

Forecasting the Impact of New Mobility in the Context of Long-Range Transportation Plans

Metro Vancouver Case Study

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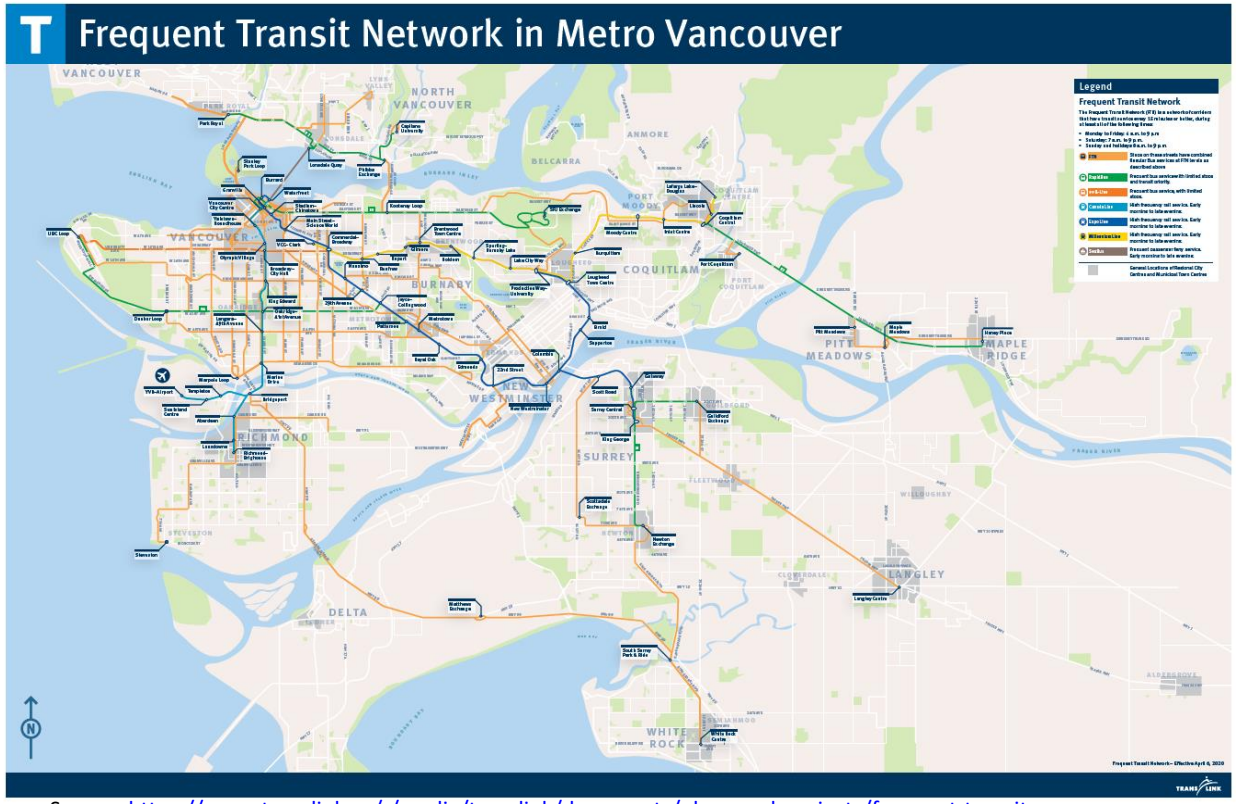
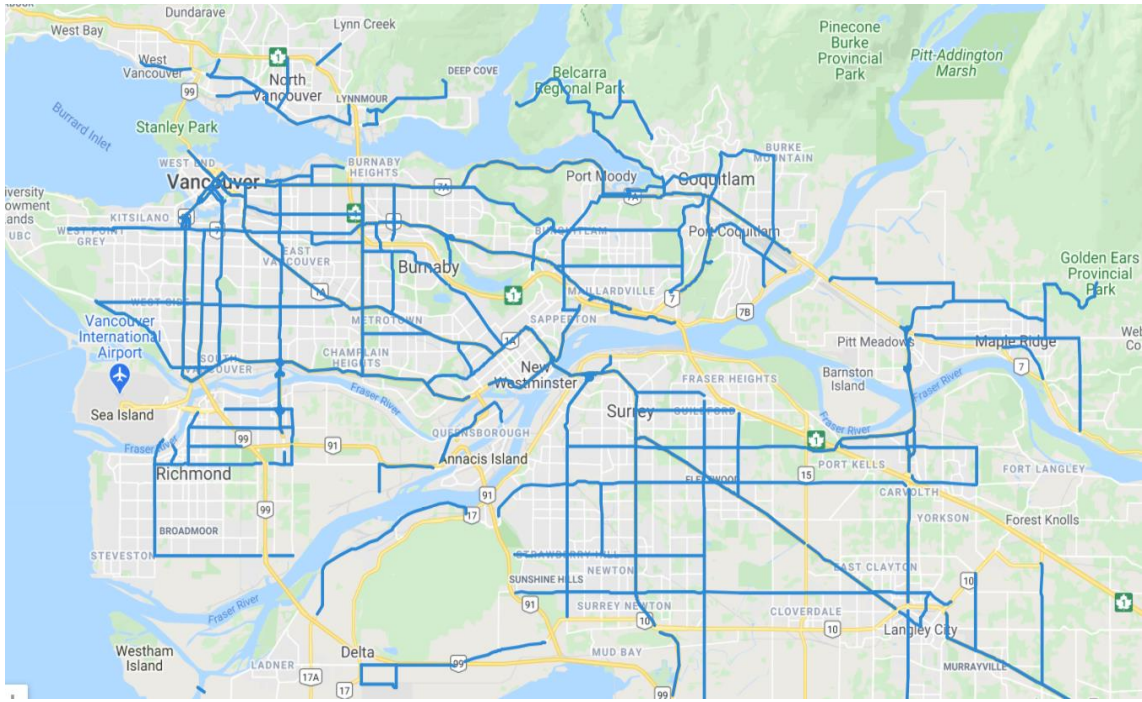
TransLink 101

FREQUENT TRANSIT NETWORK



Source: https://www.translink.ca/-/media/translink/documents/plans-and-projects/frequent-transit-network/frequent_transit_network_map.pdf

MAJOR ROAD NETWORK



Source: https://www.translink.ca/plans-and-projects/projects/major-road-network

TRANSPORT 2050

Automated

Advances in computing and sensors could put robots in the driver's seat.

Connected

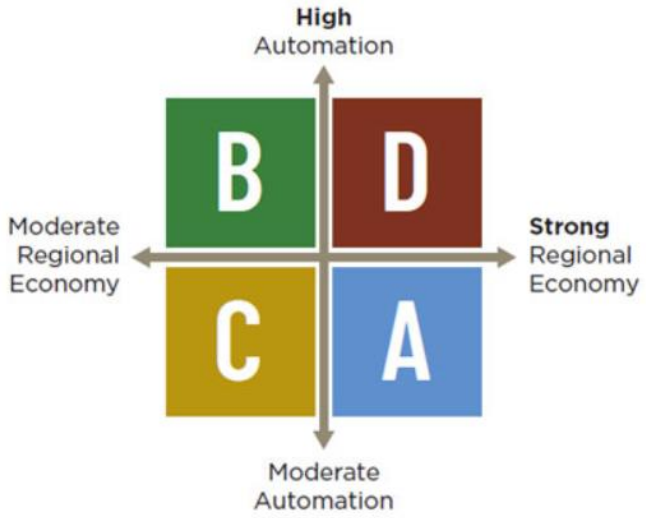
Vehicles of all types will soon be able to communicate with each other.

Electrified

Powered by renewable energy, electric vehicles are taking off.

Shared

From scooters to bikes to cars, people are moving from owning to sharing.



A — Trend Forward
Current economic, growth and development trends continue

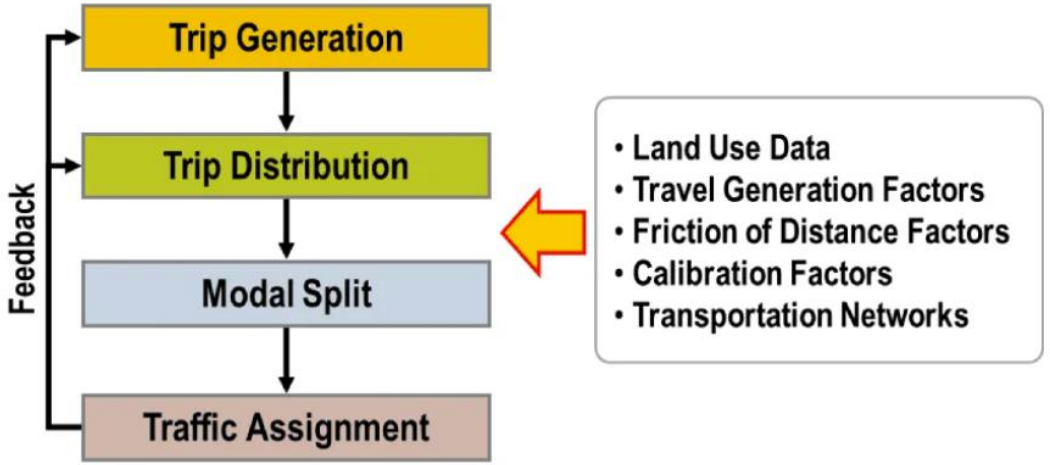
B — Automation-Driven Decline
Automation-driven job losses and outmigration result in a regional economy in decline

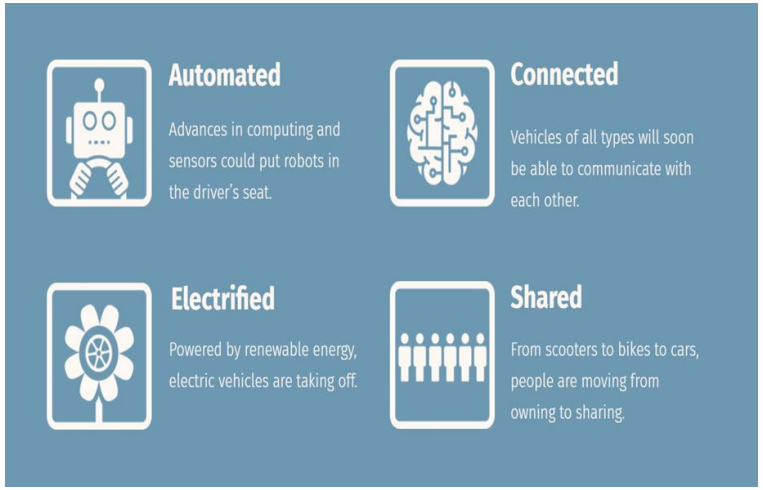
C — Self-Sufficiency
Barriers to global trade spur a more self-sufficient regional economy

D — Automation-Driven Boom
Automation drives a new economic boom led by new creative and knowledge sectors

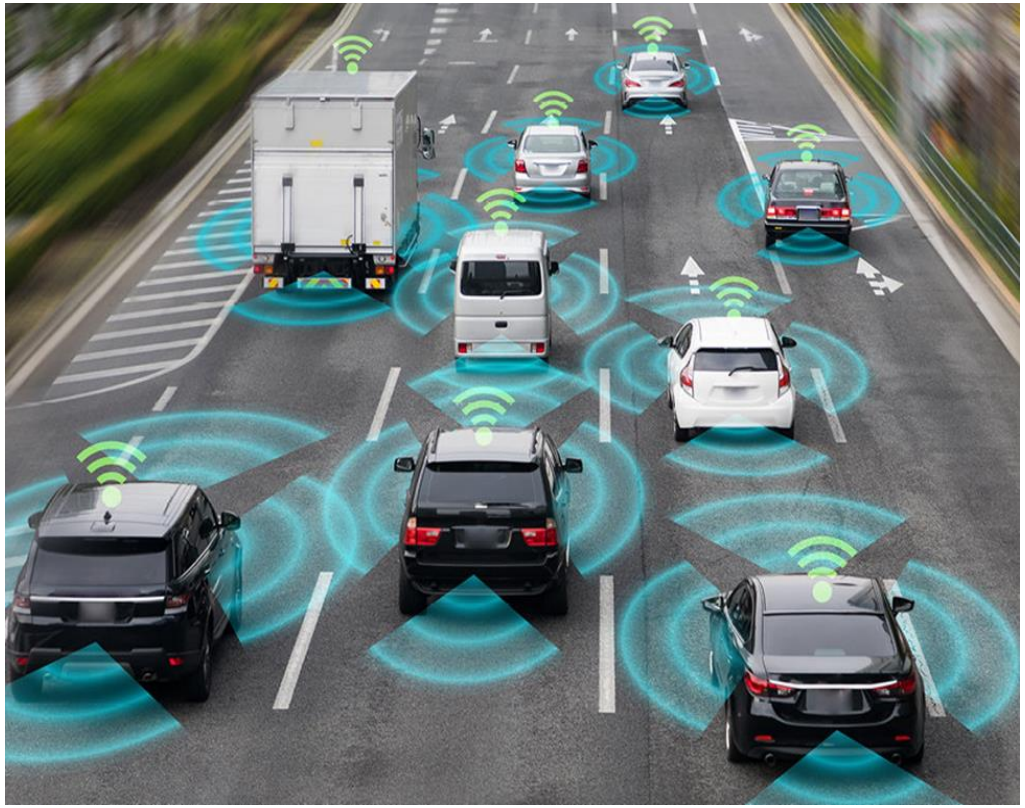
The Regional Transportation Model (RTM)

- Travel Demand Model
- Used to Evaluate Scenarios
  - Land Use
  - Infrastructure
  - Demand Management
- Upgraded to Incorporate New Mobility



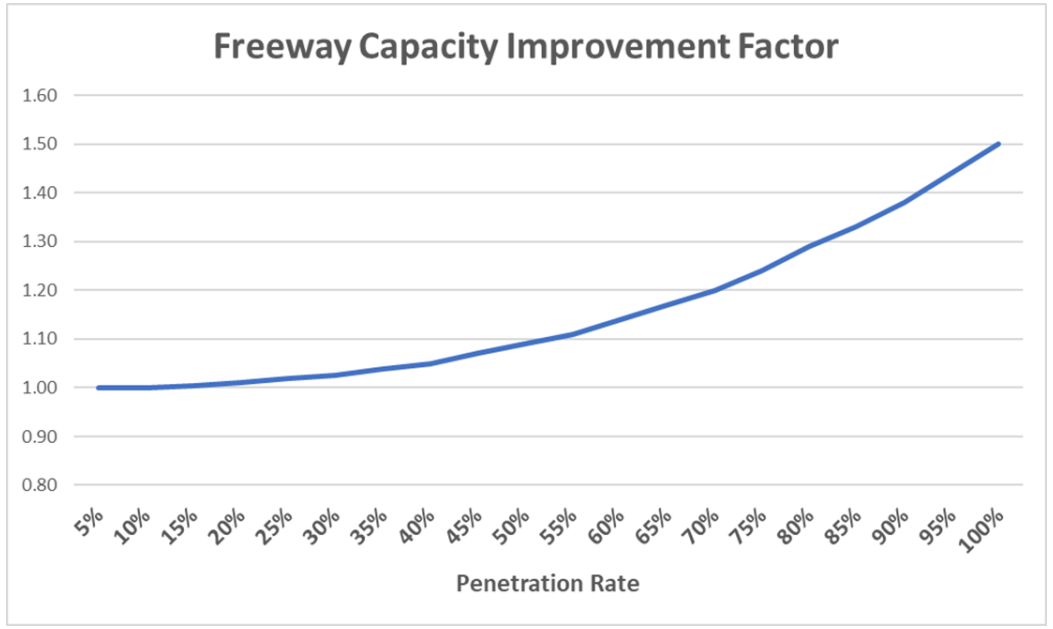


New Mobility



New Mobility – Behavioral Upgrades

- Connected-Autonomous Vehicle (CAV) owners can send vehicle back home to avoid parking
- CAV travel less sensitive to travel time
- TNC availability correlated with density
- CAV %
  - Speed and Capacity
- Modeller controls ‘knobs’
  - CAV Penetration
  - Speed/Capacity improvement factors
  - Travel time sensitivity



Summary of Upgrades

Connected and Autonomous Vehicles (CAV) ownership ✓

Accessibility-sensitive trip generation ✓

Transportation Network Company (TNC) modes ✓

Network speed/capacity adjustments ✓

Intra-household travel ✗

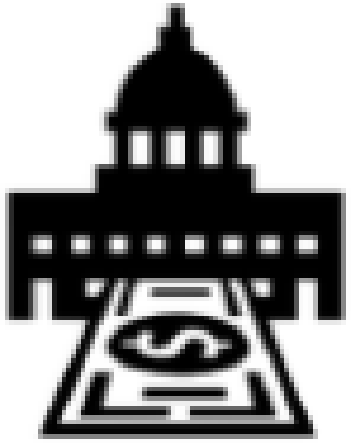
TNC dispatch model ✗

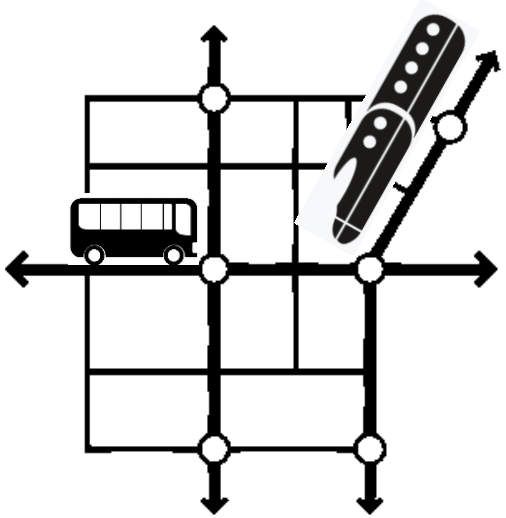
TNC ridesharing ✗

Parking demand model ✗

Transport 2050 modelling

- Used the RTM to model the proposed:
  - Policy levers (Road User Charging(RUC) etc.)
  - New mobilities (TNC etc.)
  - Transit services (Higher-order transit etc.)
  - New Infrastructures (Bus Lane etc.)





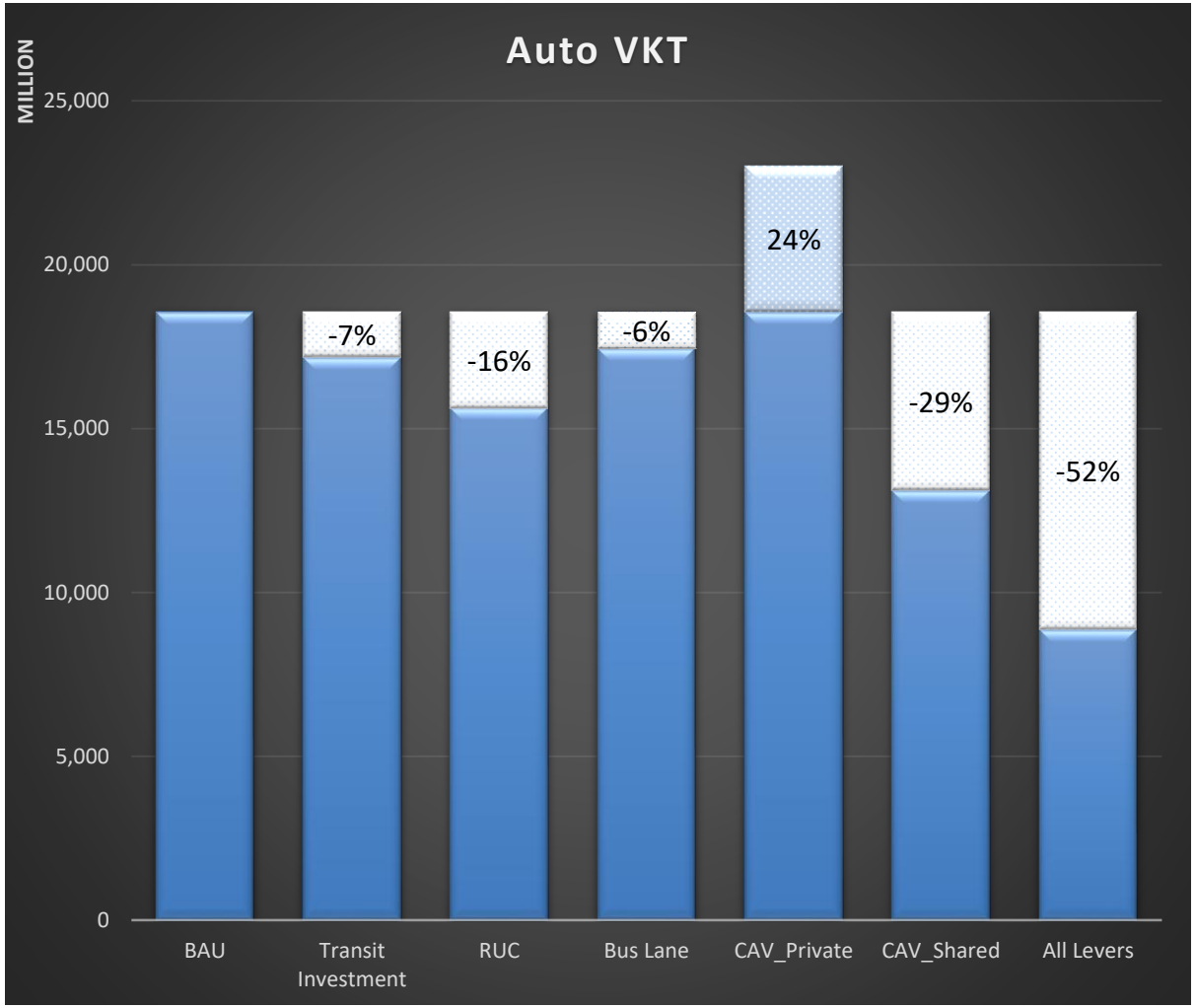
BAU Assumptions

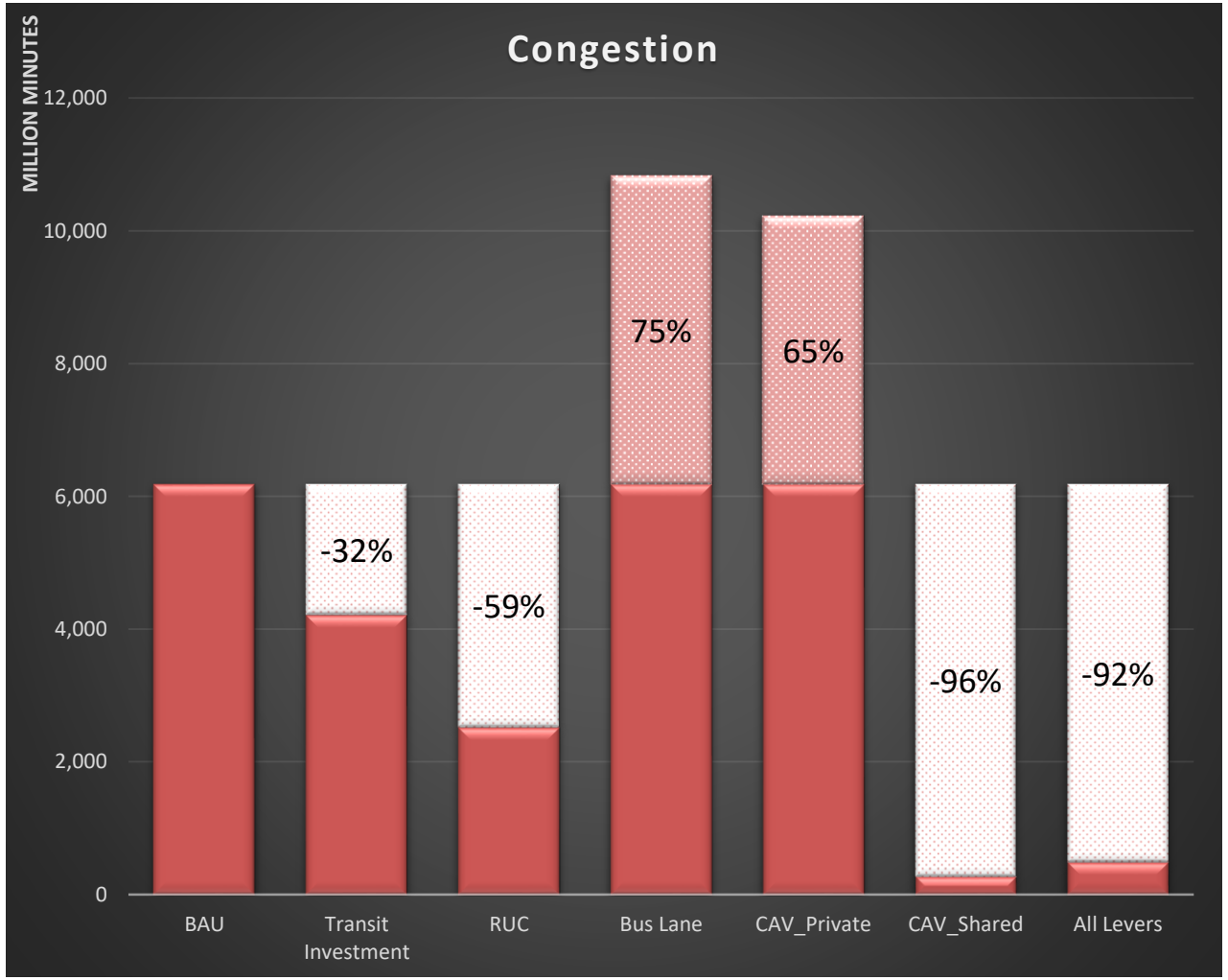
- Horizon year 2050
- 100% Electric Vehicle penetration (non-truck)
- Landuse aligns with MetroVan Regional Growth Strategy Plan
- No CAVs
- No Road User Charging (RUC)
- Transit Network Companies (TNCs)
- New SkyTrain Extensions
  - Surrey Langley SkyTrain
  - Broadway Subway
- etc…

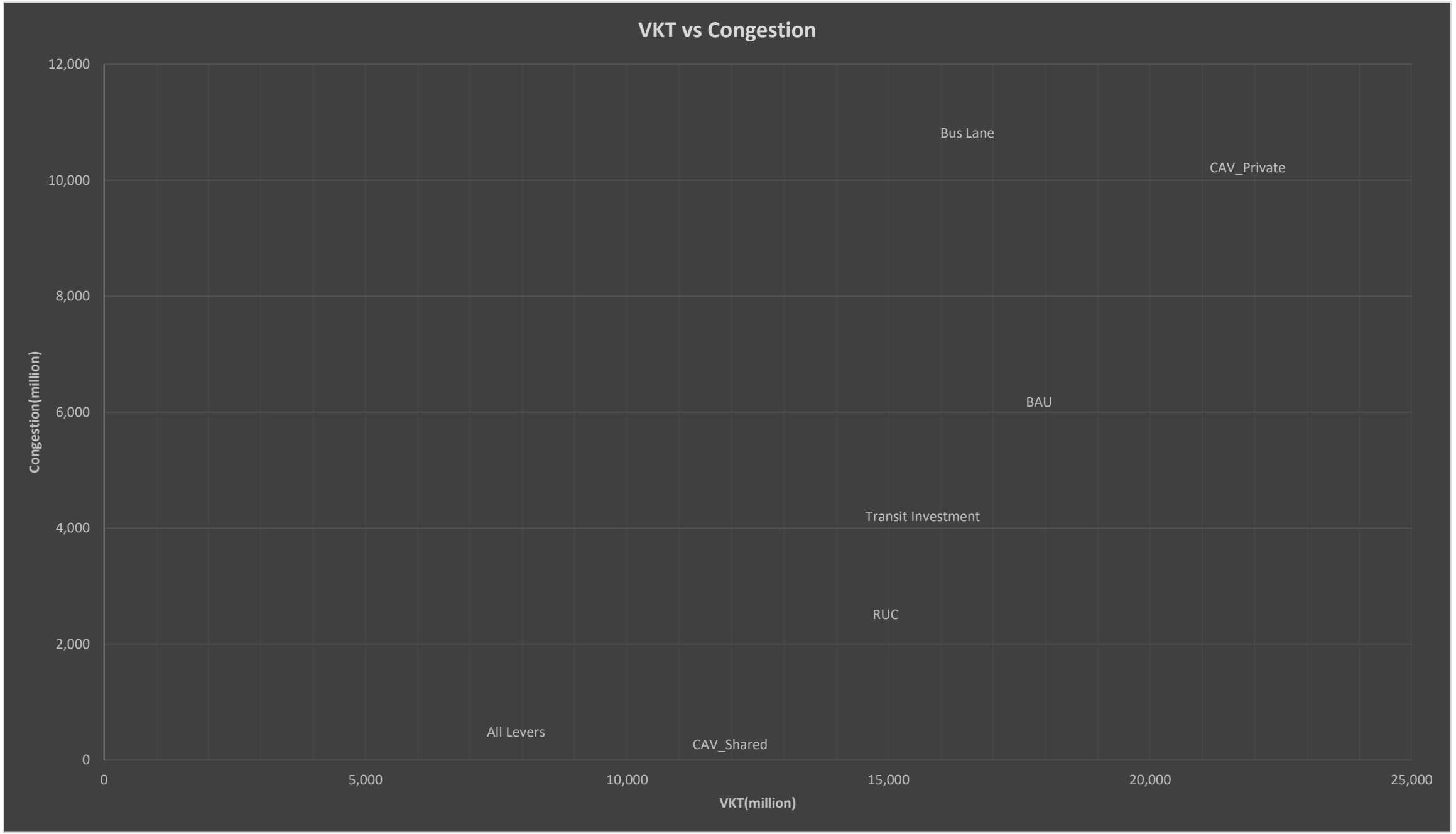
Scenarios

Scenario	Policy Lever	New Mobility	Transit Service	New Infrastructure
Transit Investment			- 36 new rapid transit services, increase rapid service by approx 450%. - Increase regular bus service by approx 300%	
Road User Charging (RUC)	- Apply additional price by trip distance. -The range is 0.2-0.8 $/km in peak hour, depending on the region.			
Bus Lane				- Convert general traffic lane to bus-only lane under a certain criterion
CAV private		- All private owned vehicles are CAVs		
CAV shared		- No private vehicles, and all shared vehicles are CAVs		
All levers	√	CAV shared	√	√

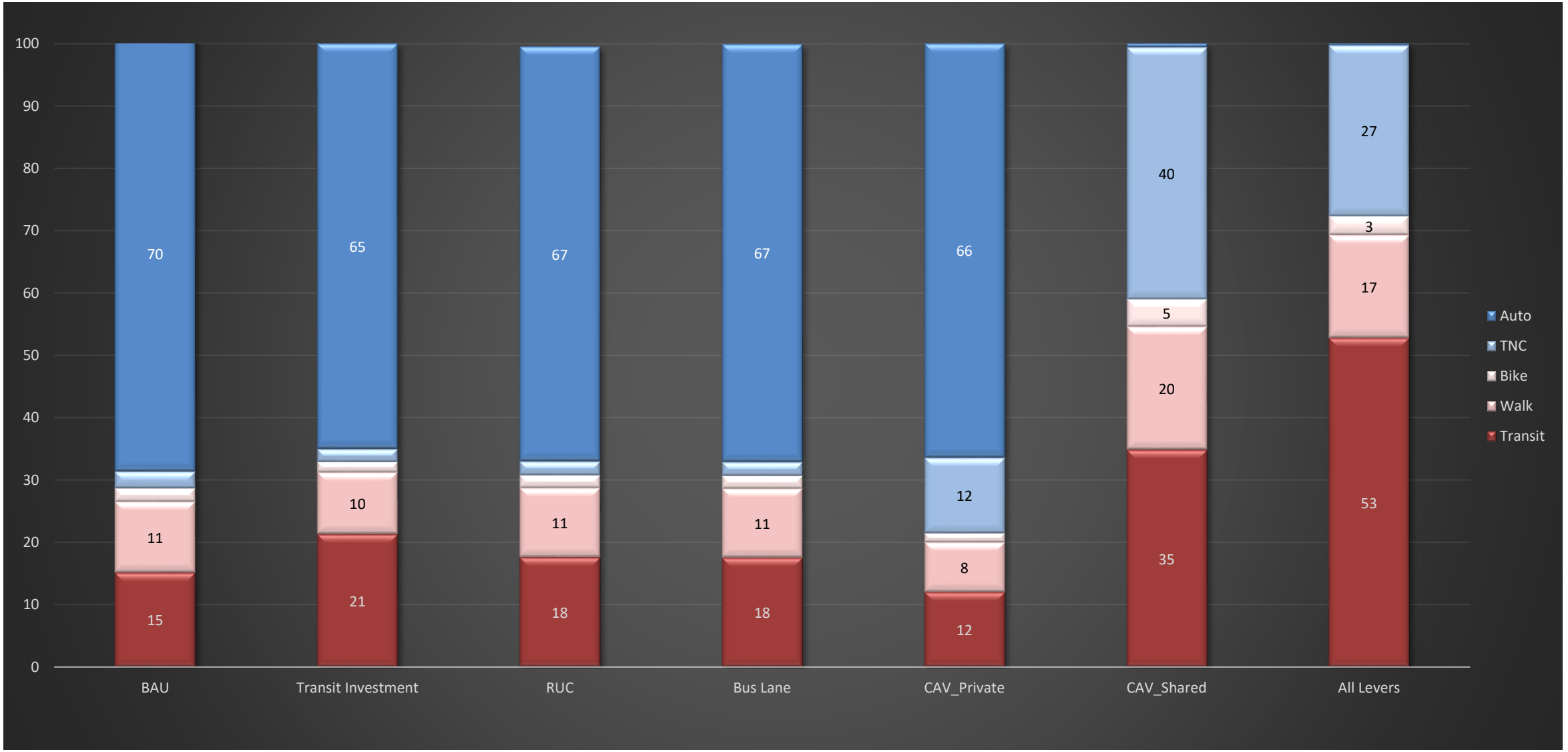
VKT and Congestion

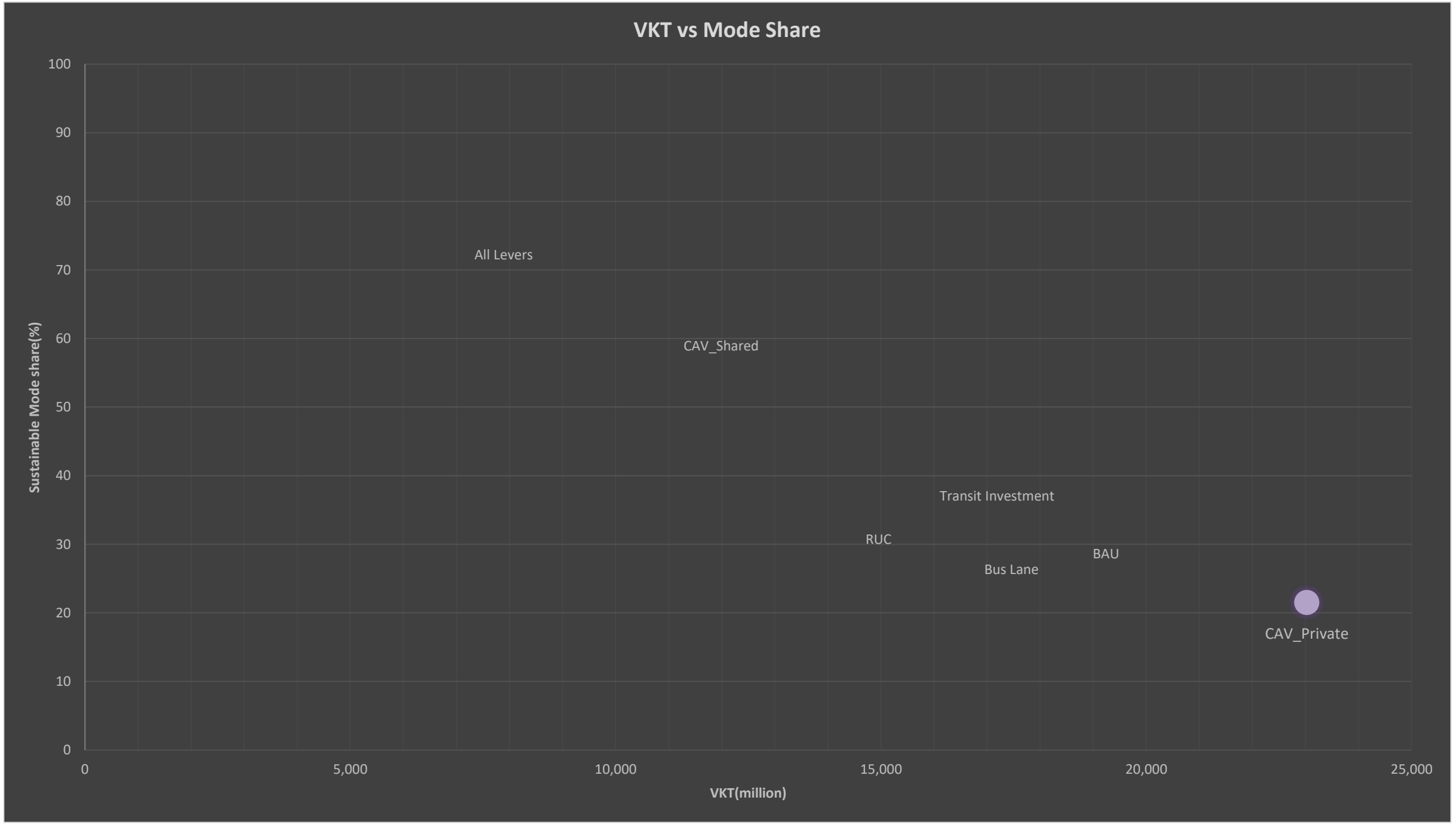





VKT vs Congestion
12,000
10,000
8,000
6,000
4,000
2,000
0
Congestion(million)
0
5,000
10,000
15,000
20,000
25,000
VKT(million)
Bus Lane
CAV_Private
BAU
Transit Investment
RUC
All Levers
CAV_Shared

Mode Share


100
90
80
70
60
50
40
30
20
10
0
70
11
15
65
10
21
67
11
18
67
11
18
66
12
8
12
40
5
20
35
27
3
17
53
BAU
Transit Investment
RUC
Bus Lane
CAV_Private
CAV_Shared
All Levers
Auto
TNC
Bike
Walk
Transit


VKT vs Mode Share
Sustainable Mode share(%)
100
90
80
70
60
50
40
30
20
10
0
All Levers
CAV_Shared
Transit Investment
RUC
BAU
Bus Lane
CAV_Private
0
5,000
10,000
15,000
20,000
25,000
VKT(million)

Findings

- Private-owned CAVs contribute to higher congestion and VKT
  - Lower travel time sensitivity
  - Sending car back home to avoid parking
- Road User Charging reduces auto usage and road congestion efficiently
  - Fewer long trips
  - Shift to other modes
- Significant investment in transit required to reduce congestion
  - Very expensive
- Shared CAVs is a hypothetical scenario however
  - Almost eliminates congestion
- CAVs could be a game changer in transportation system

Concluding Remarks

- The future is uncertain
  - Models are ‘best guesses’ based on:
    - What we know today
    - What we think is the impact of what has not been observed yet
- Long term plans need to be ‘nimble’
  - As more information becomes available, planners can readily decide to refine some plans and discard others
- One type of policy is not enough