A new trajectory planning strategy has been developed to aid in allowing a reusable launch vehicle to complete the Terminal Area Energy Management (TAEM) phase of reentry. Using the new trajectory planning and tracking strategy, the reusable launch vehicle will complete TAEM with a higher degree of accuracy than what has been accomplished in the past. The reusable launch vehicle will also be better prepared to adapt to unpredictable conditions, which in the past were a hindrance to an accurate and safe reentry.

The new strategy is composed of two distinct components. The first component provides the vehicle with a new way to track the Heading Alignment Cone (HAC) using dynamic gain values. The new dynamic gains values are found through a combination of linearization, state-space representation, and pole-placement. The second component provides the vehicle with an extremely accurate groundtrack predictor. The groundtrack predictor allows the vehicle to accurately determine an ideal trajectory to the next reentry phase, Approach and Landing. The groundtrack predictor utilizes a combination of HAC size and location modifications in order to provide the vehicle with an accurate prediction.