Logistics & Launch Vehicles

Baseline Requirements

- **120 Personnel**
- **200 tonnes supplies**

  40 industrial pilot plants @ 2 t each = **80 t**
  0.5 t consumable supplies/plant = **20 t**
  5 initial shelters @ 3 t each = **15 t**
  Seeds, eggs, fertilizer, misc. biologicals = **15 t**
  6 months food, air, water for 3 pioneers ≈ **2.5 t**
  12 months food, 15% water for 30 pioneers ≈ **12 t**
  24 months 50% food, 5% water for 120 settlers ≈ **40 t**
  Medicine & misc. life-support = **5 t**
  Miscellaneous = **10 t**

Mission Profile

- Direct-ascent, non-return
- Trip time 72 hr
- Arrival velocity 2600 m/s
- Landing stage mass-ratio (hydrogen, c = 4400 m/s*) 1.8
  (methane, c = 3500 m/s†) 2.1

*RL10A-4-2 @ 444.4-451 s I_{sp}
†CECE @ >350 s I_{sp}

Delta IV Heavy

Existing heavy-lift satellite launcher, available commercially from Boeing

Maximum escape payload (C3 = 0, less payload adapter)	**10.0 t**
Maximum landed mass (hydrogen)	**5.6 t**
(methane)	**4.8 t**
Cargo launches @ 4 t/launch	**50**
(not including increased supply requirements of protracted development)	
Personnel launches @ 2 men/launch	**60**
110 launches @ $250 M/launch *(quoted price)*	**$27.5 B**
@ 1 launch/month	about **10 years**

∴ *feasible, but unfavourable*

Skylifter Reference Case

New launch vehicle with minimum engineering development, combining clustered tankage with existing engines (SNECMA Vulcain 2 *or Mitsubishi* LE-7A*)*

Nominal escape payload (11.2 km/s)	**20.0 t**
Nominal landed mass (hydrogen)	**11.1 t**
(methane)	**9.5 t**
Cargo launches @ 8 t/launch	**25**
Personnel launches @ 3/launch	**40**
65 launches @ $100 M/launch *(estimated cost)*	$6.5 B
+ $2.5 B development cost	**$9 B**
@ 2 launches/month	about **3 years**

∴ *much more favourable*