

# The Economics of Lunar Development and its Importance for Civilisation

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- 1 Wanted: Lunar Exports
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- 3 Lunar Tourism
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# 1 Wanted: Lunar Exports

For economic growth in space and on the Moon, ***investment*** is needed.

In order to attract investment, ***benefits*** are needed - ie ***profits*** if private investment, ***public good*** if government-funded.

In order to earn profits, ***sales revenues*** are needed - ie ***EXPORTS***.

## 1.1 First Space Revenues - Information

Earliest revenues were from telecommunications, telephony, and photography for weather, resources, and recently surveillance.

**(Apollo** project)

**Lunacorp** planned to sell video from rovers - but failed.

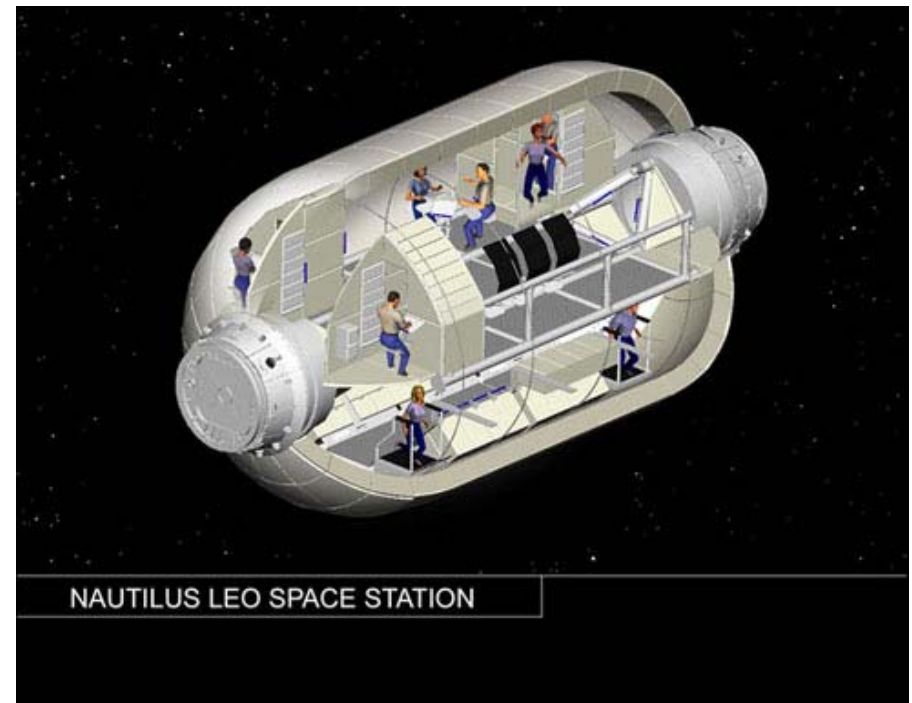
**Google Lunar X-Prize** project similar - but sales distribution system different.

## 2 LEO Hotels' Key Role

Orbital Hotels will boom as soon as orbital tourism begins.

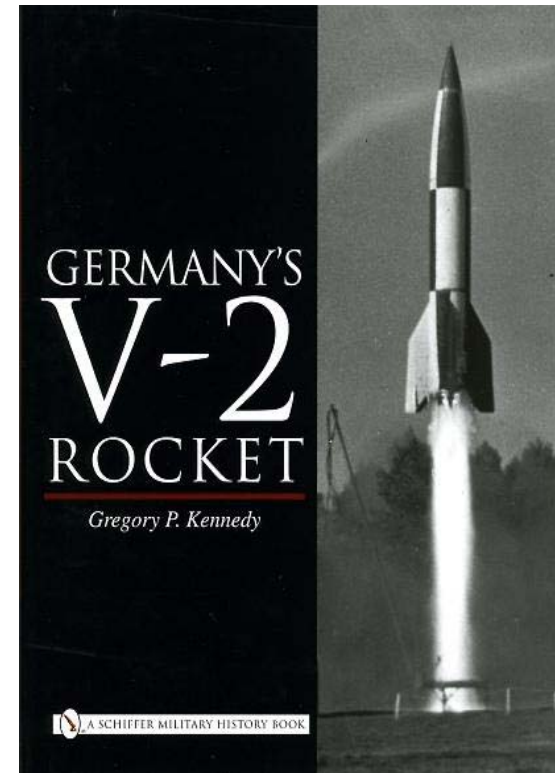
Bigelow Aerospace prototype hotel module is *already in orbit*.

N.B. Technically not very difficult: could have started *decades ago*.

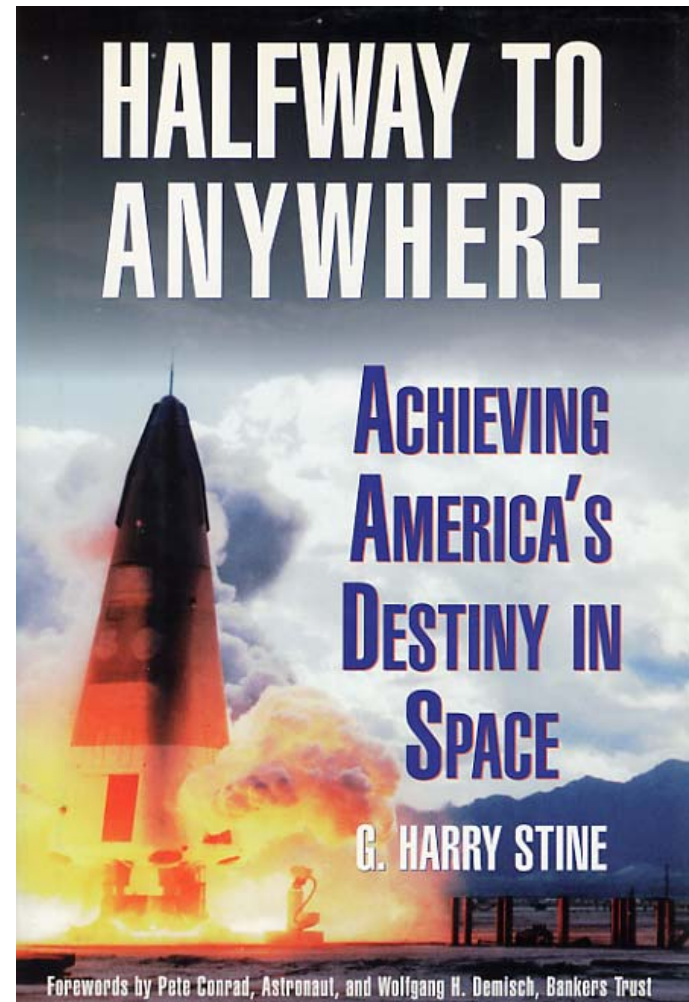


“We have proved rocket propulsion practicable for space travel . . . This 3rd day of October 1942 is the first of a new era in transportation, that of *space travel*.”      Walter Dornberger

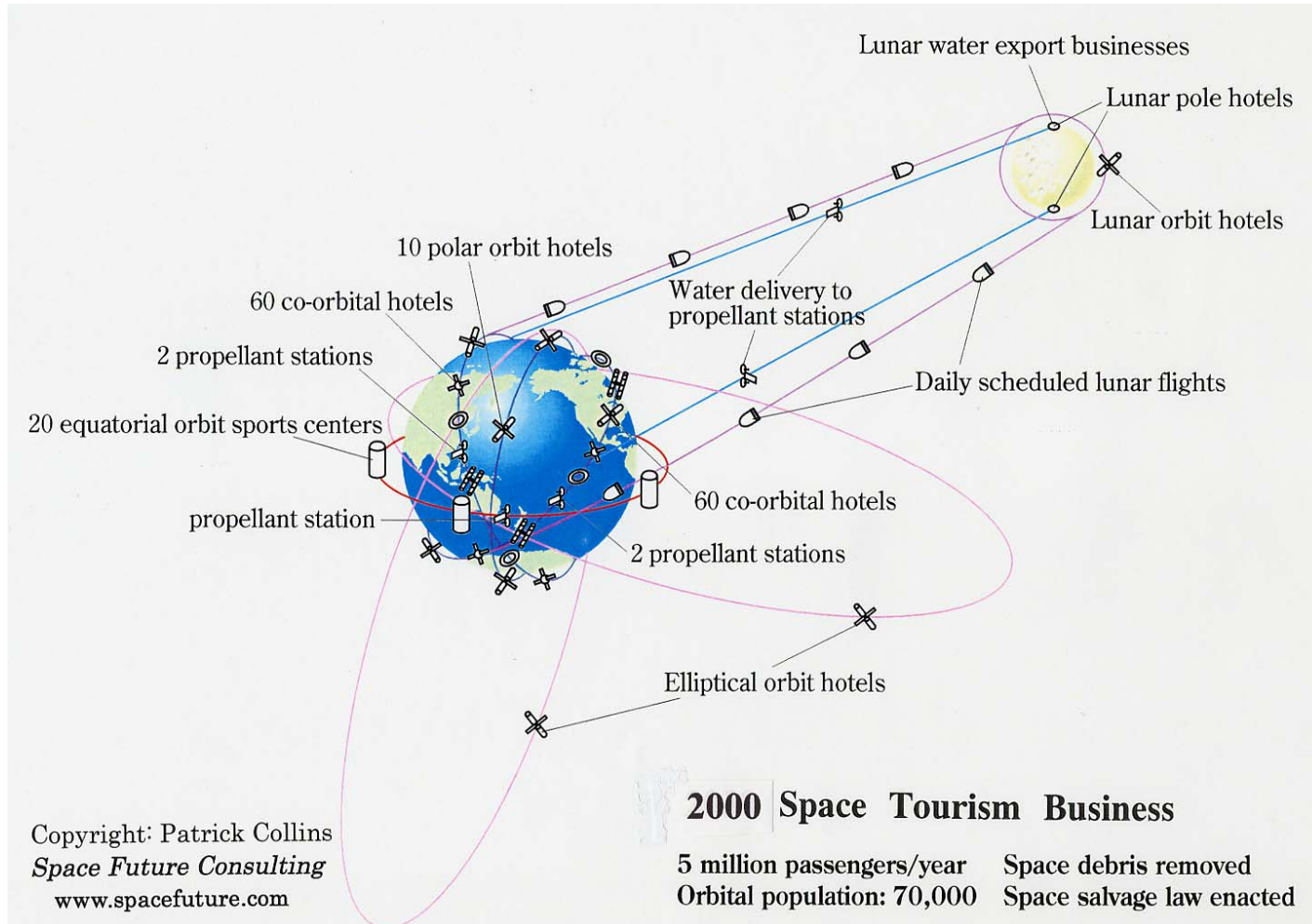
If these projects had continued, *sub-orbital passenger travel could have started in 1950!*



Low-cost access to LEO also opens access to the Moon – because travel to the lunar surface + return uses the same amount of energy as Earth-to-LEO.



If LEO hotels had started in the 1960s, traffic could have reached 5 million passengers/year and 100 hotels in orbit – by the year 2000.

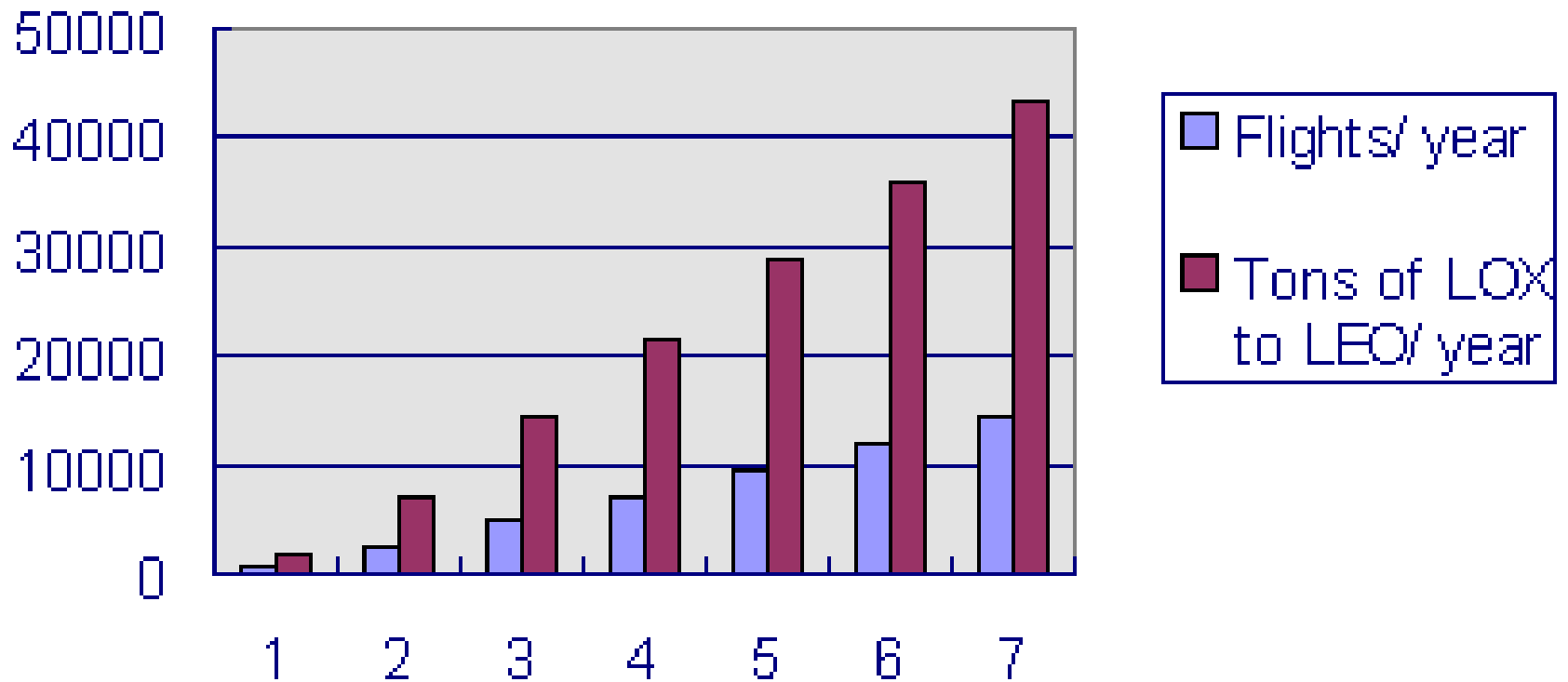


LEO hotels will use large quantities of oxygen, water and hydrogen fuel.

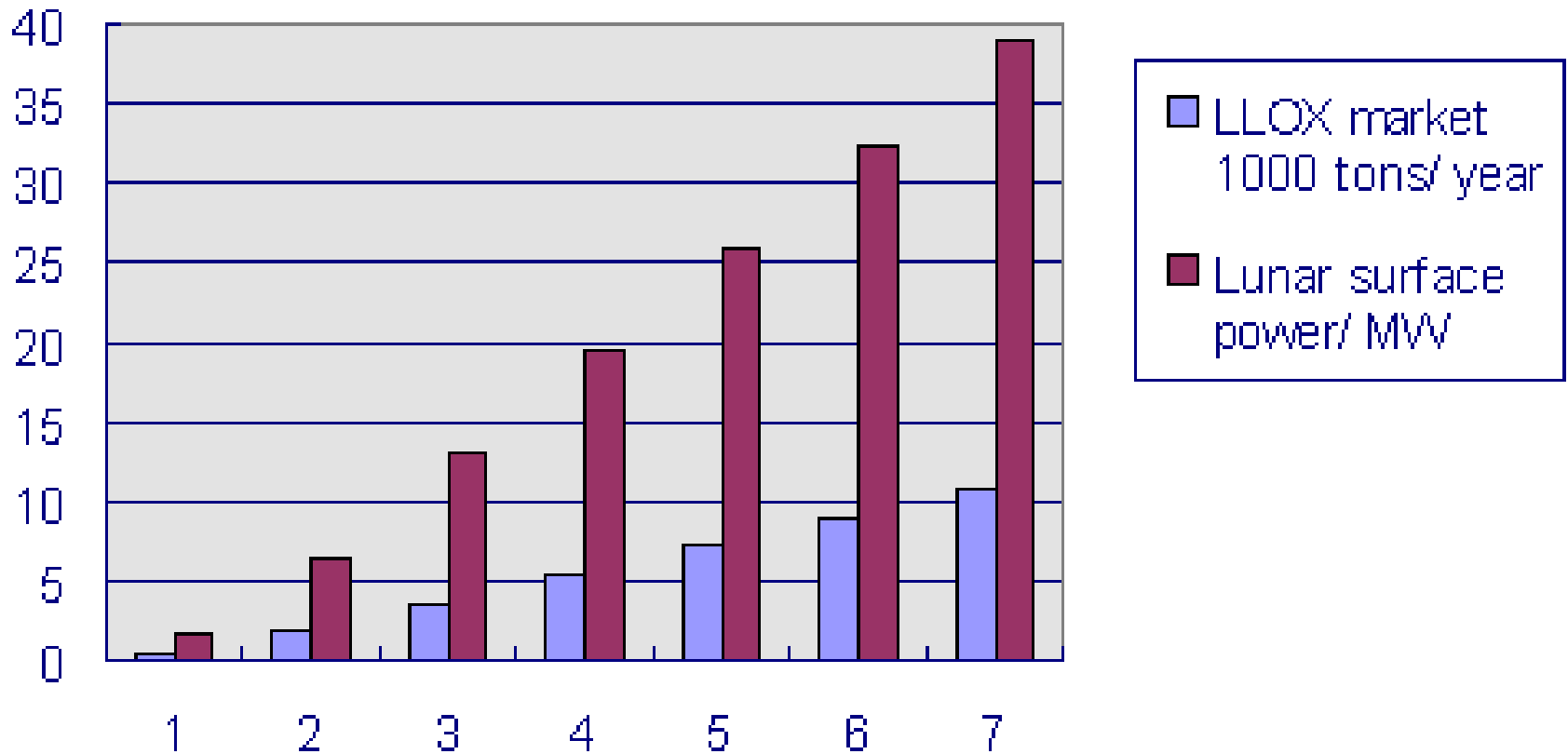
These and many other materials are available from the Moon.

Orbital market prices will be far higher than Earth-surface prices – so will be a much easier target for lunar exports.

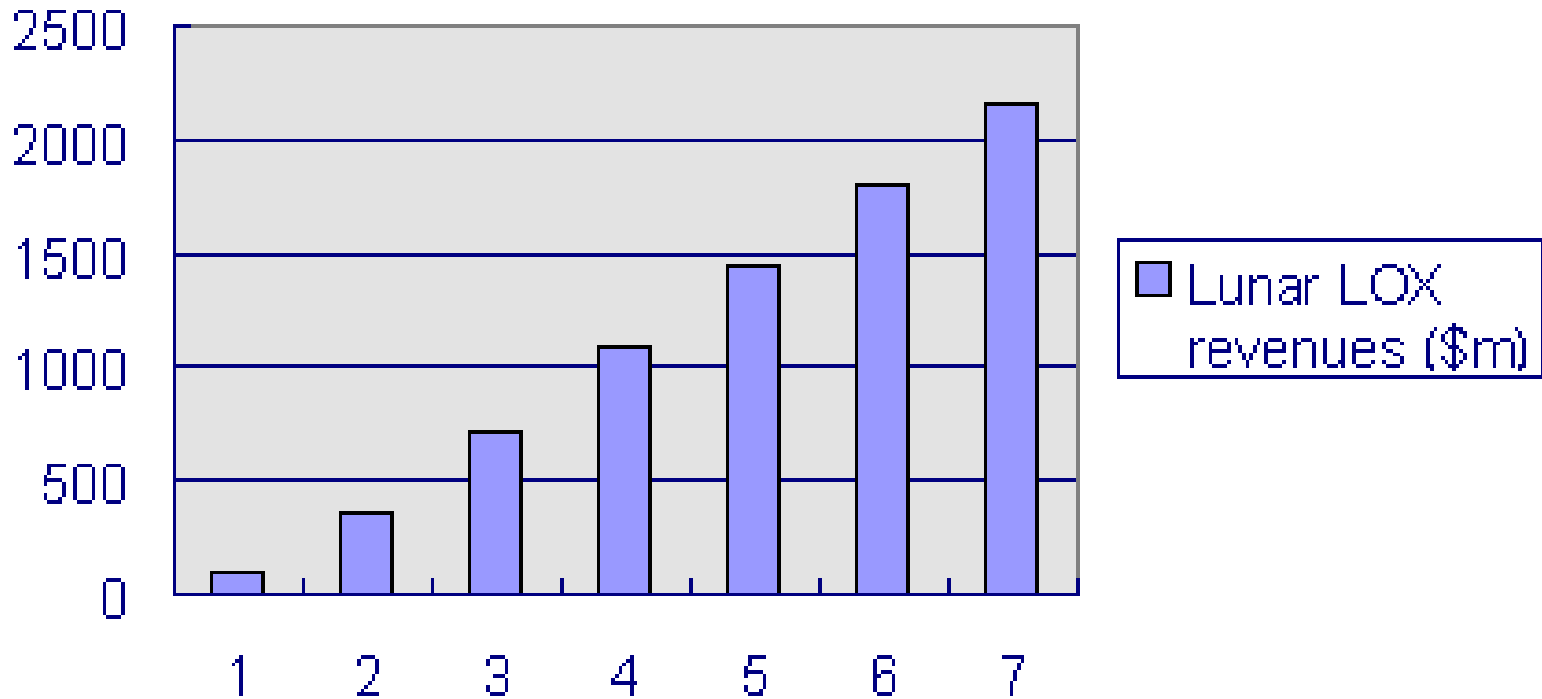




LEO Hotels' demand for oxygen, based on Japanese Rocket Society scenario.



Potential scale of lunar LOx (ice) exports



Potential scale of lunar LOx (ice) export revenues/year could pay for infrastructure.

Lunar orbital tours  
are already  
planned using the  
expendable  
launch vehicle  
“Soyuz”.

## Lunar tourism project by 2010 - Russian Space Agency

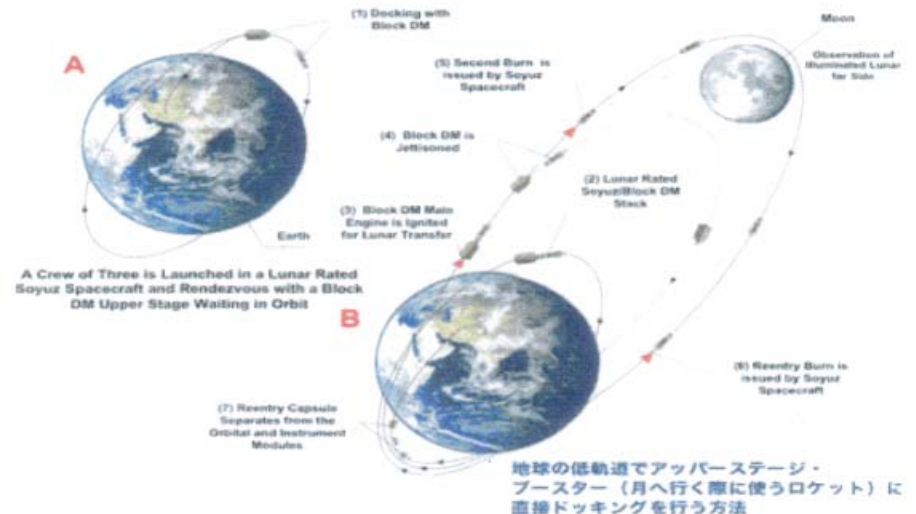
11/08/2005 15:21

MOSCOW, August 11 (RIA Novosti) - A lunar tourism project proposed by Russia's Federal Space Agency and its leading spacecraft manufacturer, Energia, will be launched by 2010, the agency announced in a Web site posting Thursday.

It said the project, to be carried out in association with the U.S. company Space Adventures, would offer around-the-moon trips on board a Russian Soyuz spacecraft. Two tourists at a time will be able to go on such a trip, accompanied by a professional astronaut.

Space Adventures will have the exclusive right to market the project and search for potential tourists and investors, the agency said.

"We expect the project to be implemented within five years' time, with an appreciable positive marketing effect, and to show the capabilities of Russian-made space equipment and, importantly, Russia's consistent efforts to make space exploration accessible to non-professional astronauts," the agency posting said.

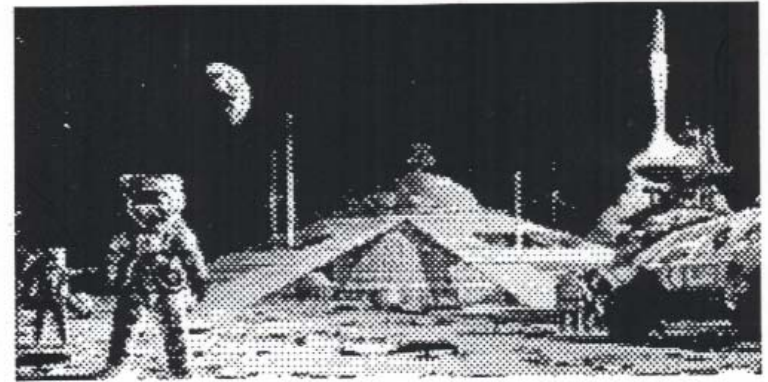


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April 19 1998

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Discovery of lunar ice in the 1990s revived the idea of lunar hotels.



## Hilton plans hotel on moon - with a beach

*by Mark Austin*

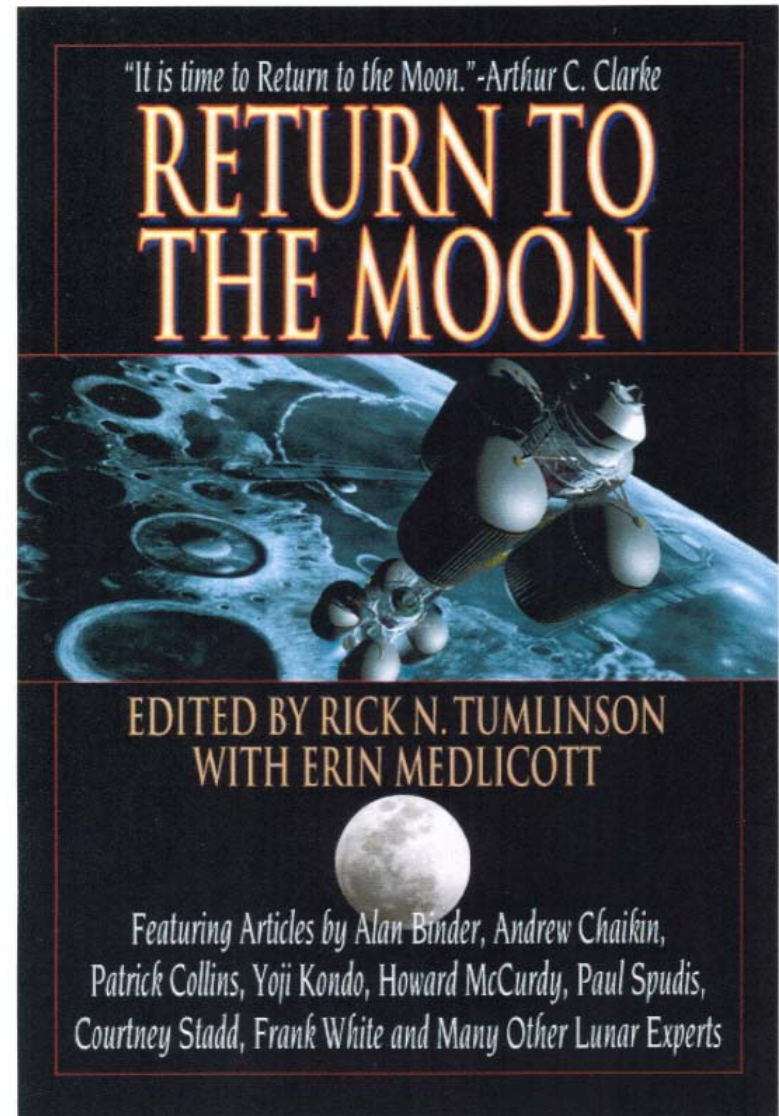
HILTON International, owner of many of the world's most prestigious hotels, has joined the race to build the first hotel on the moon, bringing a new meaning to the term five-star.

Called the Lunar Hilton, the huge complex would be more than twice the size of the Millennium Dome and would have 5,000 rooms. It would be powered by two huge solar panels and would have its own beach and sea as well as a working farm.

The company commissioned architects to design the building following the discovery of water on the moon last month.

Only 1 chapter discusses lunar tourism . . .

. . . but this seems likely to become the major commercial export from the Moon, because lunar travel will be a unique experience.



# Lunar travel sequence

- 1 Boarding orbital ferry
- 2 Take-off
- 3 Entering low Earth orbit
- 4 Rendezvous and docking at LEO hotel
- 5 Disembarking, short stay in LEO hotel
- 6 Boarding Earth-Moon inter-orbital ferry
- 7 Undocking, departure from Earth orbit
- 8 Views of ever-shrinking Earth and ever-growing Moon
- 9 Earth-Moon Libration point 1: 58,000 km to go
- 10 Earth-Moon gravitational equivalence point: 38,000  
km to go
- 11 Entering low lunar orbit

- 12 Rendezvous and docking at lunar orbit hotel
  - 13 Disembarking, viewing Moon from low orbit
  - 14 Boarding lunar surface ferry
  - 15 Departure, de-orbit
  - 16 Landing, disembarking on lunar surface
  - 17 Check-in, acclimatisation, "Moon-walking"
  - 18 Sight-seeing, views of Moon and Earth
  - 19 Visits to dark side, polar mines, historic sites
  - 20 Flying stadium, flying sports
  - 21 Performances, flying ballet
  - 22 Lunar park, low-gravity pool
  - 23 Check-out, take-off for return journey
- reverse sequence to above.



Cost of lunar tour  $\geq 2 \times \text{LEO} + \alpha$

$\alpha$  depends on infrastructure and its utilisation.

When travel to LEO is \$200/kg, ie \$200,000/ton, then cargo delivery to the lunar surface will be < \$2 million/ton.

After some billions of USD are invested in lunar infrastructure, commercial tourism investment will be feasible.

# Infrastructure needed for lunar tourism

- Earth-LEO shuttle
- Earth orbital dock
- Lunar return vehicle
- Lunar orbital dock
- Lunar lander
- Lunar spaceport
- Lunar accommodation
- Lunar tourism services
- Surface vehicles
- Buildings (underground)
- Equipments

# Lunar Construction

Bases

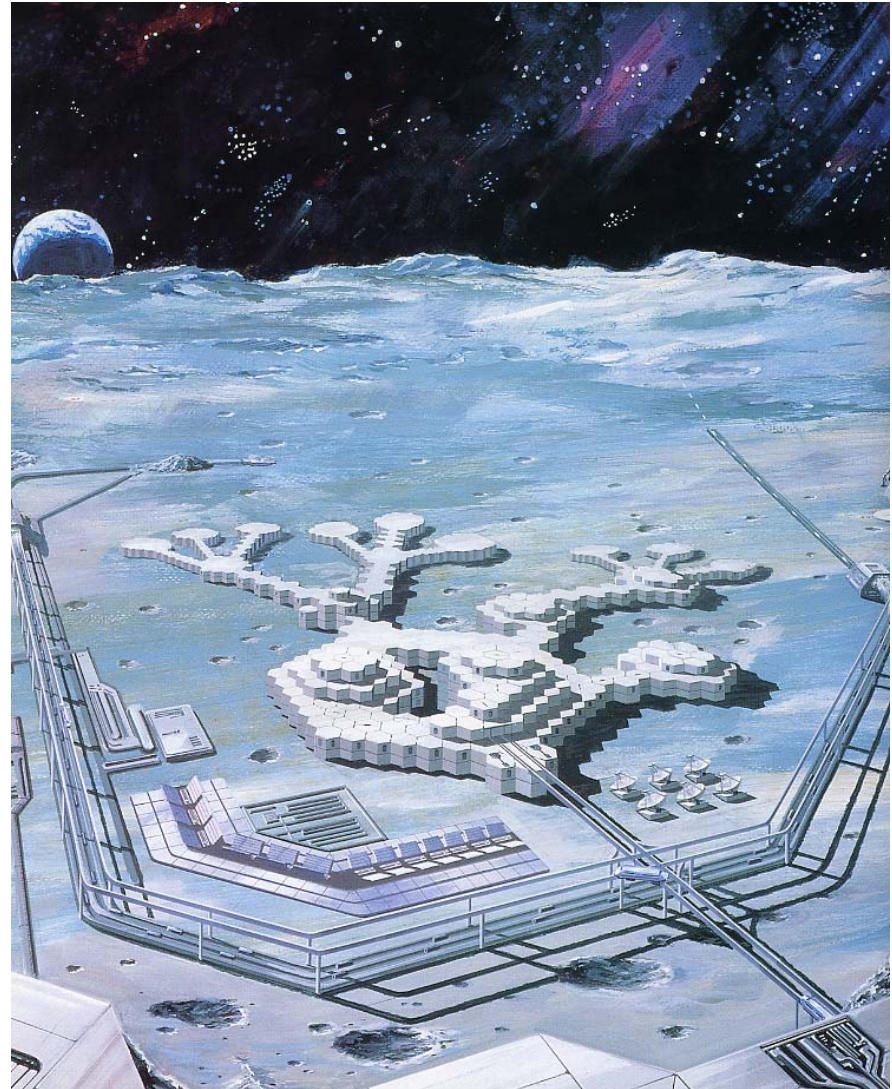
Hotels

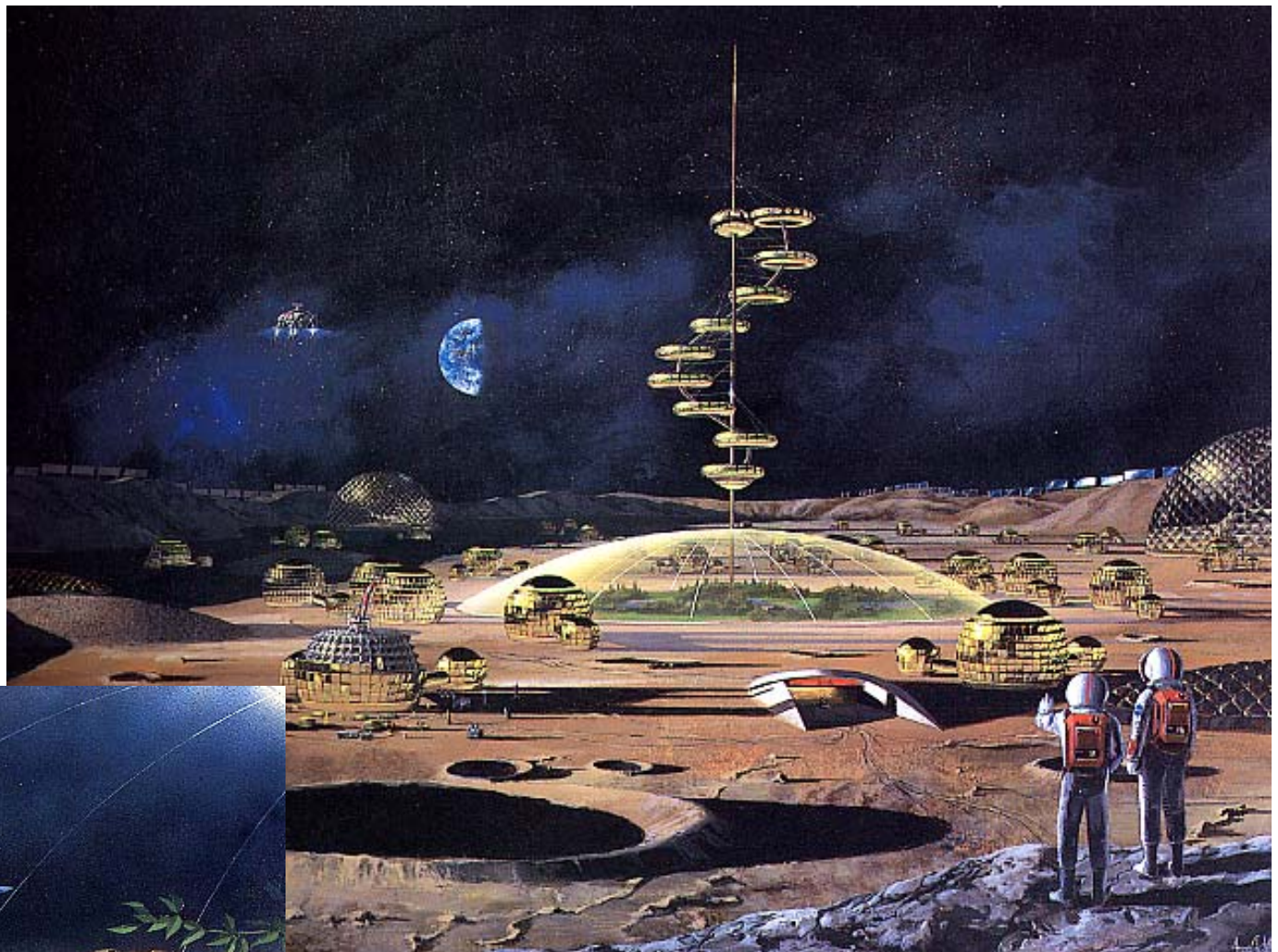
Stadia

Resorts

Domed cities

Shimizu Base:





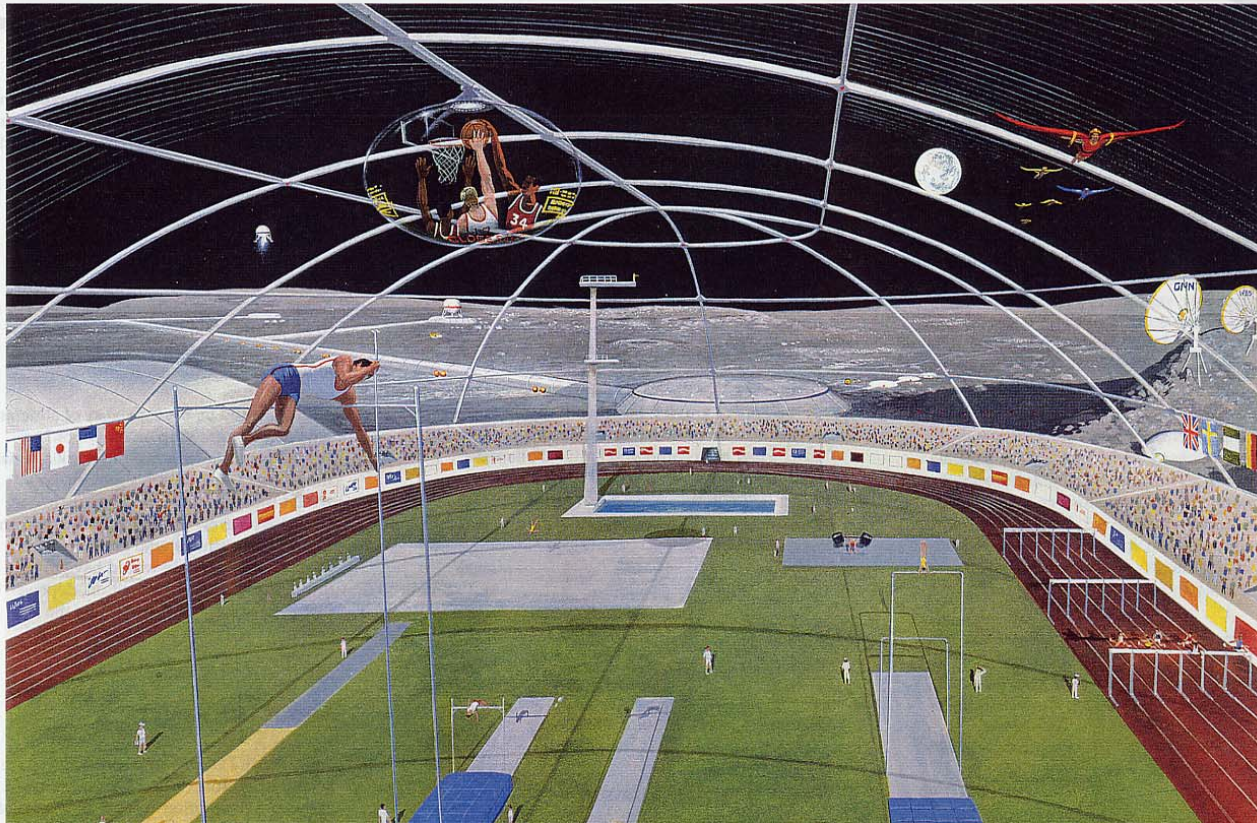
Obayashi Lunar Settlement

# All sports will be transformed on the Moon – and new ones will be possible.

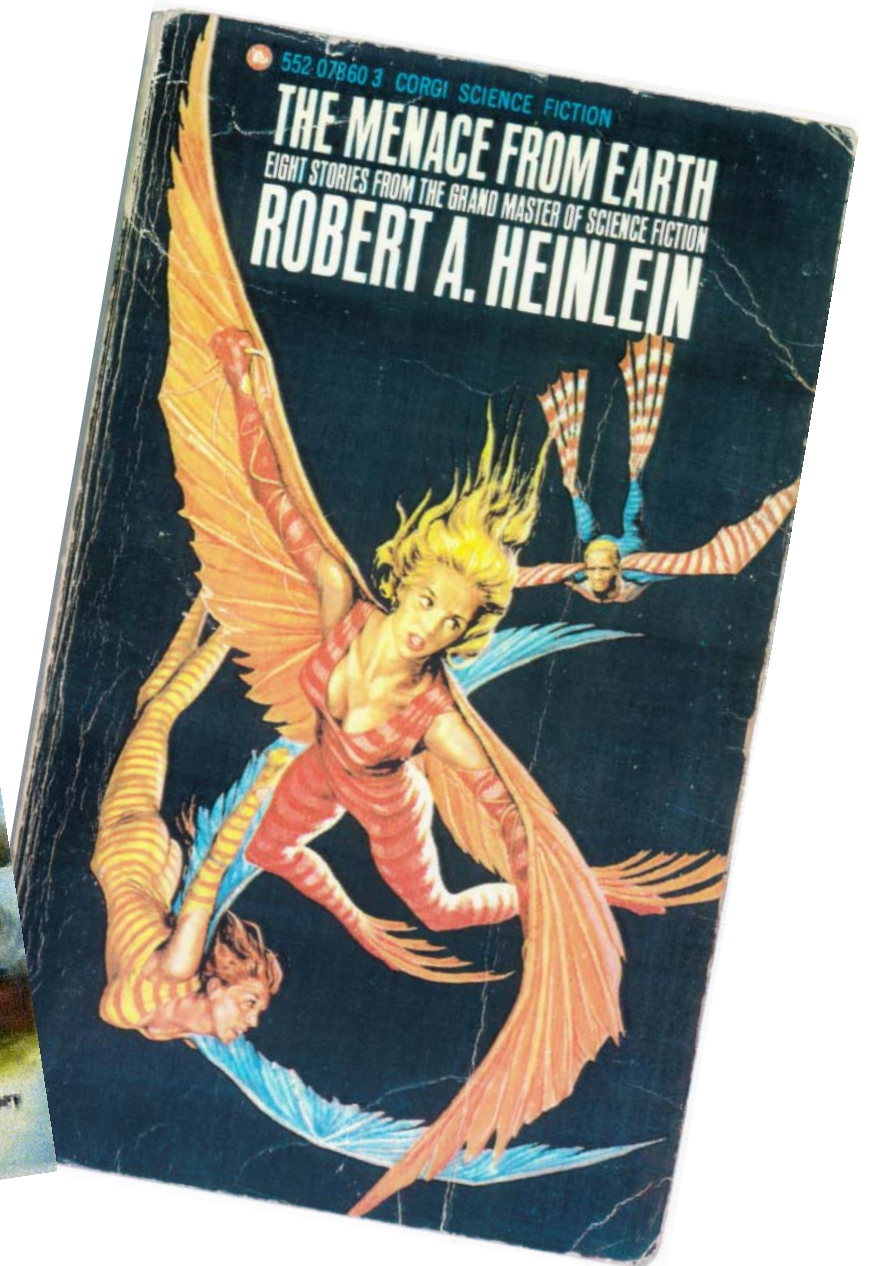
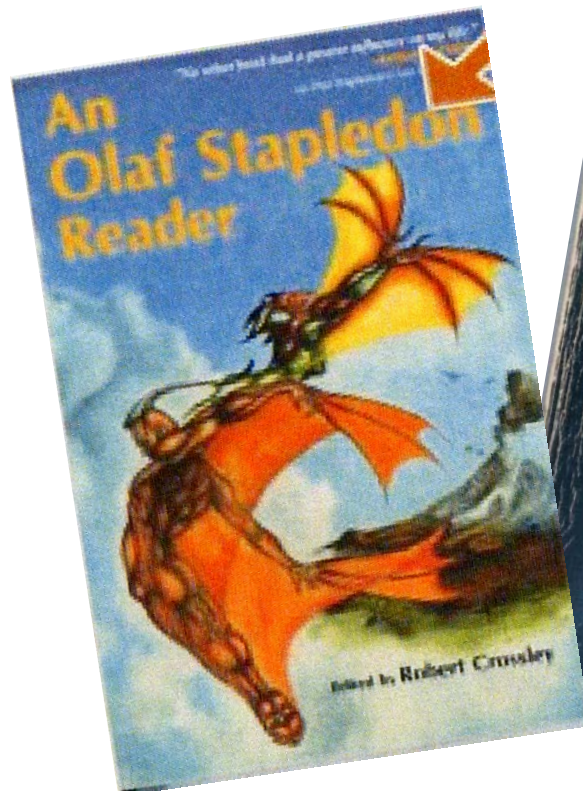


National Aeronautics and  
Space Administration

The Lunar Games



*The idea of flying in lunar gravity is an old one - but sure to be hugely popular.*



Many kinds of flying race will surely be popular:

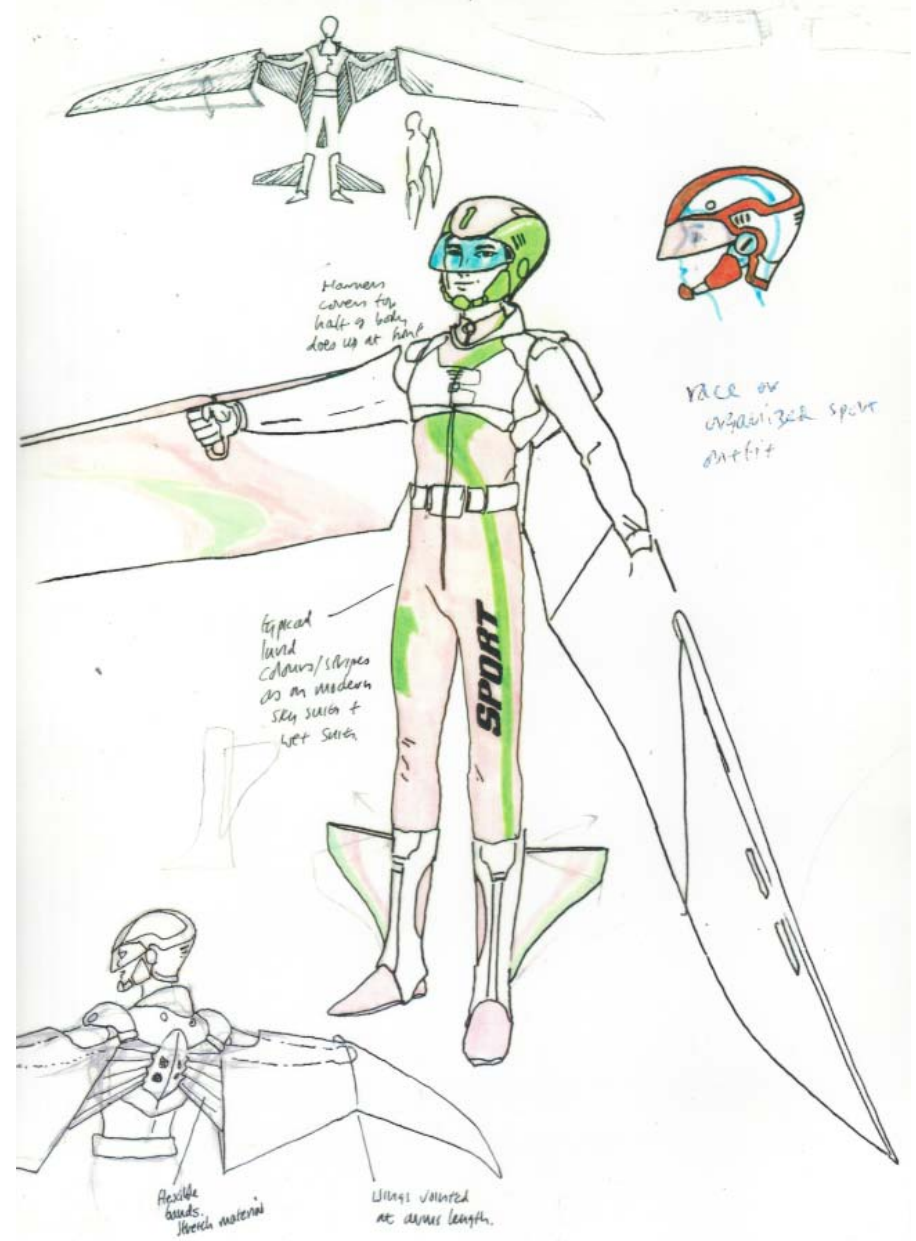
Sprint

Long distance

Slalom

... even

“Synchronised Flying”



*For the general public, flying stadia may operate like Ice-rinks.*





Low-gravity  
***flying ballet***  
will be another  
unique lunar  
attraction.



## Other lunar activities

4.1 Cemetery

4.2 Large-scale vacuum engineering laboratory

4.3 Lunar environment protection

Historic sites

Outstanding natural beauty

Scientifically valuable

(geology, astronomy, etc)

## 5 Cultural Impact of lunar tourism

Every culture has lunar myths.

The Moon is visible from every country.

Visiting the Moon will have special value for people from every country in the world.

## 5.1 Future Lunar Culture

Cannot predict in detail. But can predict one aspect: once a stadium is constructed - people will fly!

Possible to fly to and from apartments in tall buildings inside domed cities.

## 6 Importance for Civilisation

### 6.1 Economic importance

The world economy is becoming paralysed - due to ***Lack of New Industries:***

- High unemployment world-wide.
- Financial instability - due to financial fraud, "churning", and dishonest deregulation
- Brutality towards the poor - wars, unfair trade, widening income gap . . . . .

These are done ***in search of profits*** - because opportunities for profitable investment are insufficient.

Worst of all: we are on the brink of “**Resource Wars**” that might never end.

Initially to steal oil and overthrow weak countries' governments.

Claimed to be inevitable, but they are **entirely unnecessary . . . .**

. . . because the resources available in near-Earth space are unlimited.

Long-term, we need to re-structure society to share work and wealth more appropriately.

But we also need to ***develop more new industries.***

Governments cannot do this adequately while they ignore passenger space travel.

## 6.1 Cultural Decline of Western Civilisation

The greatest civilisation to date - now being destroyed by bad policies.

***Truth*** and ***Freedom of Speech*** are the basis of technological civilisation.

Resource wars are based on lies propagated by governments and colluding media owners.

As terrestrial economic growth approaches environmental limits, governments become more repressive (“Bernasconi Theorem”, 1997).



# Summary

Lunar development will be an integral part of space-based civilisation.

It can be largely financed by space tourism, and will help create an ***open, optimistic future***.

But most people still don't know this is feasible.

Political instability is usual at changes of era, but the ***“Open World Movement”*** can win - through mass popularity.