

Opportunity Cost to Society Related to US Size and Weight Regulation

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IRTENZ

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Trucks and Transportation

- The U.S. public road system road length is roughly 30 times that of rail roads
- Trucks transport 6.5 times as much freight by weight and 30 times more by value than railroads
- Compared to all other modes combined, (rail + water + air + pipelines) trucks transport approximately twice the amount of freight by weight and approximately 1.8 times the amount of freight by value.
- Weight distance - rail 39.5%, truck 28.6%, pipeline 19.6%, water 12.0%, air 0.3%.

How Modes Have Evolved

- Container ships have doubled in capacity in 13 years
- Rail axle weights have increased from 263,000 lbs in 1991 to 315,000 lbs today
- 70% of Rail intermodal containers are double stacked
- Federal truck size and weight have been frozen for over 30 years
- Other countries have evolved their policies


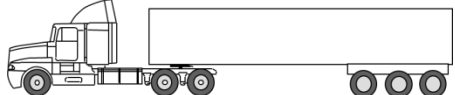
Early Size and Weight

- 450 BC Roman legal code lane width equivalent of 2.45 m wide where straight and 4.90 m where curved
- AD 438, Theodosian code set weight limits to the equivalent of 750 kg on ox-drawn wagons, 500 kg on horsed drawn wagon and 100 kg on a cart.
- Compliance - restricted by power; limited the number of animals that could be used to haul a vehicle

US Size and Weight Stagnation

- Federal size and weight policy has been frozen since 1982
- Federal policy applies to the National Network which includes the Interstate.
- State governments have their own size and weight regulations but they mostly apply to state roads

Freight Efficiency

- Maximize the amount for freight transported per vehicle
- Longer vehicles provide more volume for lower density freight 
- Vehicles with more axles provide greater capacity for higher density freight 

The Goal - Reduce the number of truck trips through improved vehicle productivity and the use of other transport modes such as rail.

Vehicle Mass



Country	Steer	Drive	Tridem	GVW	Productivity advantage Relative to USA
	(kg)	(kg)	(kg)	(kg)	
<i>Mexico</i>	6,500	19,500	22,500	48,500	53%
Denmark	8,000	16,000	24,000	48,000	51%
<i>Canada</i>	5,500	17,000	24,000	46,500	44%
Australia	6,500	17,000	22,500	46,000	41%
UK	6,500	16,000	21,500	44,000	32%
NZ	6,000	15,000	18,000	39,000	8%
USA	5,500	15,400	15,400*	36,300	----
Assumed empty weight 16,500 kg for 6-axle * 15,400 kg for US 5-axle vehicle					Woodroffe



International Comparison (weight)

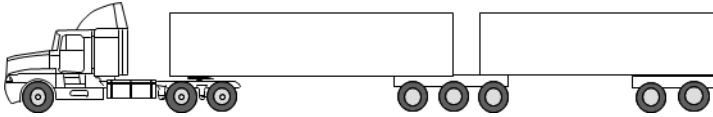
<p>Canada</p> <p>6-axle tractor semi-trailer 46,500 kg</p> <p>8-axle B-train double 62,500 kg</p>	<p>European Union</p> <p>6-axle tractor semi-trailer Typical 44,000 kg 48,000 kg (Denmark)</p>
<p>United States <i>(Interstate and NHS limits)</i></p> <p>5-axle tractor semi-trailer 36,300 kg</p> <p>7-axle tractor twin-trailer 36,300 kg</p>	<p>Australia</p> <p>6-axle tractor semi-trailer 46,000 kg B-train doubles 68,500 kg (approved routes)</p>
<p>Mexico</p> <p>6-axle tractor semi-trailer 48,000 kg 8-axle B-train double 63,000 kg</p>	<p>New Zealand</p> <p>6-axle tractor semi-trailer 39,000 kg B-train doubles 44,000 kg or 50,000 kg Up to 62,000 kg specific routes for High productivity motor vehicles (HPMV)</p>



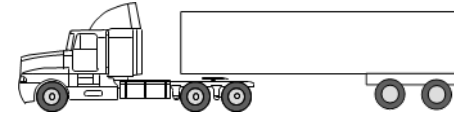
NAFTA Conundrum – GVW Barrier

<p>Canada</p> <p>6-axle tractor semi-trailer 46,500 kg</p> <p>8-axle B-train double 62,500 kg</p>
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Productivity Comparison



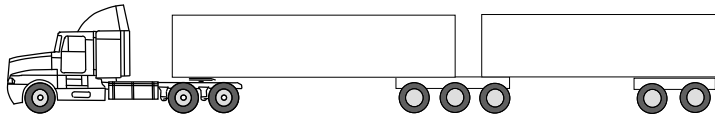
Canadian B-train



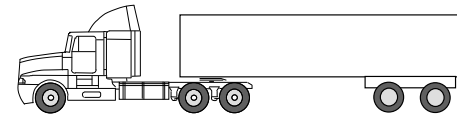
US Tractor semitrailer

Country & Vehicle	GVW	Number of axles	Payload	Productivity Advantage
Canada 8-axle B-Train	62,500 kg	8	42,200 kg	Factor of 2
US Tractor semi	36,300 kg	5	20,900 kg	-

Fuel and GHG Comparison *unrestricted access vehicles*



Canadian B-train



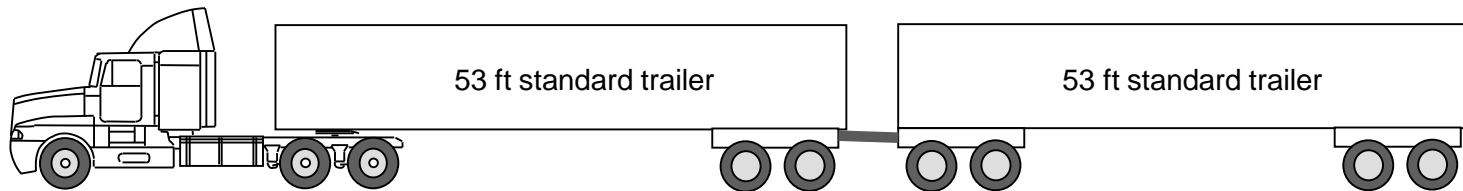
US Tractor semitrailer

Country & Vehicle	Cargo unit Fuel (liter/tonne-km)	Cargo unit CO ₂ (g CO ₂ /tonne-km)	Fuel and GHG Advantage per unit cargo
Canada B-Train	0.037	98.79	68%
US Tractor semi	0.063	165.9	-

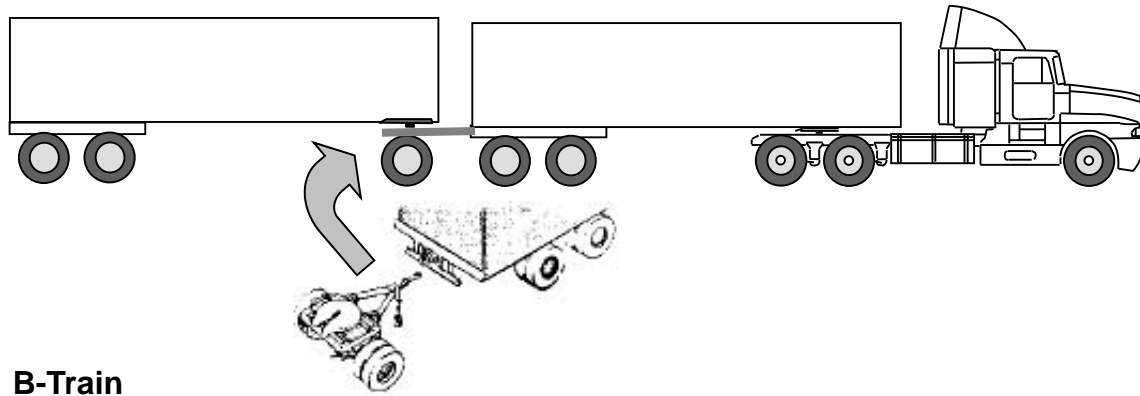
Addressing Vehicle Cubic Capacity

Long vehicle combinations

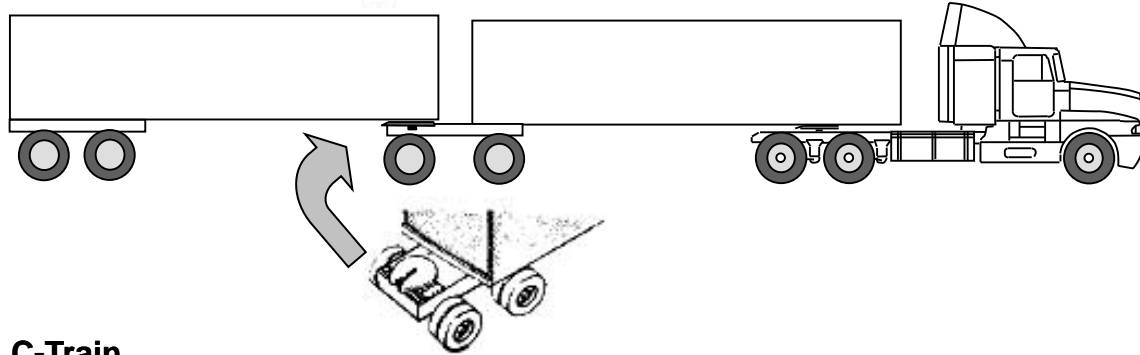
Progressive operations policy can yield substantial societal benefit



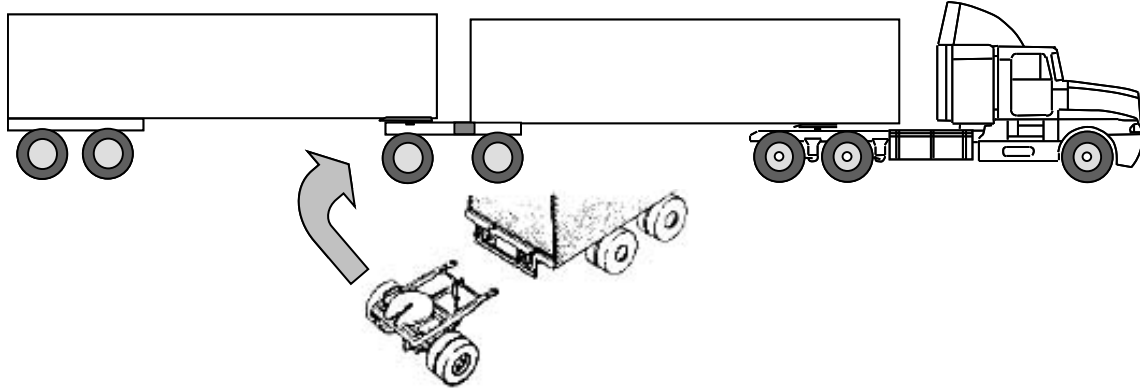
A-Train



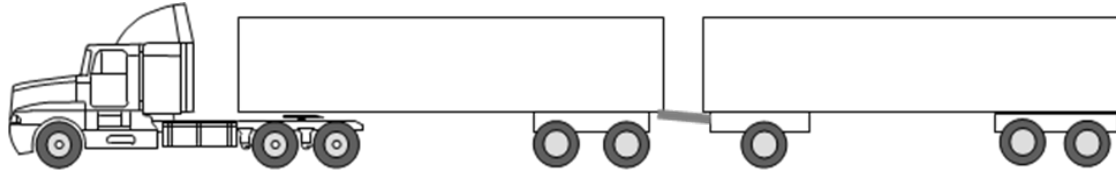
B-Train



C-Train



What can advanced LCV policy do (per vehicle)



System category	Benefit Estimate
Improved productivity	44%
Improved safety	2.5 to 5 times*
Reduced fuel consumption	32%
Reduced emissions	32%
Reduced infrastructure consumption	40%
Reduced VMT	44%
Reduced shipper cost	29%

Source: Assessments of Alberta LCV Program- Montufar et.al 2007, Woodrooffe et.al. (2001)

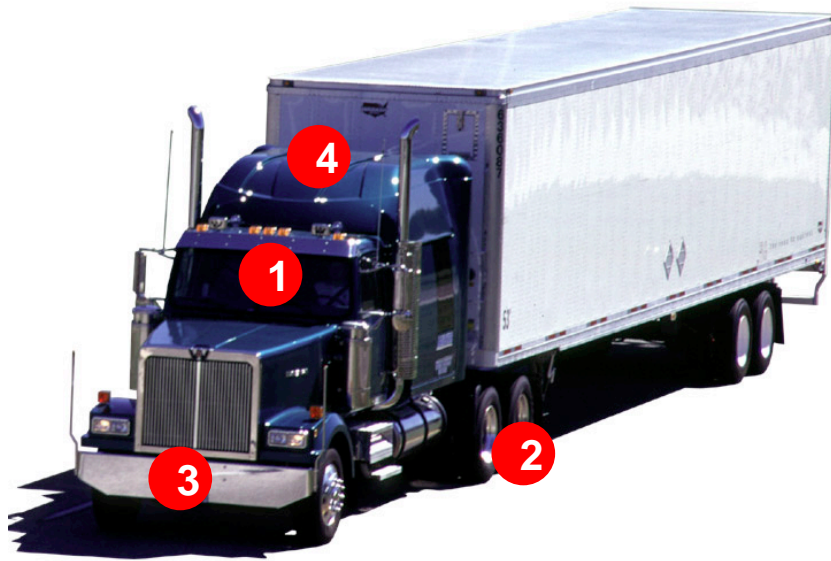
Note: Safety benefits are largely attributed to advanced policies governing LCV operations



Special Permit Systems

- Provide economic advantage that is a privilege not a right
- Can specify safety, maintenance and operational requirements beyond the norm
- Because they can be revoked due to poor safety performance, they engender “enhanced” carrier safety culture.

Vehicle Technologies



- 1 Lane Departure Warning Systems
- 2 Roll Stability Systems and Electronic Stability Systems
- 3 Forward Collision Systems with Adaptive Cruise Control
- 4 Vehicle diagnostic, location systems, electronic logging

Estimating Societal Benefit

10% Reduction in Truck VMT

Benefit study variable	Injury severity	Reductions assuming 10% reduction in exposure	Estimated annual benefits (\$US Billion)
Estimated safety benefits attributed to a 10% reduction in truck travel distance	no apparent injury	21562	0.20
	possible injury	2,929	0.44
	evident injury	2,724	0.68
	disabling injury	1,453	0.87
	Killed	330	2.54
	Total safety cost saving attributed to 10% reduction in exposure		
Estimated fuel and emissions benefits attributed to a 10% reduction in truck travel distance	Category	Quantity saved	Annual cost saving (\$US Billion)
	Diesel fuel reduction	10.6 billion liters	10.60
	CO2 reduction	28.3 Million metric tons CO2	0.680
Combined benefits	Total estimated annual savings		16.01



Comparing Estimated Annual Safety Benefits

Assumes 100% ESC and F-Cam Fleet Penetration
Assumes 10% Reduction in VMT from Size and Weight Reform

Crash Avoidance Option	Annual Fatality Reduction	Annual Injury Reduction
ESC	126	5,909
F-CAM (2 nd gen)	99	3,590
Size & Weight Regulation reform	330	7,106

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Size and Weight Reform as a Safety Strategy

Safety and Road Class

Road Class Effects

- Fatal truck crash rates on the Interstate system are 2.41 times less than other arterial roads (excluding local and collector roads)

Source: UMTRI TIFA & FHWA Highway Statistics

- Strong safety argument for encouraging heavier trucks to use the Interstate rather than other roads – current 80,000 lb weight limit prevents this safety benefit

Conclusion

Outdated truck size and weight policy results in high societal cost, including:

- Elevated truck related fatal and injury crashes
- Excessive fuel consumption
- Elevated emissions including CO₂
- Compromised international transport efficiency (eg. within NAFTA region)
- Significant opportunities associated with size and weight reform
- Leadership can be best demonstrated at the State level.

Thank You!

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