



Technical Note

Project: Hybrid Rail Study

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Subject: Operational Cost Estimate Memo

1 Primary Factors Determining the O&M Cost Difference between Locomotive-Hauled Coaches (LHC) and Hybrid Rail

- Primary potential cost differential factors include operations labor, fuel, vehicle maintenance
- Operations Labor: Potential for cost savings depends on whether hybrid rail would be able to operate with one-person crews. (Metrolink locomotive-hauled coaches operate with two-person crews.) If two-person crews are needed for hybrid rail because of operating two-vehicle consists or FRA regulations, the cost of labor would be essentially comparable to operating Metrolink trains. (Analysis of midday ridership in the San Bernardino Line corridor indicated that two-vehicle HR consists would probably be needed.) In addition, substituting hybrid vehicles for LHC for midday service could result in scheduling issues for the LHC equipment and crews.
- Fuel: Hybrid rail vehicles use less fuel per mile than Metrolink trains.
 - Comparison study for NCTD cites fuel economy as 0.33 miles per gallon (3 gallons per mile) for commuter rail (Coaster), with 2-DMU consist hybrid vehicles ranging from 0.8-0.875 miles per gallon (1.25-1.14 gallons per mile)
 - SCRRA (Metrolink commuter rail) FY16-17 budget reflects average fuel economy of 0.36 miles per gallon (2.75 gallons per mile)
 - Fuel consumption data in National Transit Database (NTD), combined with NCTD's revenue-miles data indicate that the Coaster gets 0.34 miles per gallon (2.97 gallons per mile) and the Sprinter gets 0.78 miles per gallon (1.29 gallons per mile).
- Vehicle maintenance: Comparison data on vehicle maintenance costs indicate lower unit costs for hybrid rail systems.
 - Vehicle maintenance cost data cited in the NTD and operator budgets indicate a range of \$1.06-5.44 per train mile for hybrid systems, \$11.78-15.81 per train mile for commuter rail systems. (Note: hybrid data exclude low-mileage systems; commuter rail data are for systems in California.)
- **Conclusion #1:** Hybrid rail trains consume less fuel and have lower vehicle maintenance costs than Metrolink trains, but would not necessarily reduce operating labor costs.

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2 Estimating the Potential Fuel and Vehicle Maintenance Cost Savings if Substituting Hybrid Rail for LHC

- With a current (early 2018) cost of \$3.65 per gallon for diesel fuel in California, and given the fuel economy data cited above, the cost of diesel fuel for commuter rail ranges from \$10.04 to \$10.96 per train mile, while the cost of diesel fuel for hybrid systems ranges from \$2.83 to \$4.56 per train mile.
- The potential fuel cost savings from converting commuter rail to hybrid rail ranges from \$5.48 to \$8.13 per train mile.
- Conclusion #2: Substituting hybrid rail trains for Metrolink LHC trains during midday and off-peak periods could result in fuel cost savings of approximately \$5.50 to \$8.10 per train mile.
- Vehicle maintenance costs are in the range of \$1.06-5.44 per train mile for hybrid systems, \$11.78-15.81 per train mile for California commuter rail systems, so the potential cost savings for vehicle maintenance ranges from \$6.34 to \$14.75 per train mile.
- For a scenario in which midday and off-peak LHC service is replaced by hybrid rail, the potential cost savings for vehicle maintenance would not likely be achieved, since daily maintenance is required for a train regardless of how many miles it logs or hours it operates in service.
- Since two types of vehicles would be serving the corridor in this scenario and both would need some level of maintenance on a daily basis, for the purpose of this analysis – to be conservative and not over-estimate potential savings – it should be assumed that there would be no net reduction in the cost to maintain vehicles if HR equipment were used to replace midday and off-peak Metrolink trains.
- Conclusion #3: Substituting hybrid rail trains for Metrolink LHC trains during midday and off-peak periods would not necessarily result in any net cost savings for vehicle maintenance.

3 Estimating the Cost of Adding Hybrid Rail Service

- Hybrid rail services operating fewer than 300,000 annual train miles have operating costs between \$40-80 per train mile (NTD and operator budgets).
- Hybrid rail services operating more than 300,000 annual train miles have operating costs between \$25-38 per train mile (NTD and operator budgets).
- The estimated cost for operating the Redlands Passenger Rail Project (RPRP) with Omnitrans as the operator is \$57.13 per train mile based on 137,476 estimated annual revenue service miles.
- For purposes of comparison, commuter rail services in California (Metrolink, Caltrain, and Coaster) have total operating costs between \$63-87 per train mile.
- Conclusion #4: It is reasonable to assume that added hybrid rail service could be operated at a lower cost per mile than the Redlands service. The overall O&M cost for added hybrid rail service in the corridor should be estimated using a range of \$25-38 per train mile.