



Alternative fuel technologies and operational models for on-road freight

Pembina Institute | Transportation and Urban Solutions

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Leading Canada's transition to clean energy

The Pembina Institute is a non-profit think-tank that advocates for strong, effective policies to support Canada's clean energy transition.





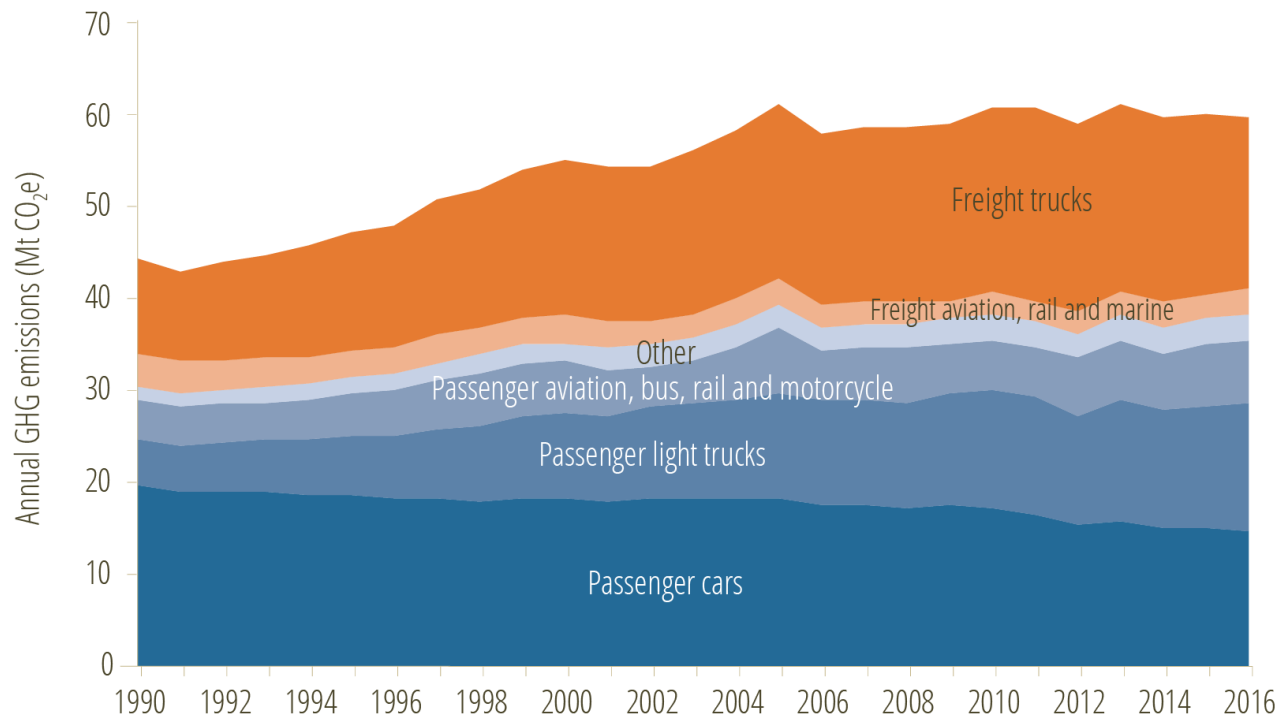
Context

On-road freight



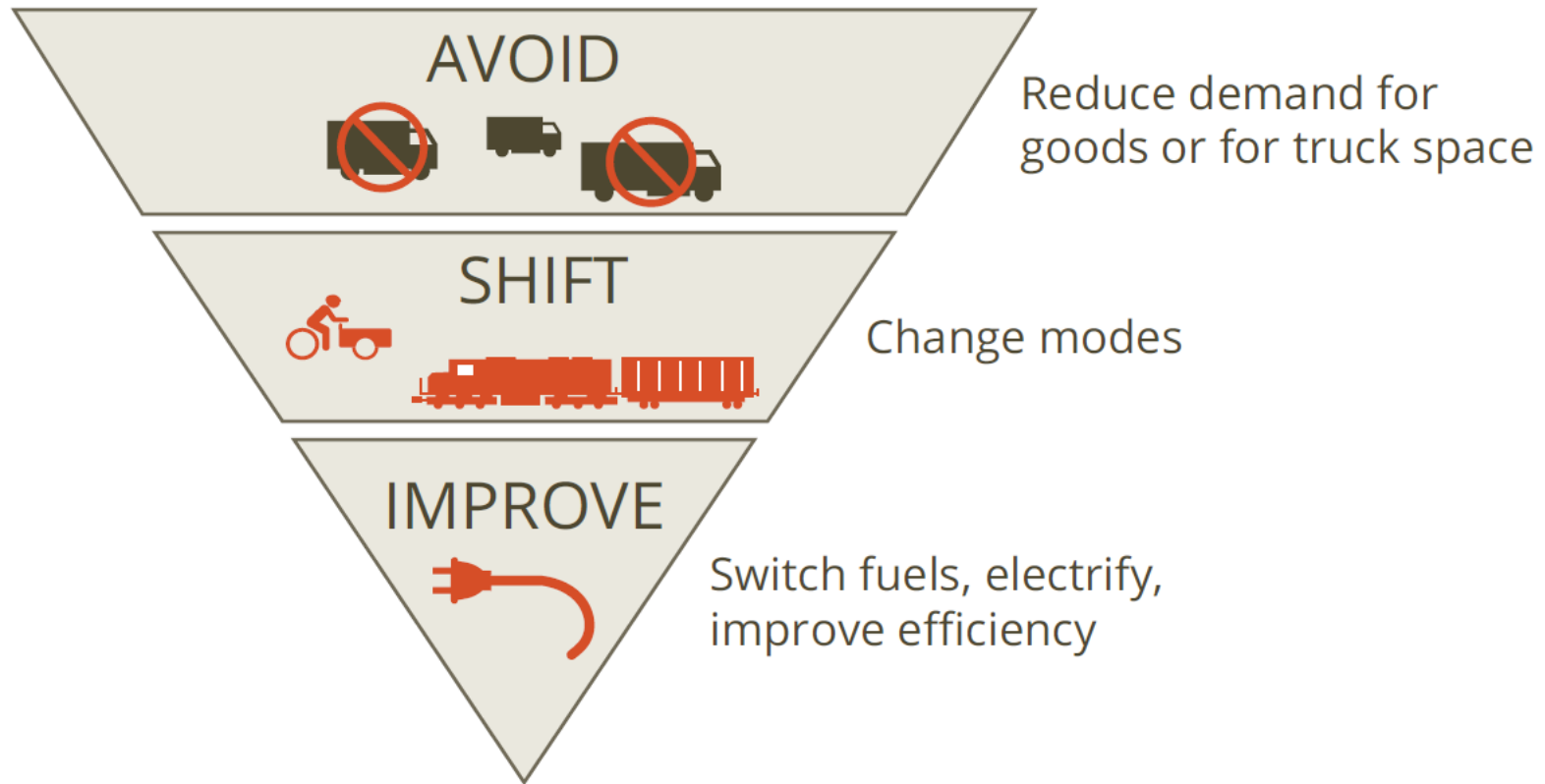


Trucking is a growing source of GHG emissions in Ontario



Source: NRCAN Comprehensive Energy Use Database

Working towards the decarbonization of Ontario's freight sector



Reducing GHG emissions from freight
Technology options and operational practices

On-road freight is diverse

- Varies by:
 1. Size
 2. Operations
 3. Geographic scope
 4. Type of goods moved



- A need for *situation-specific strategies*

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Different solutions for different realities

	Long haul	Regional	Urban
Fuel saving devices	✓		
Battery electric vehicles			✓
Hydrogen fuel cell vehicles	✓	✓	
Renewable natural gas vehicles	✓	✓	✓
Biofuels	✓	✓	✓
Cargo bikes			✓

Key barriers to success of low-carbon technologies

- Availability of refueling infrastructure
- Vehicle costs
- Fuel costs
- Fuel availability



Operational practices to reduce GHG emissions from freight trucks

1. **Maximize** amount of goods shipped per vehicle
2. **Reduce** empty runs
3. **Reduce** distance travelled by truck
4. **Reduce** fuel consumption
5. Perform **off-peak** deliveries

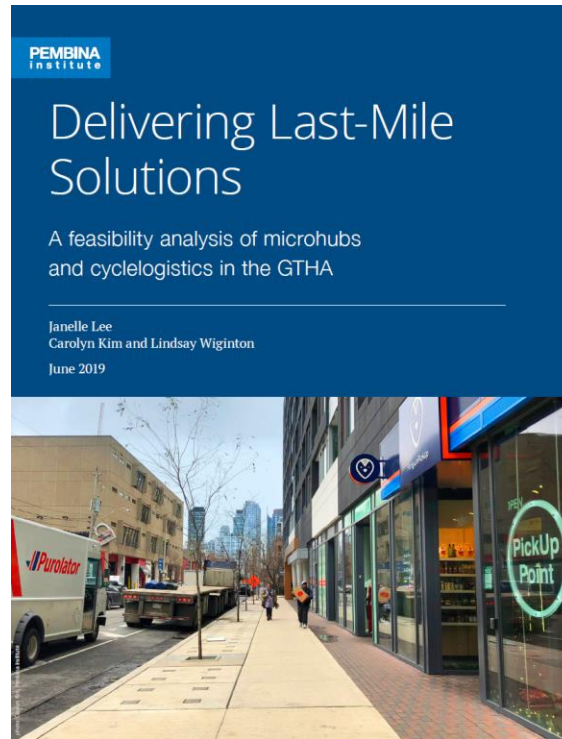


A photograph of a red brick building with a covered entrance and several Canada Post delivery vans parked in front. The building has two prominent brick chimneys and a green-painted cornice. The sky is overcast. A semi-transparent dark blue banner is overlaid across the middle of the image, containing the text "Last-mile delivery" and "Microhubs and cyclelogistics" in white. The Canada Post vans are red and white, with the company logo and name in both English and French. One van on the left is a larger truck, while the others are smaller delivery vans.

Last-mile delivery

Microhubs and cyclelogistics

Delivering Last-Mile Solutions



<https://www.pembina.org/pub/delivering-last-mile-solutions>

Business as usual

Suburban
consolidation

+

package car

Alternative

Micro-consolidation

+

- electric cargo van
- large e-assist cargo bike
- small e-assist cargo bike

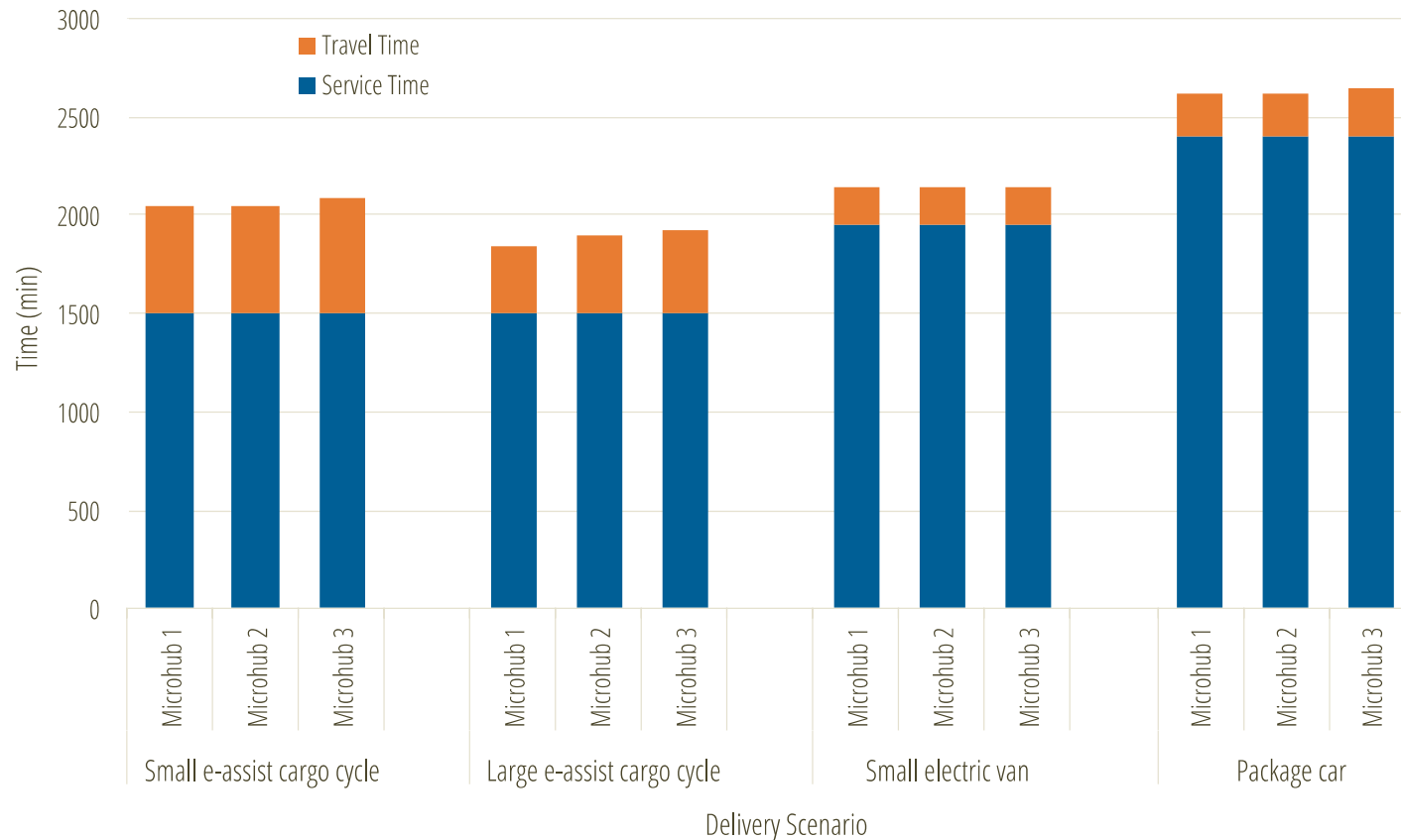
Microhubs and cargo bikes are viable and practical in the GTHA

- Efficient operations
- High asset utilization
- Cost effective
- Lower freight emissions



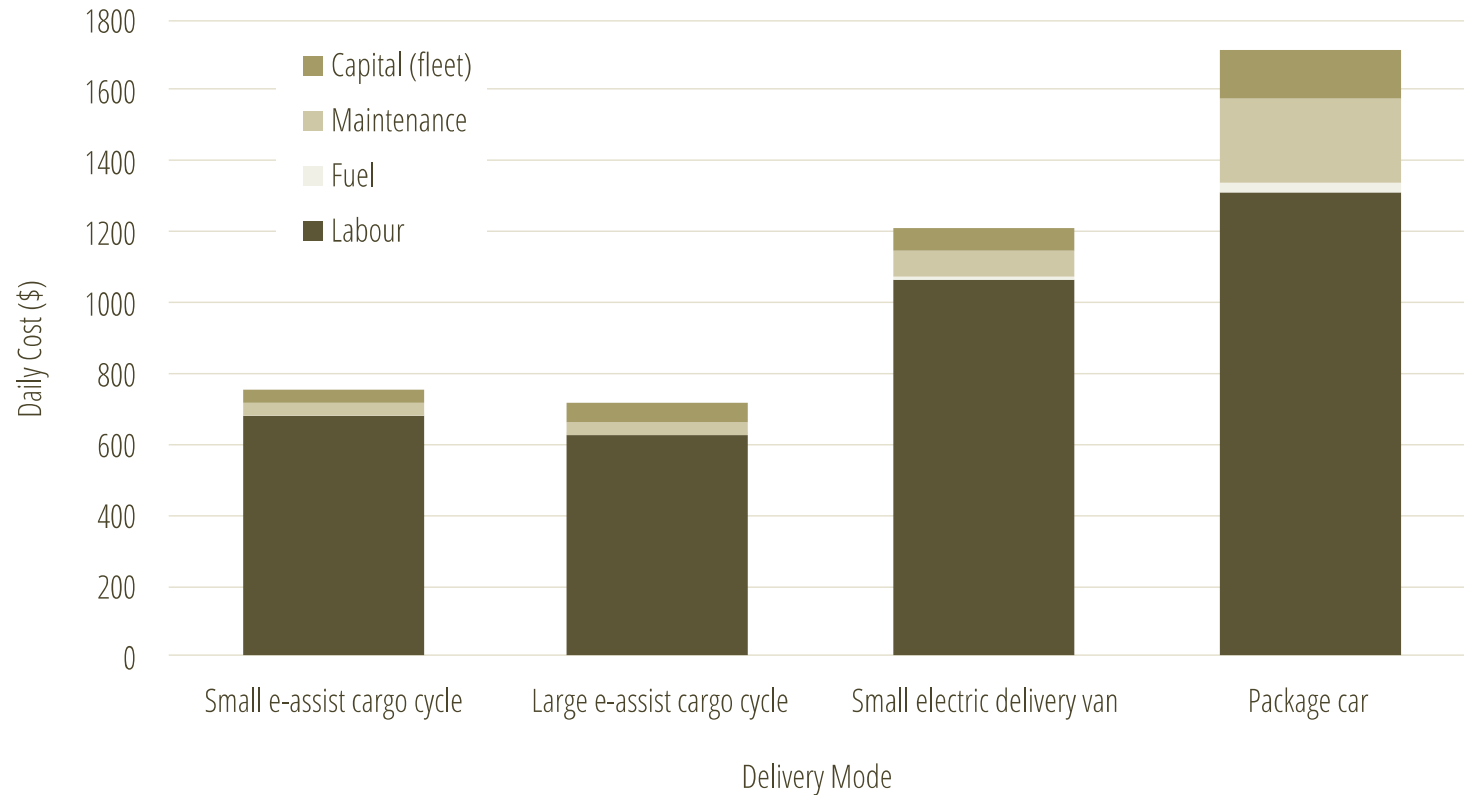
Photo source: Steve Russell, Toronto Star

More efficient



Total operational time under high congestion, high demand conditions

Cost effective



Average scenario costs under high demand conditions.

Low-carbon

Average GHG emission savings using microhubs and cyclelogistics:

24

kg CO₂/day

Low demand
conditions

53

kg CO₂/day

High demand
conditions



Supporting low-carbon on-road freight

Turning ideas into action

Turning ideas into action

- **Pilot** low-carbon technologies and operational models
- **Develop** alternative refueling infrastructure build-out strategies



Turning ideas into action

- **Explore** policies and incentives to support adoption of low-carbon technologies and operations



- **Launch** public/private partnerships

Urban Delivery Solutions Initiative

- A network of businesses and organizations working to modernize urban freight operations



<https://www.pembina.org/UDSI>

Potential benefits of freight decarbonization

- Climate change **mitigation**
- **Improvements** to efficiency
- **Reduced** concentrations of local air pollutant emissions
- Cost **savings**



Questions?

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