

NASA Response to Followup Questions regarding Ares I Marginal vs Fixed Costs

1) I thought that the "marginal cost" category also included the cost of government oversight, which in the case of an Ares I might be about \$40 or \$50 million (added to the 69 million). What figure is for Ares I? Also, is that figure repeated 100 percent each time (each rocket), or only a percentage added each time?

Response: NASA does not budget by flight, but rather by fixed and marginal costs expected on annual basis. The cost of Government oversight is not a marginal cost; Government oversight is a fixed cost. Marginal costs are those costs that can be cleanly attributed to the production of one unit of the flight element, and that cost is generally the same unit by unit. For example, the physical material and labor associated with the manufacture and assembly of one Orion capsule or a flight set of the Ares 1 First and Upper Stage. Both the Ares I and the Orion account for only \$69.0M each in marginal costs for a flight unit, thus totaling \$138M in marginal costs for each flight since each flight would have a rocket and a capsule.

2) It seems that Dr. Crawley's estimate of a billion dollars per flight is true only if there only one flight per year. If there were, for example, three flights/missions each year, how much of that fixed cost would be repeated, if any? (for example, the \$781 million, in the top half of the chart).

Response: Total costs are fixed and marginal costs added together. Given that fixed costs are set, the total costs can increase based on how many flights take place each year. The example below is based on the "excludes shared fixed costs with lunar elements" box on the previously provided chart. In more simplistic terms, this example includes only the costs that are shared between Ares1/Orion for ISS missions, but excludes those additional costs associated with lunar missions. Under this scenario, the fixed base for an Ares I flight (including the rocket and capsule) in FY08 dollars is \$781M with an additional \$138M allotted for marginal costs, totaling \$919M for one flight. (Note, this total cost does not include costs associated with Ground Operations, Mission Operations, EVA, and Program Integration elements, which are budgeted under their respective projects.) A second flight in the same year adds an additional \$138M for the year and so on and so forth. In a tabular format, this can be viewed as:

	FY08 \$s M
Fixed costs	781
Marginal cost for 1st flight	138
Total cost for one flight in the year	919
Marginal cost for the 2nd flight	138
Total cost for 2 flights in the year	1,057
Marginal cost for the 3rd flight	138
Total cost for 3 flights in the year	1,195