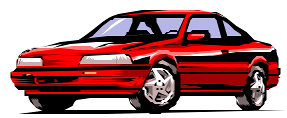
Frequently Asked Questions about Trucks

Think & Drive



January 2006

•Frequently Asked Questions (F.A.Q.s) about trucks.

•Although this presentation focuses on the truck mode, rail, marine and air play significant roles in the success of Alberta shippers reaching domestic and international markets.

•Highways, however, play a key intermodal role and are the glue that holds together the transport network. Grain and containers rely on highway access to rail as do all passengers and freight moving to and from an airport. Marine terminals in Vancouver also rely on road connections.

•Highways play a pivotal role in tourism as “rubber tire” traffic constitutes the major market and 90% of all intercity trips are made by car.

Need for Understanding

- Some people say big trucks are damaging highways, are unsafe and are not paying their way, while many others don't know whether this is true or not.
- Alberta Infrastructure and Transportation, as owner, builder, and maintainer of the provincial highway network, needs to provide both information and answers to this debate

•It is unfortunate, but some people believe that highways are inefficient, unsafe and a wasted investment.

•Alberta Infrastructure and Transportation has over 800 people dedicated to making the province's 30,000 km highway network safe and efficient.

•Highways are designed to the highest safety standards in Alberta with wide shoulders, chip seal and rumble strips.

•Everything Alberta Infrastructure and Transportation does has a safety component: twinning highways and adding interchanges reduce collision rates by about 50%!

•Clearly these and other messages are not getting through to the public.

Introduction

- Alberta Infrastructure and Transportation (AIT) only has access to data on highway network & use
- AIT needs to respond to key questions and debates on highway use issues
- It is hoped these responses will lead to a greater understanding of highways and their role in the economy

•Highway carriers and the public do not have access to information relating to highway safety and capital & maintenance costs. Consequently, Alberta Infrastructure and Transportation must step up and respond to the many misperceptions that have arisen and are continually repeated.

F.A.Q.s about Trucks

1. Don't big trucks do more damage to highways?
2. When overloaded, don't big trucks do more damage than smaller trucks?
3. Aren't big trucks unsafe?
4. Are trucks subsidized?
5. Don't trucks take traffic from rail?
6. Aren't big trucks bad for the environment?

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•These are six of the most frequently asked questions that reflect the common misperceptions that exist.

•The answers provided here are non-technical and in each response a case study is used to illustrate the point.

•Where anything is not readily apparent, please note your question and it will be addressed once the presentation has been completed.

F.A.Q. #1

Don't big trucks do more damage to highways?

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Why permit larger trucks?

- Must increase highway productivity to maximize the return on public investment ($28.5 billion in Alberta)
- Increased productivity means:
  - reduced travel costs & improved safety
  - more affordable goods & services for consumers
  - minimum public investment (less infrastructure to move same amount of goods)

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•First, it is important to understand why Alberta Infrastructure and Transportation allows larger trucks.

•The trucking industry is constantly looking for ways to improve productivity to make shippers more competitive.

•A more efficient trucking sector means more affordable goods and more jobs for Albertans. (The same is true for other modes.)

•Alberta Infrastructure and Transportation is always trying to maximize the use of Albertans' significant investment in the highway network. Although cars and passenger travel constitute the major customer group and time is critical to them, the economy relies heavily on a safe, cost-effective and less congested intercity highway network to successfully serve markets.

Increasing Transport Productivity

- All modes are taking advantage of scale economies to improve productivity:
  - *Air:* developing larger aircraft
  - *Rail:* increase train length + double stack
  - *Pipe:* increase diameters
  - *Ships:* increase capacity (8,000 TEUs)
  - *Communications:* broaden bandwidth
  - *Truck:* longer & more axles

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•To understand what is going on in the trucking industry we need look no further than what all other modes are doing today.

•As one can see, scale economies are the preferred way of achieving increased productivity to facilitate global trade.

Economic Efficiencies of LCVs

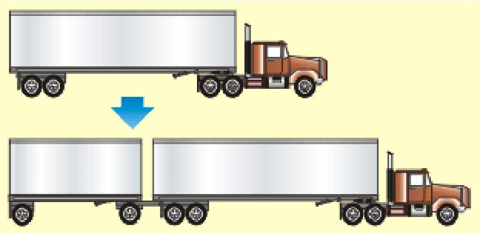
- Fertilizer:
  Pocatello, ID – Calgary, AB
  - 1,150 kilometres

  47,600 kg – 58,500 kg: -19.6%

- Processed Meat:
  Calgary, AB to Barstow, CA
  - 2,340 kilometres

  36,300 kg – 58,500 kg: -33.6%

- The longer the trip and the larger the payload gain, the greater the savings.



LCV Type	Total Logistics Savings	
	Average	Maximum
Rocky Mtn Doubles	22%	50%
Turnpike Doubles	23%	59%

Source: Middendorf and Bronzini, The Productivity Effects of Truck Size and Weight Policies, 1994

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•The benefits of long combination vehicles (LCVs) to shippers and consumers are lower transportation and logistics costs.

•Highway trucking costs are reduced from 20% to 33% depending on the increase in allowable gross vehicle weight.

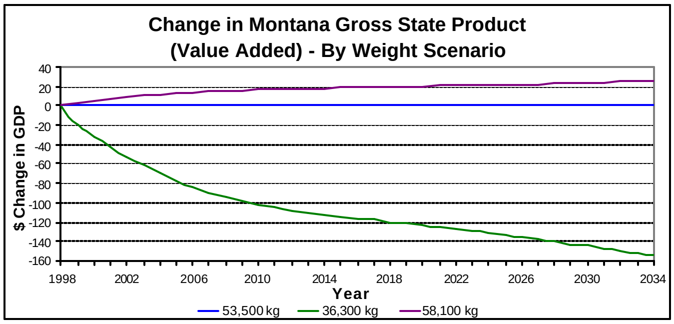
•Total logistics savings can range from an average of one quarter up to a maximum of one half of existing costs. This represents a significant savings and will generate considerable benefits for the economy.

•Transport savings allow firms to reduce selling prices in existing markets, thus increasing their market share and associated sales. Additionally, firms are able to enter new markets that are further away. The result is increased plant production, new jobs and investment, i.e., economic growth.

Montana Study Findings

Currently at 53,500 kg, but if reduced to 36,300 kg:

- •Increase in pavement damage of > 60%



■ Freezing truck weights at 36,300 kg or below the Interstate design standard of 58,500 kg may restrict economic growth by up to 0.5% per annum.

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•A Montana State University study demonstrates the impact of truck size and weight on the economy as a whole.

•Montana currently allows 53,500 kg trucks to operate in the state. The study assessed the impact of changing the gross vehicle weights allowed to 36,300 kg and to 58,000 kg.

•If gross vehicle weights (GVW) were reduced to 36,300 kg, after 30 years the economy would be losing over $150 million. On the other hand, if the GVW was raised from 53,500 kg to 58,000 kg, there would be an increase in the gross state product.

•The university research found that reducing truck GVW in Montana to 36,300 kg would have the impact of reducing economic growth or gross state product by up to 0.5% per annum!

Reduced Infrastructure Impacts

Impact of Moving 1,000,000 Tonnes of Freight

Truck Size (Gross Vehicle Weight)	Truck Payload Capacity	Truck ESALs (Fully loaded)	Total ESAL Impact	Damage Index	Total Truck Trips
14,600 kg	7,000 kg	2.829	404,143	**1.00**	**142,857**
22,500 kg	10,500 kg	2.830	269,524	**0.67**	**95,238**
39,500 kg	25,400 kg	4.470	175,985	**0.44**	**39,370**
62,500 kg	42,600 kg	5.876	137,935	**0.34**	**23,474**

ESALs - Equivalent Single Axle Loadings which is a measure of the wear and tear on a highway.

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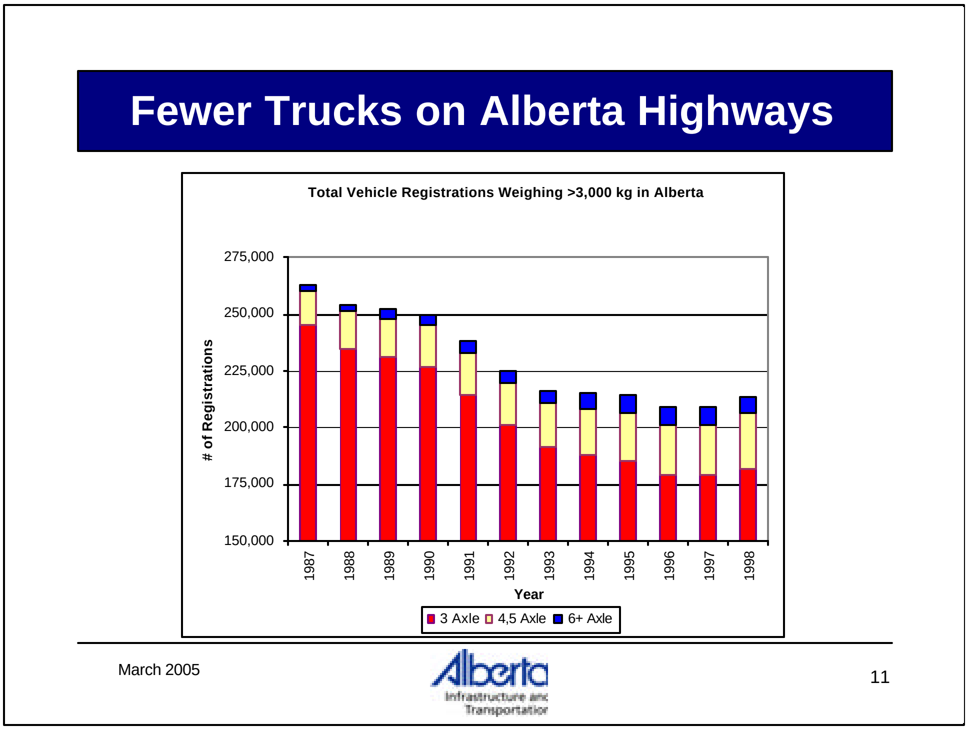
•This chart is based on an example where a plant produces a million tonnes of product each year and ships it by truck to the consumer.

•The LCV fleet does two-thirds less cumulative damage to the highway compared to the smaller 2-axle truck, and truck traffic is reduced even more (85% reduction).

•The higher the truck gross weight, the greater the number of axles (i.e., same maximum weight per axle). However, more axles achieve the higher gross weight.

•LCVs have almost one-quarter less impact on the highway than semi-trailers & 40% fewer trips.



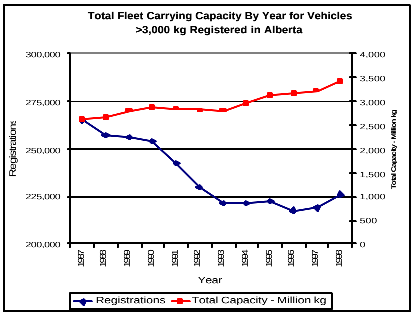
•In 1988 Alberta significantly increased truck weights and dimensions of trucks to match national standards.

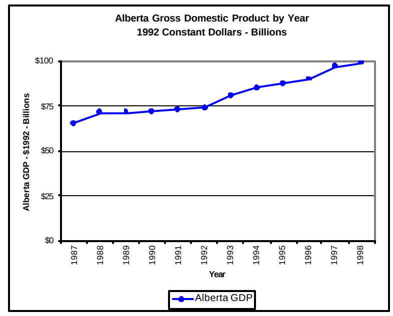
•Since then, the total number of registered working trucks (>3,000 kg) has declined sharply. Total registrations have recently begun to rise and will continue to do so as the economy continues to grow.

•The reduction is almost exclusively found in the small truck sector with registrations increasing for semi- and multi-trailer types and LCVs.

•The end result is that fewer trucks and truck trips are required to do the work for a growing economy.

Alberta Truck Fleet Capacity





Although truck registrations declined, fleet carrying capacity has increased, keeping pace with the growth in GDP

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•The chart on the left shows declining registrations but increasing carrying or payload capacity of the Alberta registered truck fleet.

•The growth in the carrying capacity of the truck fleet corresponds directly with the growth in GDP.

•Thus, Alberta has been able to accommodate rapid economic growth (>3%/yr of GDP) with fewer trucks operating on the highways.

F.A.Q. #2

When overloaded, don't big trucks do more damage than smaller trucks ?

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An overloaded truck, whether small or large, does significantly more damage than a legally loaded truck. First, there is no statistical evidence in Alberta that:

1. larger trucks are more likely to be overloaded, nor that
2. larger trucks have heavier overloads than smaller trucks.

However, there is clear evidence that smaller trucks are capable of doing significantly more damage when overloaded.

There are two ways of assessing overloads:

1. Determine if an overload is spread evenly, and
2. Determine if an overload is on a single axle or axle combination.

We will begin by examining the first case above where the overload is spread evenly over the length of the truck.

Highway Impact of Overloading Trucks

One Tonne or 1,000 Kilogram Overload

Truck Size (Gross Vehicle Weight)	Axles	kg/Axle	Tires	kg/Tire	Tire Overload Index
 14,600 kg	2	500.0	6	167.7	1.000
 22,500 kg	3	333.3	10	100.0	0.600
 39,500 kg	5	200.0	18	55.6	0.333
 62,500 kg	8	125.0	30	33.3	0.200

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This slide is based on an example where a truck is overloaded by one tonne. It demonstrates that the larger the truck, the overload weight is spread over more axles or tires, thus significantly reducing the impact on the highway.

For smaller trucks, the overload weight is greater per axle or tire. Consequently the damage to the highway would be greater as well.

The potential damage of a one tonne overload spread evenly is 80% less for the largest trucks with eight axles versus the smallest truck with two axles.

Permitted Axle Weights

	Single	Tandem	Tridem
Maximum Permitted Weight	9,100 kg	17,000 kg	23,000 kg
No. of Axles	1	2	3
Weight/Axle	9,100 kg	8,500 kg	7,667 kg
No. of Tires	4	8	12
Weight/Tire	2,275 kg	2,125 kg	1,917 kg

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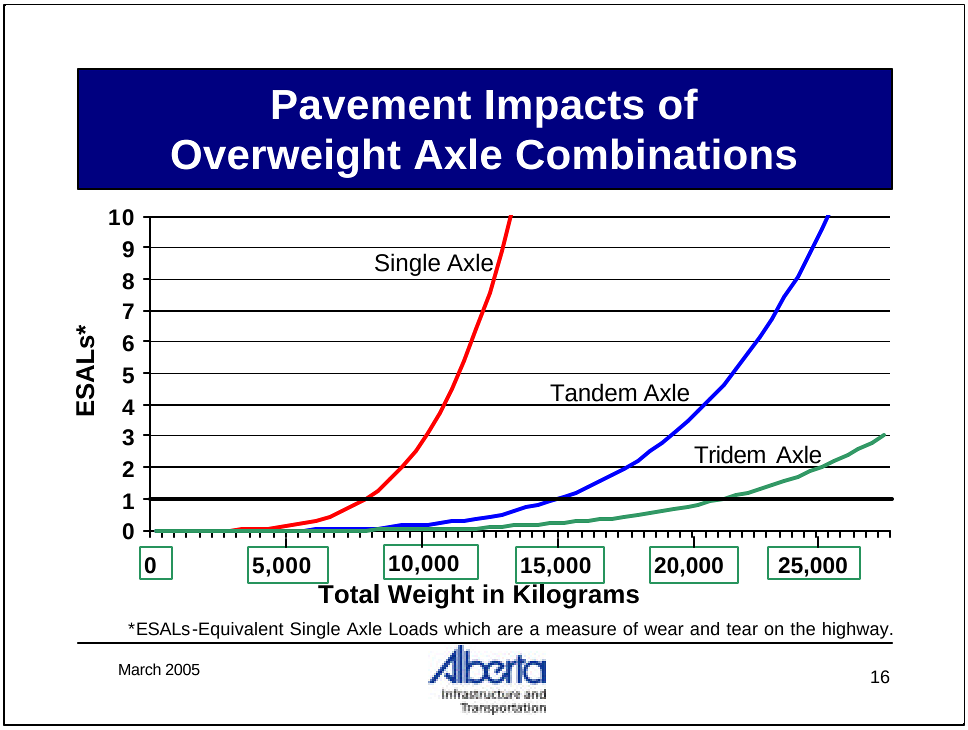
Why are smaller trucks potentially more damaging?

- the single axle is allowed the highest weight limit and any overload is carried by one axle; and
- the legal weight limit per axle is reduced with the increased number of axles in the combination.

To illustrate the importance of tire loads, Alberta Infrastructure and Transportation routinely allows large loads (as high as 400 tonnes) to be moved on highways. A load of 200 tonnes would require roughly 100 tires to produce a maximum load of around 2000 kg/tire, which is within the design limits of a highway. The increase in tires is achieved by using trunnion axles with eight to 10 tires/axle and more axles. When large loads are moved during the winter (on frozen ground), the wear and tear is within acceptable limits.



Axle overloadings can occur: (1) when a truck is within allowable gross vehicle weight (GVW) limits but with improper weight distribution, and (2) when the GVW limit is exceeded. The graph demonstrates that:

•single axle overloads have a greater negative impact (steeper rising curve);

•tandems have less of an impact; and

•tridems have the lowest negative impact (flattest or slowest rising curve).

Only the largest trucks have tridem combos, thus, larger trucks have a lower potential for significant damage to highways due to overloading.

How much more damage can be done by overloaded smaller trucks?

Highway Impact of Overloading Axles

	+ 2000 kg Overload ESALs	ESAL	Required Overload (kg)	Overload Index
Single	4.071	4.0	1980	1
Tandem	2.742	4.0	5440	2.75
Tridem	2.044	4.0	7710	3.89

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This slide illustrates the relative damage done by overloading axle combos by a weight of 2,000 kg: a single axle reaches 4.071 ESALs or over four times the legal limit, tandem is 2.742 ESALs and the lowest ESAL rating is for a tridem combo at 2.044 or about twice the legal limit impact.

To achieve an ESAL rating of 4.0, a single axle would require only a 1,980 kg overload, while a tandem axle would have to be overloaded by 5,440 kg or 2.75 times that of a single axle to have the same ESAL rating. A tridem axle would have to be overloaded by 7,710 kg or 3.89 times to have an ESAL rating of 4.0.

Generally, for a one tonne overload, smaller trucks, particularly single axles, will do more damage than larger trucks by between 1.5 to two times.

In summary, it takes significantly more overload on a larger truck to do the same damage as a smaller truck.

F.A.Q. #3

Aren't big trucks unsafe?

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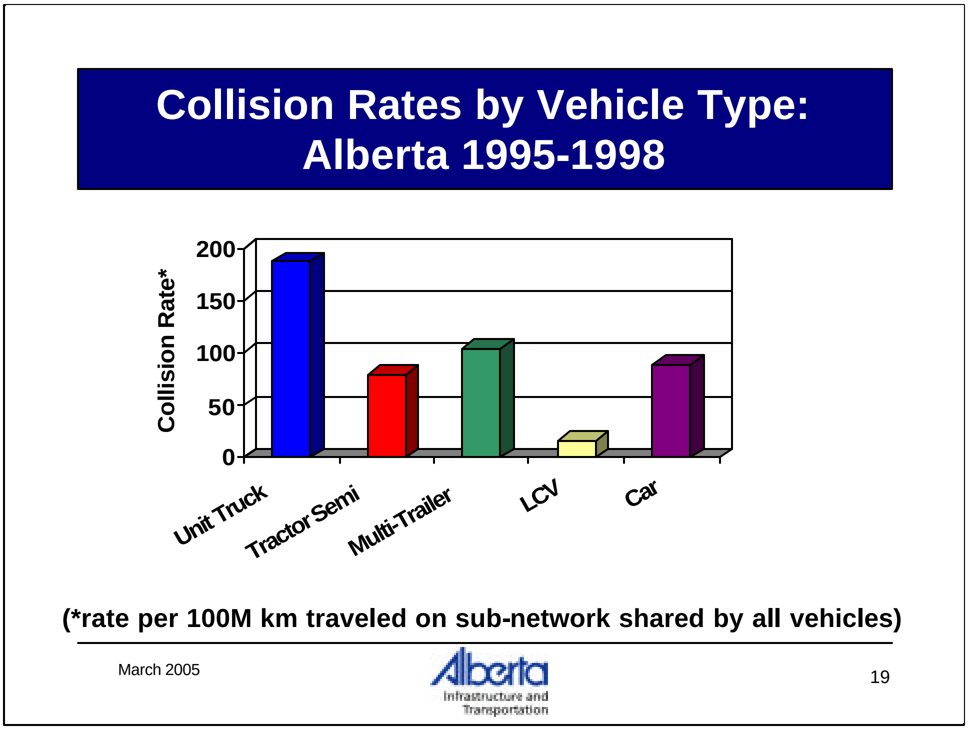
•The collision rates for various vehicle types were established in an independent study of Alberta Infrastructure and Transportation data collected over a four year period from 1995 to 1998.

•The comparison is based on a subset of the provincial highway network as LCVs are not allowed to operate outside specified routes (mostly four-lane). That is, this is the sub-network where all vehicle types are present in the traffic mix.

•The LCV sub-network consists of roughly 3,000 km or 10% of the total provincial highway network.



•LCVs include vehicles from 31m to 37m in length with a maximum weight of 62,500 kg. (In 2000, this was raised to 63,500 kg.)

•Collision rate is calculated on the number of vehicle types involved for every 100 million km traveled.

•The error of estimate is plus or minus 10%, which is not sufficient to change the rank order of rates.

•LCVs were involved in only 37 crashes in four years (two fatal); and none of the fatal & major injury crashes were found to be the fault of LCVs.

•In fact, from 1995 to 1998 there were more fatal collisions on highways involving trains than LCVs.

•Overall truck and car collision rates are within 10% of one another (not surprising as 90% involve cars).

Alberta LCV Safety Efficiency

(1 million tonnes trucked 1,000 km)

	# of Trips	Collision Rate (/100M km)	Potential Collisions	Collision Index
Straight Truck (3 axle)	95,238	187.19	178.28	1.000
Semi Trailer (5 axle)	39,370	79.52	31.31	0.176
LCV (8 axle)	23,474	15.80	3.71	0.021

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•This chart is based on a plant producing a million tonnes of product each year and shipped to a customer located on a 1,000 km round trip from the plant.

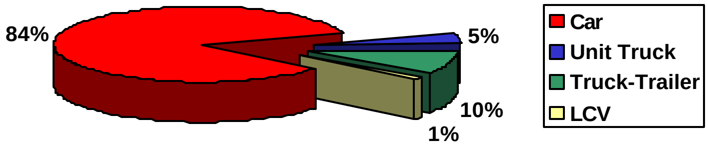
•The use of larger trucks with bigger payloads provides a double or compound safety efficiency:

- •fewer trips or less exposure to traffic and
- •lower collision rates for larger trucks.

•The result is a 98% reduction in potential collisions using LCVs rather than straight or unit trucks (3-axle).

•Using LCVs rather than semi-trailers results in an almost 90% reduction in collisions.

Alberta Safety Study Results



LCVs make up a small proportion of total traffic volumes, roughly one in every 100 vehicles

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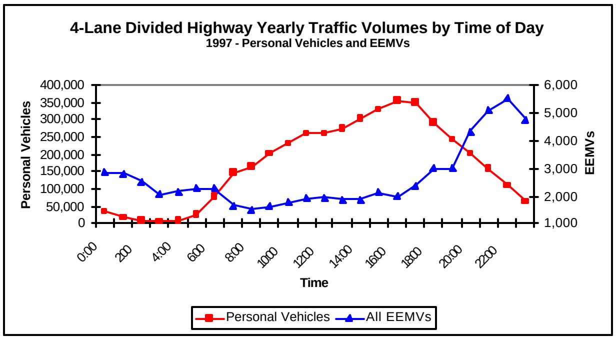
•A driver behaviour study was undertaken for each of these vehicle types at a special installation immediately north of the Vehicle Inspection Station on Highway 2, just south of Leduc on the LCV sub-network.

•The installation recorded the speed, gap and length of the vehicle for all of 1997, the last year of the collision study. The reported results are based on over six million vehicle observations or an 86% sample. Such a large sample ensures that the resulting statistics are very stable and accurate.

•Of all vehicles recorded, LCVs constituted just over 1%, or one in every 100 vehicles.

Alberta Safety Study Results

Time of Day - Personal Vehicles and LCVs



(Note: EEMS = Energy Efficient Motor Vehicles or LCVs)

•The graph is based on the two north-bound lanes of Highway 2 leading into Edmonton.

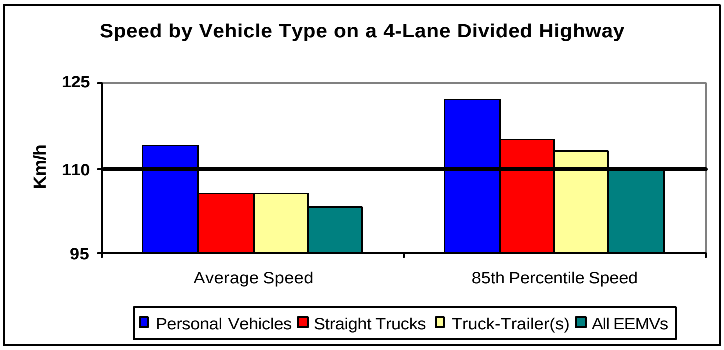
•LCV volumes peak at 23:00 hours and are relatively low during the day and at peak car demand times.

•Between midnight and 06:00 hours, trucks make up over 50% of the traffic on Highway 2. In other words, trucks are using the highway when cars are not.

•The voluntary diversion of LCVs to off-peak travel times likely contributes to the their lower collision rates as LCV exposure to cars is less (cars are involved in 90% of all collisions).

Alberta Safety Study Results

Speed by Vehicle Type - 1997



(Note: EEMS = Energy Efficient Motor Vehicles or LCVs)

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•LCVs travel at the lowest average speed, around 100 kmph, significantly slower than cars.

•The 85th percentile speed of LCVs is just under 110 kmph, the posted speed limit, and significantly slower than cars, which are over 120 kmph.

Speed and Gap Analysis

Truck Type	Average Speed (kph)	Average Gap (sec)
Unit truck	105.42	11.88*
Truck+trailer(s)	105.49	14.42*
LCV	103.30*	20.98*
* statistically significant difference		

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•LCVs demonstrated a statistically significant difference from other truck types (using Difference of Means Test) at both the 95% and 99% levels of confidence. On average, LCVs travel significantly slower and follow at significantly greater distances than other commercial vehicles.

Why Are LCVs Safer?

- By permit, LCVs have stricter requirements:
  - drivers need minimum requirements & fewer violations
  - truck equipment upgrades
  - operating restrictions (time of day/week)
- Many LCVs equipped with on-board computers/monitoring equipment
- Better on-road safety performance

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•Statistically, LCVs are safer in that they have the lowest collision rate. In fact, LCVs have lower collision rates than cars.

•LCV operators must have special permits prior to starting up and there are a number of requirements relating to drivers, vehicles and operations.

•As the driver behaviour study revealed, LCVs travel in off-peak times, thus significantly reducing their exposure to automobile traffic and higher volumes which are associated with shorter following distances for all vehicle types, and consequently, higher potential collision rates. LCVs also maintain greater gaps between vehicles and travel slower by regulation - maximum speed 100 kmph.

F.A.Q. #4

Are trucks subsidized?

or:

Do trucks pay their way?

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Road Financing in Alberta

Road Ownership	Related Revenue Sources	Network Length (km)	Replace-ment Value ($billions)
Provincial	Fuel Taxes & Fees	30,000	$28.5
Municipal	Property Taxes	135,000	>$33.2
Private	Private Funding	>135,000	n.a.

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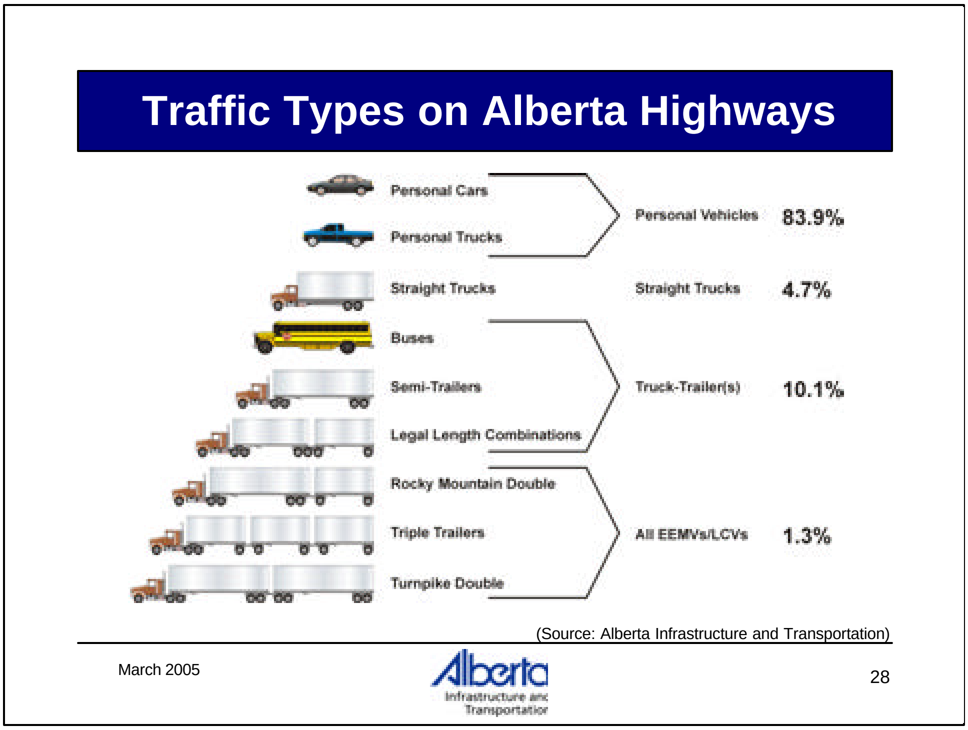
•The responsibility for roads in Alberta is divided amongst three groups: province, municipal & private with respective funding based on fuel taxes, property taxes and private funds.

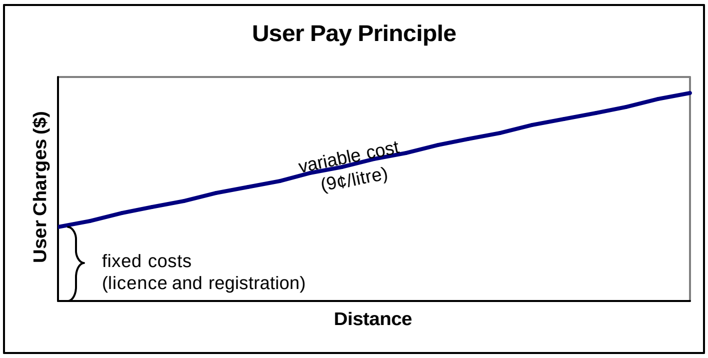
•The provincial highway network has been developed to move traffic interregionally and internationally, whereas the local road network is concerned with journey-to-work and retail and consumer access. Unlike in the U.S., Alberta has received no fuel taxes from the federal government in the last five years.

•The private road network in Alberta is very extensive and is the largest network by length, consisting of forestry roads, resource access roads, etc. These are funded exclusively by the private sector.



- This chart provides a look at Alberta Infrastructure and Transportation's customer base.
- On average, roughly 85% of all vehicles using the highway network are personal vehicles, including cars, vans, pickups and motorcycles.
- Commercial vehicles make up around 15% of the total traffic on Alberta highways. This can vary depending on location and time of day.
- LCVs constitute just over 1% of all traffic, i.e., only one in every 100 vehicles you meet would be an LCV. Anyone in Alberta can apply for an LCV permit but there are a limited number of shippers that require them. LCVs are largely used for transporting lighter higher-value goods, i.e., LCVs are longer but not heavier than the maximum GVW.

User Pay for Alberta Highways

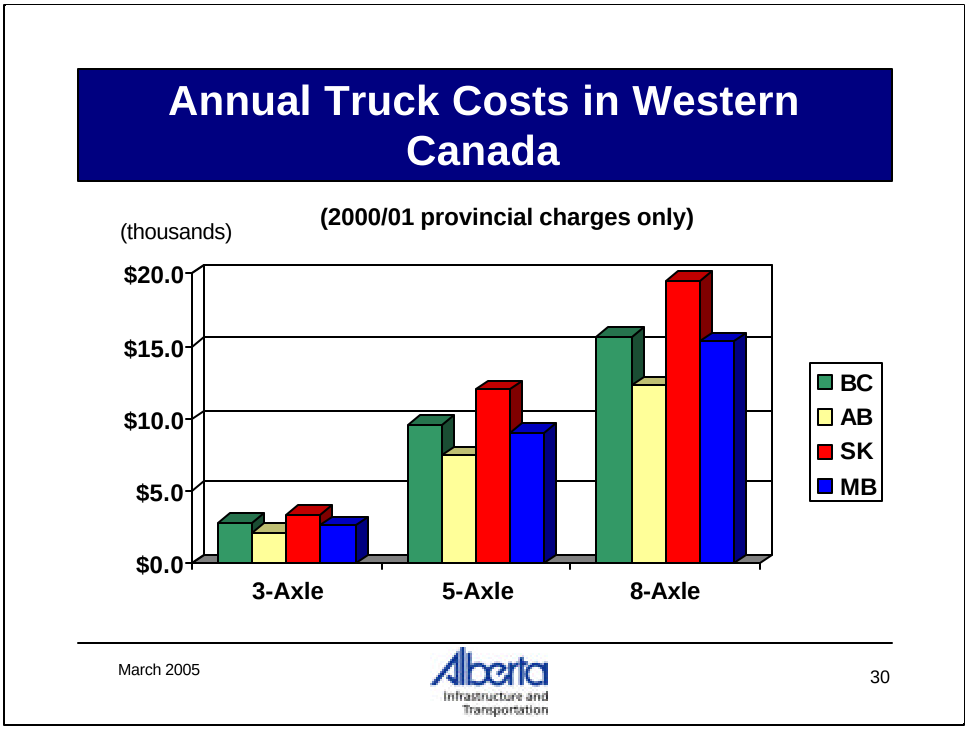


The slope depends on the fuel consumption of vehicle, with higher fuel consuming vehicles paying more per kilometre

•For road user charges, the fixed costs are relatively small (<15%) and include vehicle registration & operator's license ($50 registration and $5 for license for cars in 2000/01). Unlike other modes, Alberta Infrastructure and Transportation does not pay for storage/terminals nor capital costs for operating equipment which are borne by users.

•Variable costs are by far the largest contributions made by users. Given the flat rate of nine cents/litre, the contributions per kilometre increase with engine/vehicle size. Thus, trucks contribute considerably more per unit distance traveled than cars. Larger trucks contribute more than smaller trucks per unit distance traveled.

•The larger the vehicle, the steeper the slope of the variable cost curve.

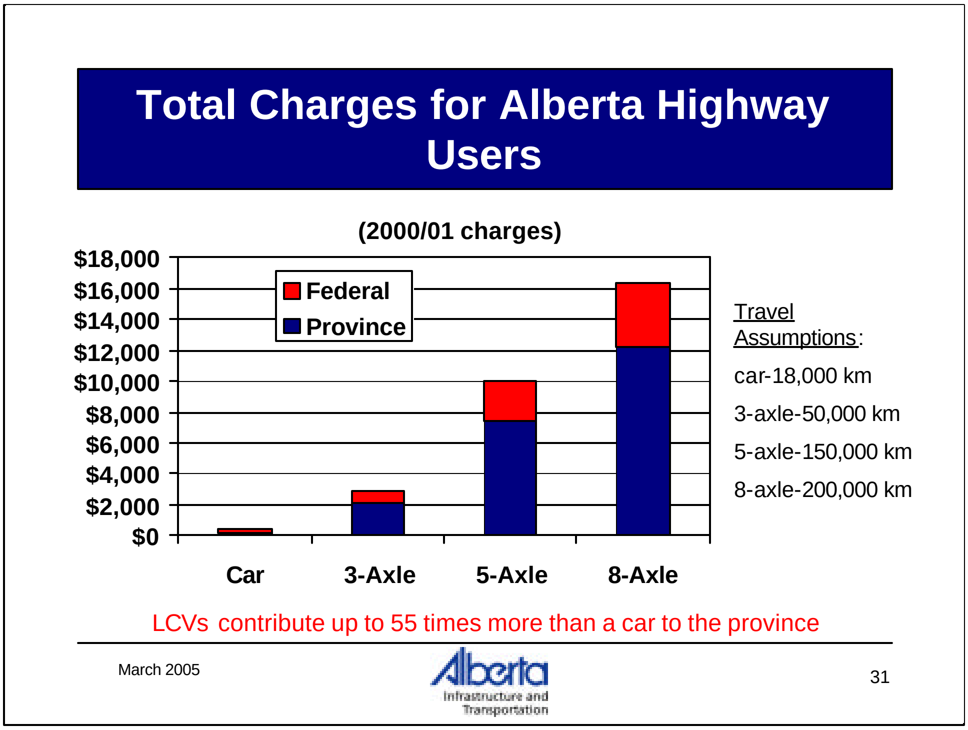


•This chart compares the provincial user charges only for commercial vehicles across western Canada.

•The charges for each province are generally straight lines with increases corresponding to additional axles and payload capacity.

•In a large part, the total contributions are a reflection of the assumptions for annual distance traveled (variable costs), with greater distances traveled by larger vehicles.

•Alberta has the lowest user charges in Western Canada, so the cost recovery results for Alberta will more than likely be true for the other western provinces. In the past, provinces have collected more in revenues than they have spent on roads.



- This chart illustrates the total provincial and federal user charges by vehicle type for average usage.
- The federal charges are based on 10 cents per litre for gasoline and four cents for diesel (excluding GST).
- For cars, the average contribution is just over $400, of which half goes to the federal government and half to the province.
- For trucks, the relative contributions are split roughly 75% provincial and 25% federal. On average, a large truck contributes 55 times as much as a car.
- The question is:
    - Is this adequate to cover the costs assigned to trucks?

Alberta Highway Costs & Revenues

Budget 2000 - 2001 ($millions)

	Highway Expenditures		Commercial Vehicles % Share	Commercial Vehicles $ Share
Capital	$380		40%	$152
Maintenance	$150		20%	$30
Rehabilitation	$135		75%	$101
Annual Expense	$665			$283
Commercial Vehicle Contribution		40%		$270
Total Revenues				$675

Trucks pay their share in Alberta

(trucks pay one-third more ($90M) to federal government)

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•Thumbnail sketch of highway cost allocation:

- •build highways to accommodate cars (85%)
- •strengthen for trucks
- •worn out largely by weather in Alberta.

•Capital: strengthening costs 50% more or 1/3 of costs; plus trucks assigned 15% for volume, total about 40%.

•Maintenance: trucks assigned 15% for volume plus 5% more for structural maintenance, total 20%.

•Rehabilitation: 30% of profile is shoulders that no one drives on, trucks given 15% by volume; and 100% of remainder, for total of 75%.

•Overall 40% of costs assigned to trucks, but this is likely an overestimate for Alberta as weather plays a larger role.

U.S. Cost-Allocation Findings
(2000)

- U.S. trucks are allocated 40% of all highway costs, same as Alberta estimate
- FHWA cost allocation study reveals that trucks cover 100% of their costs at the federal (0.9) and state (1.1) levels
- Single unit truck ratio is 1.1 versus 0.9 for larger combination trucks

Table ES-5. Ratios of 2000 User Fee Payments to Allocated Costs for All Levels of Government

Vehicle Class	Federal	State	Federal and State	Local	All Levels of Government
Autos	0.9	1.0	1.0	0.1	0.7
Pickups and Vans	1.2	1.2	1.2	0.1	0.9
Buses	0.1	0.8	0.5	0.0	0.4
All Passenger Vehicles	1.0	1.0	1.0	0.1	0.8
Single Unit Trucks					
≤ 25,000 pounds	1.4	2.2	1.9	0.1	1.5
25,001 - 50,000 pounds	0.6	1.0	0.8	0.0	0.6
> 50,001 pounds	0.5	0.5	0.5	0.0	0.4
All Single Unit Trucks	0.8	1.2	1.0	0.1	0.8
Combination Trucks					
< 50,000 pounds	1.4	1.7	1.6	0.1	1.3
50,001 - 70,000 pounds	1.0	1.3	1.1	0.1	0.9
70,001 - 75,000 pounds	0.9	1.1	1.0	0.1	0.8
75,001 - 80,000 pounds	0.9	0.9	0.9	0.1	0.8
> 80,000 pounds	0.6	1.0	0.9	0.0	0.7
All Combinations	0.9	1.0	0.9	0.1	0.8
All Trucks	0.9	1.1	1.0	0.1	0.8
All Vehicles	0.9	1.0	1.0	0.1	0.8

NOTE: These ratios are based on total revenues and expenditures nationwide. Ratios for individual States and local governments are expected to vary from these ratios. Federal ratios include obligations not financed from the HTF, and thus vary from equity ratios presented in other tables

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•The U.S. findings allocate 40% of costs to trucks.

•At the state and federal levels, trucks cover their costs!

•The ratio often cited is 0.6 for trucks >80,000 lbs at the federal level which does not include the revenues paid directly to the states (registrations, licensing, fuel, weight-distance taxes, etc.).

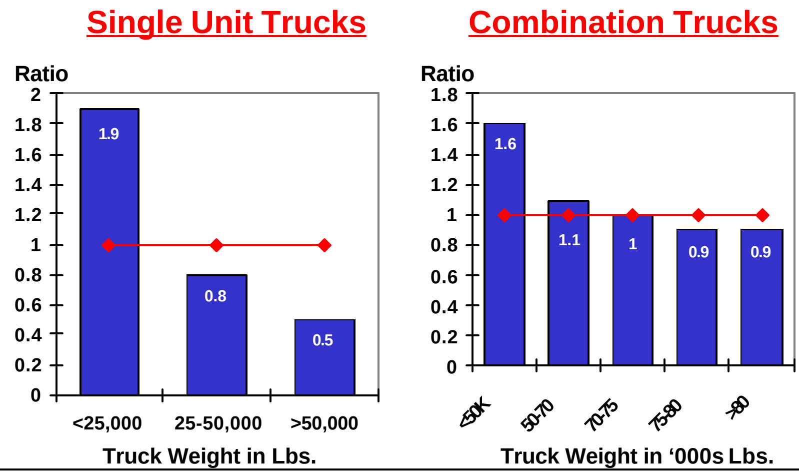
•Local government ratios are all low, as the revenues do not include property taxes & other revenue sources available to municipalities for infrastructure.

•Given that all trucks cover their costs, the final question is:

  •Are charges fair by truck size?

Charge/Cost Ratio by Vehicle Size

(U.S. FHWA 2000, Federal & State Totals)



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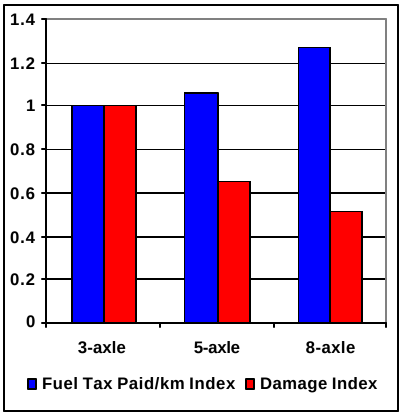
•This chart illustrates the revenue/cost ratios by gross vehicle weight for trucks in the U.S.

•On average in the U.S., larger trucks, whether straight or tractor trailer configuration, contribute less than their assigned costs; but, overall, larger trucks do contribute to the total share of highway costs that are assigned to all trucks.

•The biggest ratio differential by weight is for the smaller straight trucks.

•Is this a fair allocation of costs, with smaller trucks paying more than their "allocated" share and larger trucks paying less?

The Large Truck Paradox



- The larger the truck, the greater the fuel tax paid per kilometre.
- The larger the truck, the lower the cumulative damage/cost.
- For an 8-axle truck, the fuel tax is 27.2% more than for a 3-axle BUT 48.8% less damage/cost.
- A large truck also pays higher fixed charges for registrations & licensing.

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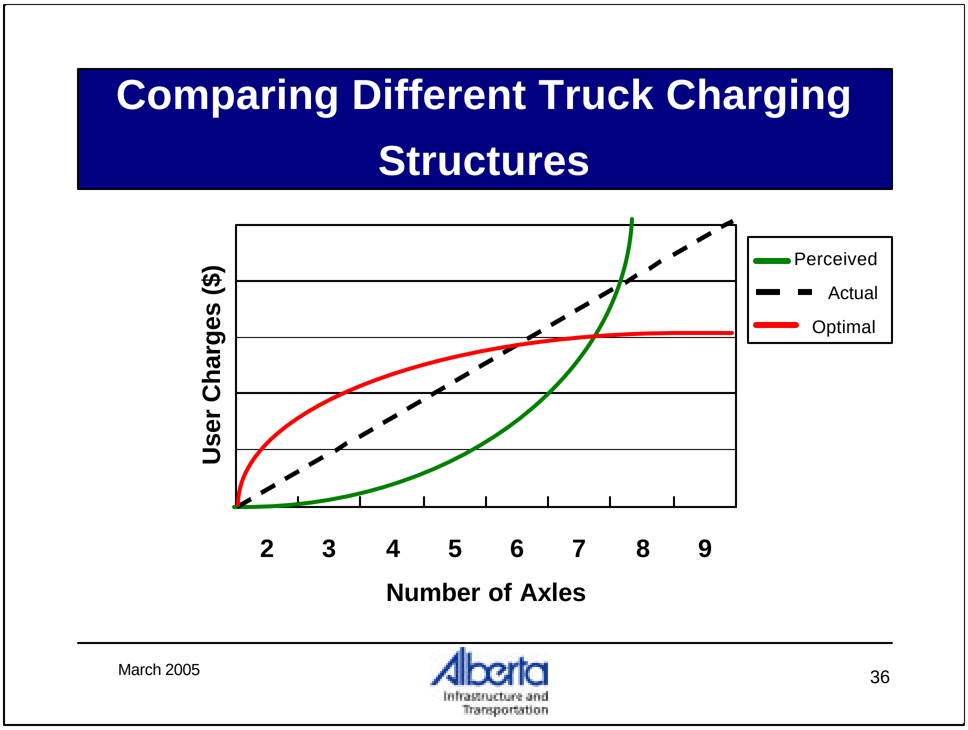
•In Alberta, the charge to cost ratio for larger trucks is greater than one.

•By way of illustration, the graph above demonstrates that:

- •The larger the truck, the greater the charge versus smaller trucks,but
- •the larger the truck, the lower the cumulative cost/damage to the highway.

•For an 8-axle truck, the fuel tax is 27.2% more than for a 3-axle truck, but the 8-axle truck does 48.8% less cost/damage than a 3-axle truck for a given volume of freight.

•Compounding this problem is the fact that the larger the truck, the higher the fixed charges for registration and licensing.



•Some people argue for the green or lower curve, as they believe that bigger trucks do more damage, but this is definitely not the case.

•The actual charge is a straight line, with fuel taxes per mile rising with truck size/payload through added axles.

•The optimal charge regime would look like the red or top line, which increases at a decreasing rate & recognizes:

- •reduced cumulative damage to highway;
- •reduced capacity requirements; and
- •shift to off-peak times & improved safety.

•Comparing optimal to actual, the cost recovery ratios would look like those derived in the U.S., with higher contributions than expected assigned to smaller trucks.

Revenue-Cost Comparison

- Analysis does not include:
  - financing costs
  - indirect costs & benefits (safety)
  - social costs & benefits
- Would not increase % allocation to trucks/commercial vehicles
- In some years investments less and in other years more than revenues

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•Governments do incur financing costs but highway user revenues are more than enough enough to cover costs; thus, there should be no financing charges.

•Indirect costs/benefits: largest contributor is collisions. It is very unlikely that safety costs would be higher for trucks than cars as cars are involved in about 90% of all collisions, while trucks are involved in 10%. As for fatalities, 78% involve cars and 22% trucks.

•Social costs/benefits: Largest cost is associated with the environment, but no mode is required to contribute to mitigation measures for green house gases, regardless of amount. The car is the largest polluter accounting for 91% of all vehicle/km traveled. Roads provide access to schools & health care as well as emergency services & these costs should come from general revenues, not users.

Alberta Cost-Revenue Summary

- Overall, Albertans pay >$1.3B/year, far exceeding highway costs
- Commercial traffic is contributing its share (40%) of investments, and are not subsidized
- Users contribute more than is invested, as the federal government does not put its share in highways

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•Albertans actually contribute $500 million more than $1.3 billion, but it is rebated to farm gasoline which is largely consumed on the provincial highway network; fuel tax holidays (liquid natural gas & ethanol); and $40 million in GST (tax-on-a-tax only) to the federal government.

•The major problem with highway financing is that the federal government does not return the roughly $550 million annually in fuel taxes it receives from Albertans.

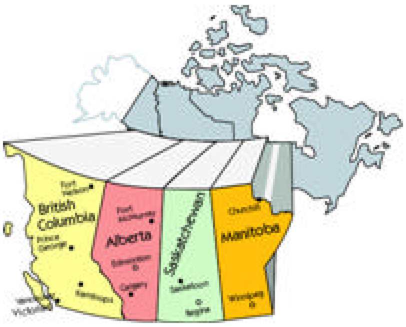
•This a common question, but there is no definitive answer. The following points are designed to illustrate the relationship of truck and rail in Western Canada which may or may not be reflected elsewhere in Canada.

•As the highway authority, Alberta Infrastructure and Transportation is neutral should rail capture truck traffic. Truck volumes on highways are relatively small (15%) and annual growth so high (3.5%) that any diversion of truck traffic to rail would have no beneficial effect for the highway provider.

Western Canada Modal Growth

Export Tonnes: 96-98

Mode	Growth
Air	+6.1%
Pipeline	+5.6%
Rail	+10.7%
Road	+6.2%
Water	-0.6%



Source: Statistics Canada Trade Merchandise Data Base

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•During 1996 to 1998, all modes experienced considerable growth in tonnes carried, except water.

•Rail experienced the greatest growth by volume.

•Rail revenue ton-miles in Western Canada show continued growth throughout the decade.

Alberta Exports - 1998

Top Five Commodities by Value

	Rail		Truck	
	Commodity	$/kg	Commodity	$/kg
1	Wood Products	0.59	Electrical Machinery	99.26
2	Wood Pulp	0.65	Meat Products	3.42
3	Plastics	0.91	Live Animals	1.98
4	Fertilizers	0.26	Machinery	11.31
5	Fuels	0.17	Wood Products	0.65

Findings

- no competition for different commodities, except wood products
- wood products transported by truck are of higher value
- many wood exports go to rail transfer yards in Montana and Idaho

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•This chart is based on the value of shipments, which is a better way of revealing potential competition as higher value goods are often transported by truck. Generally, truck does not compete for long haul, lower value bulk commodities.

•The top five commodities by value account for a significant portion of the total value, but not by volume as grain, coal, sulphur and fertilizers are missing (but these will never be exported by truck).

•The findings indicate that only wood products are potentially competed for:

> •truck's role in exports is mostly limited to moving goods to alternate rail heads (transfer yards) to get better freight rates or market access.

Calgary - Vancouver Corridor

A corridor length which includes truck and rail should be competitive. If shorter, rail may not be competitive; if longer, truck may not be competitive.

Corridor:
1,057 km
or 660 miles

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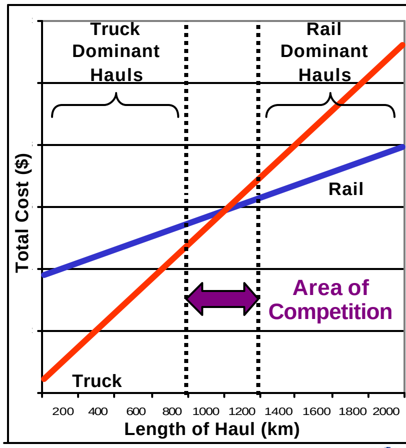
•From 1990 to 1997, Transport Canada examined the Calgary-Vancouver corridor, which stretches 1,000 km from Alberta to British Columbia.

•The study was designed to determine how much freight could be diverted from truck to rail with a view to reducing green house gas emissions.

•Divertible traffic will be composed of commodities which are up for competition between truck and rail.

Distance: Key Determinant of Modal Choice



- For short hauls, truck dominates:
  - e.g. Calgary-Edmonton (300 km)
- For medium hauls, truck and rail may compete:
  - e.g. Calgary-Vancouver (1000 km)
- For long hauls, rail dominates:
  - e.g. Vancouver-Toronto (4400 km)
- Intermodal traffic takes advantage of strengths of both modes to reduce transport costs.

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The key factor, but not the only one, in determining which mode a shipper/consumer selects is the total cost of transport, which is directly related to distance. Trucking is generally cheaper for short hauls of less than 500 km, but more costly than rail for distances over 1,500 km. Rail has higher fixed costs, but lower variable or operating costs per unit weight than trucking. After a given distance, the higher variable costs of operating a truck result in higher transportation costs. Overall, rail is more cost-efficient for longer hauls as its fixed costs are spread over a greater shipping distance. As a result, there is very little competition between truck and rail for either short hauls where truck is predominant or long hauls where rail dominates.

Truck and rail are cost competitive, however, on hauls between 800 and 1200 km. Over this distance, truck and rail compete for freight on factors such as service levels and not cost. The Calgary-Vancouver corridor falls within this competitive zone: 975 km by road and 1,033 km by rail. An assessment of this 1,000 km corridor should provide some insight as to the degree of competition between rail and truck. This case study will also allow the assessment of the combined impact of all factors on transport decision-making including cost/distance, levels of service, time sensitivity, etc.

Calgary - Vancouver Corridor

	1990		1997		Annual
	Tonne/km (000's)	Percentage	Tonne/km (000's)	Percentage	Growth Rate (%)
Air	11.5	0.9	14.9	0.7	+3.8
Water	-	-	-	-	-
Rail	739.5	57.5	1,158.3	55.1	+6.6
Road	534.6	41.6	930.0	44.2	+8.2
Total	**1,285.6**	**100.0**	**2,103.2**	**100.0**	**+7.3**

(Source: Transport Canada)

Based on a Transport Canada study, just over 10% of truck volumes are shiftable to rail, but only with incentives as shippers require the higher service levels of trucks.

•The analysis was based on corridor trade over seven years from 1990 to 1997.

•All modes show an increase in tonne/km, with rail's output growing 6.6% and road 8.2%. The result is that the road share of the total traffic increased from 41.6 to 44.2%, and rail dropped from 57.5 to 55.1%.

•The researchers determined that just over 10% of the freight was divertible from road to rail, and only if incentives were in place.

•Thus, the maximum amount of freight that would be contestable is 10%, whereas 90% is mode specific and not up for competition.

•To say that rail & truck compete based on just 10% is a stretch.

Truck and Rail Complementarity

- Do truck & rail compete? Not very much (10%), not for the same goods and not over the same length of haul.
- Rail and road generally are **complementary**.
  - Truck: higher value and lower volumes
    LTL or smaller shipments
    goods requiring higher service levels
  - Rail: bulk commodities (grain, coal, potash, sulphur)
    unit trains (lower value, high volume shippers)
- Growth in truck based on industry changes.
  - West is moving to manufacturing of higher-value goods.
- Consumer wants complementarity, or seamless transportation.

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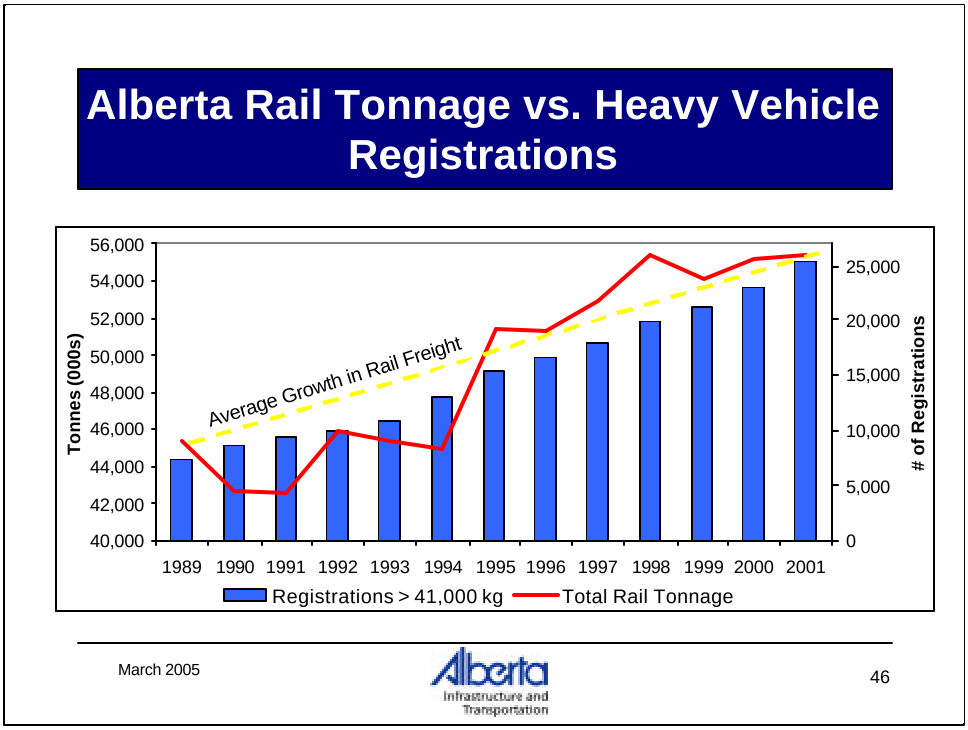
•Overall, highways are the glue that hold together the transportation network serving western Canada. This is not to say that highways are more important than any other mode, but rather that highways perform a largely inter-modal role, carrying goods to and from rail and air terminals to consumers and retail outlets, based on hauls under 1,500 km.

•Rail is more competitive over longer distances (>1,000 km) and for bulk commodities.

•Truck is more competitive over the shorter haul and higher-value goods with significantly higher service levels.



•Since 1989, large truck (GVW >41,000 kg) registrations have continued to increase as shown. At the same time, rail tonnages carried to and from Alberta have increased. During the same period both modes have demonstrated growth in the amount of freight carried.

•As was the case with the Calgary-Vancouver corridor, it is apparent that growth in trucking is increasing at a faster rate than rail.

•This joint rail and truck growth is partly in response to the dramatic increase in intermodal traffic such as containers. Container traffic on rail has increased substantially over the last decade. All of these containers are moved to/from rail terminals by truck, thus growth in one mode is matched by growth in the other. The same is true for grain traffic from the farm that starts its journey in a truck to the elevator and is transshipped to rail.

•This chart clearly demonstrates that truck and rail thrive together and are far more complementary than competitive.

F.A.Q. #6

Aren't big trucks bad for the environment?

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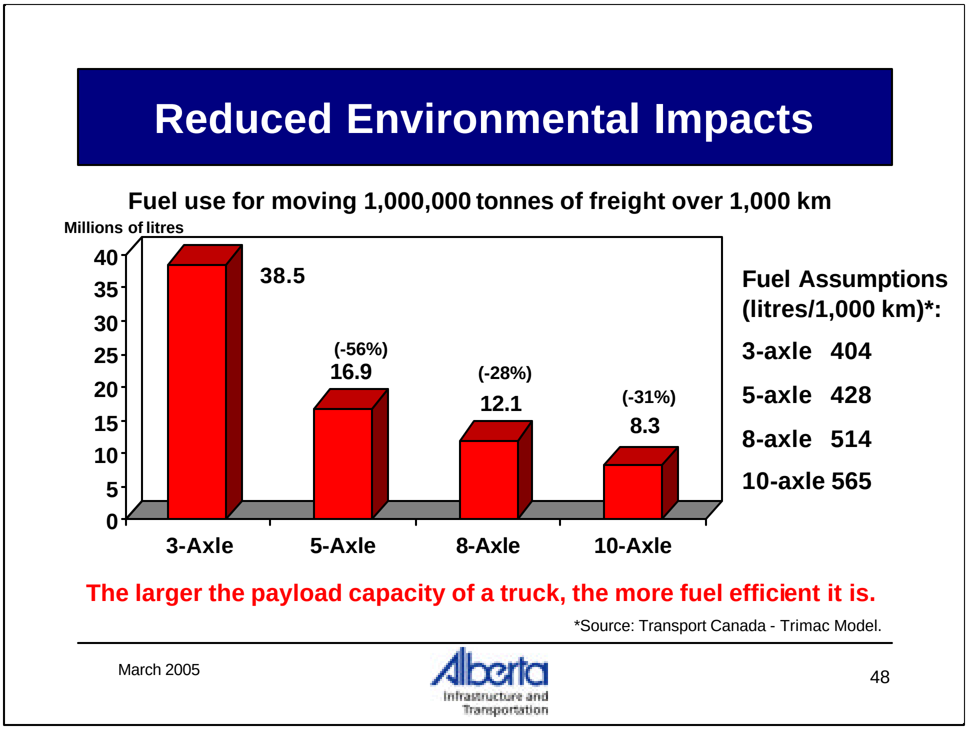

- This chart is based on the example of a factory producing 1,000,000 tonnes per month and located 1,000 km from its customer.
- The fuel consumption assumptions are shown: the larger the truck, the higher the fuel consumption per kilometre traveled.
- The greater efficiencies of the larger truck results in less fuel being consumed and fewer emissions generated to move a fixed amount of freight.
- This is not to say that trucks are as fuel efficient as rail (nor rail as water); but if road providers want to reduce the fuel consumed, larger trucks would provide significant reductions in emissions--over 25% reduction using LCVs rather than semi-trailers.

Idling and Waiting

Idling time and fuel consumption when moving 1,000,000 tonnes of freight

	Number of trips	Idling Fuel Consumption (litres/hour)	Fuel Consumed (1000 litres)	Index	Total CO_2 Produced (tonnes) **	Total N_2O Produced (kg) **
3 axle	95,238	3.4	324.4	**1.000**	885.5	129.9
5 axle	39,370	3.8	149.0	**0.46**	406.7	59.7
8 axle	23,474	4.5	106.6	**0.33**	291.0	42.7

*Based on an average of one hour idling time per vehicle trip (borders, vehicle inspections, traffic congestion, etc.)

**Source: Environment Canada. "Trends in Canada's Greenhouse Gas Emissions 1990-1995".

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•At border crossings, vehicle inspection stations or when stuck in traffic, idling truck engines consume fuel. This example of moving one million tonnes is applicable to any of these situations. It is based on idling one hour on each trip required.

•The larger the truck, the more fuel consumed while idling.

•Because fewer trips are required by larger trucks to deliver one million tonnes of freight, the larger truck burns less fuel in idling/waiting.

•For every shift in trucks from 5-axle to 8-axle or LCV, there would be just under 50% savings in fuel consumed while idling/waiting. This results in significant reductions in CO2 and N2O pumped into the atmosphere.

Facts About Trucks

1. Big trucks cause less damage to highways
2. Big trucks cause less damage overloaded
3. Big trucks (LCVs) are safer
4. Trucks & big trucks pay their fair share
5. Truck & rail are complementary
6. Big trucks reduce emissions

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•It is hoped that the preceding information provides a better understanding of truck transport and its impact, and serves as a basis for meaningful discussion of the role of highways in the provincial transportation system and the economy in general.

Conclusion

- Bigger trucks create bigger efficiencies:
  - **reduced collisions**
  - **reduced damage**
  - **reduced emissions**
  - **reduced traffic vol.**
  - **reduced costs**
  - **maximize public investment**

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•The use of larger trucks and their scale economies generate significant productivity gains for highway providers as well as the trucking industry, shippers and indeed, the entire economy.

Thank you