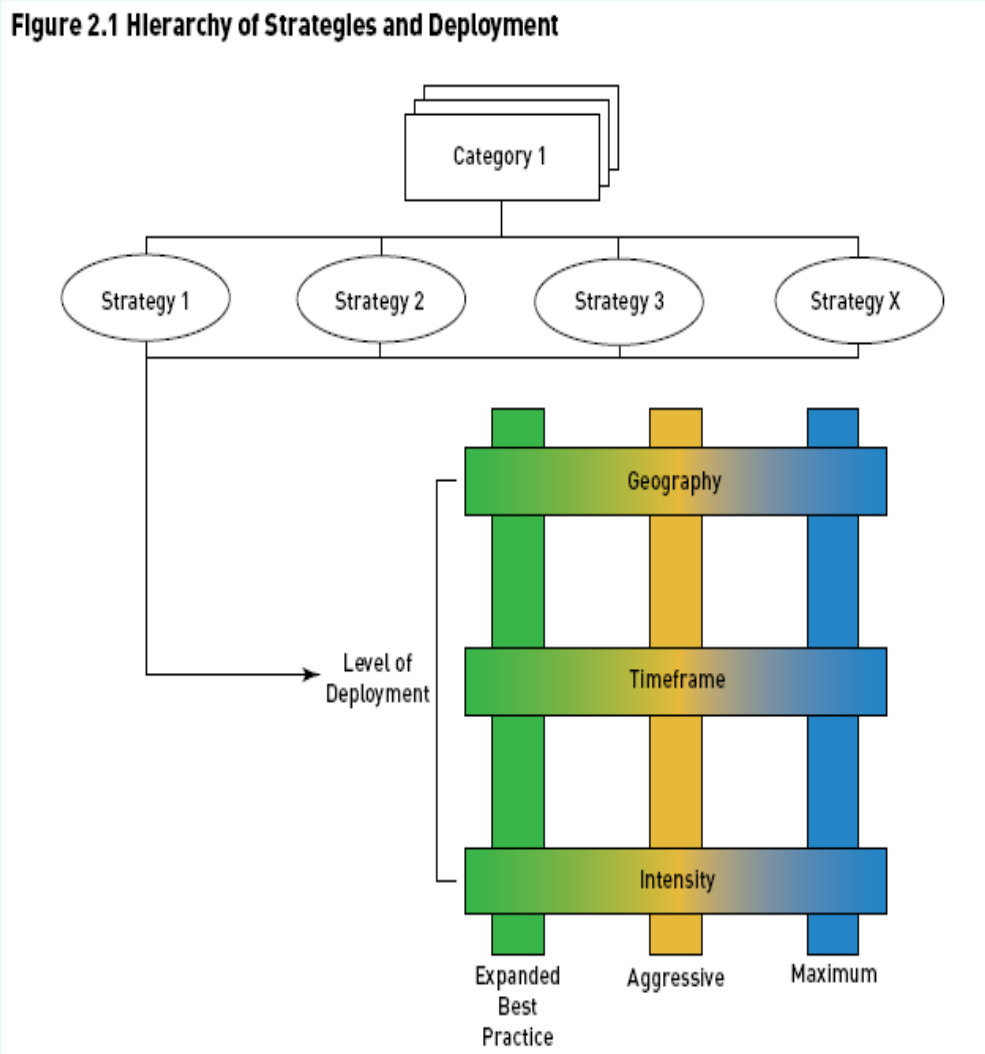


Note: This figure displays National On-Road GHG emissions as estimated in the Moving Cooler baseline, compared with GHG emission estimates based on President Obama's May 19, 2009, national fuel efficiency standard proposal of 35.5 mpg in 2016. Both emission forecasts assume an annual VMT growth rate of 1.4 percent. The American Clean Energy and Security Act (H.R. 2454) identifies GHG reduction targets in 2012, 2020, 2030, and 2050. The 2020 and 2050 targets applied to the on-road mobile transportation sector are shown here.

Moving Cooler

Wide Range of Strategies Examined Individually and in Strategic Bundles

- Pricing, tolls, PAYD insurance, VMT fees, carbon/fuel taxes
- Land use and smart growth
- Non-motorized transportation
- Public transportation improvements
- Regional ride-sharing, commute measures
- Regulatory measures
- Operational/ITS strategies
- Capacity/bottleneck relief
- Freight sector strategies



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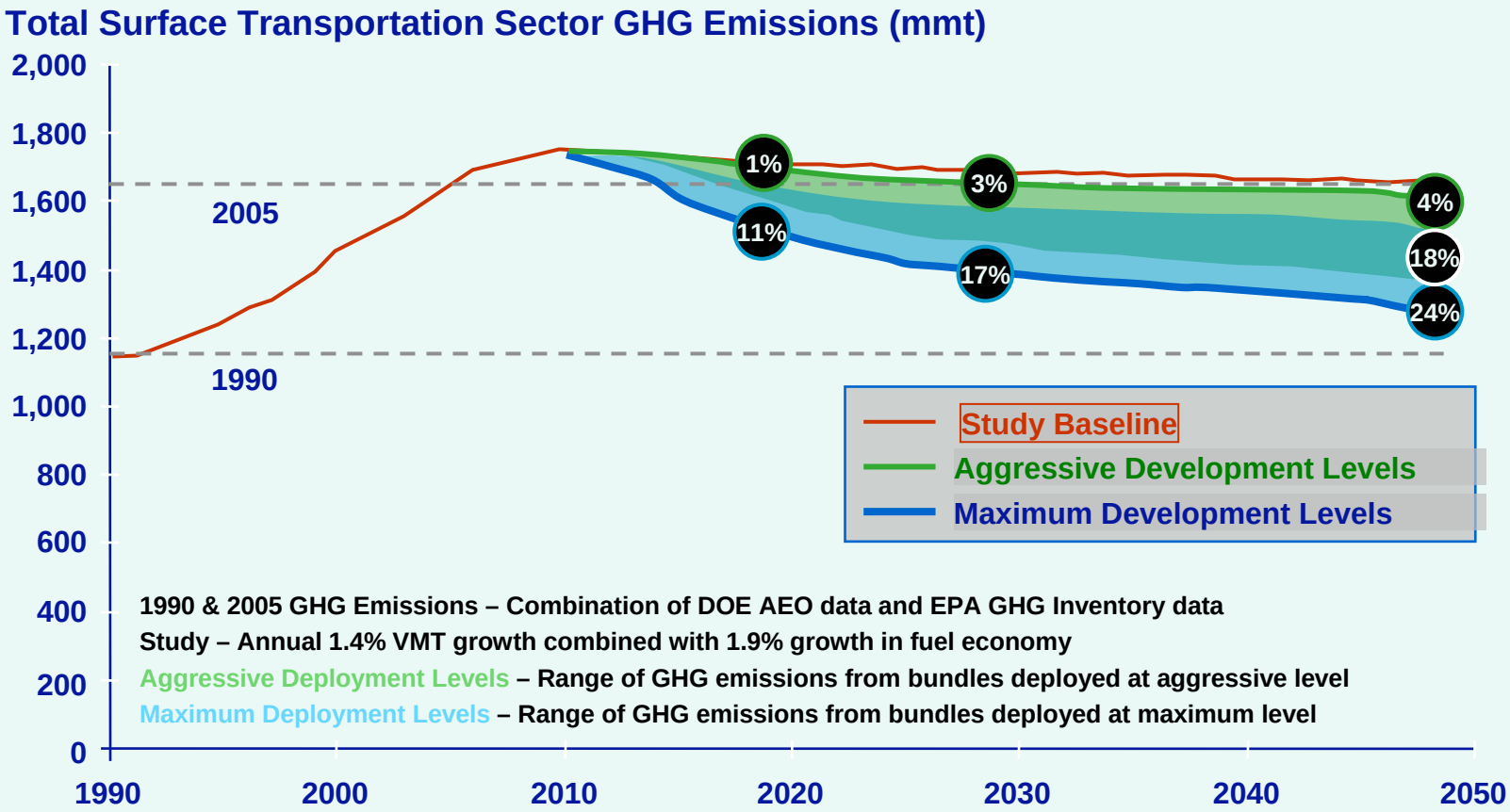
Evaluation of Implementation Costs / GHG Reduction Effectiveness

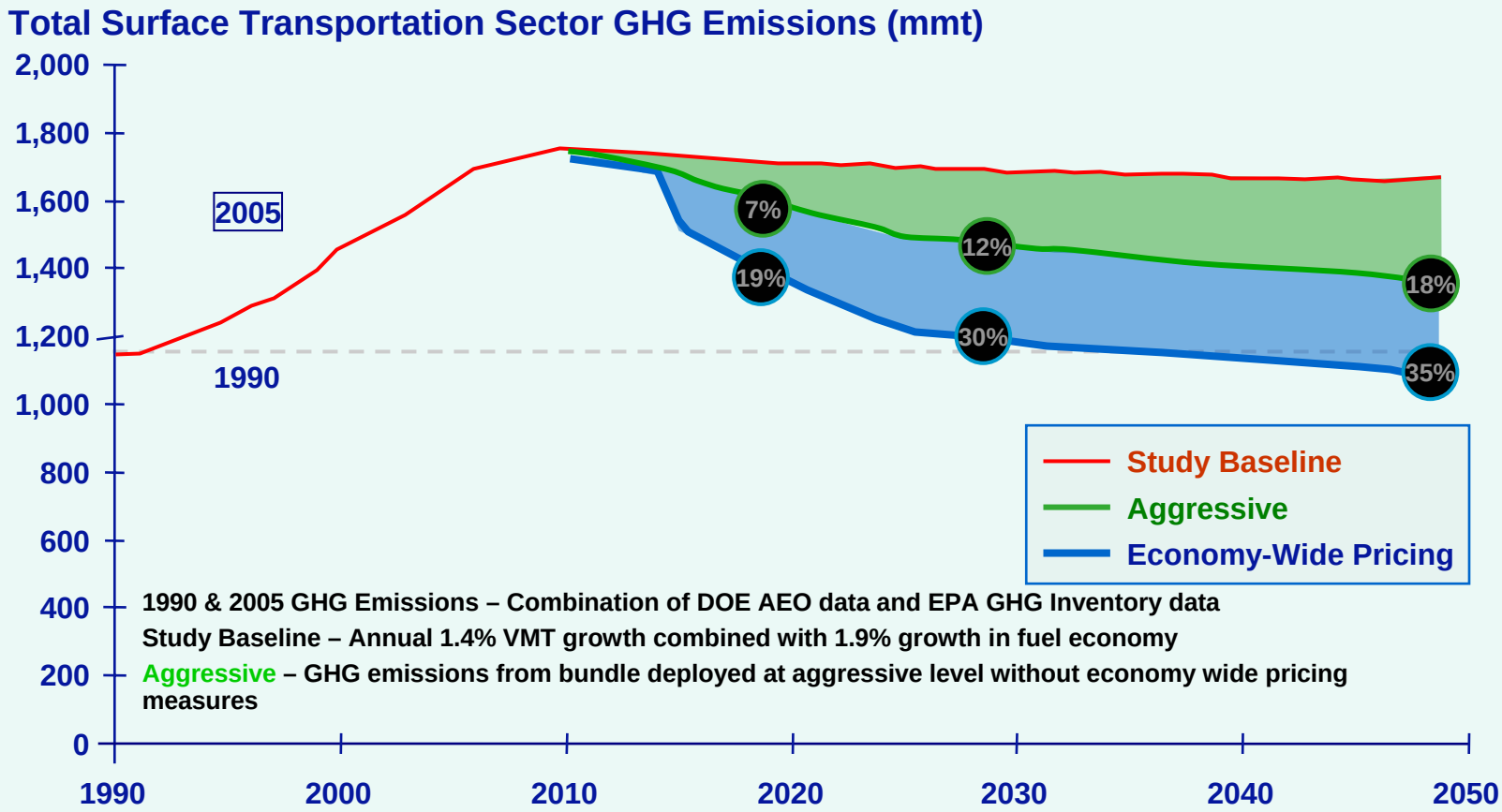
- Estimates direct implementation costs and GHG effectiveness
- ***Not*** a full cost-benefit analysis – therefore not a complete basis for decisions
  - GHG benefits only
  - Direct agency monetary implementation costs
  - Vehicle operating costs (savings): fuel, ownership, maintenance, insurance
  - Not including co-benefits (air pollution, health, economic development, mobility, time savings) or time losses
- Allows comparison to McKinsey Report findings on fuels and technology

Range of Annual GHG Reductions of 6 Strategy Bundles (Aggressive and Maximum Deployment)

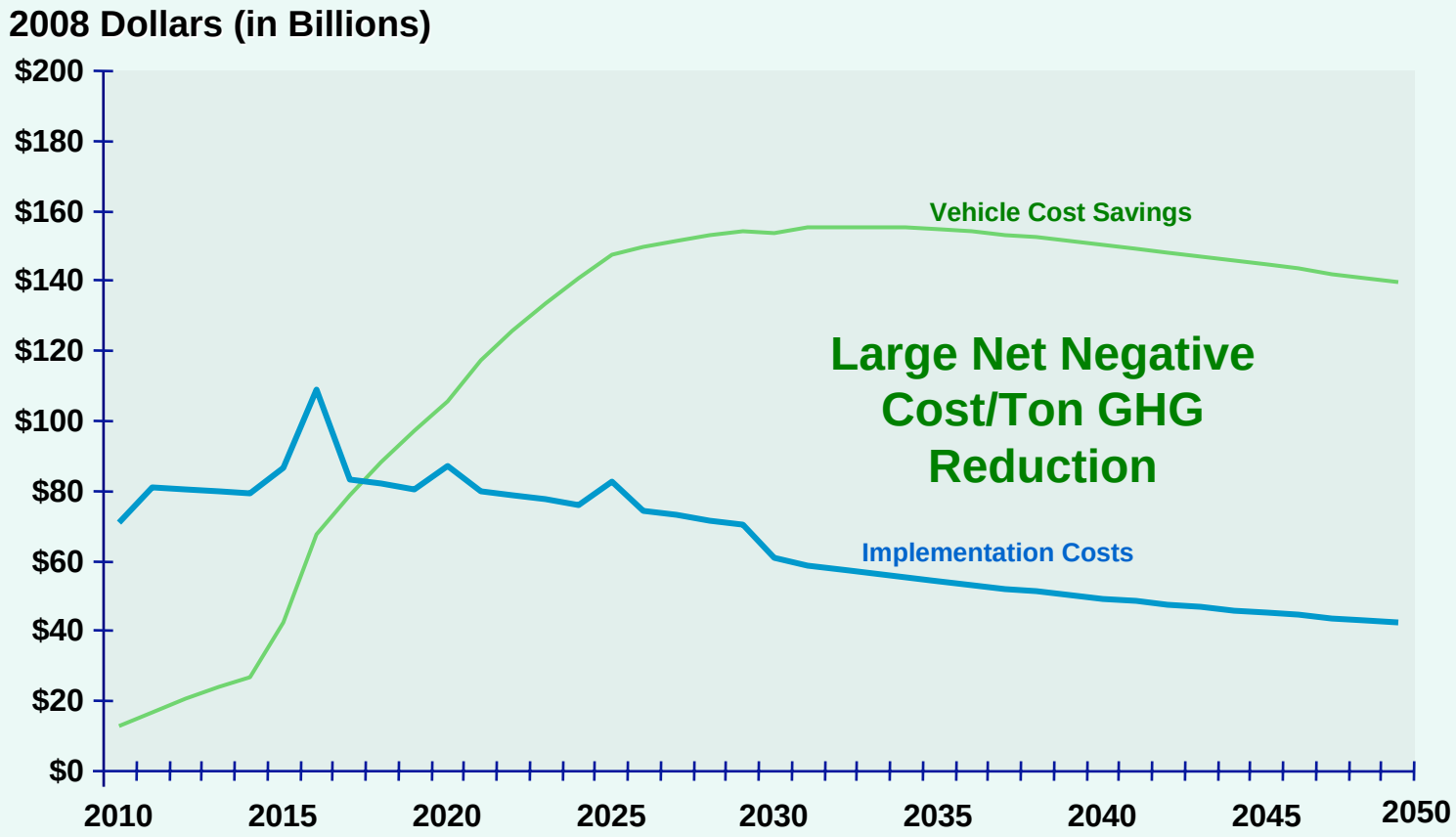


Note: This figure displays the GHG emission range across the six bundles for the aggressive and maximum deployment scenarios. The percent reductions are on an annual basis from the Study Baseline. The 1990 and 2005 baseline are included for reference.

Pricing Strategies Multiply Effectiveness of Other Measures



Direct Vehicle Costs and Costs of Implementing Strategy "Bundles" Without Economy-Wide Pricing



Note: This figure displays estimated annual implementation costs (capital, maintenance, operations, and administrative) and annual vehicle cost savings [reduction in the costs of owning and operating a vehicle from reduced vehicle-miles traveled (VMT) and delay. Vehicle cost savings DO NOT include other costs and benefits that could be experienced as a consequence of implementing each bundle, such as changes in travel time, safety, user fees, environmental quality, and public health.

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Summary of Bundle Results

(2010 to 2050 – Aggressive Deployment without economy-wide pricing)

Scenario Bundle	GHG Reduction (Gt)	Implement. Costs	Change in Vehicle Costs	Net Cost per Tonne
Near Term/Early Results	7.1	$676	-$3,211	-$356
Long Term/Maximum Results	7.6	$2,611	-$4,846	-$293
Land Use/Transit/ Nonmotorized Transportation	3.8	$1,439	-$3,270	-$484
System and Driver Efficiency	5.0	$1,870	-$2,214	-$69
Facility Pricing	1.4	$2,371	-$1,121	$891
Low Cost	7.5	$599	-$3,499	-$387

Moving Cooler

Economy-Wide Pricing

- Mechanisms: Carbon pricing, VMT fee, and/or Pay As You Drive (PAYD) insurance
- Strong economy-wide pricing measures added to "bundles" achieve additional GHG reductions
  - Aggressive deployment: additional fee (in current dollars) starting at the equivalent of $0.60 per gallon in 2015 and increasing to $1.25 per gallon in 2050 could result in an additional 17% reduction in GHG emissions in 2050
- Two factors would drive this increased reduction
  1. Reduction in vehicle-miles traveled (VMT)
  2. More rapid technology advances

Near-Term and Long-Range Strategies

Moving Cooler

- Some strategies are effective in achieving near- term reductions, reducing the cumulative GHG challenge in later years: speed limits, congestion pricing, eco-driving, expanded transit service, pay-as-you-drive insurance
- Investments in land use and improved travel options involve longer time frames but have enduring benefits
- Relieving bottlenecks in road networks without pricing boosts short and long-term GHGs; with pricing of new capacity: smaller, but still negative long term GHG effects
- Most bundles yield large net negative cost/ton GHG reduction. Best is to combine transit, land use, smart traffic management and operations, economy-wide pricing.

Linking Moving Cooler and Growing Cooler to Building Cooler

Pedestrian and transit oriented development expands opportunity for green building

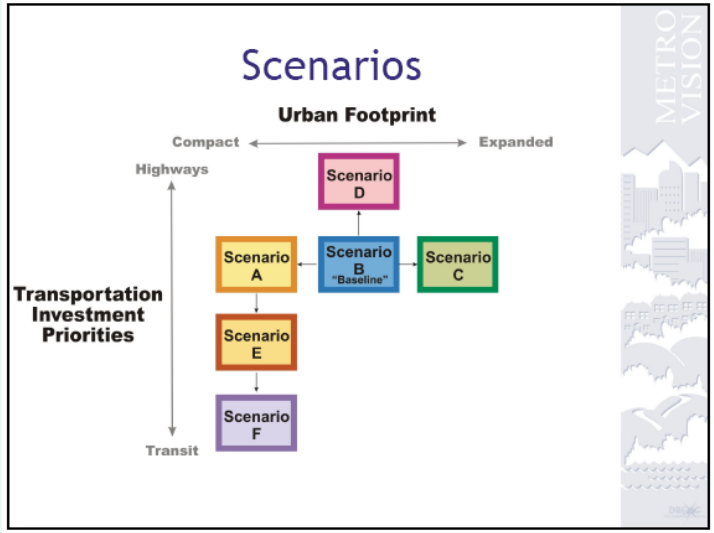
- **District heating & cooling**
- **More shared wall construction**
- **Efficient infrastructure**

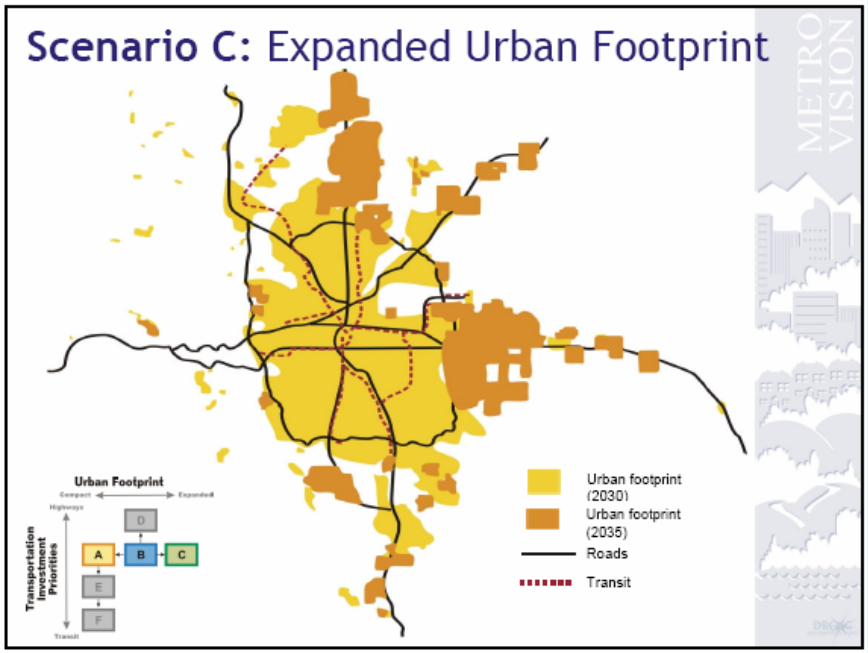
Trigen/Inner Harbor East Heating and Cooling Plant in Baltimore. (Photo credit: Spears/Votta & Associates.)

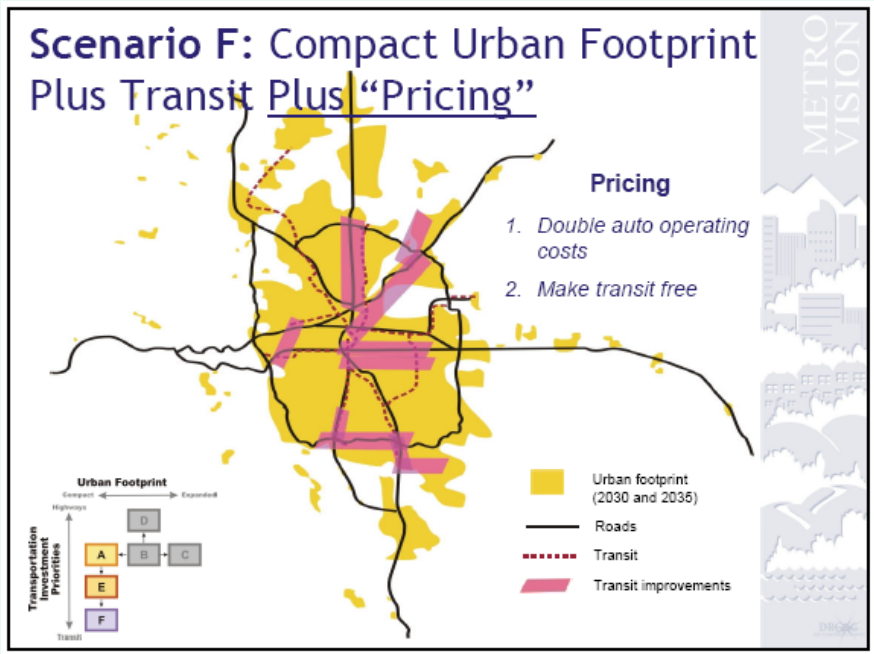
Moving Cooler Reduces Time Wasted in Traffic

- 23% difference in Vehicle Hours of Delay (Scenario F vs. Scenario C)

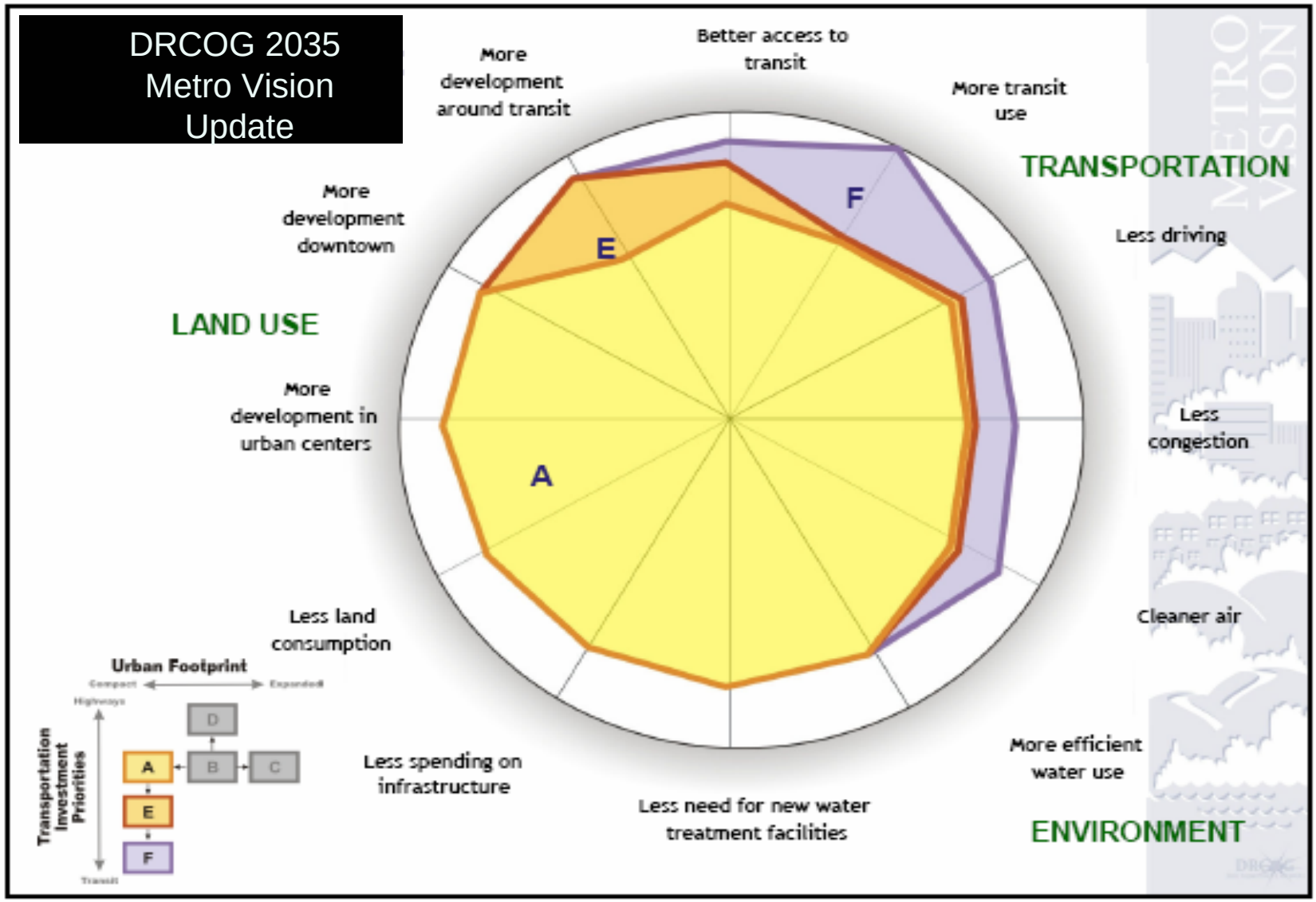
DRCOG 2035 Metro Vision Update







Transit Expansion With Pricing Yields Better Performance Than Road Expansion



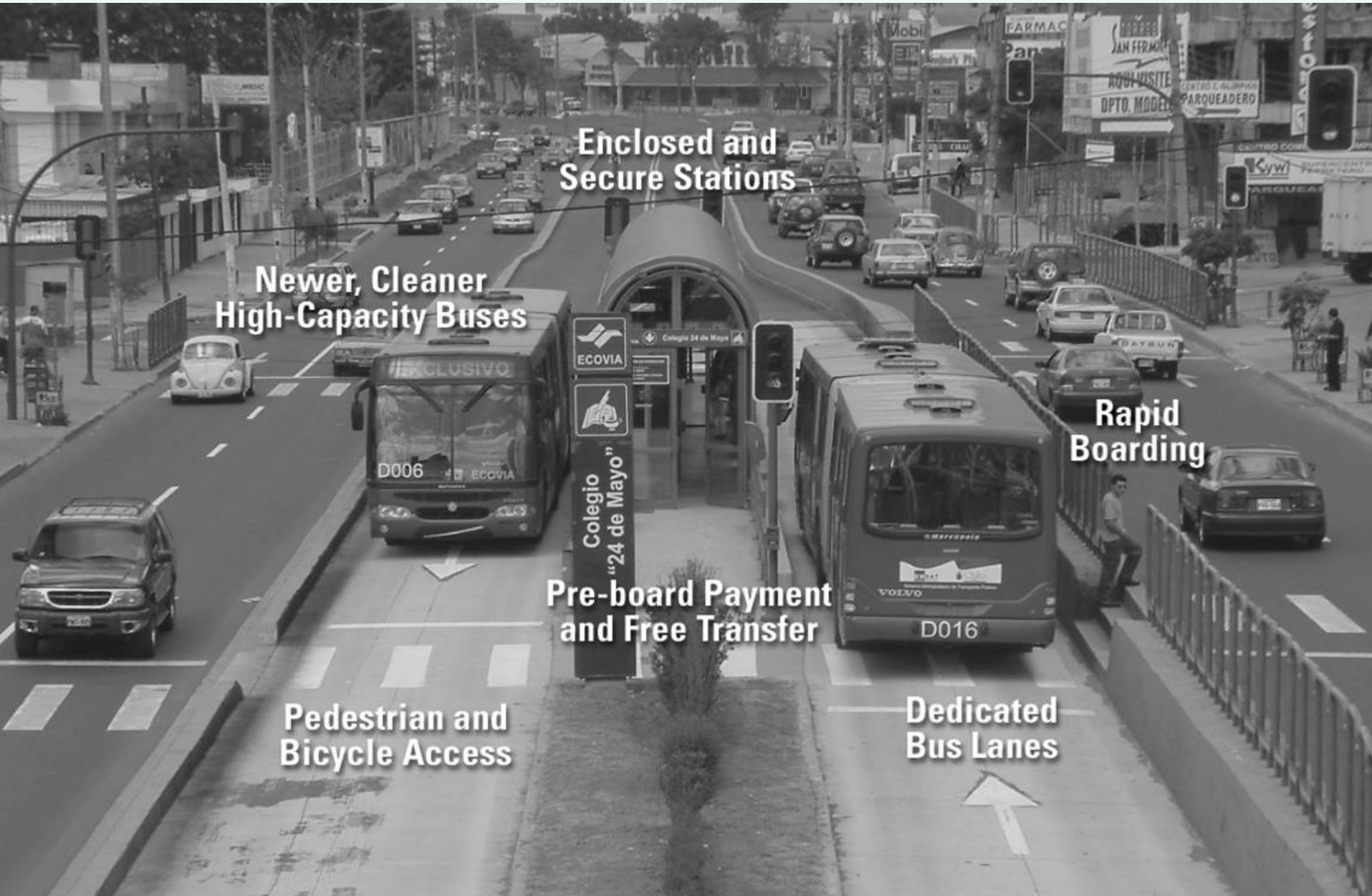
Today's growing investment in costly rail expansions concurrent with broad transit service cuts

Can we manage, allocate, and price street space to favor a faster, affordable pathway to low-carbon transport?

Growing Investment in Bus Rapid Transit

Cheaper and quicker to put in place than new rail lines…

Critical elements for High Quality BRT



World Class BRT Designed For High --

- **Efficiency:** pre-paid fares, wide doors, and high level boarding; priority at junctions, reserved right-of-way
- **Reliability:** real-time dispatching/operations management, real-time passenger information
- **Capacity:** stations sized for demand
- **Speed:** local & express services
- **Connectivity and directness:** inter-line routes on comprehensive network, collection & distribution off-network
- **Management effectiveness:** performance contracting with rewards and penalties

Bike-and-ride transit access:

much less costly than park-and-ride

But needs secure parking, safe routes to transit with <u>complete streets</u>…

Marketing & social action cultivates support, changes behavior

Information-driven services

Offer new approaches to boost mobility while reducing driving

Parking: Measure it, Manage it, Price it

Pasadena & London set parking charges to keep 85% occupancy

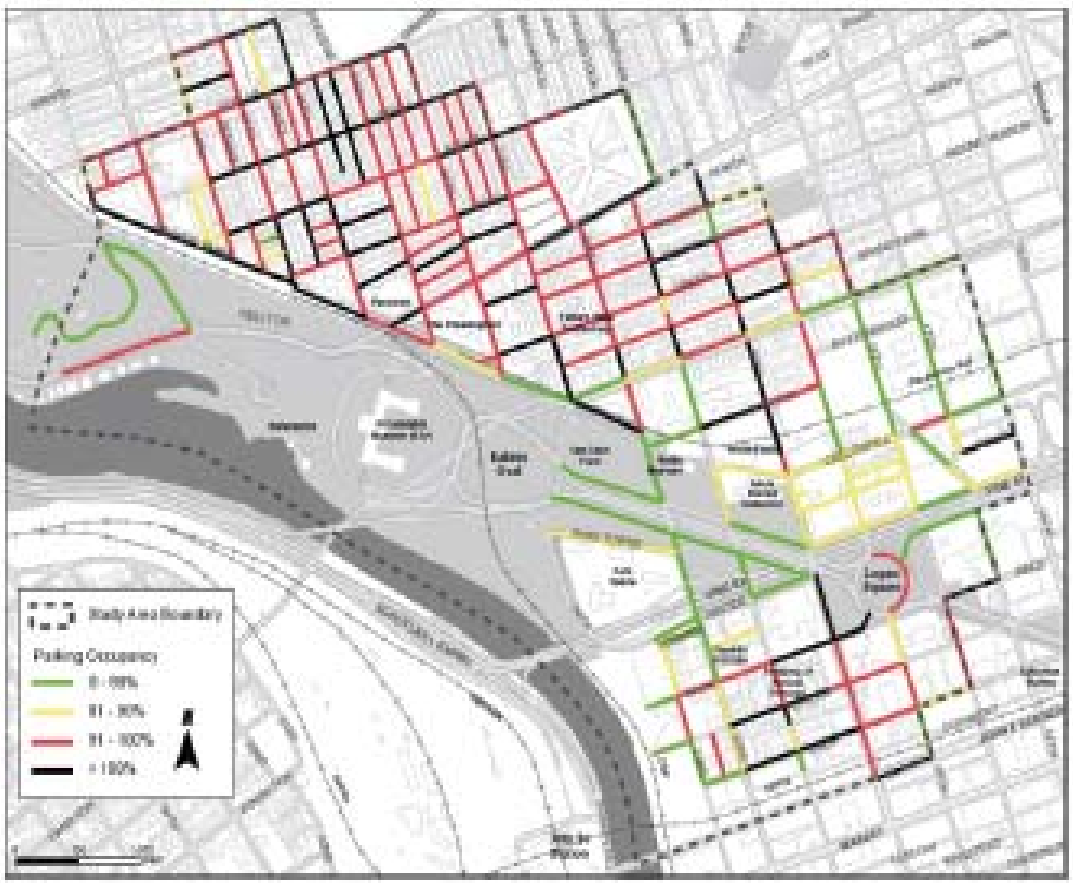
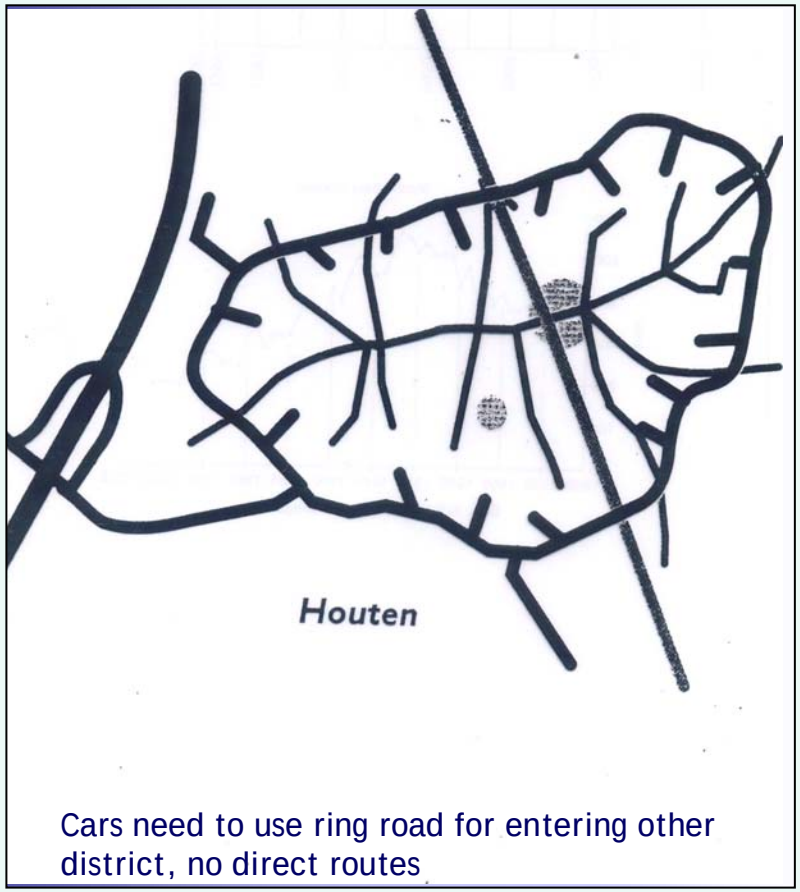


Figure 24: Block-by-block on-street parking occupancy survey

City of Philadelphia (Pennsylvania, USA) 2006 Parkway-area Parking Study by Nelson\Nygaard Consulting Associates

Can we dedicate road pricing & parking proceeds to transit, bike, communities: through innovative contract structures?

Can we help cities develop traffic cells that allow bikes and transit to pass through while blocking through traffic by cars?

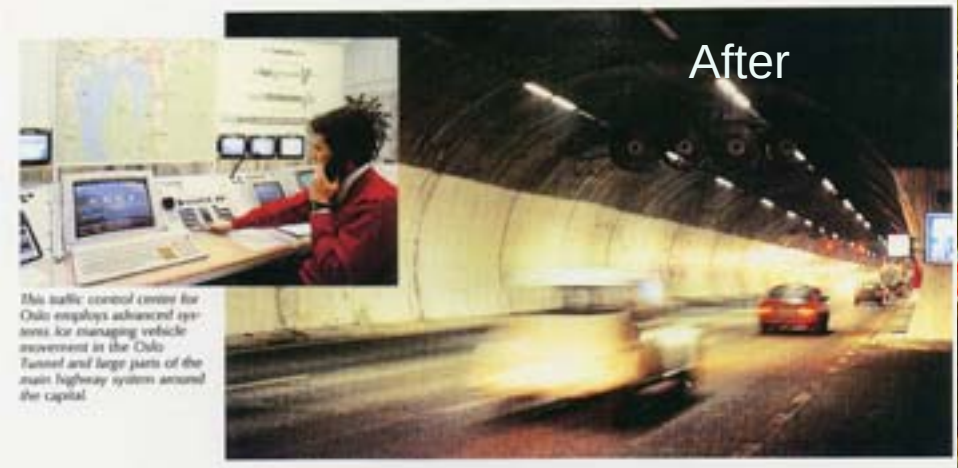


Cars need to use ring road for entering other district, no direct routes

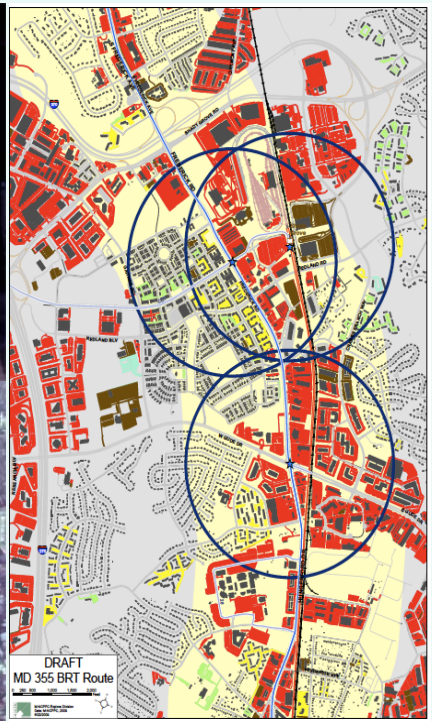
Can we revitalize dying city centers that drive elites to suburban, auto dependent developments?

Can we find cities willing to tear down highways or open up hidden waterways, like Seoul?

Oslo Put Main Artery Underground
(financing with congestion charge)



Can we ensure most new development is pedestrian and transit-oriented?



Can we optimize the logistics of bike sharing and car sharing through modeling?

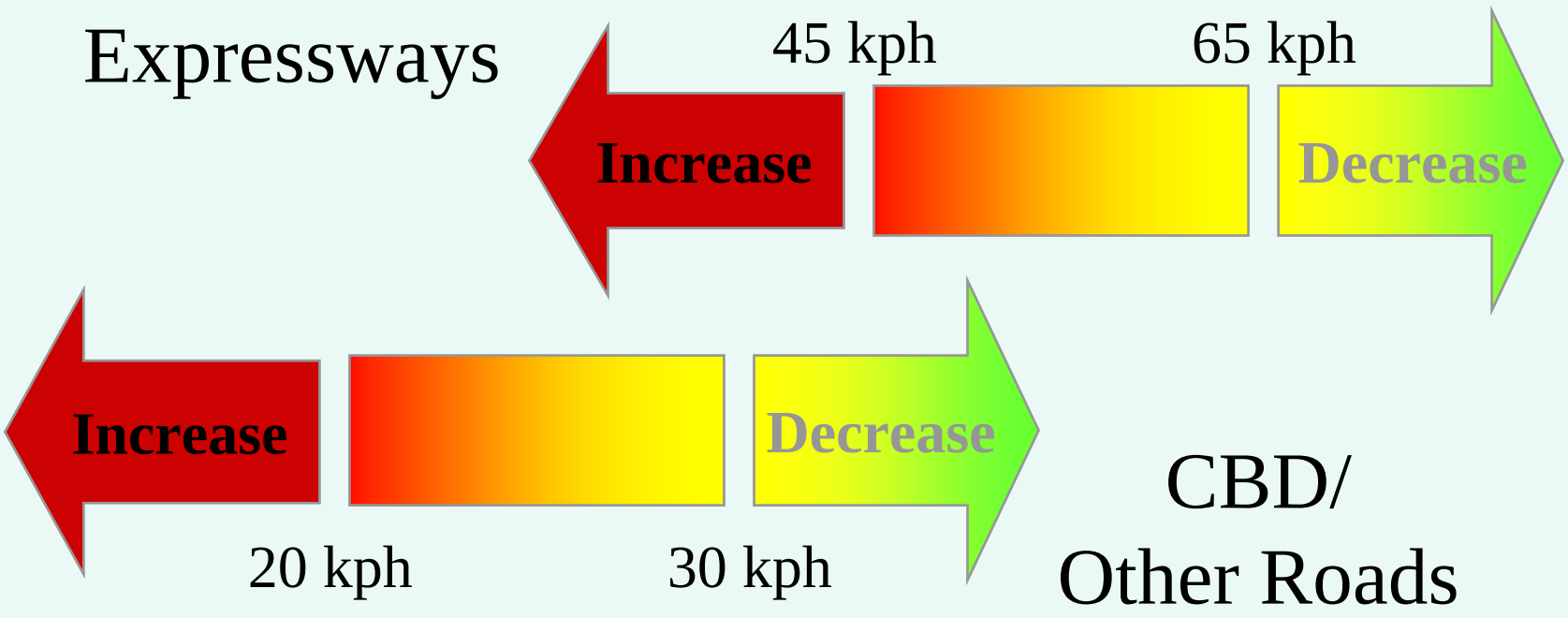
Can a city phase into bike sharing with franchised bike rental and parking facilities? How can private initiatives be accelerated?

Can we adapt Singapore's success in road pricing and public transport investment to other cities?

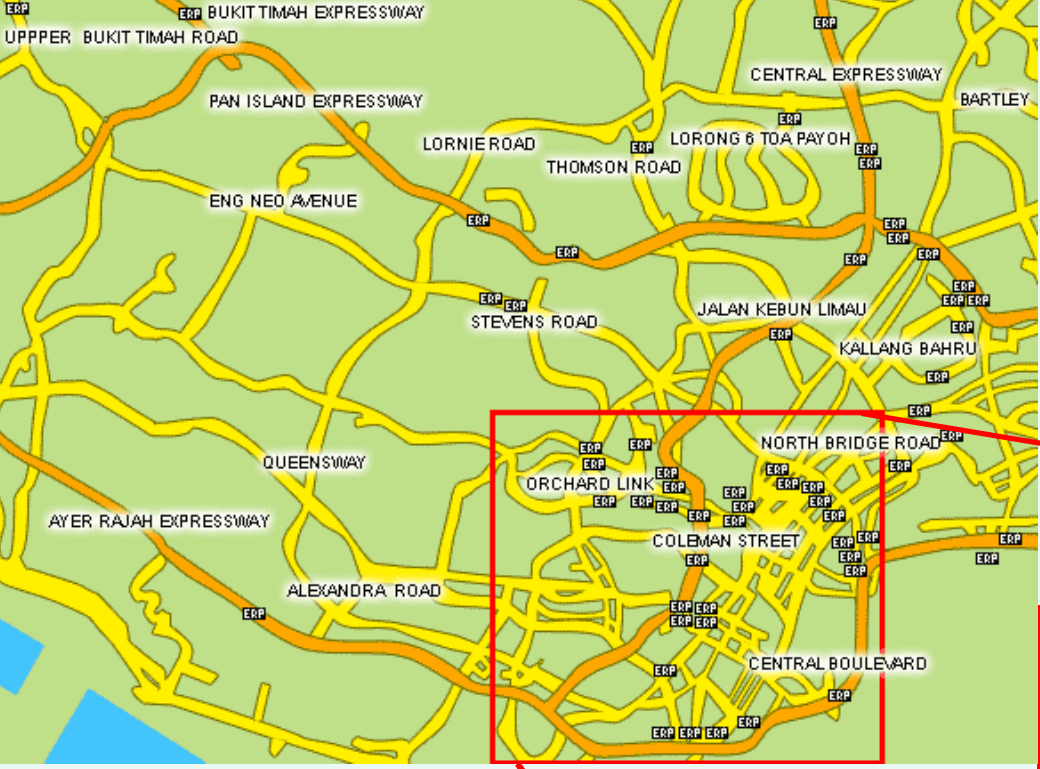
Land Transport Authority

Singapore's quarterly review of toll rates

Tolls adjusted up or down to ensure traffic flows freely at least 85% of the time



Singapore ERP Charging Points June 2008



Land Transport Authority

Can We Learn From Stockholm's Success in Implementing Cordon Pricing?


AFTONBLADET

Lördag 14 januari 2006

Betalstation

STOCKHOLM BILTULLARNA

Nu har folk insett fördelarna

"Stockholm ♥ the congestion tax"

Public opinion of cordon charge in Stockholm **for** - against:

Before start of tolling: **31%** - 62%

After 6 months: **52%** - 40%

After 9 months: **67% approval**


AFTONBLADET

Publicerad: 2006-09-07 Textstorlek: 1 2 3

KÄNDISTÄTT Al Gore var i går i Sverige för att visa filmen "En obekväm sanning" som har premiär i morgon. Den före detta vicepresidenten har mycket gott att säga om Sveriges miljöarbete. "Jag är imponerad av det svenska folket", säger han.

Foto: ULF HÖJER

Al Gore: ja till trängselskatt

Hans film om klimathotet hade svensk smygpremiär i går

USA:s förre vicepresident Al Gore visade i går filmen "En obekväm sanning" för bland andra kungen och drottningen. Om klimatförändringen och hur vi människor förstör vår jord.

– Om jag fick rösta skulle jag säga ja till trängselskatten,

How can we re-price car insurance?

MILEMETER

AUTO INSURANCE BUY THE MILE

Progressive's *My Rate* ™
PAYD Policy now in 7 States

Insurance fully priced based on miles driven can cut GHGs 8% and saves 2/3 of households money on insurance, with average savings of $270/car/year for these households

- **2008 Brookings Institution study**

MILEMETER

AUTO INSURANCE BUY THE MILE

Now Available in Texas

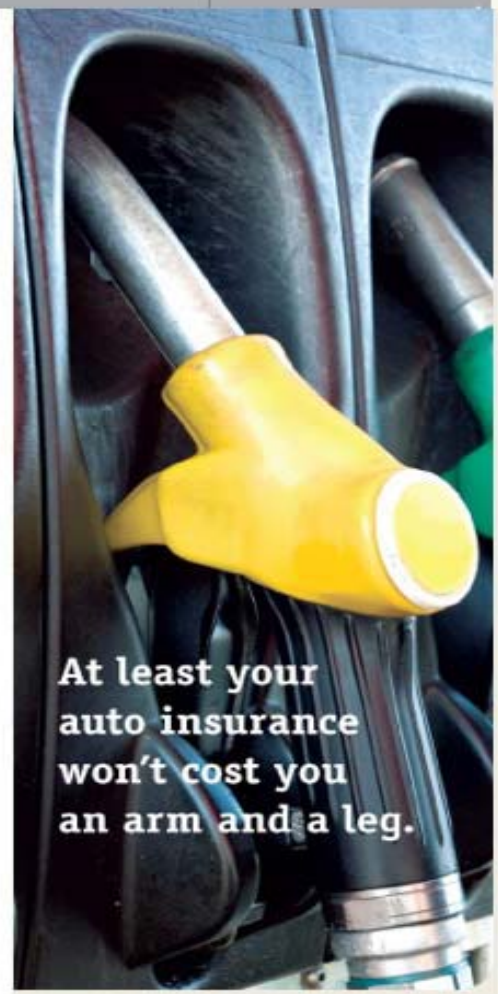
HOME | GET A QUOTE | CLAIMS | YOUR ACCOUNT | ABOUT US | FAQ | CONTACT US

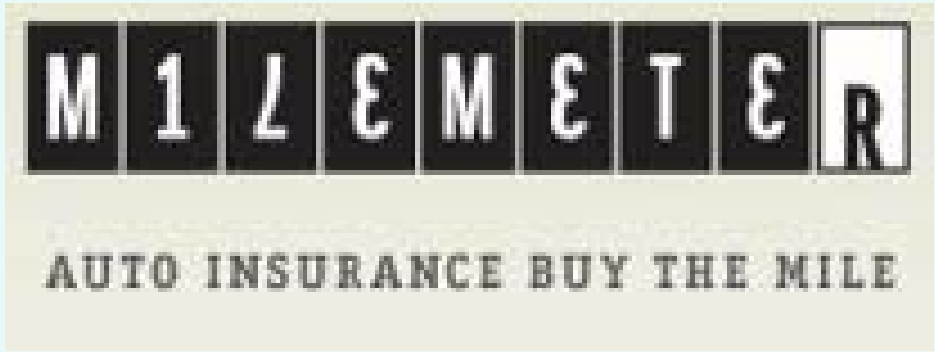
SIGN ME UP!

Choose coverage - Step 2 of 5

Essentials	Cost per Mile
(•) 25/50/25 - Bodily injury liability coverage of $25,000 per person and $50,000 per accident. Property damage liability coverage of $25,000 for property liability.	3.05¢
( ) 50/100/25 - Bodily injury liability coverage of $50,000 per person and $100,000 per accident. Property damage liability coverage of $25,000 for property liability.	3.70¢
Policy administration fee	0.8¢
Extras	**Cost per Mile**
[ ] Physical damage coverage for collision, theft, fire, hail or flood, with a $500 deductible.	4.76¢
[ ] Matching liability coverage for collision with an uninsured or underinsured motorist.	0.44¢
[ ] Towing reimbursement of up to $40, and vehicle reimbursement of up to $20 day (max $600).	0.13¢
[ ] Coverage for personal injury up to $2,500.	0.66¢
Total Cost per Mile	**3.85¢**

Next





HOME | GET A QUOTE | CLAIMS | YOUR ACCOUNT | ABOUT US

SIGN ME UP!

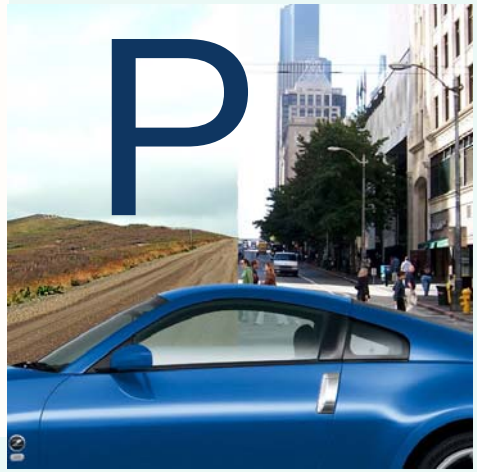
How many miles do you want? - Step 3 of 5

3.85¢	x	2,000	=	$77.00
Per mile		Miles		Policy Cost

- Your policy will expire at the soonest occurrence of an odometer reading of **99,000** or the end of **07 May 2009**.
- Adjust your total purchase cost by selecting the amount of miles you want. You can purchase as many as 6000 or as few as 1000 miles per policy.

Next

How fast will we move towards time, distance & place based road use fees?



Pay more during peak periods

Pay for actual use

Pay varying rates on different roads

enabling a variety of new travel services

How can we learn from Germany's success With GPS truck tolls?

- 2005: $.25/mile toll on trucks over 12 tons on 12,000 km autobahn system
- 50% toll premium for old dirty trucks
- US $5 billion/year revenue for road, rail, waterway transport investment
- Freight VMT & deadheading cut 7%

Source: Andrea Kossak, http://www.hhh.umn.edu/img/assets/20164/Kossak%20-%20Pricing%20in%20Germany.pdf

Can America renew its vision and commitment to invest for the future?

How can we advance near-term progress?

- Innovative transport finance
- Cutting operating costs
- Cutting red tape for sustainable transport
- Incentives for performance
- Support for local/state reforms

21st century leaders will put smart transport and development strategies at the heart of their efforts to foster healthy, economically successful cities

For More Information

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