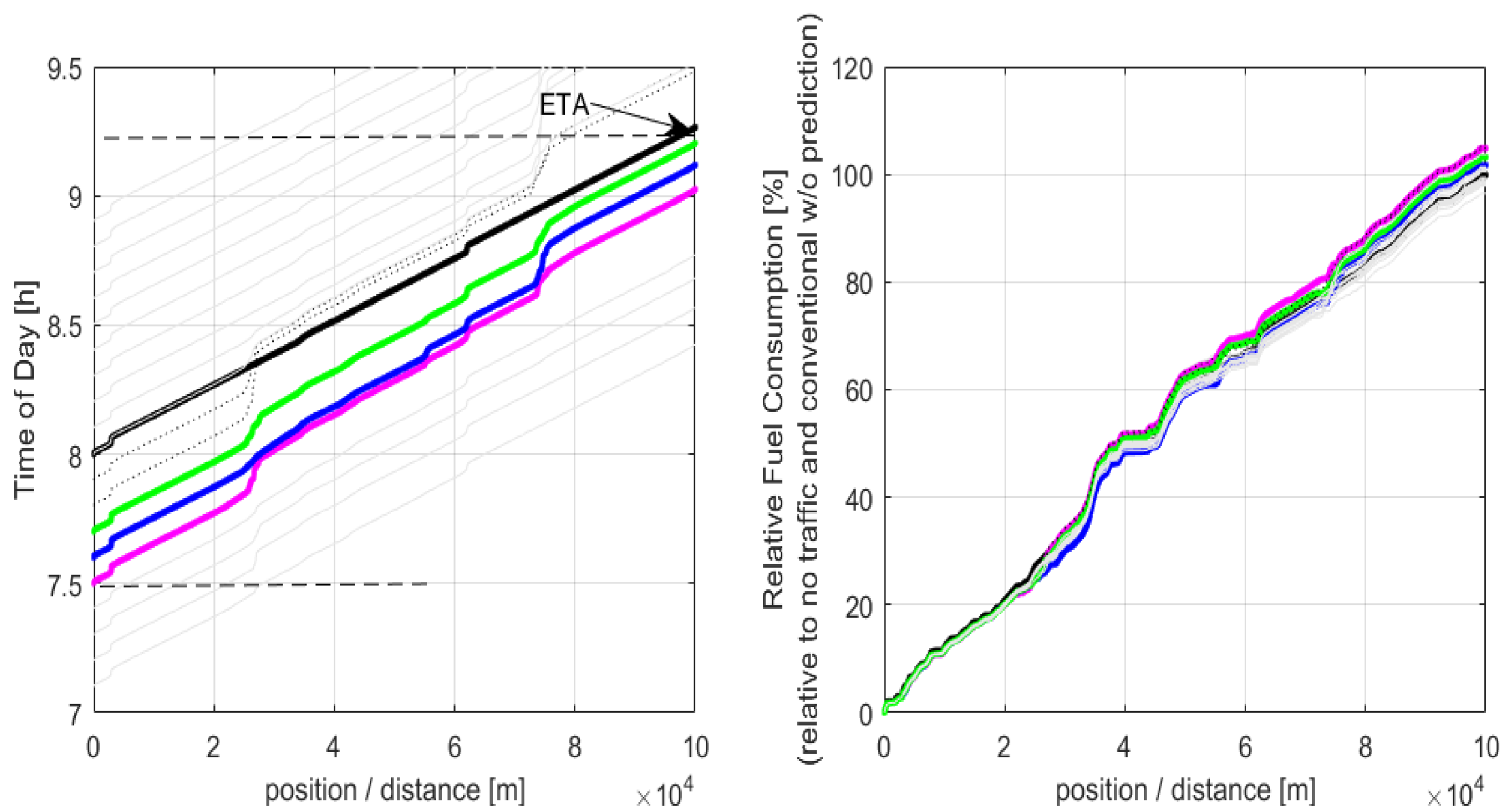


Mission Adaptation Control Strategy

Challenges and solutions: The objective of mission adaptive control is to derive adaptations of set points, reference values, and weights in cost functions, constraints and boundary conditions with respect to changing driving conditions, traffic disturbances and transport mission and provide these to the predictive energy management control and the integrated engine systems and after-treatment control. The main mission adaptation is found to be implicit within the control strategies. Hence, the scope for mission management reduces mainly to time at waypoints and state-of-charge reference set point for hybrid electric power trains.

IMPERIUM's contributions: For Mission Management with respect to hybrid electric vehicles there are four main strategies for SoC reference. The Optimal Discharge over Entire Route is the optimal choice if all route information is available. If route data is missing, corrupt or not existent, the choice is to use the other strategies. For in-vehicle implementation as a fallback solution when route data is not available and possibly recorded route data not sufficient, Charge Depletion Charge Sustaining (CDCS) Strategy is a suggested strategy. The analysis shows that there is a potential for fuel saving under the constraint of ETA to find an optimal time to start the mission. This is valid both predictive control as for non-predictive control. However, the potential with predictive control in heavy traffic suggests that the predictive control can almost provide similar fuel consumption as the non-predictive control without traffic.



Impact / what's next: Mission adaptation shows a high potential for fuel consumption reduction. Here only a part of this benefit is utilized. The outcome will be continued in two paths:

- The co-optimization for time to start the mission under the boundary of ETA as well as SoC reference is a topic for further research headed by Chalmers.
- The potential for SoC reference especially concerning plug-in hybrid will be topic for continued advanced engineering.