

How Much Can We Slow VMT Growth?

The Potential Savings of Implementing Best Practice Everywhere

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presented by
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Transportation leadership you can trust.

CAMBRIDGE
SYSTEMATICS

GHG Reduction Measures

- **Fuel efficiency (mpg)**
- **Carbon content (alternative fuels)**
- **Travel activity (vehicle miles travelled)**
- **System performance (congestion)**
- **Emphasis of most GHG reduction efforts is on first two elements**
- **Travel activity needs further research**
 - **Effectiveness and costs**
- **System performance needs analytic development**

Greenhouse Gas Typology

Greenhouse Gas (GHG) emissions =

Travel activity (trips) times

Person miles / trip times

Vehicle miles / person mile times

Gallons / vehicle mile times

GHG / gallon

This study focuses on first three elements, and also considers congestion effects on fuel efficiency

Approach

- **Explore “what if” travel activity was national priority**
 - Intended to show the possible, not the likely
- **Hypothetical policy scenario of aggressive national implementation of travel activity measures**
 - Assumes full package applied throughout the country
 - Did not use national pricing/economic policies such as gas tax, carbon tax, VMT fees or cap-and-trade
- **Feasibility is based on referencing best practices or aggressive implementation of measures currently in place**
 - Simplistic assumption but appropriate for hypothetical approach

Methodology

- Select travel activity measures
- Identify activity targeted by each (e.g., CBD, rural)
- Develop effectiveness factors for each measure (i.e., percent VMT reduction)
 - For many measures effectiveness was assigned *a priori* and measure defined such as to meet target (e.g., pricing levels adjust to achieve target)
- Apply effectiveness factor to targeted VMT
- Nest measures to avoid double-counting

Nesting

- **Designed to avoid double-counting**
- **Apply effectiveness of measures targeted at smallest scale first (CBD commute VMT)**
- **Then apply at measures for next largest scale (CBD VMT) minus the reduction from CBD commute measures**
- **Continue up each level: CBD Commute, CBD, Urban Commute, Urban Expressway, Urban (Rural), National**

Measures

- Selected 24 measures – 21 currently implemented in U.S.
- Applied best practice (most aggressive existing implementation; highest effectiveness rate) nationally
- Measures phased in generally over 10-20 years
 - Pricing and commuter choice faster implementation
 - Land use, transit, parking pricing gradually increase through 2050
- Did not directly address feasibility
- Did not examine costs – varies widely from revenue generators (pricing) to quite expensive (transit investment, park-and-ride lots)

Central Business Districts

- **CBDs represent ~5% of VMT in urban areas >500,000**
- **CBD commute trips are ~35% of total CBD VMT**
- **Parking freeze – defined as limiting new parking spaces so as to achieve:**
 - **Commuter trips: -33% to target VMT in 2030**
 - **Non-commuter: -22% to target VMT in 2030**
 - **Weighted to disproportionately affect shorter trips**
- **Cordon pricing – to be priced so as to achieve a 20% reduction in CBD travel**
 - **Effectiveness achieved in London and Stockholm; Singapore is higher**

Urban commute trips

- Includes all urban areas
 - Commute is about 18 percent of trips (conservative)
- Parking taxes: -3.1%
 - Commuter pay lots
 - Pricing of some free spaces
- Employer trip reduction programs: -1.0%
- Ride-matching, park-and-ride lots, and guaranteed ride home: -1.1%
- Telecommuting and compressed work week: -3.7%
 - Some studies show much higher potential

Telecommuting example

- Aggressive commute reduction policies and/or economic incentives implemented to achieve:
- 2% additional penetration of full-time telecommuters
- 9% additional penetration of part-time telecommuters
 - Telecommute 30% of time (1.5 days/week)
- 50% discount to VMT reduction to account for increased discretionary trips, induced demand (research is mixed)
- Phased in from 2008 to 2020 (full effectiveness)
- Maximum effectiveness of 2.4% reduction applied from 2020 onwards

Urban Areas

- **Expressway congestion pricing: -2.0% VMT**
 - Prices will adjust to meet this target
- **Speed limits and enforcement: -0.7%**
 - Based on travel time elasticities
- **HOV lanes: -2.7%**
 - Travel time elasticities and DC/SF results
- **Landuse – 3Ds and NMT: -11.6%**
 - Consensus from multiple studies
- **Parking policies: -1.9%**
- **Non-motorized zones: -0.5%**

Public transportation

- **Baseline transit diversion: -2.9% urban vmt**
 - Transit forecast to grow faster than vmt
- **Double new starts/system expansion from baseline trend: -0.8%**
- **Improve transit travel times: -0.5%**
 - Technology, BRT, headway benefits
- **Improve transit frequency/headways: -1.0%**
- **Reflects effects of direct transit investment, not mode shift from other measures (to avoid double-counting)**
- **Costs should be a consideration**

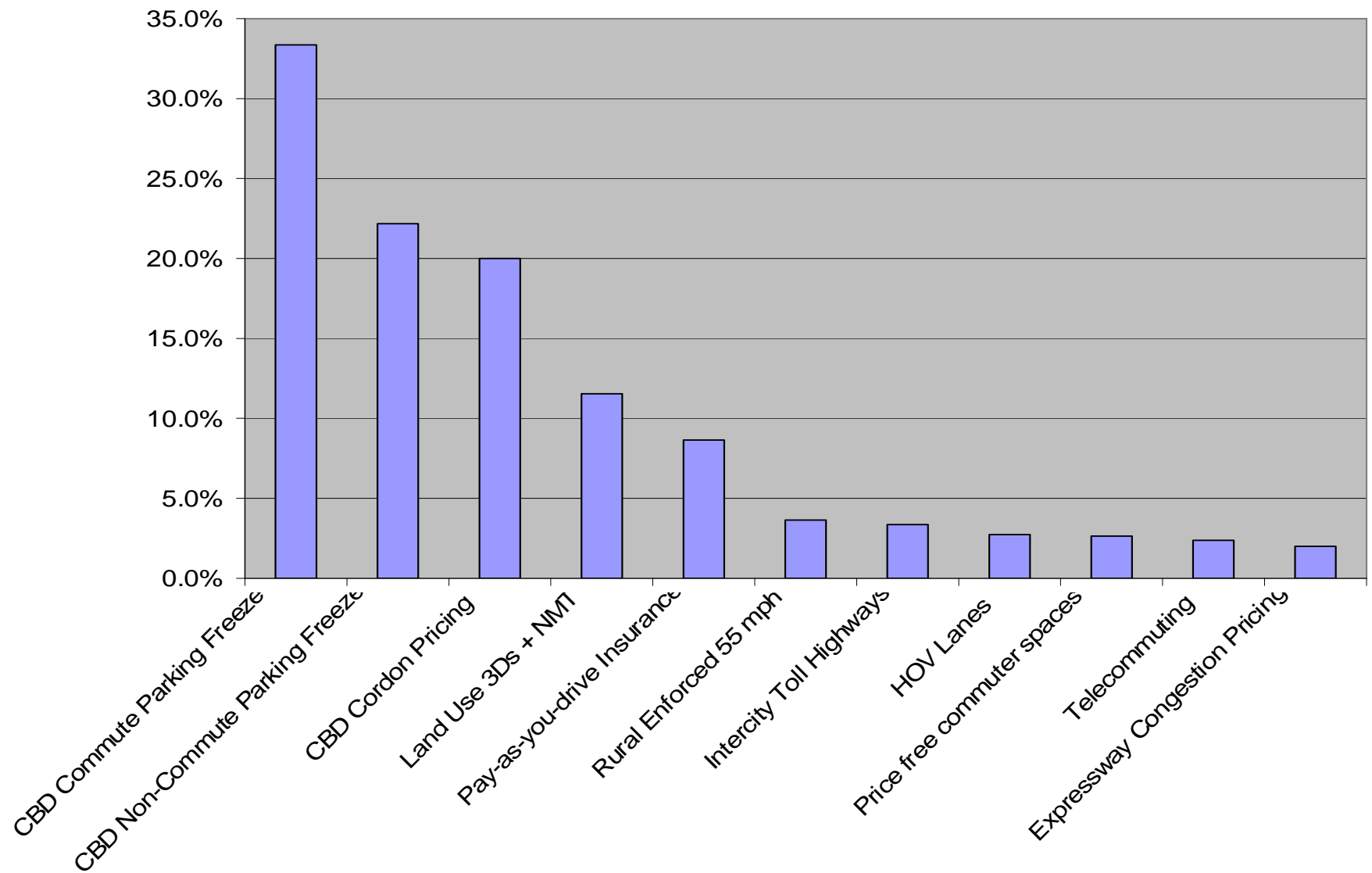
Rural and universal measures

- Intercity tolls: -3.3% of rural VMT
 - Tolls set to achieve target
- Enforced 55 mph: -3.6%
 - Mode shift and trip chaining

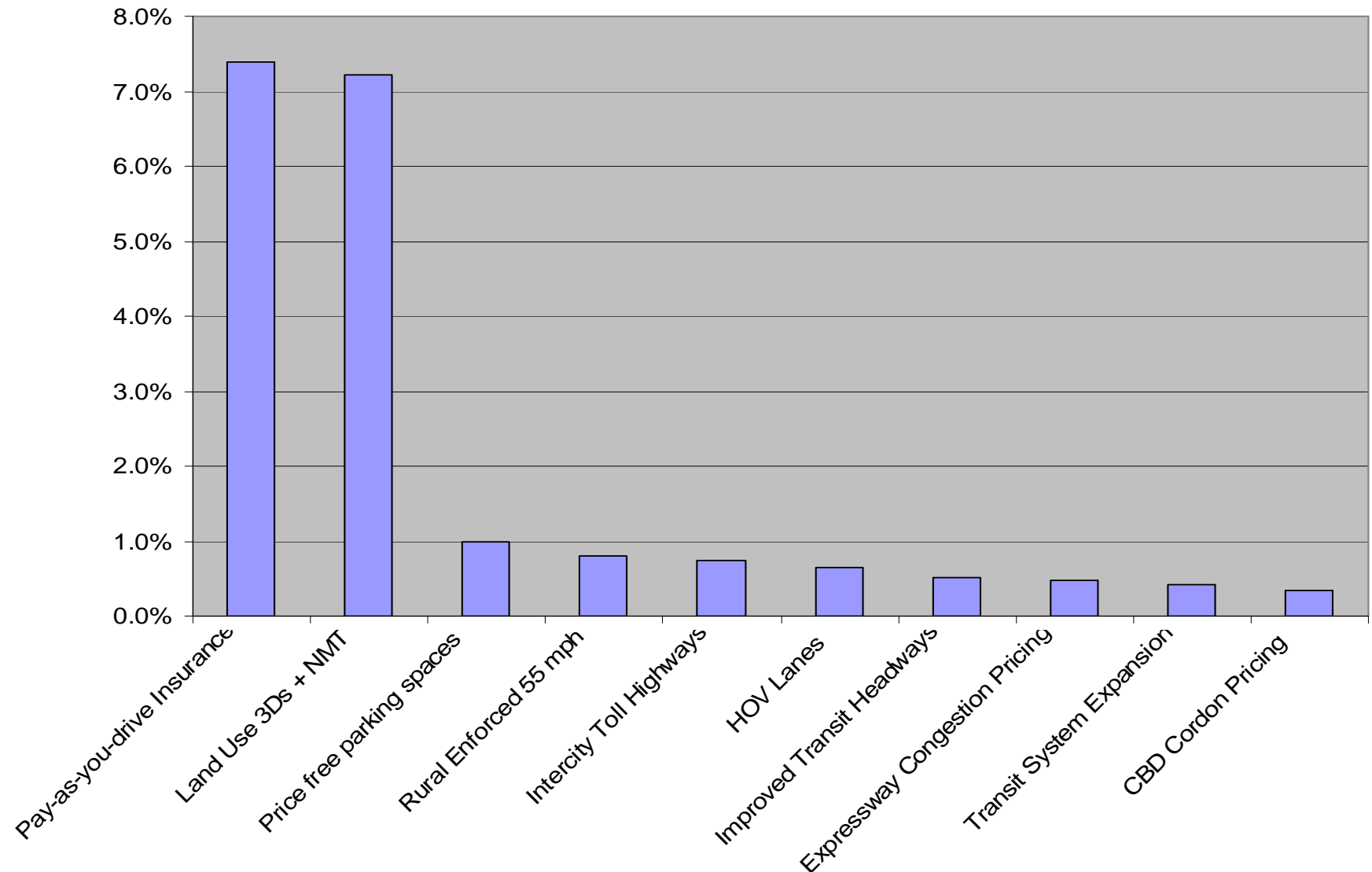
Universal measure:

- Pay-as-you-drive insurance: -4.0% to -8.6%
 - \$0.06 per mile charge, fully adopted

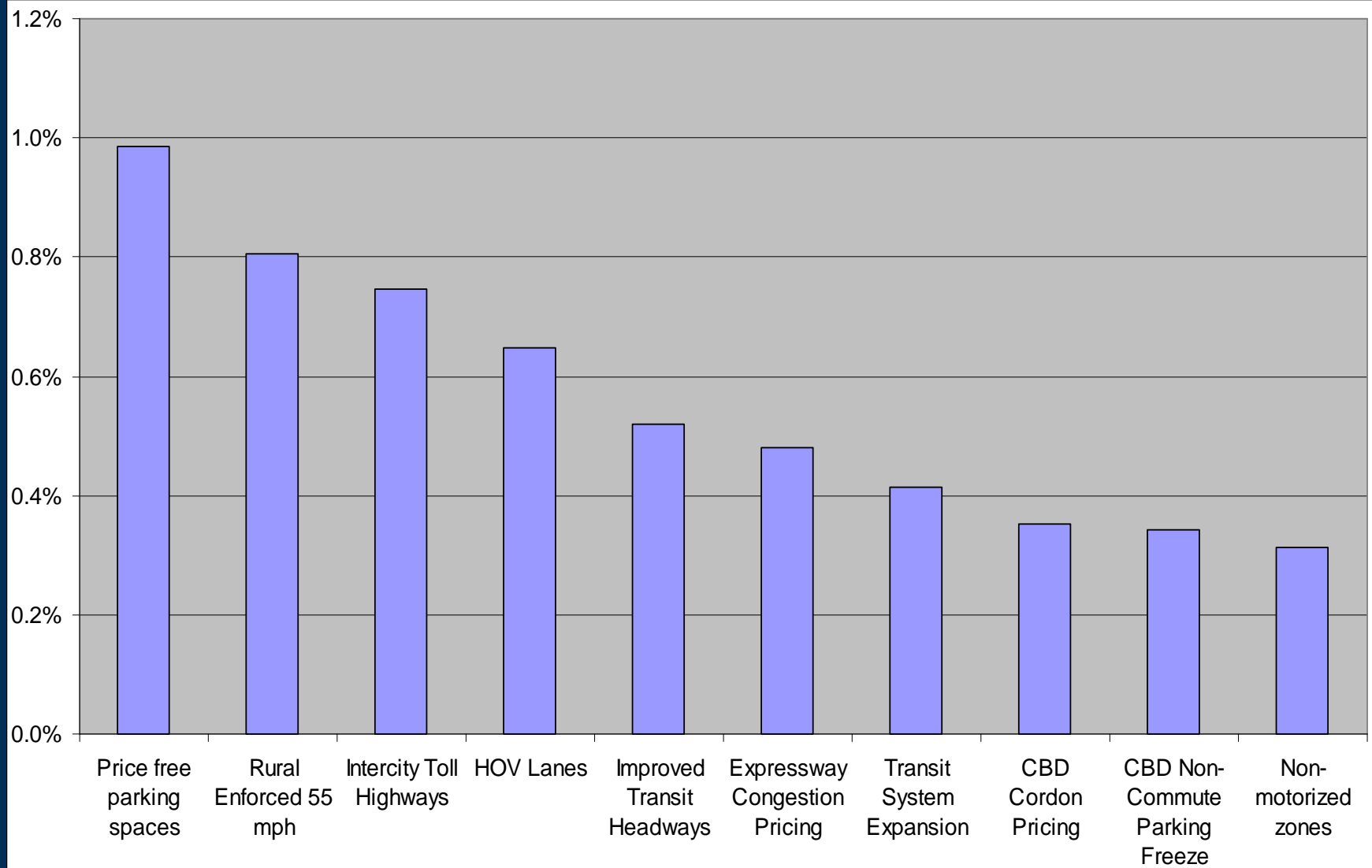
Effectiveness vs. Target VMT



Effectiveness vs. National VMT



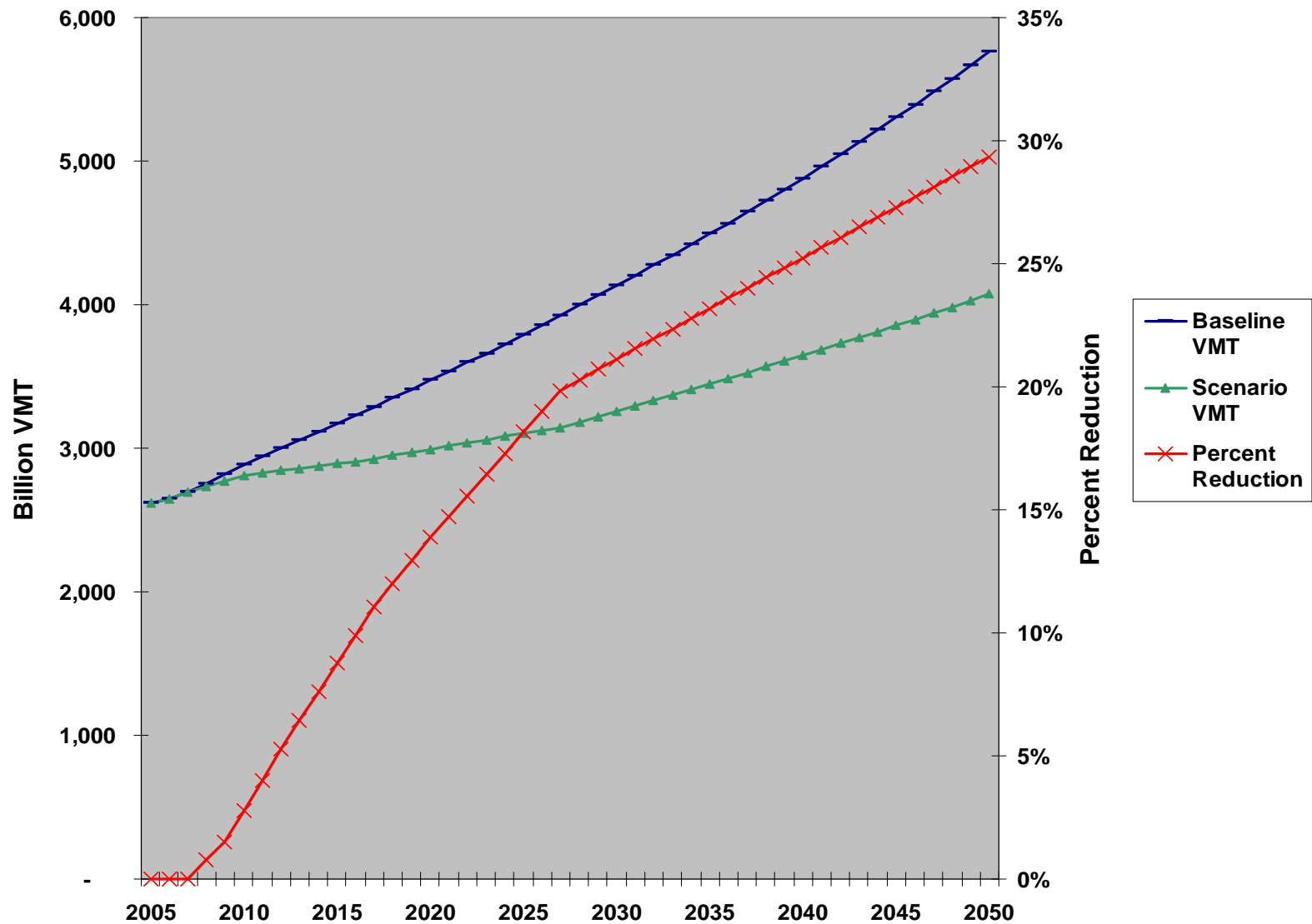
Effectiveness vs. National VMT



Congestion and Induced Demand

- **Congestion reduction can significantly improve fuel economy**
 - From all urban VMT reductions (congested VMT)
 - Additional benefits from congestion pricing
 - Simplistic method used
- **Induced demand created by congestion reduction/ improved highway speeds from VMT reductions**
 - Counteracts 50% of VMT reduction where applicable: congested travel only
 - Not applied to congestion pricing, parking freezes, speed limits, telecommuting and compressed work week (already applied), rural measures

Summary VMT Results



Summary VMT Results

- **With aggressive implementation of broad package of TDM measures, 21% reduction from baseline VMT is achievable by 2030**
 - 2020: 14% VMT reduction from baseline
 - 2030: 21%
 - 2040: 25%
 - 2050: 29%
- **Induced demand from reduced congestion largely accounted for by measures' with implementation set to reduction targets**
 - 2030 estimate would be lowered to 18%
 - Estimates need refinement

Greenhouse Gas Impacts

- **GHG reduction is equivalent to VMT reduction, adjusted by:**
 - **Benefits from reduced congestion**
 - **Benefits from speed limits**
 - **Increased emissions from transit, air and rail diversion**
 - **Increased emissions from induced demand**
- **Net effect – 2030 GHG emissions reduced 23% (21%) versus 21% (18%) VMT reduction**

Next steps

- **Identify additional measures**
 - Traffic operations (e.g., signal synchronization)
 - National pricing measures: fuel tax, vmt fees
- **Refine sketch analysis to produce better estimates of the effectiveness of measures**
 - Address uncertainty and range of effectiveness
 - Better define scope of target VMT; disaggregate into different size urban areas
 - Provide wedge analysis of measures
 - Incorporate congestion and induced demand effects by individual measure rather than one size fits all

Next steps (cont.)

- **Address cost issues for measures**
 - **Cost-effectiveness (\$/tonne; \$/PMT)**
 - **Marginal abatement cost curves**
- **Further develop analysis of congestion**
 - **Extent of VMT effected**
 - **Fuel economy effects**
- **Develop induced demand effects with greater sophistication**
 - **Incorporate effect by individual measure**

Wrap-up

- Clarifying questions
- Comments
- Discussion

Thank you!

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