Transportation Implementation Working Group (TIWG) - Transit, Ridesharing, and Commuter Choice

This spreadsheet contains Greenhouse Gas (GHG) and Vehicle Miles Travelled (VMT) reduction projections for Transit, Ridesharing, and Commuter Choice strategies (derived from the 2007 CAT T-1 Recommendation). A description of the scenarios and assumptions for each strategy is described below. The worksheet entitled, "Results long summary," contains a summary table describing the resulting GHG/VMT-reduction by strategy and also a total GHG/VMT-reduction calculation across all strategies. The total GHG/VMT-reduction figure accounts for expected overlap between strategies. Each strategy has a worksheet in this excel document that contains detailed calculation information.

The total GHG/VMT-reduction numbers are more modest than the projections from the 2007 CAT. The 2007 CAT VMT-reduction figures for Transit, Ridesharing, and Commuter Choice included a significant VMT-reduction from the "non-commute trip reduction" sub-strategy. The TIWG reframed the assumptions for the "non-commute trip reduction (renamed residential trip reduction)" to reflect what the TIWG felt was a more realistic implementation target. Further, the calculation for fixed route bus has greater resolution and reflects direct input from Washington State's transit agencies. It is important to note that the GHG/VMT-reduction calculations in this spreadsheet account ***only*** for mode shift, that is, the reduction resulting from individuals moving out of their vehicles and into one of the alternatives. Due to the relationship of Transit, Ridesharing, and Commuter Choice to the TIWG's other recommendations, the TIWG believes that the net impact of both the GHG/VMT-reduction and ancillary benefits of the Transit, Ridesharing, and Commuter Choice strategies is much greater than mode shift alone .

The TIWG is continuing to work on these Transit, Commuter Choice, and Rideshare strategies and expects to have a more expansive list of strategies, including carpool and telework, and is planning on providing recommendations on implementation specifics, funding, and scalability for the CAT meeting in October.

Fixed Route Bus

1. Bus operating hours and ridership assumed to remain constant at 2006 levels under baseline (status quo) scenario.
2. Under the action scenario, operating hours grow from 5.88 million in 2006 to 8.88 million in 2020. This is based on an annual increase of 300,000 operating hours per year beginning in 2011.
3. Ridership (boardings) grow based on assumed improvements in productivity (boardings per operating hour), as follows:
   Scenario 1: 3% annual growth in productivity statewide
   Scenario 2: no change in productivity
   Scenario 3: 1% annual growth in productivity at KC Metro, 3% elsewhere (Preferred Scenario)
4. Resulting change in bus ridership is:
   Scenario 1: from 165 million in 2006 to 377 million in 2020 (128% increase)
   Scenario 2: from 165 million in 2006 to 249 million in 2020 (51% increase)
   Scenario 3: from 165 million in 2006 to 320 million in 2020 (94% increase)
5. Mode shift factor is 0.5 (i.e., for every 100 new bus riders, 50 came from drive alone auto).[1]
6. Bus fuel type distribution remains constant (i.e., percent diesel, CNG, and electricity does not change 2006 – 2020).
7. The diesel bus fleet will be 75% hybrid-electric by 2020; hybrid diesel buses use 71% the fuel of standard diesel buses.[2]
8. Except for hybrid penetration, bus fuel use grows in proportion to vehicle miles.

Vanpool/Vanshare

1. Vanpool operating hours and ridership assumed to remain constant at 2006 levels under baseline (status quo) scenario.
2. Under the action scenario, vans in operation increase as follows:

Scenario 1: from 2,741 in 2006 to 8,836 in 2020 (consistent w/ growth 2003-07)
Scenario 2: from 2,741 in 2006 to 15,630 in 2020 (consistent w/ growth 2006-07)

3. Average van passenger load is 8.24 (including driver); assumed constant 2006-2020
4. Vanpool passenger miles grow in proportion to vans in service, as follows:
Scenario 1: from 162 million in 2006 to 360 million in 2020
Scenario 2: from 760 million in 2006 to 360 million in 2020
5. Mode shift factor is 0.83 (i.e., for every 100 new bus riders, 83 came from drive alone auto).[3]

Light Rail and Commuter Rail

1 .Change in travel based on Sound Transit regional modeling of ST-2 Plan in 2030, scaled to 2020. So under baseline (status quo) scenario, ST-2 Plan is not built.
2. Daily 2020 auto VMT without plan is 87,952,647, with plan is 87,190,346, so reduction is 762,773 VMT per day; annual VMT reduction is approx 303 times daily reduction.
3. Annual 2020 bus VMT is 58 million without plan, 44 million with plan, so reduction is 14 million.
4. Annual 2020 LRT vehicle miles is 6.8 million without plan, 24.7 million with plan, so increase is 17.9 million.
5. Annual 2020 Commuter Rail vehicle miles is 2.1 million without plan, 2.7 with plan, so increase is 0.6 million.
6. Sound Transit bus fuel economy assumed to be 4.4 mpg.[4]
7. Other bus fuel economy assumed to be consistent with the bus sub-strategy, including transition to 75% hybrid diesel by 2020.
8. Increase in LRT and Commuter rail GHG emissions taken from Sound Transit analysis.

Amtrak

1. Amtrak operating hours and ridership assumed to remain constant at 2006 levels under baseline (status quo) scenario.
2. Ridership grows from 635,000 in 2006 to 2.6 million in 2020 (interpolated from 3 million in 2023).[5]
3. Annual trains grows from 2,555 in 2006 (7 per day) to 4,659 in 2020 (interpolated from 5,110 annual trains in 2023, or 14 per day).[6]
4. Passenger miles grow from 90 million in 2006 to 365 million in 2020 (interpolated from 423 million in 2023).[7]
5. Amtrak Cascades train miles and ridership figures include Coast Starlight service on the segment.
6. Mode shift factor of 0.67 (i.e., for every 100 new riders, 67 came from drive alone auto).[8]
7. Estimate of Amtrak fuel use rate based on 2004 national system mileage and fuel consumption from US EPA.[9]
8. Comparable on-road trip distances calculated based on highway routes.

GTEC/CTR

1. Currently, 26,000 morning commute trips reduced by CTR (52,000 per day)
2. By 2020, 140,000 daily trips reduced (includes baseline 26,000 morning trips reduced, plus CTR 2011 goal of morning 27,800 trips reduced, plus GTEC goal of morning 16,200 trips reduced; all multiplied by two for daily trips)
3. A reduction in 27,800 new daily drive-alone trips eliminates 185 annual VMT, based on the WSDOT CTR goal for 2011; this ratio used to estimate VMT impacts of trip reduction.
4. When calculating total T-1 benefits, 59% of GTEC/CTR program benefits are included in the total. This reflects the portion of CTR program benefits that are not related to bus transit, rail transit, or vanpool, and thus not captured by other sub-strategies.

Residential Trip Reduction

1. Baseline (status quo) assumes no statewide program.
2. Based on experience in King County, statewide program assumed to eliminate 15 million trips per year.

3. Assuming average trip length of 10 miles, 150 million VMT eliminated by 2020.
4. When calculating total T-1 benefits, 59% of Residential Trip Reduction benefits are included in the total. This reflects the portion of King County's InMotion program benefits that are not related to transit or vanpool, and thus not captured by other sub-strategies.

VMT Reduction Innovation Grants

1. Baseline (status quo) assumes no statewide program.

2. Based on previous experiences with WSDOT's Trip Reduction Performance Program, an investment of $2.5 million will eliminate 57.5 million round-trip VMT per year.
3. When calculating total T-1 benefits, 59% of VMT Reduction Innovation Grants benefits are included in the total. This reflects the portion of CTR program benefits that are not related to bus transit, rail transit, or vanpool, and thus not captured by other sub-strategies.

All Strategies

1. Average light duty vehicle fuel economy assumed to be 20.3 mpg in 2006 and 23.7 mpg in 2020.[10]
2. 8.805 kg CO2 per gallon gasoline; 10.145 kg CO2 per gallon diesel.[11]
3. Global warming potential of N2O is 310; global warming potential of CH4 is 21.[12]
4. N2O emission factor for Tier 2 light duty vehicle is 0.005 g/mile (assumes 50% autos and 50% light duty trucks).[13]
5. CH4 emission factor for Tier 2 light duty vehicle is 0.0175 g/mile (assumes 50% autos and 50% light duty trucks.[14]

[1] Based on APTA methodology
[2] Data from King County Metro
[3] Based on data from King County
[4] From Sound Transit
[5] Based on Long-Range Plan for Amtrak Cascades, February 2006.
[6] Based on Long-Range Plan for Amtrak Cascades, February 2006.
[7] Based on Long-Range Plan for Amtrak Cascades, February 2006.
[8] From Amtrak Cascades rider profile.
[9] U.S. EPA, Draft Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less than 30 Liters per Cylinder, March 2007.
[10] DOE's Annual Energy Outlook 2008 (reflects latest proposed CAFÉ standards).
[11] US EPA
[12] IPCC
[13] US EPA
[14] US EPA