Comparison of GHG Emissions for Little Cottonwood Canyon Transportation Alternatives

Prepared by ICLEI USA
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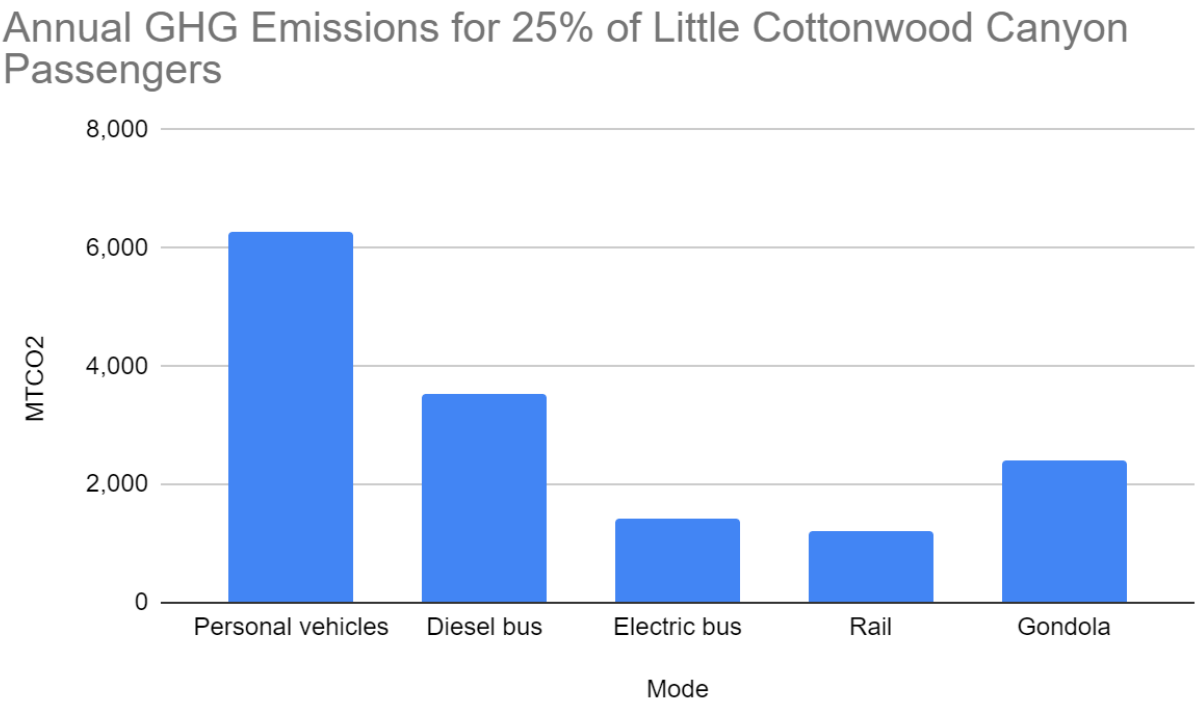
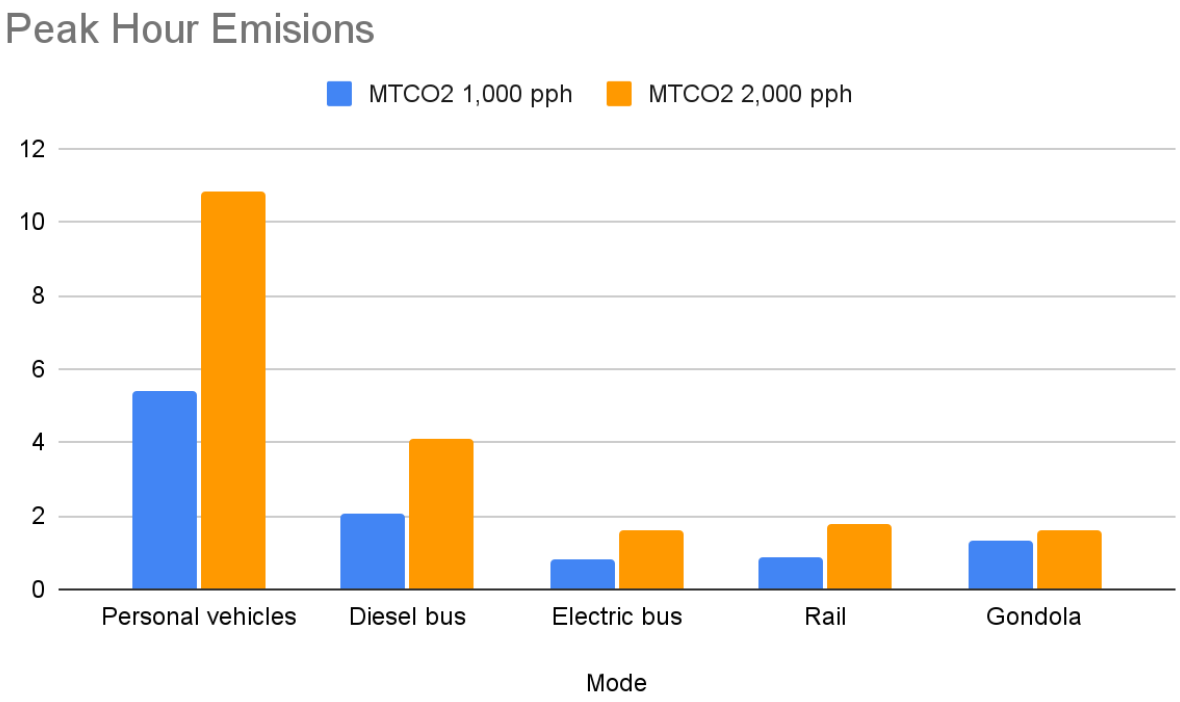
Annual GHG Emissions



All the modeled transit alternatives produce significantly lower emissions on an annual basis than the personal vehicles replaced. Electric bus and rail produce the lowest emissions. Twenty-five percent is taken as a reasonable assumption on the percentage of annual trips that could be switched to transit, given that trips outside the peak winter season would be to a limited number of summer recreation destinations, such as hiking trail heads. It is likely that the percentage of trips by transit would be higher at peak times and lower during the off season.

Peak Hour GHG Emissions



For peak hour GHG emissions, the relative difference between transit modes and personal vehicles is greater because transit vehicles are likely to operate closer to full capacity at peak hours. Peak hour scenarios were modeled with transit carrying either ⅓ or ⅔ of the estimated 3000 total passengers per hour (pph). The gondola system operates more efficiently at higher capacity, putting it about even with electric buses and rail in emissions with ⅔ of passengers traveling by transit.

Additional Considerations

There are several factors that could impact the analysis that are not directly modeled, in order to keep the analysis simple:

- **Congestion impacts:** Under severely congested conditions, the fuel efficiency of personal vehicles is likely to be lower than modeled, meaning the personal vehicle emissions would be higher.
- **Changing electricity generation:** Over time, as Rocky Mountain Power adds additional renewable energy generation, the emissions from electric bus, rail and gondola will decrease from those modeled.
- **Impacts on vehicle trips outside the study area:** Transit options, especially if well integrated into existing transit systems, could reduce vehicle trips not only in Little Cottonwood Canyon, but in the larger region. For simplicity, only the 13 mile stretch of road in Little Cottonwood Canyon is modeled here.

Data and Assumptions

Item	Value	Source
Round trip distance	26 mi (road)	Project description
Annual passengers	4.6 million	UDOT (6,600 AADT x 365 days, 96.3% passenger vehicles, 2.0 persons/vehicle)
Electricity emissions	1624.8 lbs CO2/MW	Rocky Mountain Power (2016)
Gasoline emissions	8.78 kg CO2/gallon	US EPA
Diesel emissions	10.21 kg CO2/gallon	US EPA
Personal vehicle efficiency	21.2 mpg	US Energy Information Administration (50% car, 50% light truck)
Personal vehicle occupancy	2 people/vehicle	Based on input from CWC
Factors for Bus Analysis		
Bus capacity	40 people	Based on input from CWC
Bus annual average % of capacity	75%	Assumption
Bus peak hour % of capacity	100%	Assumption
Diesel bus mpg	3.26	Federal Highway Administration
Electric bus kWh/mile	2.15	US Department of Energy
Factors for Rail Analysis		
Train capacity	253 people	Stadler Rail
kWh/train round trip	301.6	Stadler Rail
Factors for Gondola Analysis		
Electricity use (kW) at 1000 people/hour	1826	Doppelmayr USA
Electricity use (kW) at 4000 people/hour	2809	Doppelmayr USA