# Introduction

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In the Lifeboat Foundation Electromagnetic (EM) Launch Competition, entrants design and build small-scale EM launchers that boost gliders. The entrants that launch their glider to the highest apogee are awarded a prize.

All space development efforts are hindered by the high cost of placing payloads into orbit. Reducing launch costs specifically aids space development by allowing more mass to be placed into orbit for a given budget, increasing safety factors and redundancy, and facilitating unanticipated repair. Electromagnetic launch is a potential means of greatly reducing launch costs because of its inherent advantage over rockets, which must carry their fuel on board. As an indication of the potential cost reduction, the electricity needed to accelerate 1 kg to 10,000 m/s costs, at residential rates, only about $2.

Furthermore, EM launch technology could be deployed within the near future, as evidenced by the U.S. Navy's intent to replace steam catapults on aircraft carriers with the Electromagnetic Aircraft Launch System. The technology has been demonstrated to continue working efficiently at high speeds, and thus can be applied to boost of spacecraft. Mature EM launch technology would serve as a complement to rockets, with rocket launch for passengers and EM launch for cargo.

This project advances both of the Foundation's short-term goals, public education and advancement of space technology. The potential for improvement of the technology is great — many known launcher configurations have not been explored in depth, and other possibilities no doubt exist. It is intended that the contest will be repeated annually, with increases in the energy limit and funding, up to levels useful for placing payloads into orbit.

The Competitors Guide is intended to familiarize readers with the most important considerations in launcher design. An attempt was made to emphasize fundamental principles in order to give designers a better chance of arriving at novel designs, while also providing a menu of existing design concepts for inspiration. The Guide will grow as the competition adds to the body of electromagnetic launch knowledge.