



Movement of Goods, Services and People: Entanglements with Sustainability Implications

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Separation and Sustainability Issues

▶ Both passenger and freight traffic volumes continue to grow at a rapid pace, in both the Europe & North America, causing:

- increased (and expensive) traffic congestion
- continued depletion of petroleum fuels
- increased exposure to air, groundwater and noise pollution
- increased potential for accidents
- increased signs of personal stress
(e.g. the "road rage" phenomenon in the United States)

▶ Most of this traffic is currently being absorbed by the highway system, leading to increasingly frequent traffic tie-ups, greater traveler exposure to heavy truck traffic, and deteriorating and shorter lived highway pavements.

▶ **The Question: Can greater time and space separation of passenger and freight movements help to alleviate these problems?** What are the options and their possible consequences?



Objectives of this presentation

- Look at where freight and passenger issues collide
- Review how this differs between North America and Europe
- Indicate where complementarity and cooperation can be focused

There Are Varying Degrees of Separation Exist

Increased Separation of Passengers and Freight



Mixed Use Vehicles



Mixed Use Roadways

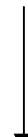
Common Examples:

- Mail on passenger trains
- "Belly freight" on passenger aircraft
- Household shopping trips
- Service vehicles in personal use

Common Examples:

- Mixed use highways
- Mixed use rail-lines
- Mixed use waterways
- Curb space fights

Separated Use Roadways (Intra-Modal)



Common Examples:

- Designated truck lanes
- Passenger only highways
- Freight-only rail lines
- Night-freight air carriage

PROPOSED:

Designated truck (toll) highways

Separated Use Modes (Inter-Modal)



Mode shifts away from highways to rail and short sea shipping

Major Pros and Cons of Separation:

Principal benefits of separating passenger and freight movements:

- Economies (of scale)
 - dedicated vehicle/vessel and terminal functions, differential infrastructure standards
- Safety (principally of passengers)
 - around heavy equipment, around hazardous cargos, around busy/polluted terminals

versus

Principal benefits of mixed traffic movements:

- line-haul infrastructure cost savings from joint use
- cost savings and convenience of multi-use vehicles

Policy Decisions Affecting the Separation of Passenger and Freight Movements (or Lack of It) Tend to Occur in Two Geographic Settings:



Inter-City and Other Long-Haul (Corridor) Movements

- very different histories between the continents
- very different systems: very similar economics
- so which options are transferable in practice?



Movements Within Urban Areas, including movements around Major Ports and other large freight transfer terminals

- many similarities, there are clear benefits from parallel and complementary work

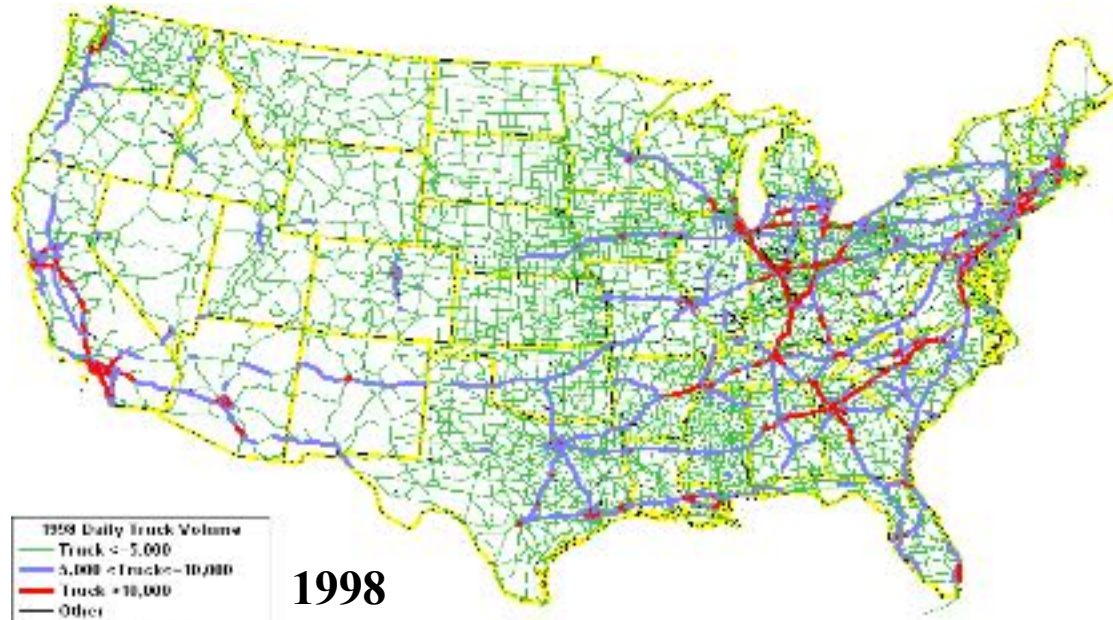
Sustainable Solutions Require That We Address These Two Settings in an Integrated Manner

INTER-CITY / LONG HAUL TRANSPORT: ALTERNATIVES TO MIXED HIGHWAY TRAFFIC

- ▶ Separated passenger and truck highways, and lanes
- ▶ High speed (Passenger) railways, and time/space conflicts
- ▶ Short sea shipping - a growing interest in the US...
- ▶ Inland waterways - recreational conflicts
- ▶ More freight moving, longer distances in less time

Key Public Policy Issues: Relative Costs (and Benefits) of Alternatives and WHO Gains/ WHO pays

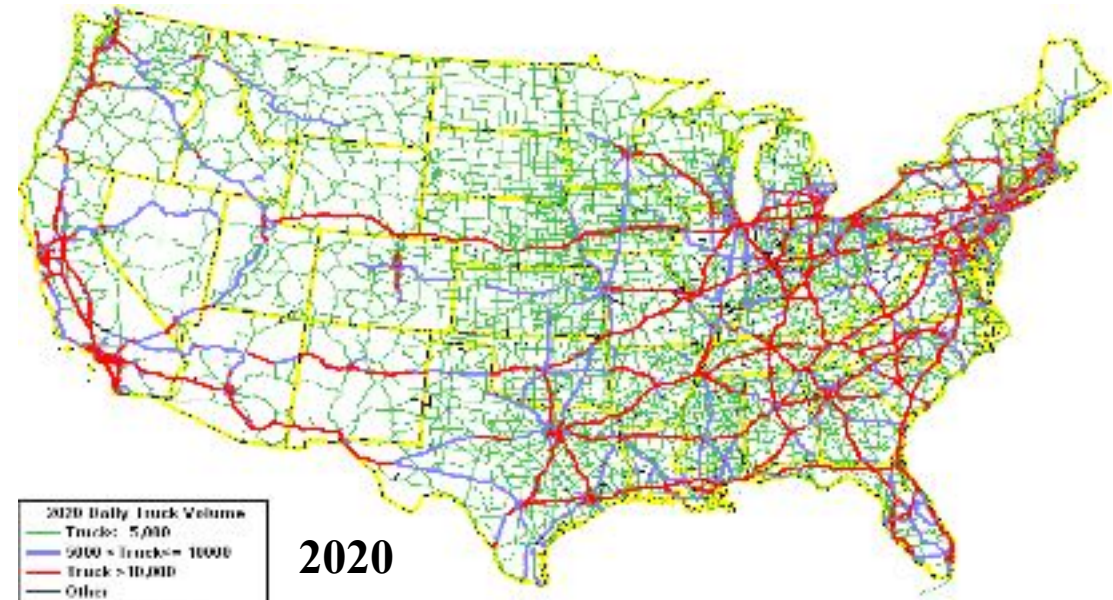
How complete is the accounting for sustainability



1998

US Interstate Highway
Congestion Is Spreading
onto Rural (Intercity)
Routes...

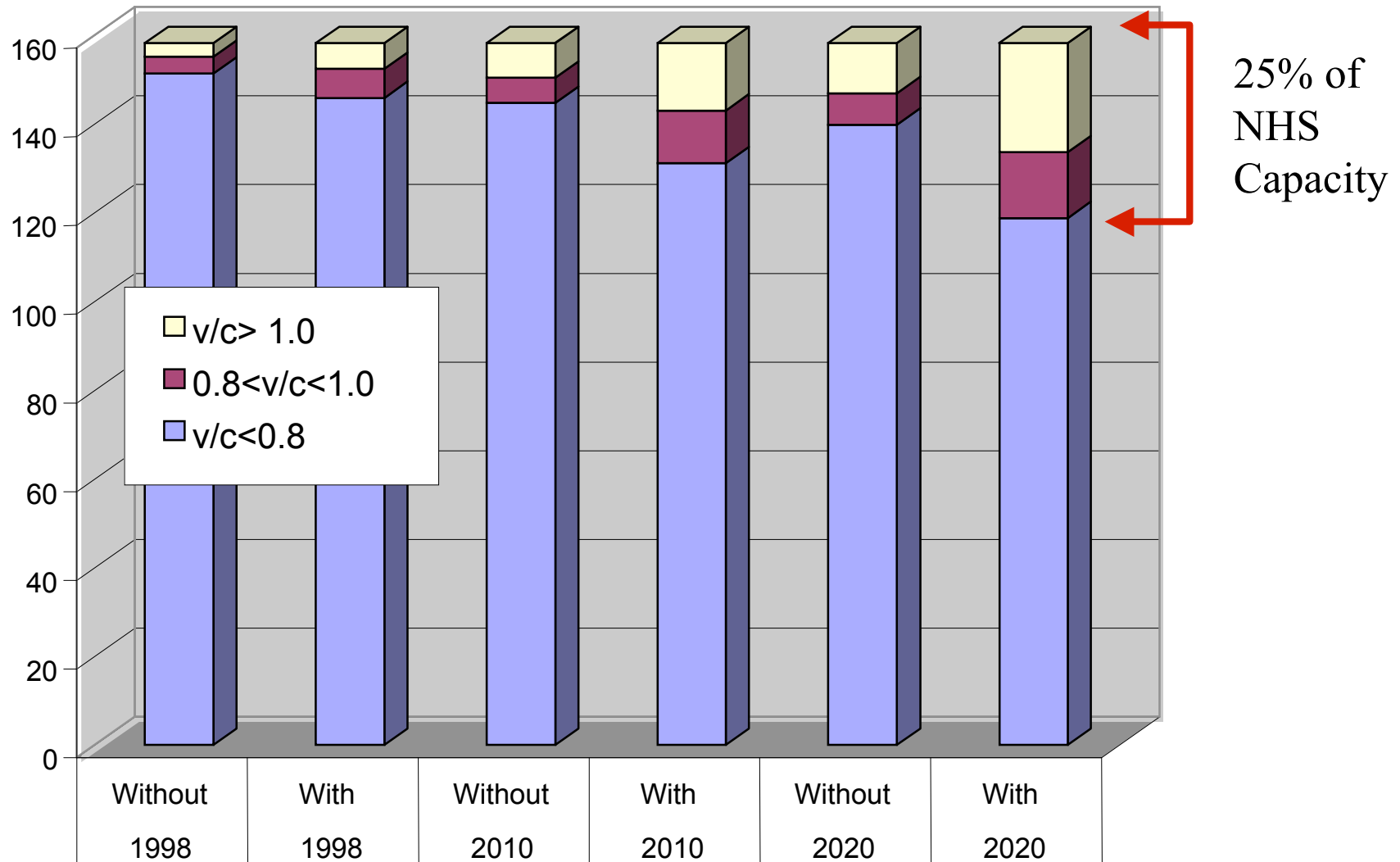
FORECAST GROWTH IN DAILY
US TRUCK VOLUMES: 1998-
2020*



2020

*Source: FHWA, Office of Freight Management
and Operations, FAF Project

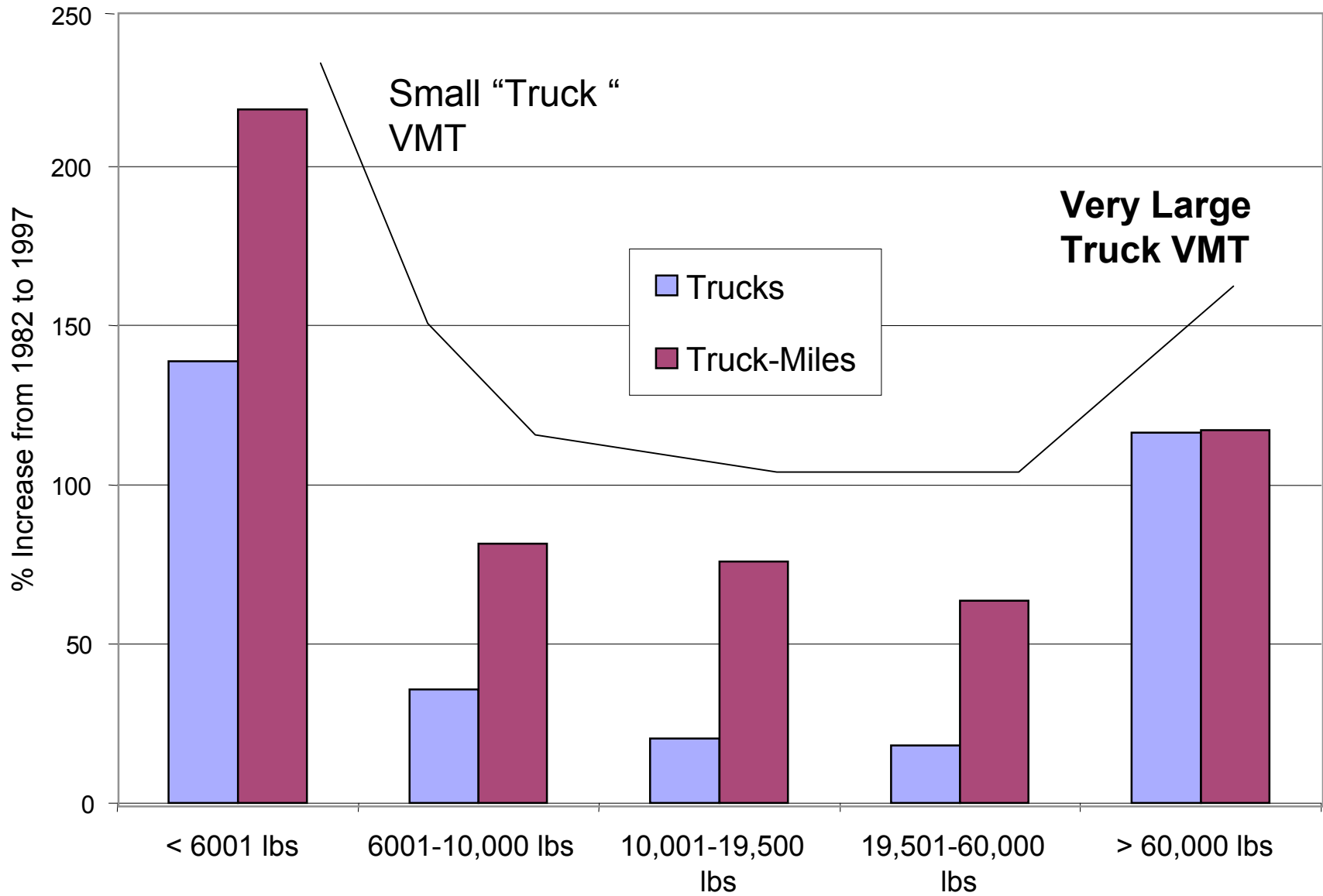
Projected Effect of Trucks on US National Highway System V/C Ratios



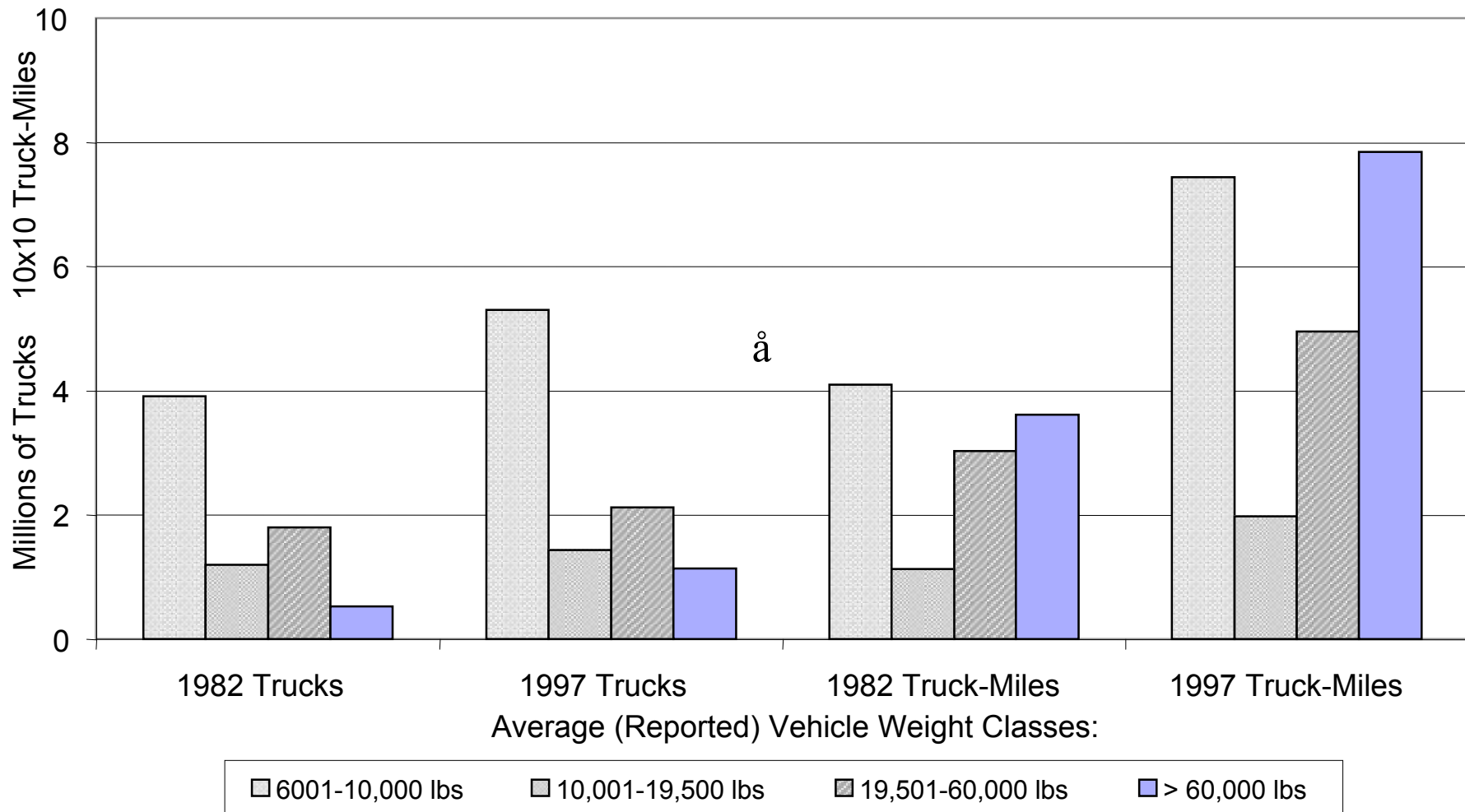
Source: Based on table in G. Maring and B. Lambert, FHWA Office of Freight Management & Operations

Percentage Growth in Trucks and Truck-Miles by Weight Class: 1982-1997

US Vehicle Inventory & Use Surveys



Growth in Number of Trucks and Truck-Miles in the United States, 1982- 1997 (excludes vehicles < 6001 lbs)



**WITHIN A GENERALLY RISING AMOUNT OF FREIGHT
MOVEMENT, AN INCREASING SHARE OF THE FREIGHT
TO BE MOVED IS IN HIGH VALUED, TIME-SENSITIVE GOODS***

Tonnage density?



*Map Source: FHWA, Office of Freight Management
and Operations, FAF project

The background of the slide is a photograph of a canal, likely in Venice, Italy. Several boats, including gondolas and larger motorboats, are visible on the water. Buildings with arched windows line the canal banks. The image is slightly faded to allow the text to be the primary focus.

Variations on road capacity management for trucks

- Designated lanes on existing roads
- Pricing of Interstate Highway lanes (I-95)
 - being chosen by trucks rather than cars?
- Entirely dedicated highways

Long Haul Modal Alternatives to Existing Highway Transport (1).... **SEPARATED TRUCK HIGHWAYS**

Recent/Ongoing US Studies include:

Interstate-81 Study (325 mile, 90 interchange highway in western Virginia:
separated truck toll lanes)

The Trans-Texas Corridor Concept (4,000 statewide separated truck and rail network of corridors)

The National Interstate-10 Freight Corridor Study (multi-state East-West corridor improvement study for the southern US)

The Florida Statewide Scoping Study (Interstate Corridors, etc.)

Useful information sources:

<http://www.virginiadot.org/projects/constSTAN-I81-overview.asp>

http://www.dot.state.tx.us/ttc/ttc_report_summary.pdf

http://www.i10freightstudy.com/7_reports.html

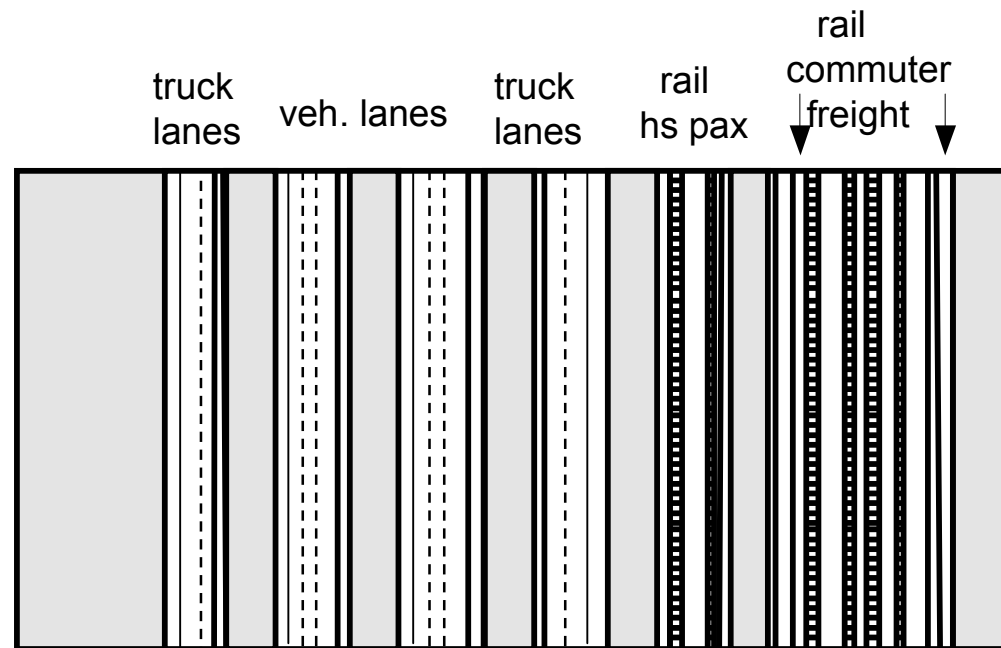
<http://www.ctre.iastate.edu/pubs/midcon2003/ReichTrucks.pdf>

Long Haul Modal Alternatives to Existing Highway Transport: Things are Speeding Up

SEPARATED TRUCK HIGHWAYS (cont..)

E.G. Trans-Texas Corridor concept (Proposed)

4,000 mile network starting with 4 major corridors, corridors up to 1200 feet wide with separate lanes for passenger vehicles (3 in each direction) and trucks (2 in each direction) ,and six rail lines (3 in each direction): one for high speed passenger rail: one for high speed freight, and one for conventional commuter and freight traffic



1,000 – 1,200 foot corridor right-of-way

Conceptual Trans-Texas Corridor

see http://www.dot.state.tx.us/ttc/ttc_report_summary.pdf

SEPARATED TRUCK HIGHWAYS (cont..)

Limited Number of Technical Studies to Date:

- 1) Janson, B.N. & Rathi, A. 1990 (ORNL study for FHWA)
Study of Separated, Designated and Mixed Traffic Lanes

Findings: To justify dedicated truck lane construction probably requires:

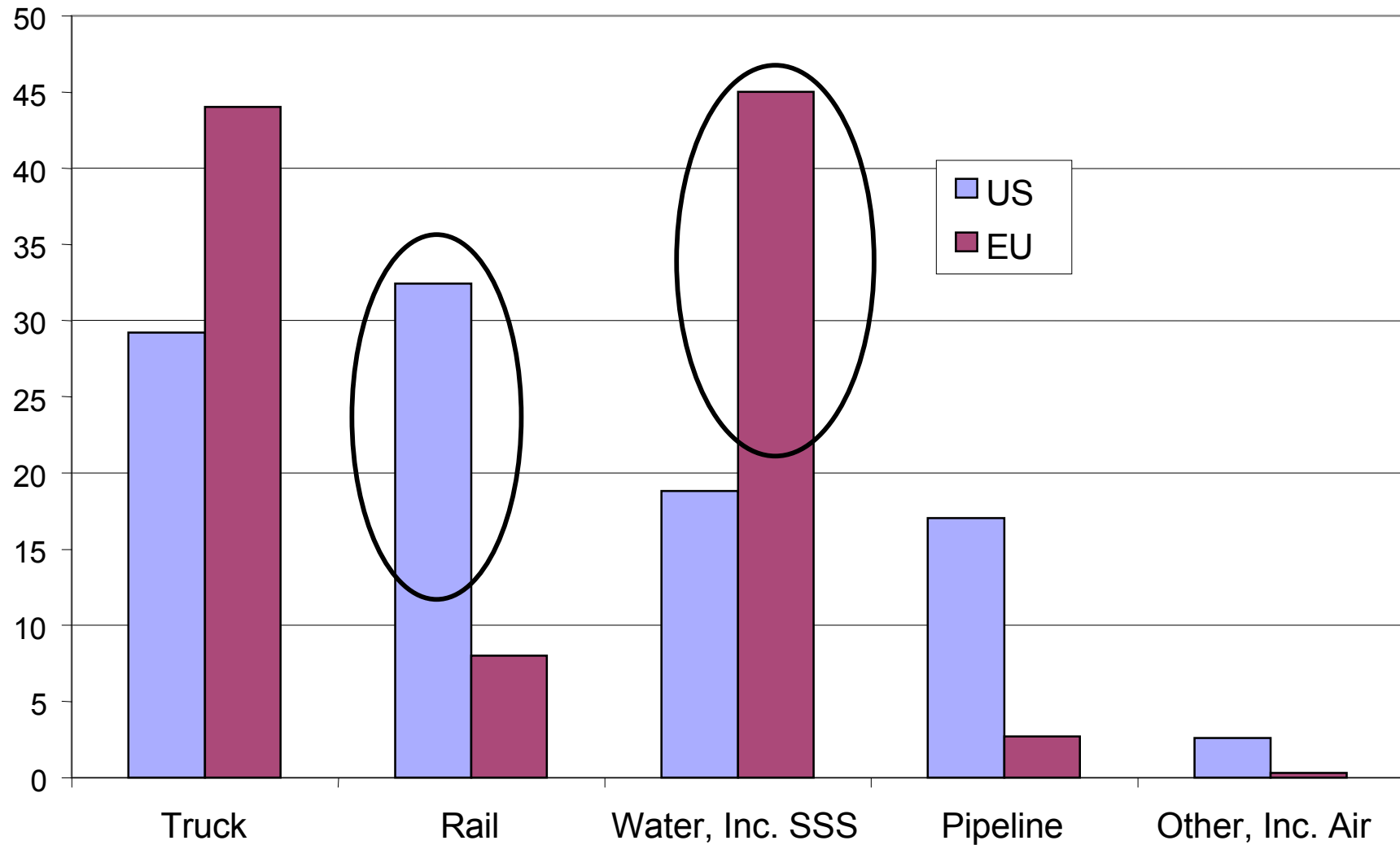
- o truck volumes to exceed 30% of traffic mix
- o peak hour volumes must exceed 1800 vehicles per lane-hour
- o off-peak volumes must exceed 1200 vehicle per lane- hour

- 2) Samuel, P., Poole, R.W.Jr. and Holguin-Vegas, J. 2002
(Reason Foundation) Study of Separated Truck Tollways in existing Rights of Way on Interstate Medians:

Findings: Recommends building truck toll lanes rather than mixed use lanes IF

- o truckers willing to pay 50% of cost savings back to pay for lanes.
- o tolls can offset fuel taxes, using IT to track truck miles driven
- o allowing suitable large truck configurations to operate on the highway system, with cargos > 33,000 lbs and trips > 25 miles.
- o trucks must make up at least 10% of traffic on highway, baseline traffic level of 40,000 AADT

MODAL ALTERNATIVES: Approximate Share of Freight Mode Activity in the EU and US Around the Turn of the Century (based on Annual Ton-Miles)



Sources: for US: "Freight USA" ORNL (2000); for EU: Eurostat 2001)

Long Haul Modal Alternatives to Existing Highway Transport: Things are Speeding Up (2).... **HIGH SPEED TRAINS**

RAPID RAIL (PASSENGER) SERVICES (CONVENTIONAL SHARED TRACK)

European Examples:

England :London - Edinburgh

Italy: Rome - Florence and Rome - Milan

Sweden: Stockholm - Gothenburg Peak speeds of over 200 km/h BUT same lines used by much slower freight services.

North American Example :

Boston - Washington AMTRAK line

HIGH SPEED PASSENGER TRAINS (DEDICATED TRACK)

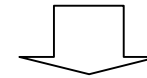
European Example:

France: TGV Atlantic and South-East Lines

Spain: ALARIS Madrid-Valencia, AVE Madrid-Seville

Germany: Frankfurt-Cologne

Peak speeds up to 300 kph.

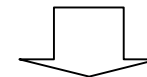


FASTER...

MAGLEV TRAINS (DEDICATED TRACK)

Passenger Plus Freight Potential?

First Intra-Urban, then Inter-Urban >>>? Peak speeds of 440 kph (projected)



FASTER...

CURRENT IMPLICATIONS? Fewer stops, Dedicated tracks

POSSIBILITIES: Fast freight also ?

Long Haul Modal Alternatives to Highway Transport: Things are Speeding Up (3) **SHORT SEA SHIPPING**

“Regular” Ferries ≤ 21 knots; **Fast Ferries** 22 to 27 knots; **High Speed Ferries** ≥ 28 knots; **High Speed Hydro-Craft** ≥ 50 knots in development.

EU Initiatives include:

- 1) Shortsea Shipping Network
- 2) 2010 “Motorways of The Sea” Concept
- 3) Marco Polo Programme
- 4) REALISE program

US Initiatives include:

- 1) Port Inland Distribution Network Concept: Port Authority of New York/ New Jersey
- 2) Florida Intra-Coastal and Inland Waterways study

SSS is responsible for some 41% of EU ton-km of freight transport, and has grown at a pace similar to trucking since 1970



MULTI-MODAL Infrastructure Investment Projects are needed that Capture the **FULL COSTS** of each alternative, as well as **WHO PAYS/WHO GAINS**

1) Technical challenges Include:

Proper full costs and benefits accounting
(infrastructure, operating and external costs)

Effective demand forecasting (scenario based)

2) Political challenges include:

Who pays/who benefits
(regional and national concerns)

Standardization (of tracks, safety regulations,
work rules, etc.)

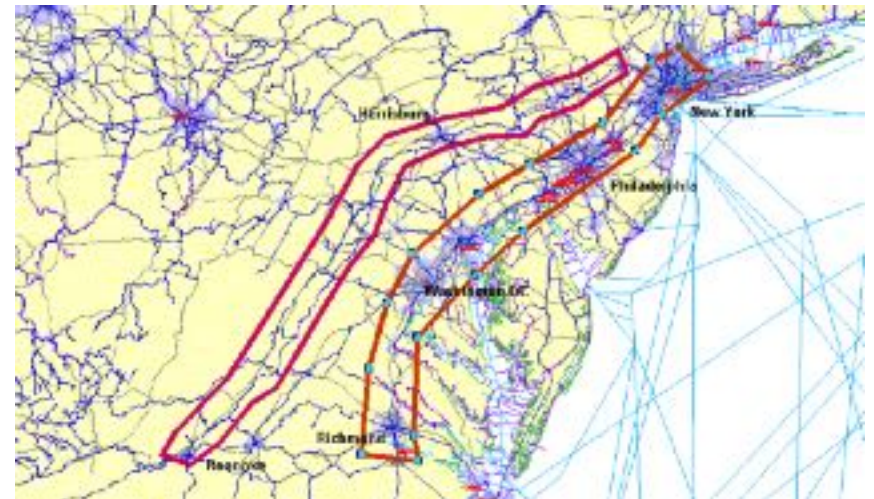
Cabotage policy

Road pricing policy

3) Useful directions for analysis:

Improved BCA analysis

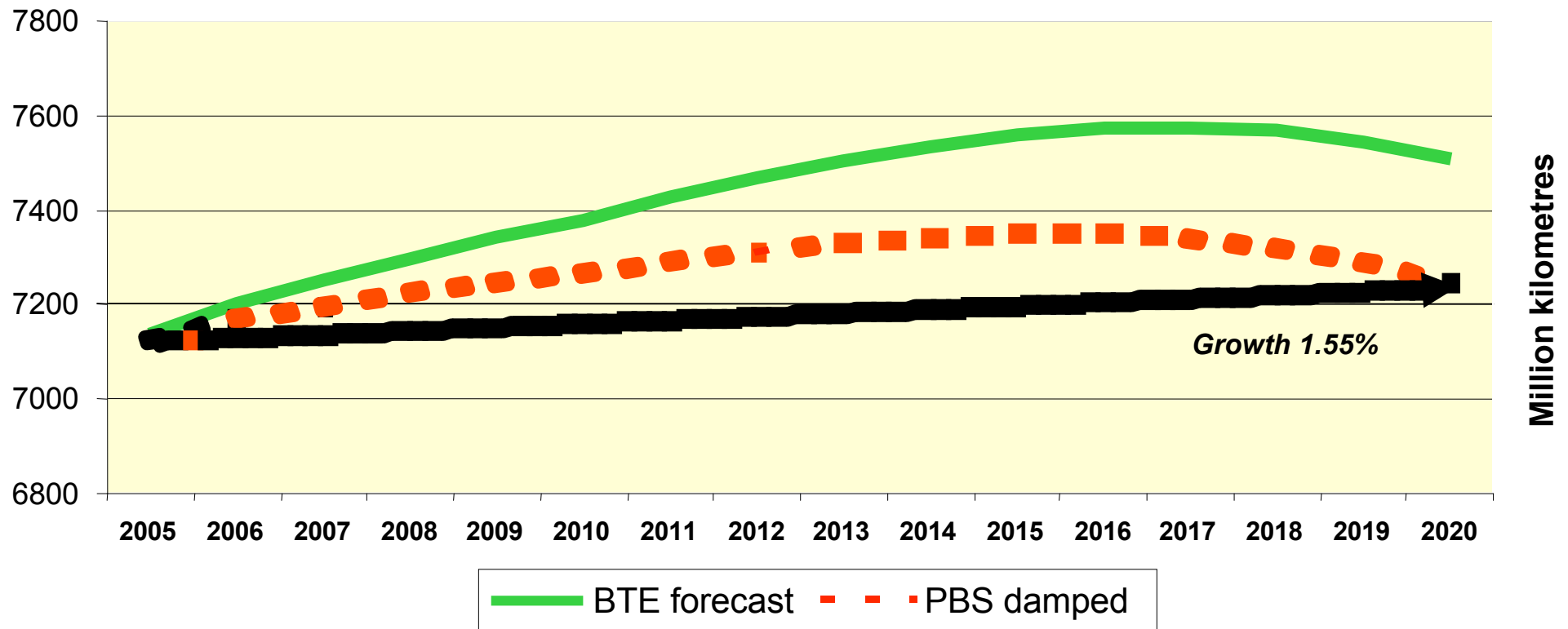
Linked transport and energy networks
(e.g. EU TEN-T and TEN-E initiatives)
-- spurred in both the EU and US by
security concerns over energy supply



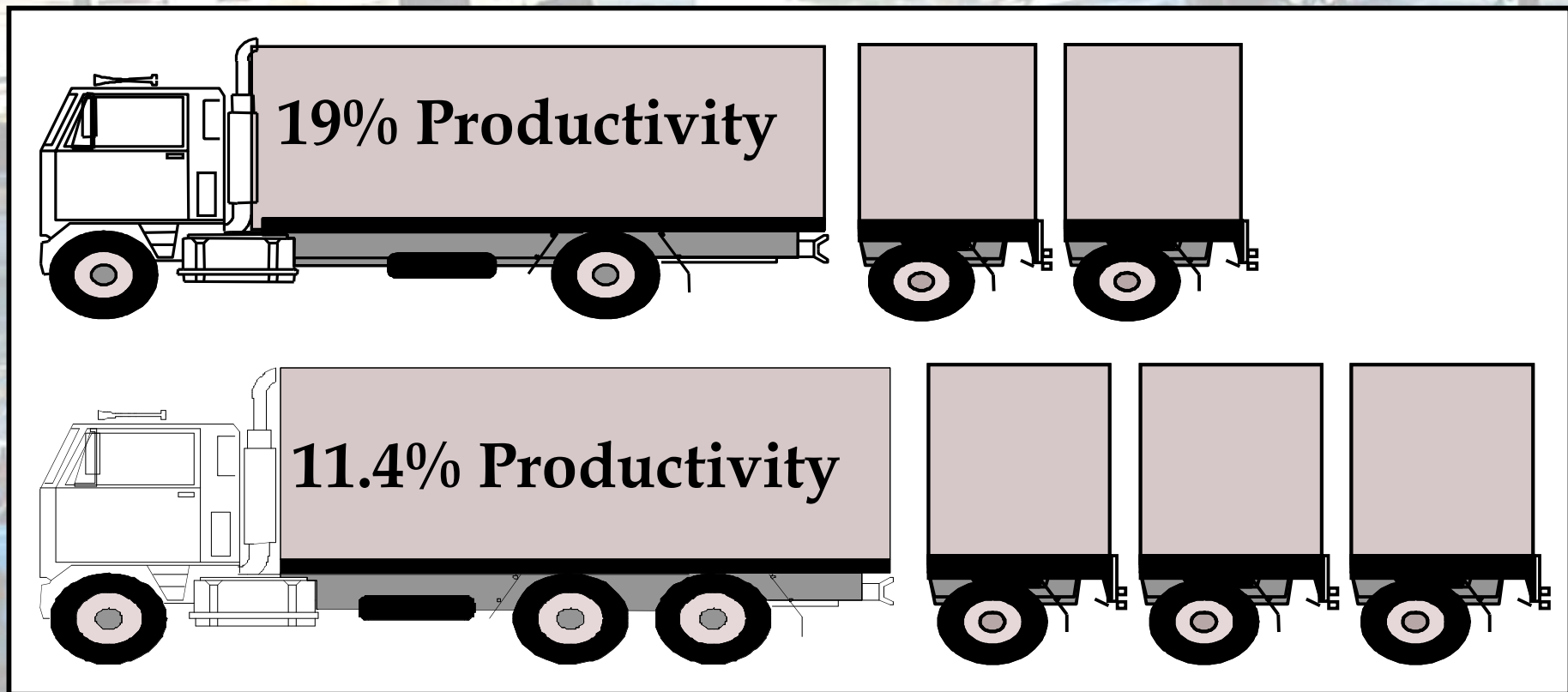
Mid-Atlantic Highway/Rail Corridor
in the United States

We cant forget the current regulatory constraints on freight vehicles

Performance Based Standards (PBS): Impacts on Rigid Truck
Forecasts 2005 - 2020 Vehicle Kilometres in Australia



Illustrative Options for Urban Rigid Concept Vehicles possible under PBS



Urban Area Passenger & Good Movement Challenges

Public Policy Issue

Rapid growth in the number and size SUVs, Minivans, Pickups and other personal use as well as commercial, and mixed personal/commercial use “trucks” . Rapid growth in service vehicles

Large trucks frequently entering busy business districts

Delivery trucks frequently entering residential areas

Mixed traffic in congested/polluted freight terminal areas

Landside seaport and airport access
For trucks

Principal Concerns

Lack of road space and worsening congestion; fuel consumption and air pollution; economic impacts of personal travel on commercial transport costs (and vice versa); mixed traffic safety issues; **service industry growth**

Parking/double parking violations; long idling times; vehicle size/maneuverability problems, mixed traffic safety issues

Potentially dangerous to neighborhood pedestrians, and children in particular

Lack of road space and costly delays in truck access/egress; delays due to competing rail commuter/rail freight traffic needs; safety of pedestrian and personal vehicle traffic; air, noise and groundwater pollution, higher HAZMAT exposure potential, NIMBY issues

Urban Traffic Analysis Issues: What is “Freight”

Data on urban freight movements is full of holes on both sides of the Atlantic

Urban freight traffic has changed considerably over the past 30 years

We have neglected to study traffic movements in such sectors as commercial, business and economic services, despite rapid growth in vehicle miles in this sector

We need to collect more data/do more analysis on the nature and economic drivers of trips visiting and linking different types of urban land use

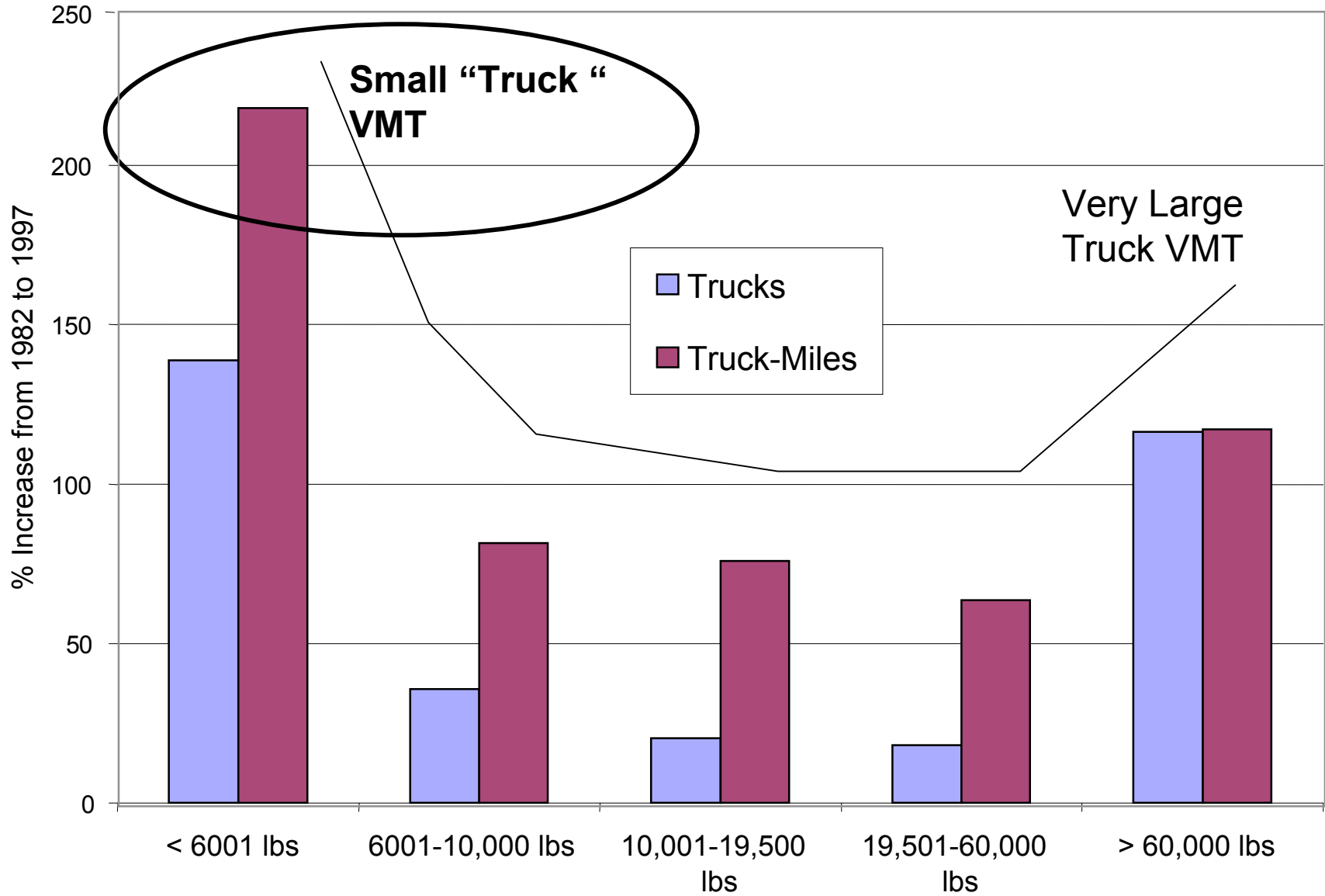
We need to understand use by vehicle type, including ‘private’ vehicles, a lot better

Rapid growth in the demand for small commercial vehicles coincides with a rise in demand for larger personal use vehicles (SUVs, minivans, etc.), and higher value densities even bring the smaller “obviously private” vehicles into the scope

How (and why) these vehicles are are being/will be used needs greater attention.

Percentage Growth in Trucks and Truck-Miles by Weight Class: 1982-1997

US Vehicle Inventory & Use Surveys



Recent Growth in Highway Vehicle-Miles of Travel by Vehicle Size



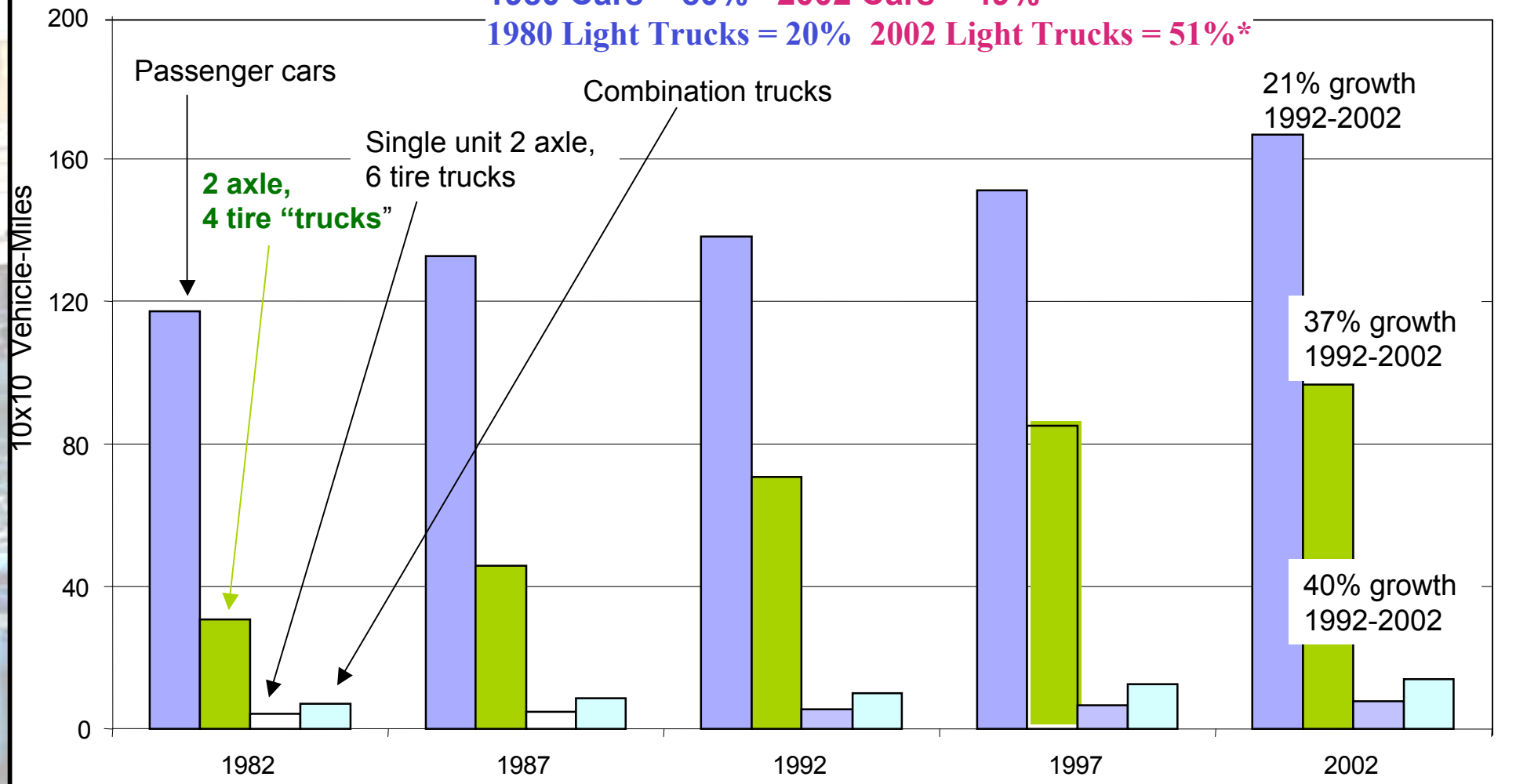
Data sources: UK DTLR DVLA data for GB; US DOT/FHWA Highways Statistics series for USA

Growth in Passenger Car and Truck Vehicle Miles in the United States

Shift in Annual Sales:

1980 Cars = 80% 2002 Cars = 49%

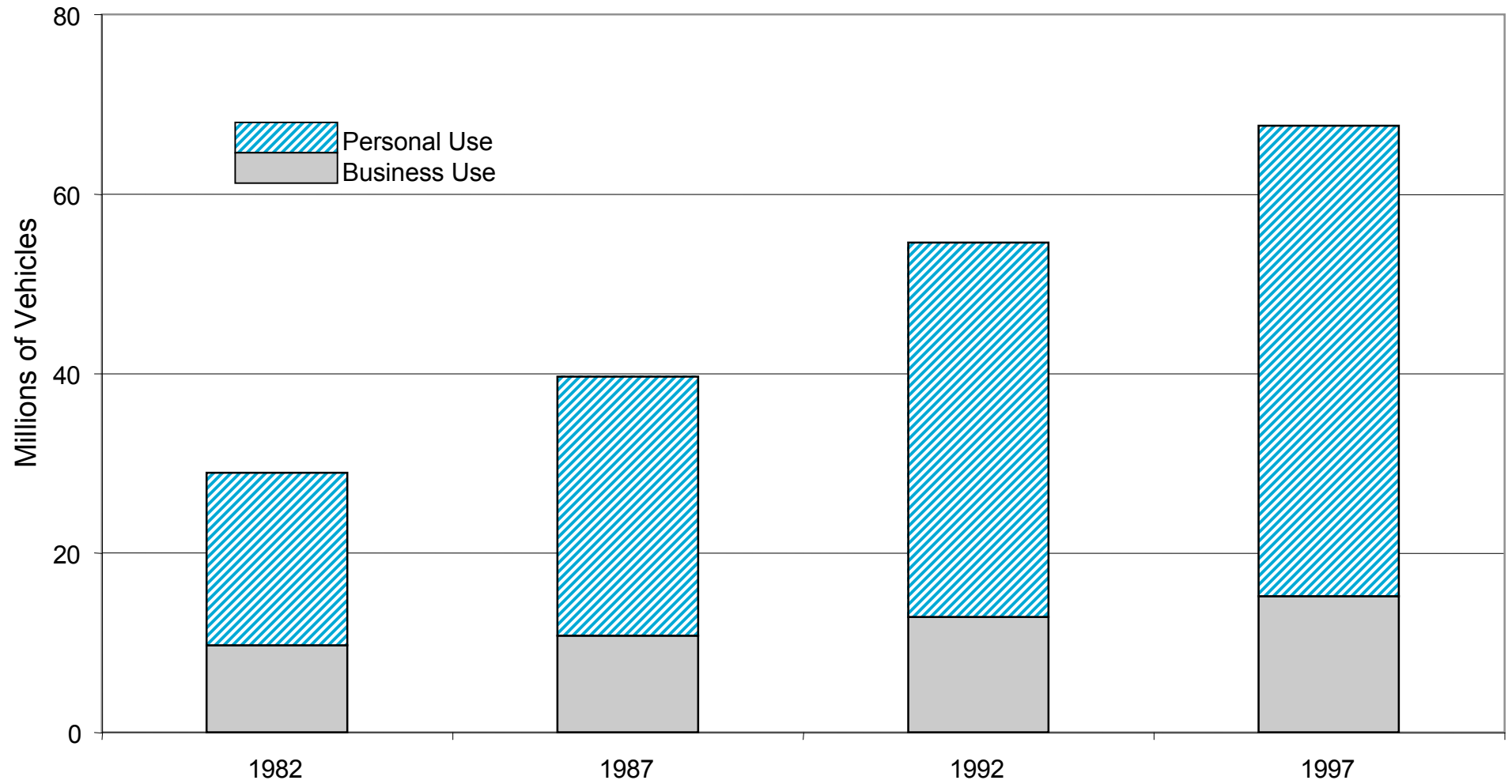
1980 Light Trucks = 20% 2002 Light Trucks = 51%*



* Sales periods from October 1 of current year through September 30 of next year Source: Oak Ridge National Laboratory at www-cta.ornl.gov

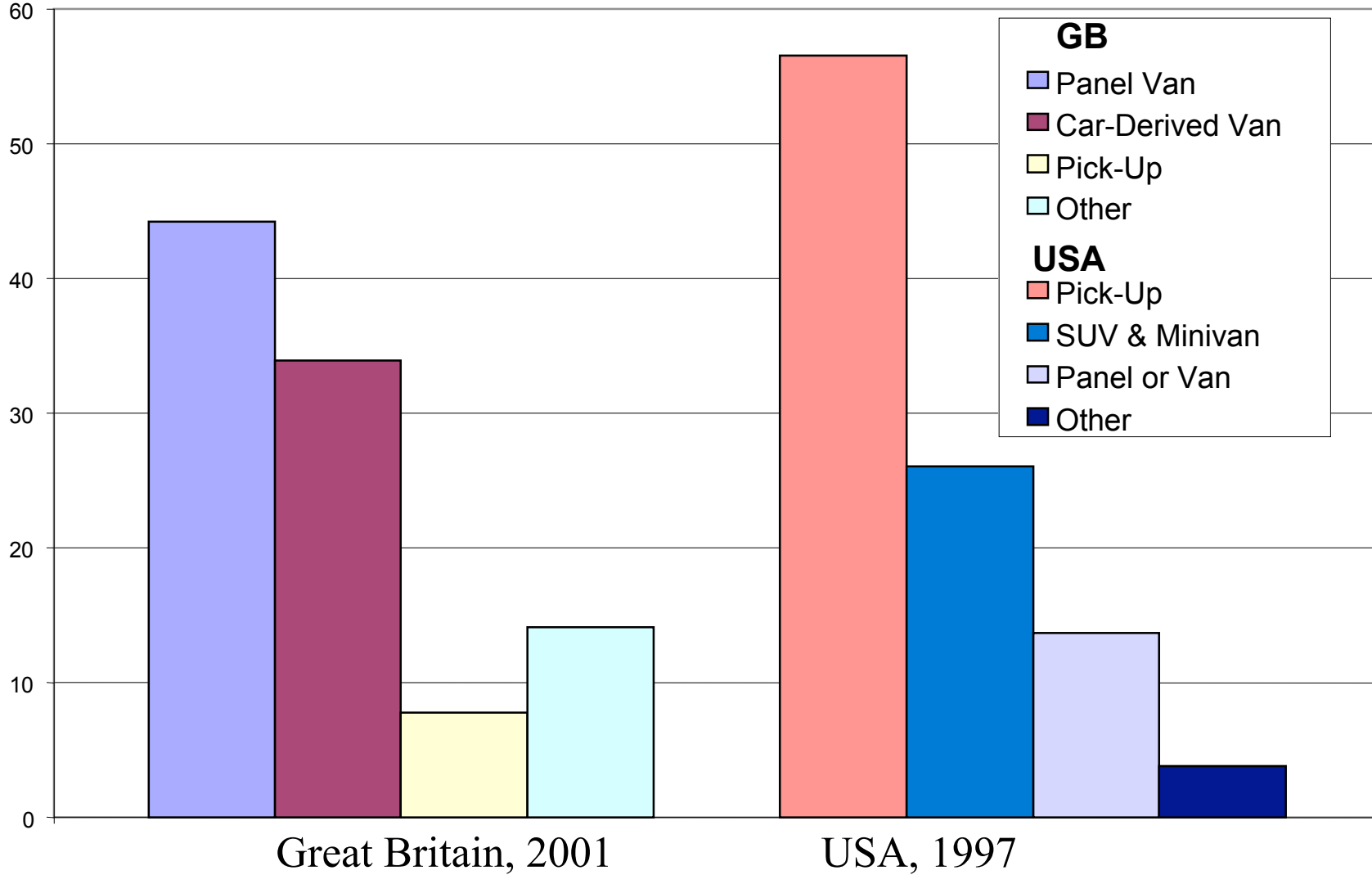
Graph Data from US DOT/FHWA's Highway Statistics Series

Growth in Light Duty (< 10,000 lbs) Truck Fleet in the United States, 1982- 1997: Business and Personal Use Percentages.



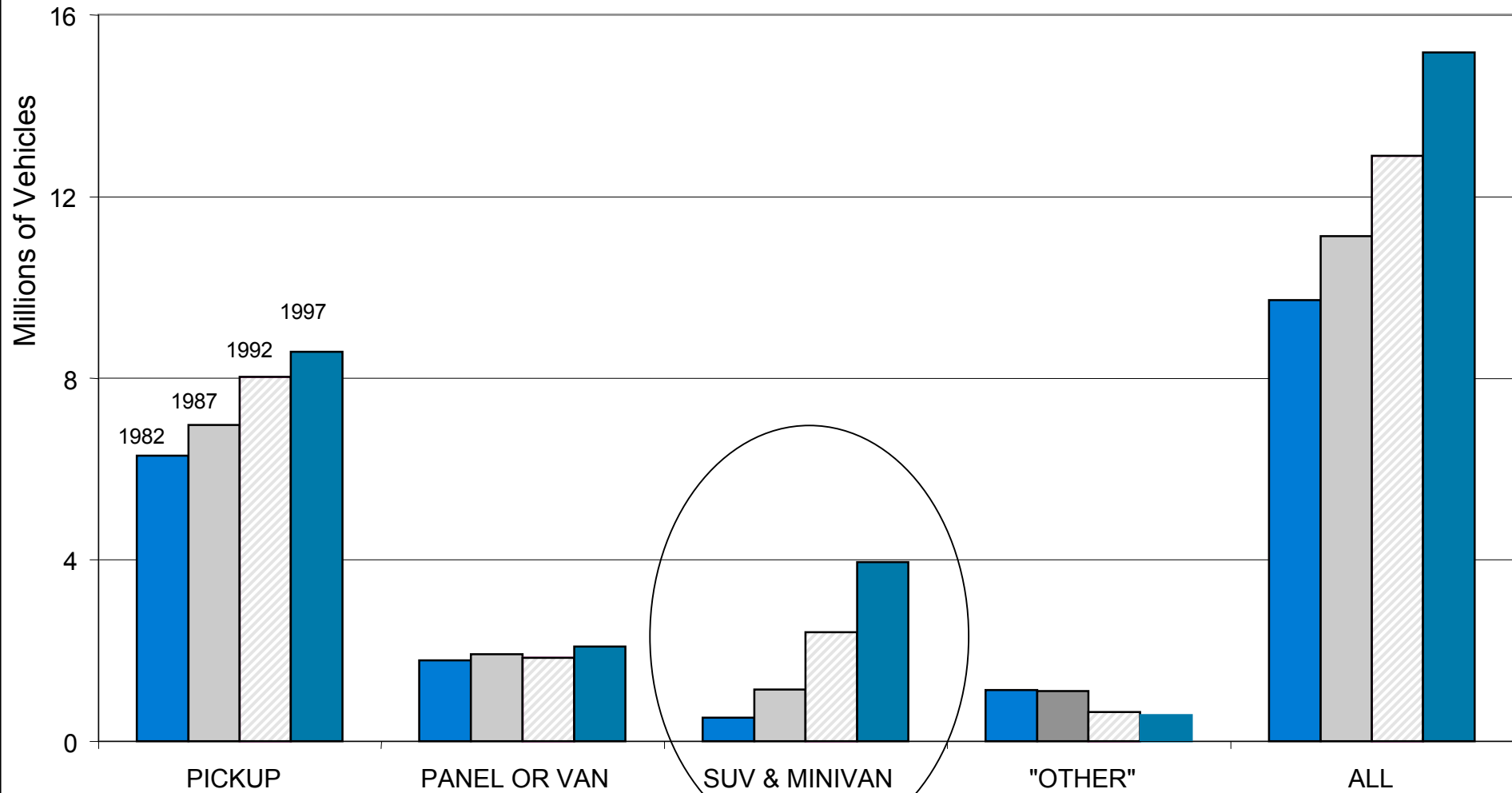
Major Body Types for Small Commercial/Freight Vehicles

% of Vehicles

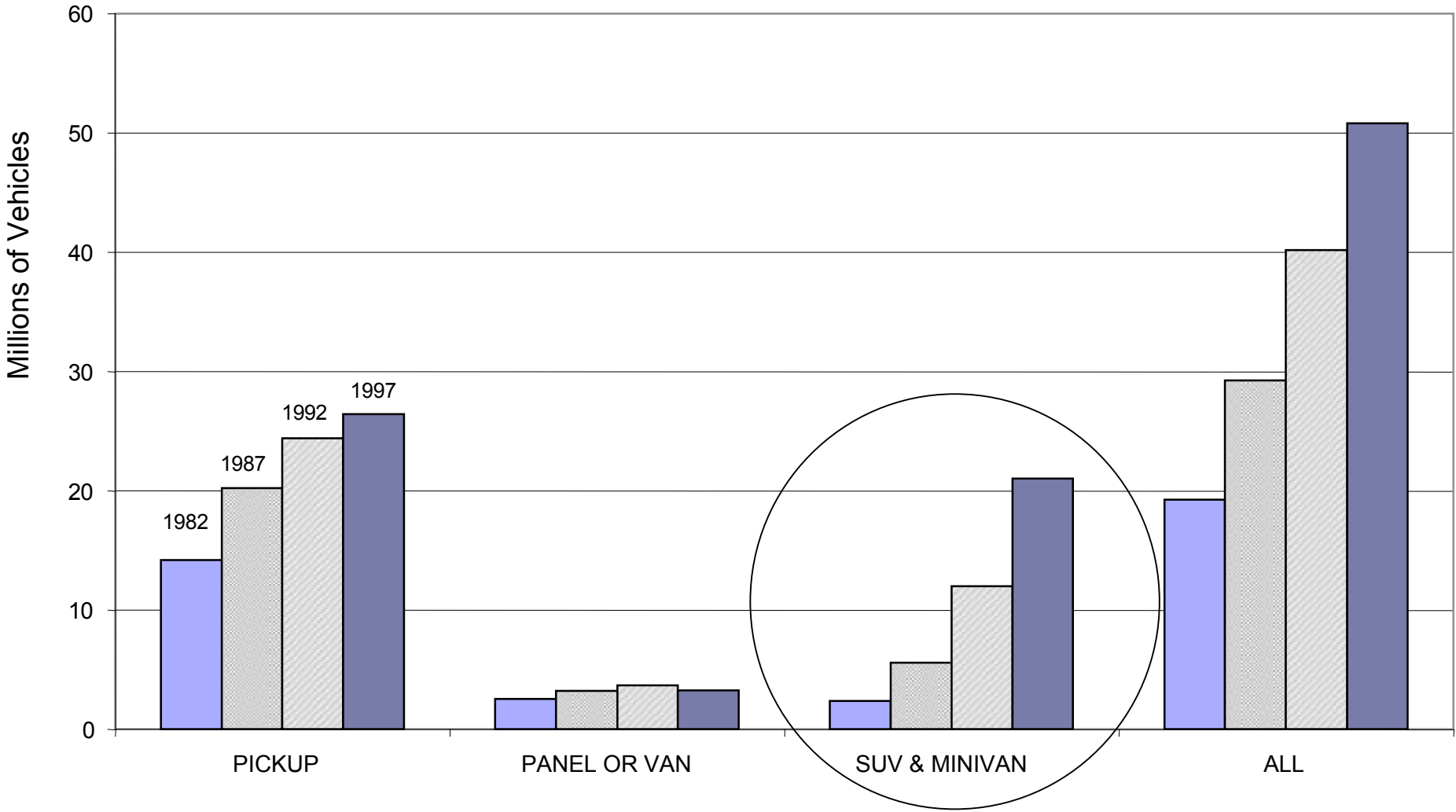


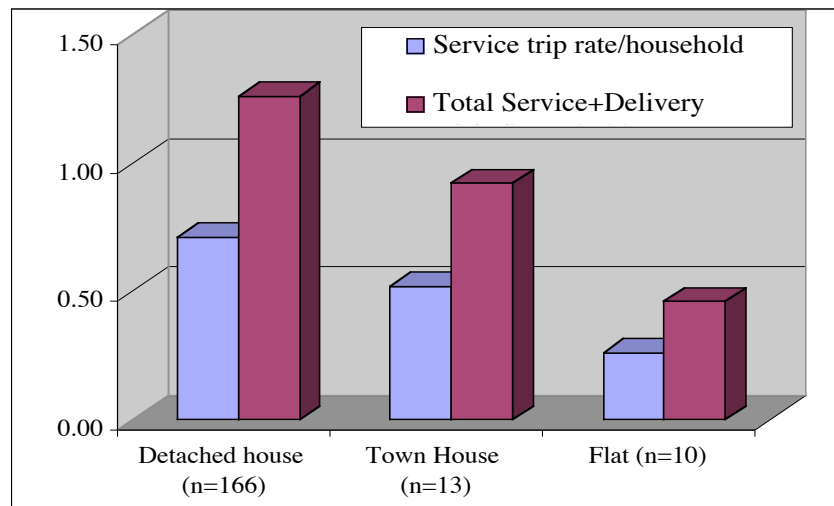
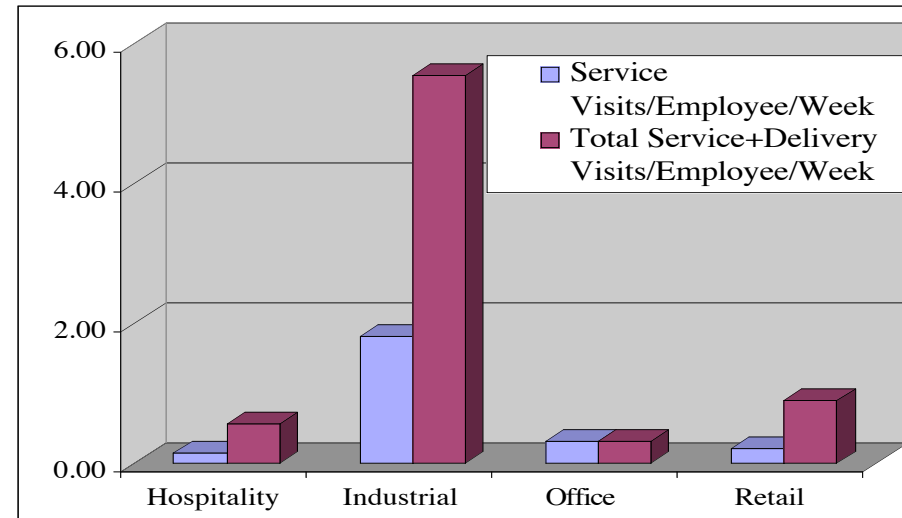
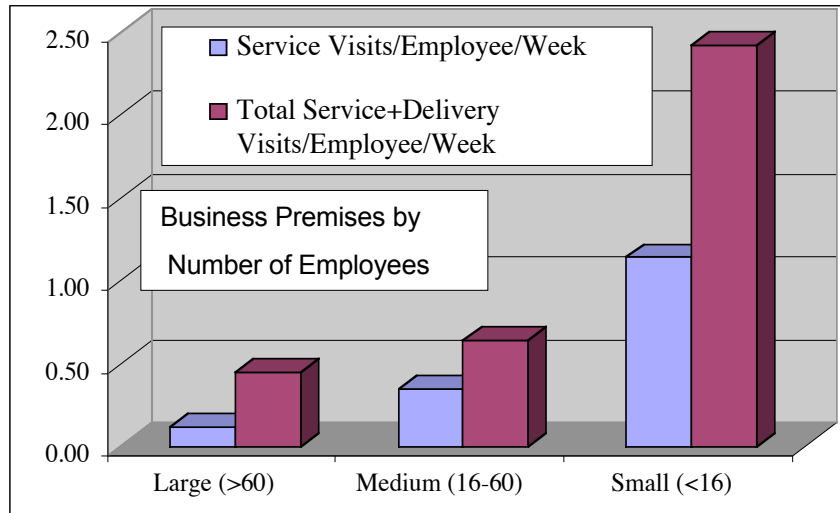
Data sources: 1 = UK DTLR DVLA data for GB; 2 = Census Bureau VIUS data

Growth in Light Duty (< 10,000 lbs) Truck Fleet in the United States by Major Body Types: 1982- 1997 : Business Use



**Growth in Light Duty (< 10,000 lbs) Truck Fleet in the United States:
by Major Body Types: 1982 - 1997. Personal Use**





Examples of Urban Area Trip Activity Rates by Land Use and Type of Activity

Sydney exploratory study by PPK Pty

Source: Wigan, M, Browne, M., Allen, J. and Anderton, S. (2002) Understanding the growth in service trips and developing transport modelling approaches to commercial, service and light goods movements, European Transport Conference

Why are Light Commercial/Goods vehicles not picked out already?

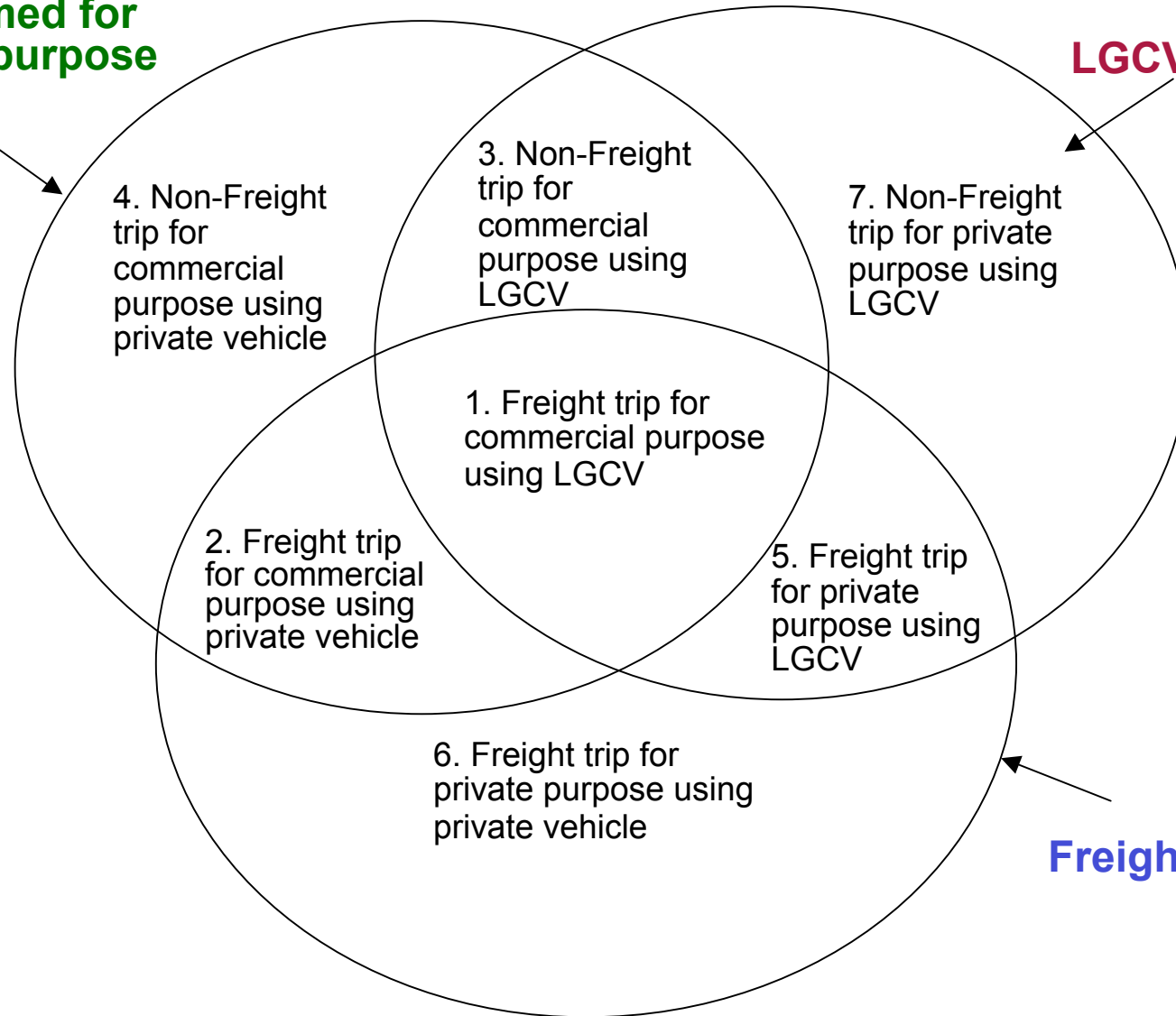
1. **Freight movements** for commercial purposes ✓
2. **Freight movements** for commercial purposes but in private vehicles
3. **Freight movements** for private trip purposes in LGCVs ✓
4. **Freight movements** in private vehicles on private purposes
5. **Non-Freight movements** in LGCVs for commercial purposes ✓
6. **Non-Freight movements** in identified LGCVs on private purposes ✓
7. **Non-Freight movements** in private vehicles on commercial purposes
✓ Visually identified as a 'freight' vehicle

Consequently 2,5,6,7 would all be visually misclassified

Classifying Goods and Service Trips

Trips performed for commercial purpose

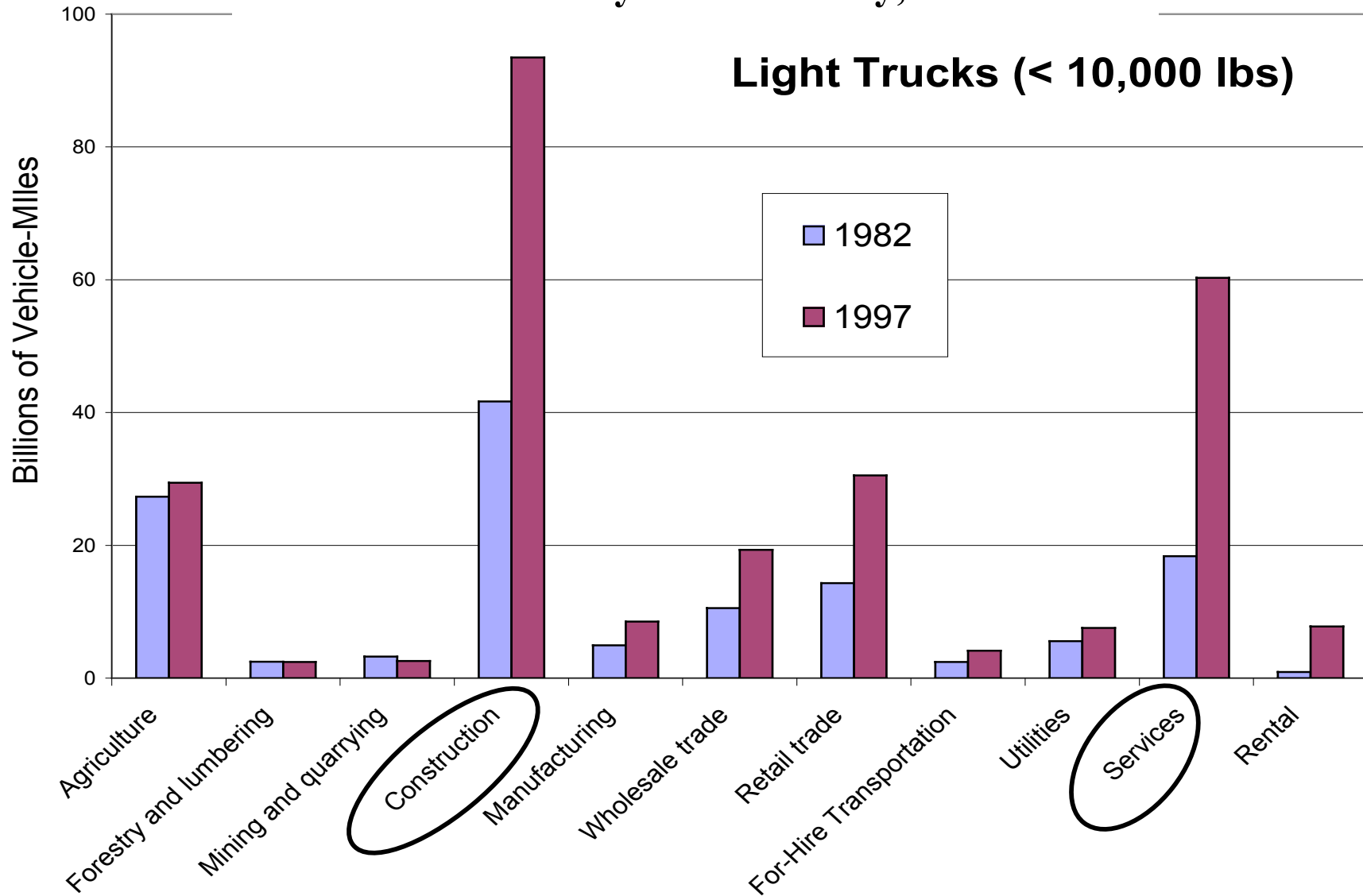
LGCV trips



Source: Wigan, Browne, Allen and Anderson, 2002

US Vehicle Inventory & Use Survey, 1982 & 1997

Light Trucks (< 10,000 lbs)



Recent Growth in Number of Trucks, Annual Truck Miles, Real GDP and Personal Consumption Expenditures in the United States

Personal Business and Services Sector

% Increase

400

300

200

100

0

1982

1987

1992

1997

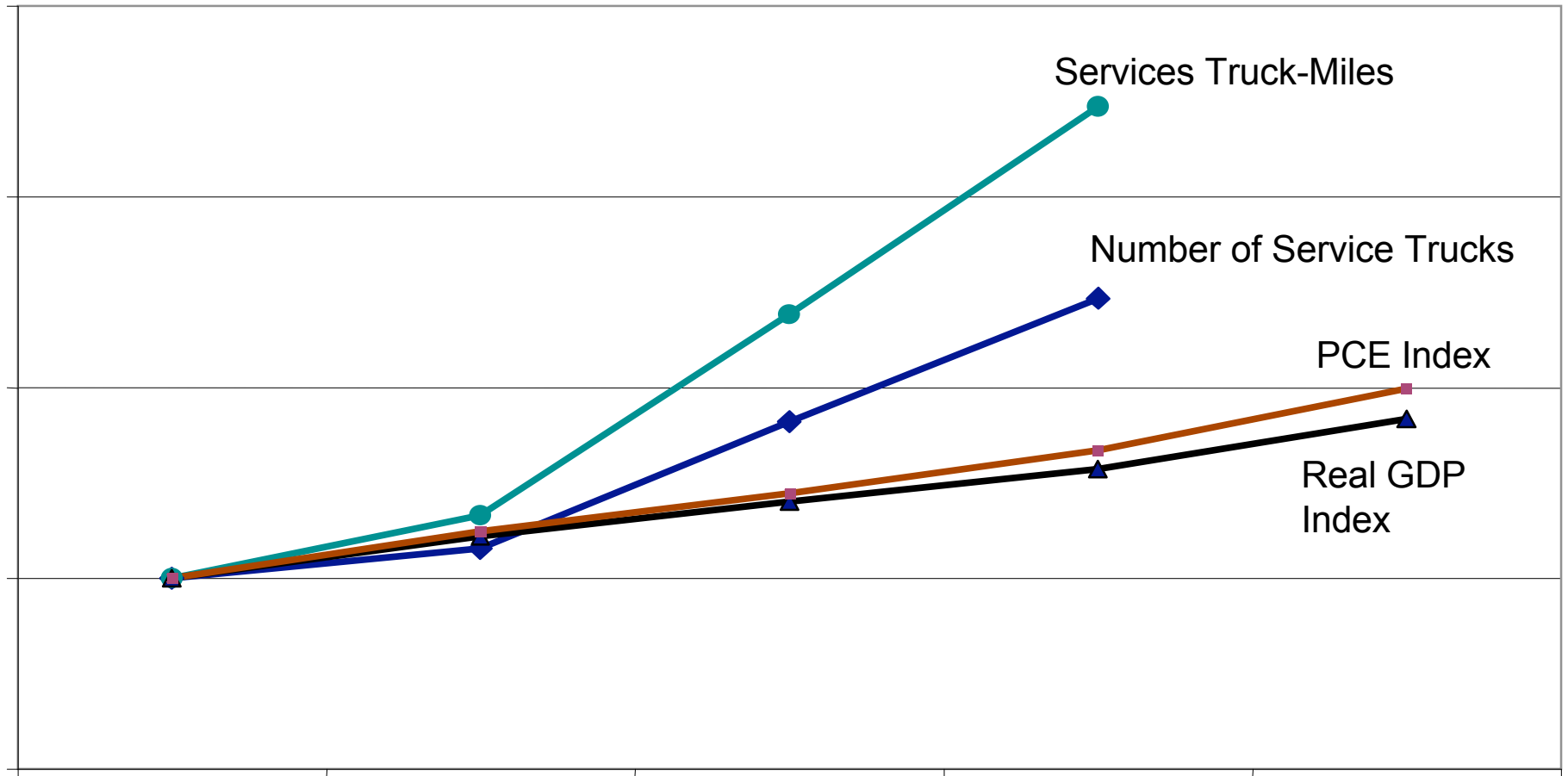
2002

Services Truck-Miles

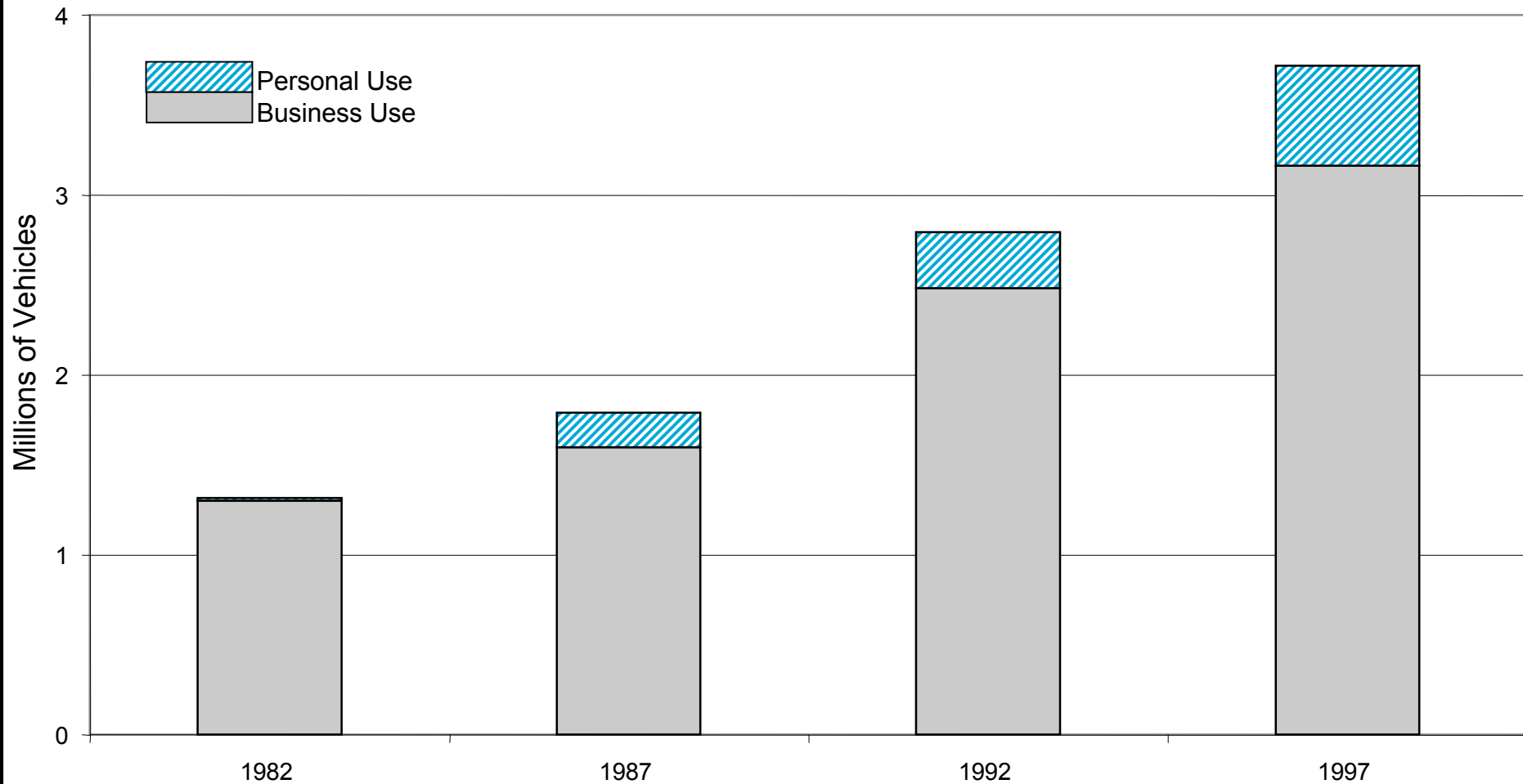
Number of Service Trucks

PCE Index

Real GDP Index



Growth in Services Light Truck Fleet in the United States 1982- 1997: Both Business and Personal Use Percentages are Growing



Challenges and Opportunities in Urban Freight Traffic Analysis

1) Technical challenges Include:

Better designed data collection and use in predicting vehicle traffic associated with different land uses

Unraveling freight supply chains

2) Political challenges include:

Ensuring land-side truck access to major freight terminals and ports

NIMBY environmental issues

Adjusting the priorities given to freight in road space management and pricing

3) Useful directions for analysis:

Linking supply chain models to Input-Output models (passenger, freight and services demand projection)

Agent-based modeling of enterprises

Micro-simulation of enterprises

Adaption of large scale integrated logistics models (such as PANDORA)

What do we do **now**?

- Overlaps needing cooperative work
 - Services Industry, Light vehicles, Urban Logistics
- Complementarity can be focused
 - pricing can be deployed in both continents
 - trials will be different and have different contexts in each continent
 - Input/output modeling is becoming essential: needs the comparisons between the continents to advance
- Cooperation can be most effective where it can be focused
 - data issues are critical, economic and evaluation methods can be shared
- Regulatory impacts on freight vehicles themselves
 - Performance based standards (PBS)[NB: EU BESTUFS]