



E-Commerce and Sustainability

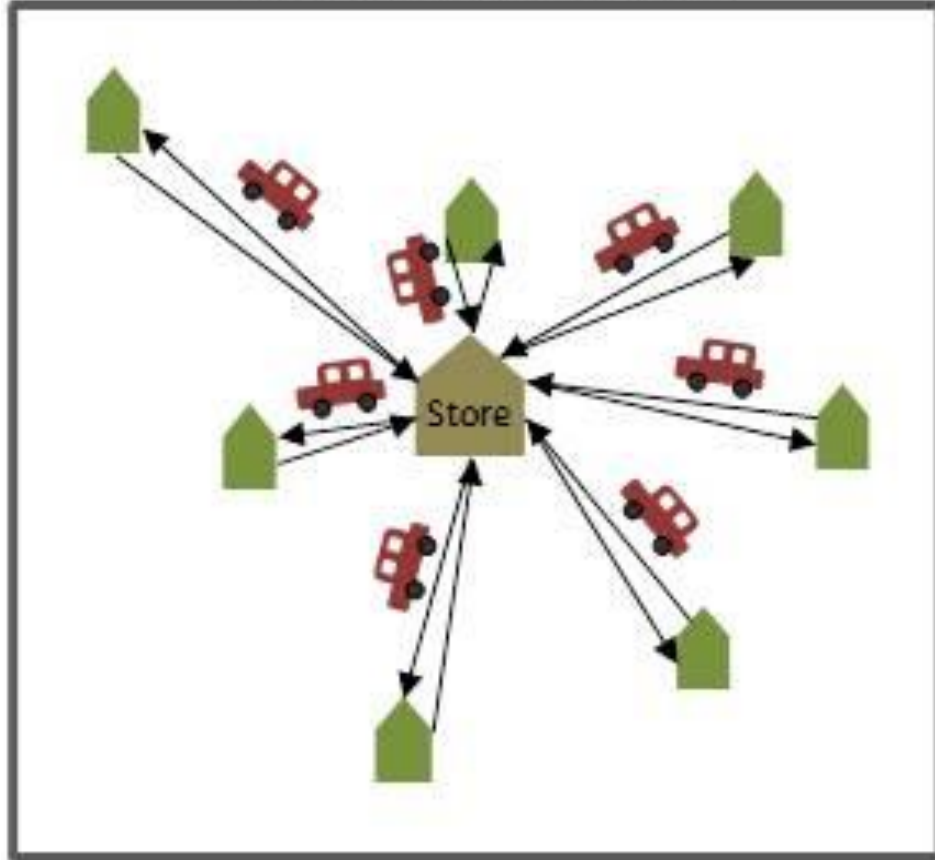
Anne Goodchild

Professor, Civil and Environmental Engineering

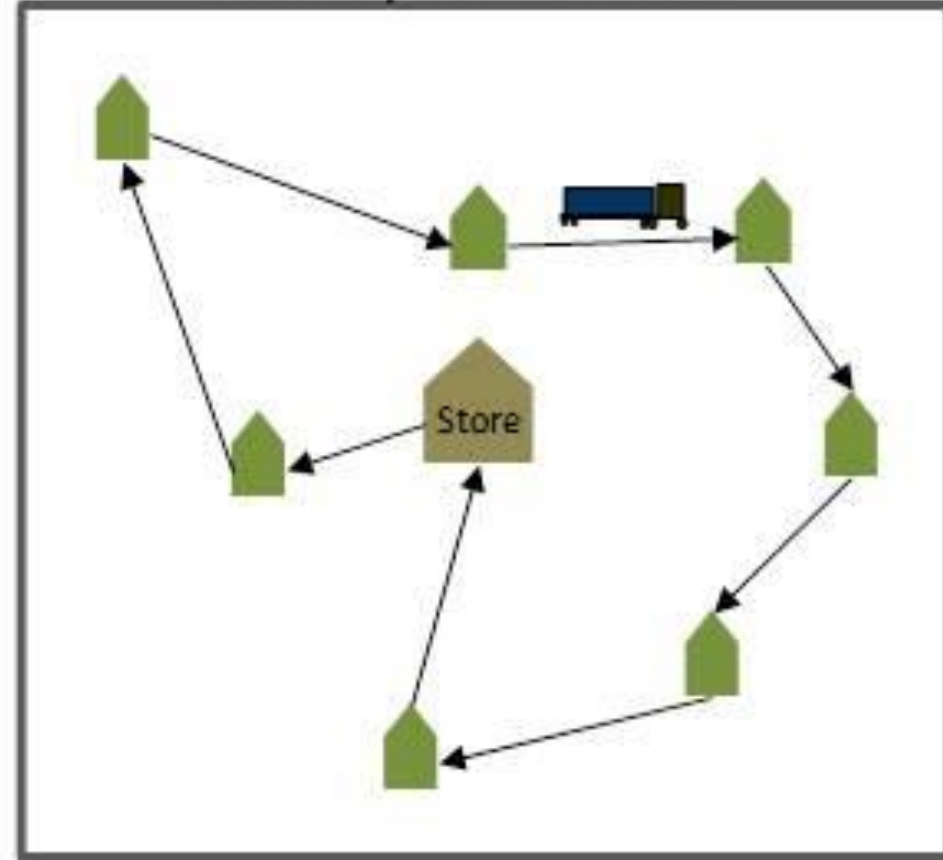
Director, Supply Chain Transportation and Logistics Center

Shopping vs Home Delivery: Consolidation

Personal Vehicle Travel

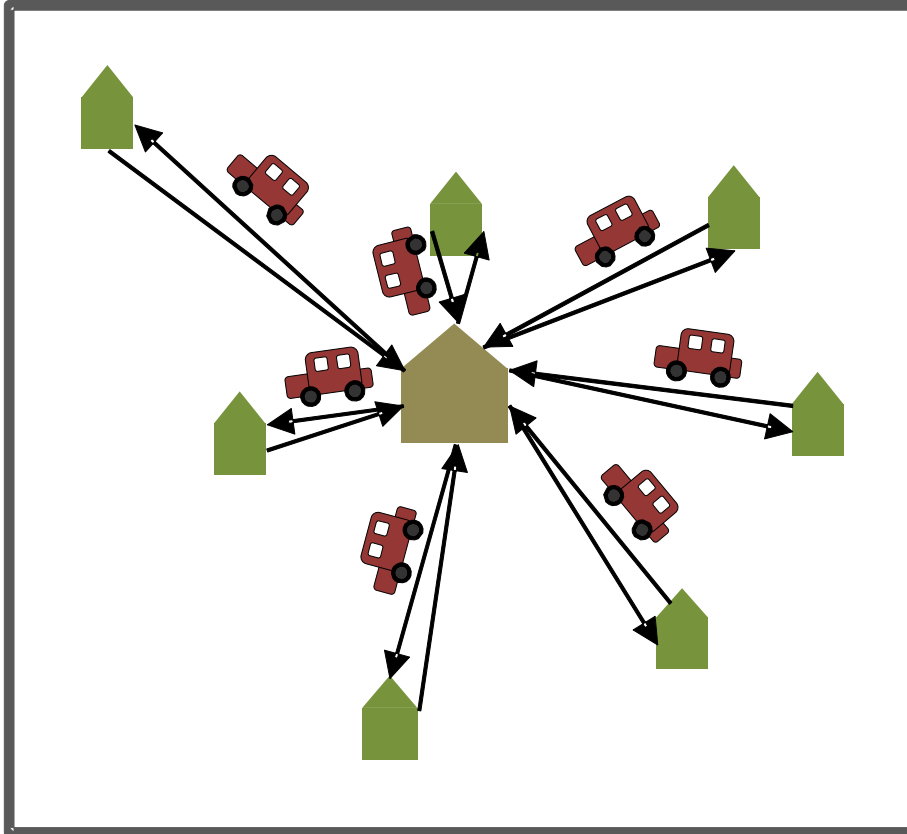


Delivery Vehicle Travel

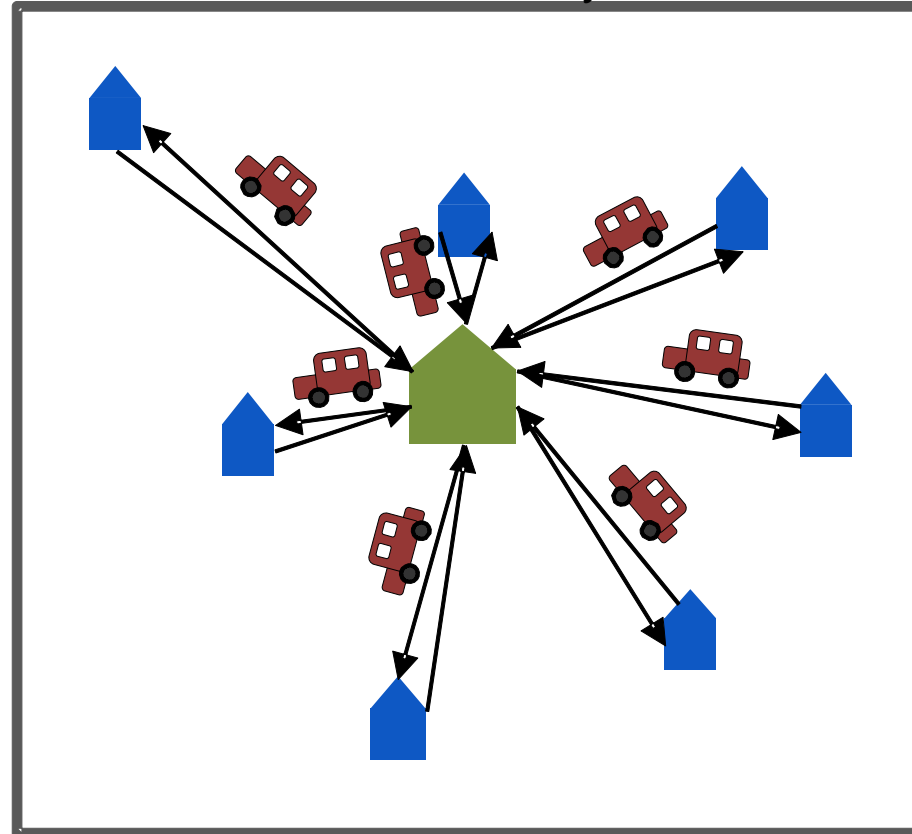


Personal Delivery Services with No Consolidation

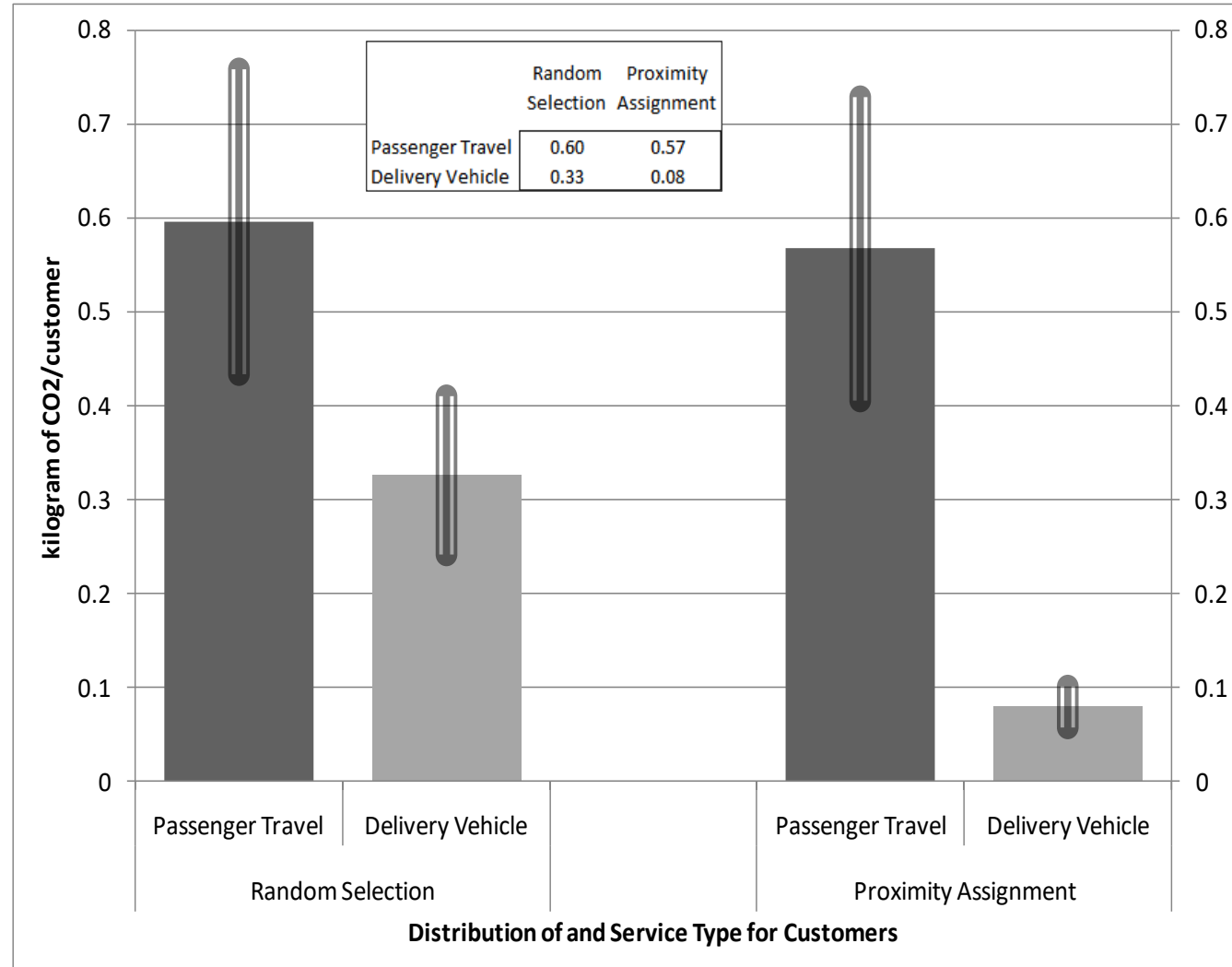
Personal Vehicle Travel



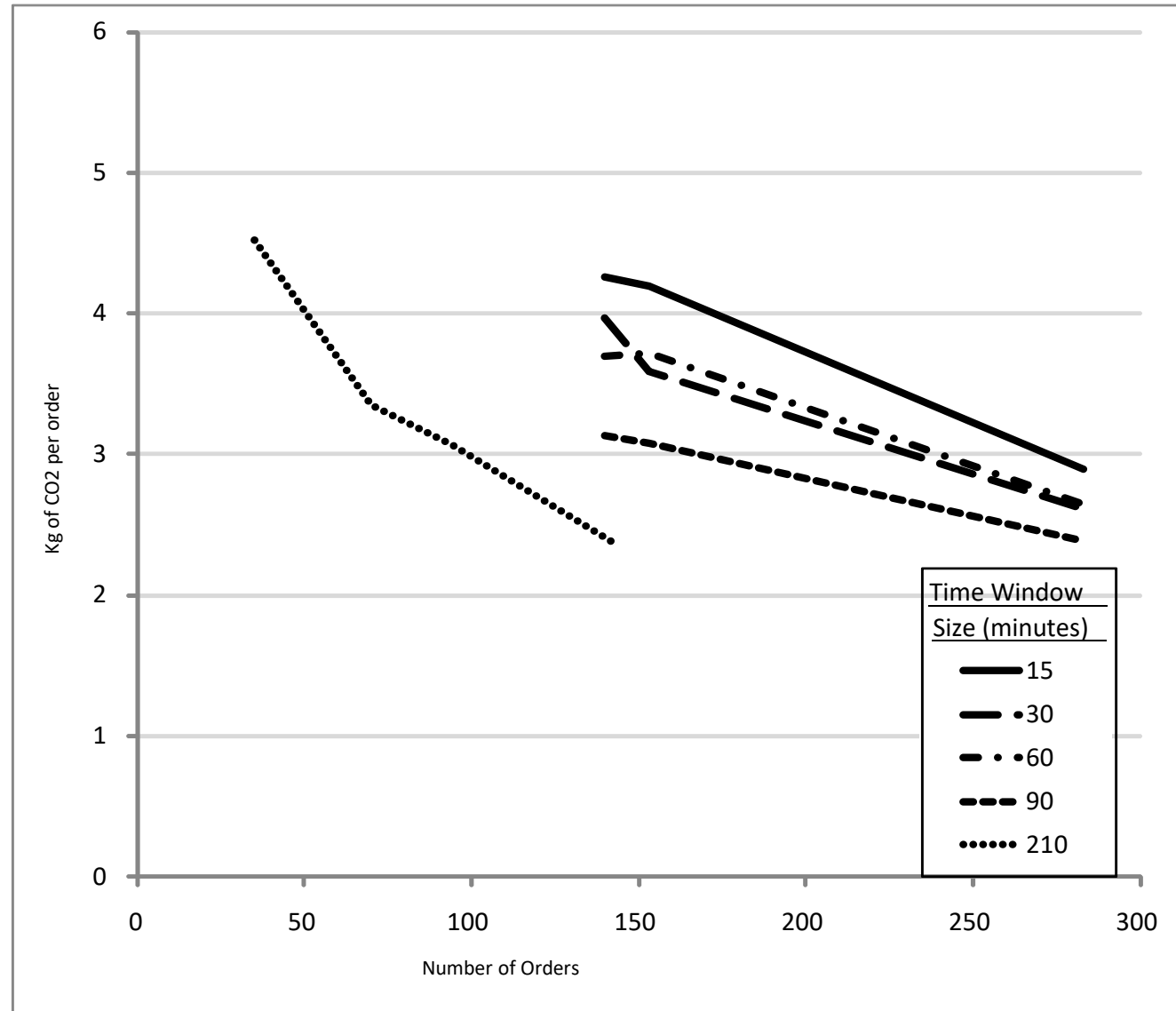
Personal Delivery Service



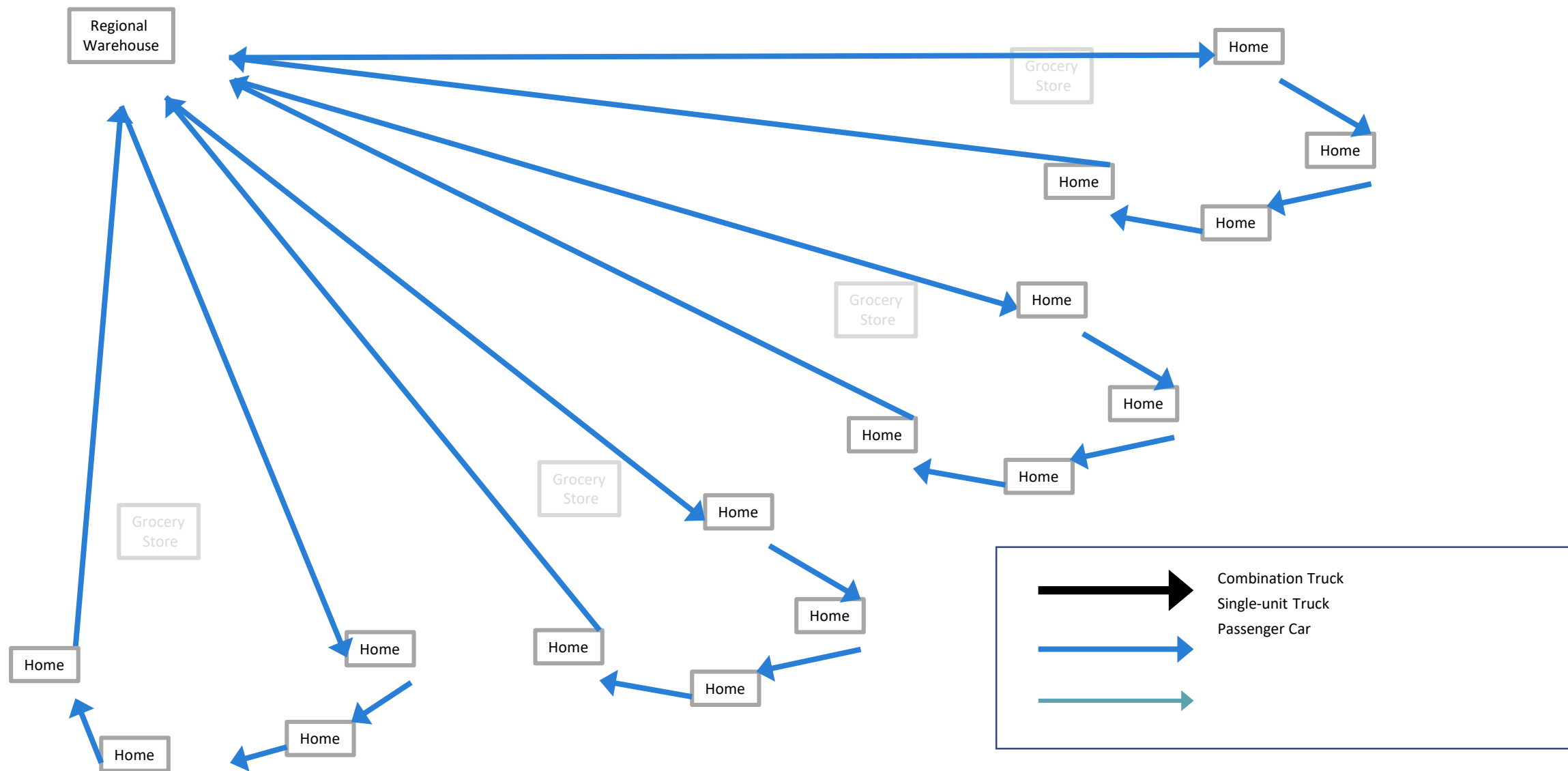
Key Variable: Vehicle Type



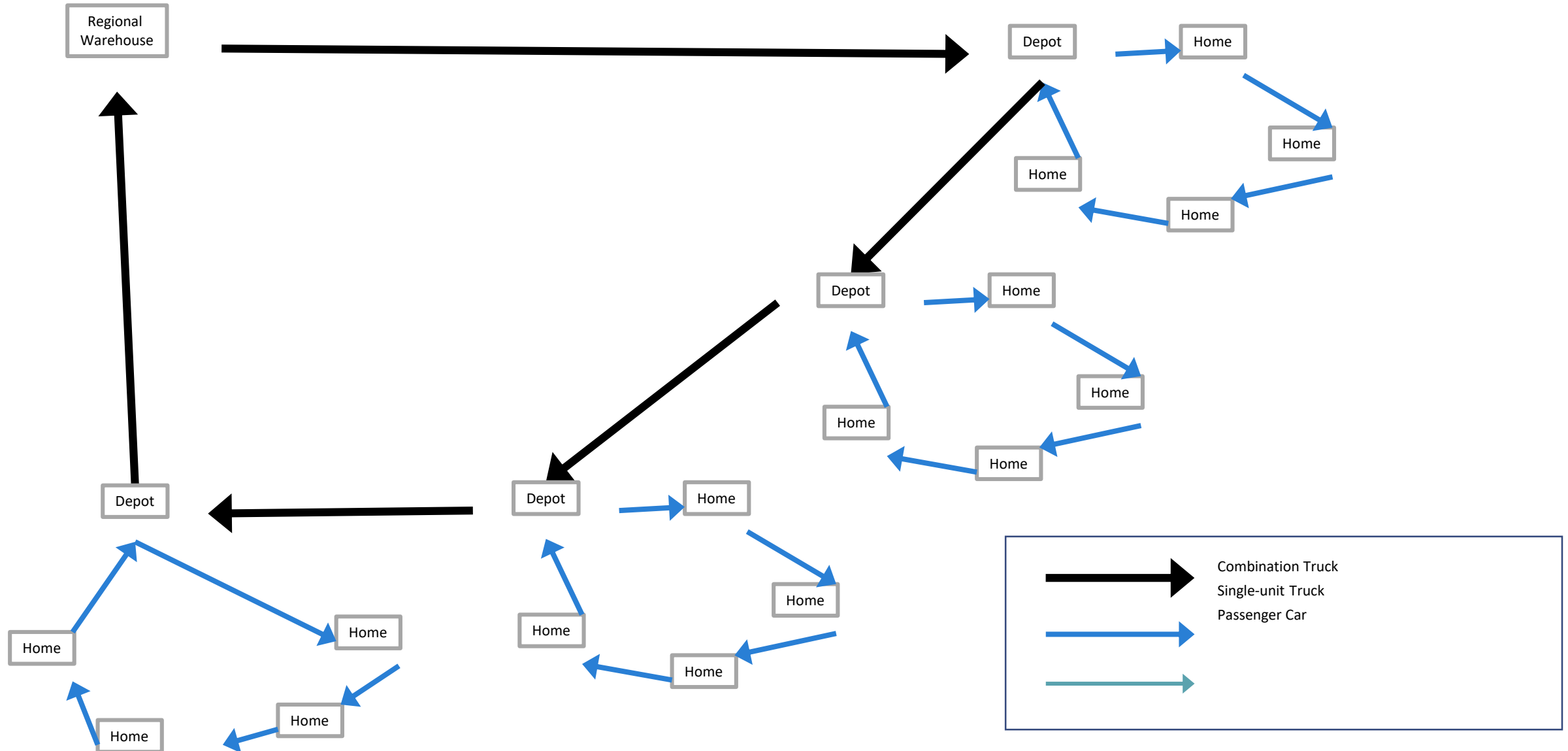
Emissions Per Order Reduces with Customer Density



Key Variable: Delivery Model



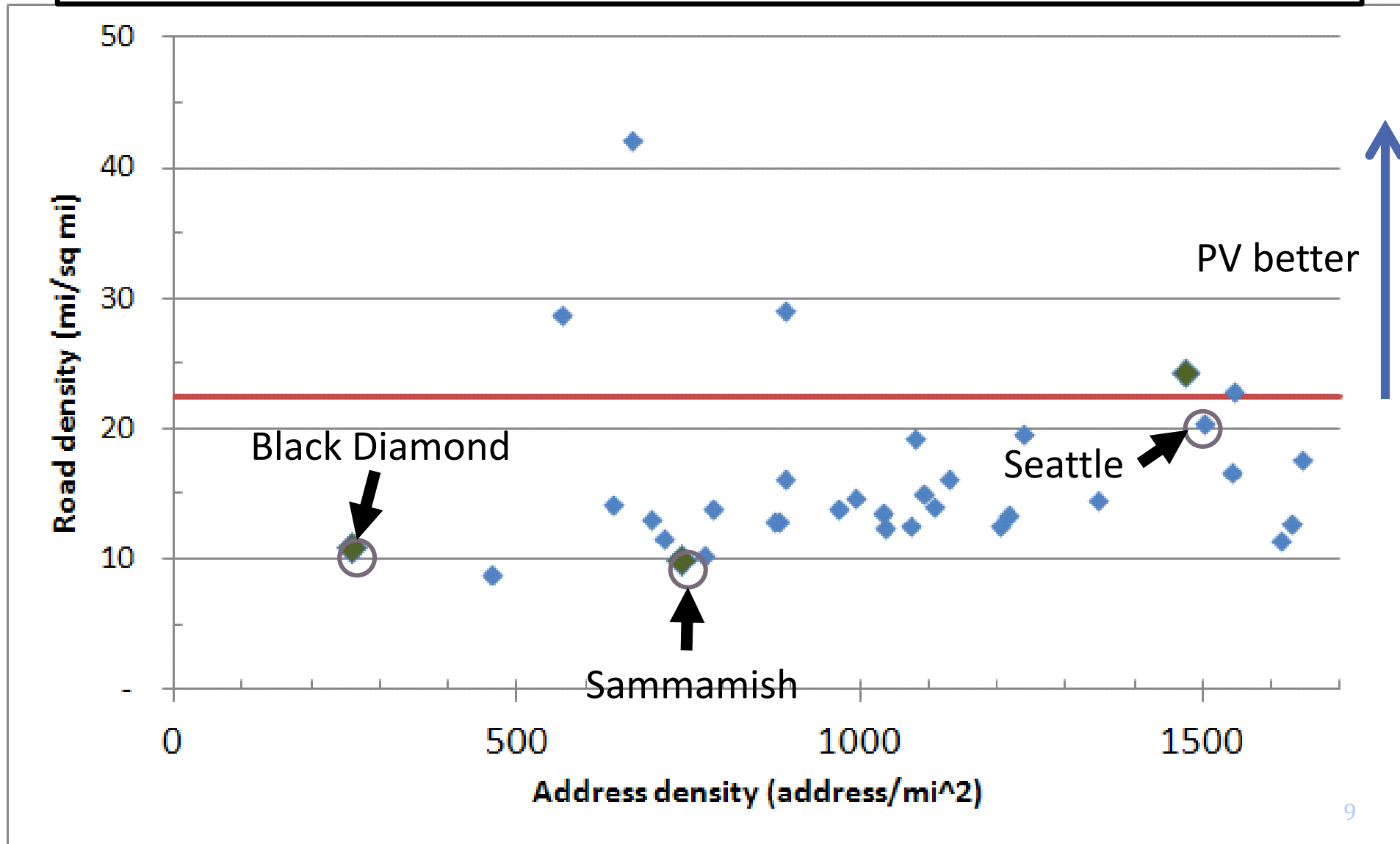
Depot-based Delivery



Delivery Reduces Carbon Dioxide in Some Municipalities

| | | VMT | CO2 (kg) | Nox (g) | PM10 (g) | Travel time (min) |
|---------|---------------|-----------------------------|----------|---------|----------|-------------------|
| lowest | Seattle | 1.1 | 1.1 | 2.7 | 0.10 | 2.1 |
| | Black Diamond | 1.4 | 1.7 | 3.8 | 0.13 | 2.6 |
| | Sammamish | 1.6 | 2.4 | 5.2 | 0.17 | 3.3 |
| highest | Seattle | 2.1 | 1.8 | 6.9 | 0.3 | 3.8 |
| | Black Diamond | 8.4 | 3.0 | 8.0 | 0.34 | 13.8 |
| | Sammamish | 8.6 | 3.3 | 10.3 | 0.46 | 14.0 |
| | | Passenger Vehicles | | | | |
| | | Local Depot Delivery | | | | |
| | | Regional Warehouse Delivery | | | | |

Delivery Would Decrease Carbon Dioxide in Most Municipalities



Urban Freight Lab Common Microhub Pilot

Anne Goodchild

Professor, Civil and Environmental Engineering

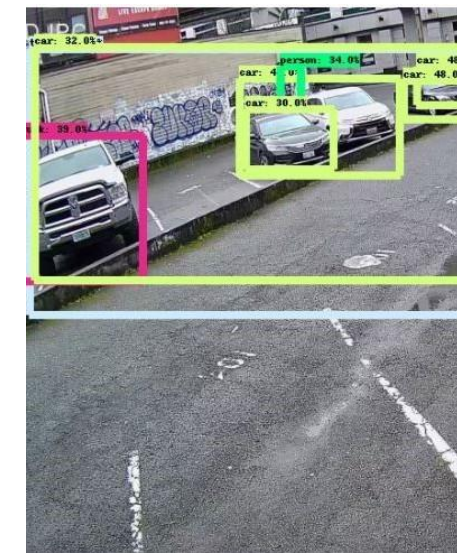
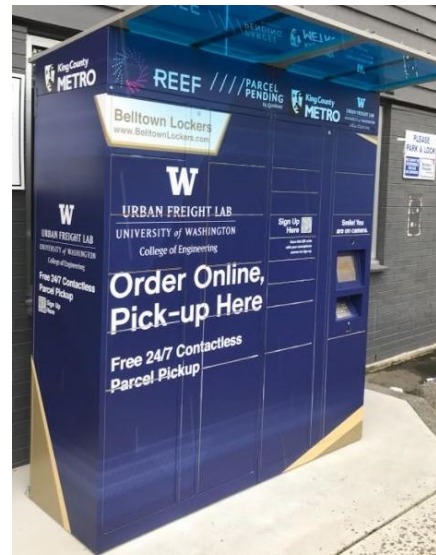
SCTL Center Director

University of Washington



Participants and Products

- Common Carrier Parcel Lockers **Urban Freight Lab**
 - Available for neighborhood residents and commuters to receive packages and complete their last mile.
- Ghost Kitchen and MicroHub infrastructure **REEF**
 - On-site food preparation and delivery staging
- Electric-Assist Cargo Bike Fleet **Coaster Cycles**
 - Customized electric-assist cargo bikes to carry electric pallets
- Last Mile Deliveries **AxleHire**
 - Provides last mile services using Microhub location as a transshipment point
- Electric Pallet (EP1) **Bright Drop (GM)**
- Curb space allocation and permission **SDOT**
- Mobile Unit for Sensing Traffic (MUST) Devices **UW STAR Lab**
 - comprehensive edge-computing based sensing and communication device for data collection

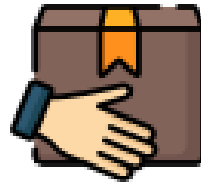


Cargo Bike Deliveries

- Data since May 5, 2021



2 routes per day



10 packages
per route



1.8 miles
per route



10 customers per
route



52 minutes spent
between first and last
delivery per route



Join Us!



- Ability to support additional retail and delivery concepts
- Allows for:
 - Zero emissions last mile
 - Consolidation to defray last-mile cost
 - No touch delivery
 - Experimentation with new retail models and delivery models

Questions?

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