Re: USA urges scientists to block out sun

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- *From*: Willie.Mookie@xxxxxxxxx
- *Date*: 30 Jan 2007 10:45:30 −0800

That's conventinoal wisdom certainly. But it delays real progress.
Which explains why conventional wisdom has not produced progress.

On Jan 29, 11:28 am, "Ian Parker" <ianpark...@xxxxxxxxx> wrote:

> On 29 Jan, 06:35, "Williamknowsbest" <William.M...@xxxxxxxxx> wrote:
>
> > Using a large dichroic mirror 10% the diameter of the Earth (1,280 km across) located at L1, 1.5 million km away from Earth, would intercept 1% of the radiation incident on the Earth − which will be sufficient to reverse global warming.
> >
> > A GBO film 50 microns thick,
> >
> > http://www.3m.com/about3m/technologies/lightmgmt/learn/overview.html
> >
> > would have a surface area of 1.2 million sq km. Each sq km masses 60 tons. So, the entire mirror masses 66 million tons.
> >
> > A large Nova class launcher capable of putting up 660 tons per launch, working in conjunction with a large Nerva class nuclear thermal rocket to carry the 660 ton payload from LEO to L1 and return, would require 100,000 launches. Assuming 2 flights per hour from a fleet of 600 vehicles − such a mirror could be placed in six years of flights.Would it not be better to produce mirrors from lunar/asteroid
>
> material?

Depends on the details.

Clearly , lofting something free of the moon's surface with 1/6th gravity amd 2.4 km/sec escape velocity is easier than lifting it from Earth's surface with 1 gravity and 11.2 km/sec.

Plainly, getting to orbit is easier on the moon than Earth, Earth orbital velocity at its surface is 7.9 km/sec. Lunar orbital velocity is 1.7 km/sec
Obviously, once you're free of the body you're on, going from 395,000 km to 1,500,000 km at L1 is easier than going from 6,700 km to 1,500,000 km.

http://en.wikipedia.org/wiki/Hohmann_transfer_orbit

delta−Vp = SQRT(mu/r1)*(sqrt(2*r2/(r1+r2))−1)
delta−Va = SQRT(mu/r2)*(1−sqrt(2*r2/(r1+r2)))

Earth−L1
r1 6700
r2 1500000
mu−earth 398600
delta−Vp 3.170607474 TOTAL
delta−Va −0.211901607 3.382509081

Luna−L1
r1 395000
r2 1500000
mu−earth 4904
delta−Vp 0.028771587 TOTAL
delta−Va −0.014764432 0.043536018

Adding orbital plus transfer velocities obtains a number higher than actually needed,

For earth to L1: 7.9 + 3.4 = 11.3 km/sec which is an overestimate
For Luna to L1 1.7 + 0.05 = 1.75 km/sec also an overestimate

Shooting material from the moon to L1 with some sort of surface launcher is an interesting possiblity. Stopping it with some sort of catcher also is possible. Sending raw materials and processing them at L1 into mirrors is also possible. Ejecting the debris using solar power to keep the catcher in place is also possible. This was all studied at Stanford by Gerard O'Neil's group back in the 1980s.

This all implies a HUGE infrastructure on the moon to mine and process and launch materials. And a huge infrastructure at L1 to catch and process and build stuff at L1 And a system to supply BOTH those facilities. And that's the kicker.

A lot of big launchers on Earth are needed anyway.

So using those launchers to send a 660 ton inflatable module that self−deploys with existing materials built on Earth directly to L1 without all the falderah is the lowest cost way to go when starting from scratch.

This same launcher and transfer technology can be adapted to explore the moon and mars and settle it. Even explore the potential to supply space based systems like the one described and expand it cheaply. .

But as far as investment in the total systems go, building a large fleet of large reusable launchers, to operate with a large fleet of large nuclear thermal rocket tugs built around the old NERVA concepts, to send finished elements for self−deployment at L1 − is the best way to go for the biggest bang for the buck.

These vehicles as I said could also launch the parts for a moon base and mars base − the nuclear reactor would be adapted fro space power − sufficient to supply thse bases. The parts and propulsive units for an Orion class vehicle could be assembled at a moon base and operated from there to establish manned outposts across the solar system, and expand human presence on Mars.

Commercially, I see me developing low−cost solar panels and using them to provide low−cost hydrogen near coal deposits to make hydrocarbons competitively. Then, I use those profits build out solar collector sites at selected mine sites in the US West and Southwest. Those solar sites supply hydrogen by pipeline to coal fired facilities throughout the West. Coal purchased on long−term contract is taken in partial payment for the hydrogen. Additional hydrogen is used to convert that coal to hydrocarbons. Profits there support the development of a Delta−class fully reusable launcher. This launcher is used to put up a network of advanced communication satellites that provide wireless communications services throughout the world. Profits from this operation is used to build a small fleet of larger launchers built on Shuttle derived technology to to place solar pumped IR lasers that beam energy to the solar sites into GEO above the US, increasing their energy output 10x. This increases the hydrogen available by 10x. Thie hydrogen pipeline system is expanded to cover all of North America, capturing all of today's coal sales in North America, and making all of North America's imported oil. Profits here are used to build similar systems throughout the world. The next larger fleet of vehicles is built − GEN III − which is the size and number I described earlier. Along with nuclear thermal rocket powered tugs − these vehicles are capable of colonizing the moon and mars, and building significant structures at L1. This structure, along with its ability to beam power to recievers on Earth − reverse global warming.

> A portion of the GBO films are used to create IR laser beams operating at 1,000 nm beam energy to Earth based receivers in deserts that double as solar collectors. These reciever/collector/panels reduce CO_2 emissions by producing hydrogen on a massive scale from water, which is then distributed by pipeline throughout the world.
>
> 1.2 milion sq km converting sunlight to laser energy at 20% efficiency produces 324 TW of laser energy.That is an interesting alternative to microwaves. If you are going to

do this, would it not be in order to include a facility for ablating asteroids that were due to colliode with Earth.

The attraction of microwaves is that you can receive them under most weather conditions. Unless you convert water into hydrogen it will be difficult to transmit to where the energy is needed. I also have a feeling that given the right laser wavelength it might be possible to decompose water directly without electricity generation and electrolosis.

Terrestrial solar is operational 15% to 20% of the time. Any system that integrates low−cost solar into our existing energy supply, as I have done, is capable of making far more energy when used 85% to 90% of the time from space. Which is what I'm proposing.

Also, the Earth already receives lots of IR energy from the sun. By merely matching that IR energy and concentrating it at 1,000 nm − silicon based solar panels can be efficiently driven at 10x the energy output per year − than when operated as solar panels. Thus, no new technology is needed.

Also 1,000 nm wavelengths can be efficiently beamed and colleted when compared to 300,000,000 nm microwaves. This introduces severe practical difficulties.

Microwaves also, even if beamed at 100x the energy intensity they occur naturally, will be only 1% the intensity of sunlight! This has a very severe practical difficulties when building cost effective receivers.

> Coal fired plants represents 3.4 TW and oil usage represents 5.9 TW − a total of 9.3 for humanity. If 10 billion people consumed energy at the rate of the US per person rate there would be a demand for 50 TW for oil displacement, and 30 TW for coal displacement. The balance of 264 TW could be used to propel spacecraft throughout cislunar space − including augmenting the nuclear thermal rocket fleet with solar

thermal, or solar electric, or solar sail technology.

The space vehicle fleet would also be available to place significant payloads on the moon and mars during and after the construction period..

One part of this missions would be the processing the 100,000 kg or so, of weapons grade plutonium into 10 million non−threatening impulse units, and flying them to orbit, along with spacecraft that use them, using the nuclear thermal rockets to send them far from Earth before startup − would allow us to rid ourselves of another long−term difficulty facing humanity, while expanding human activity throughout the solar system.

Imagine something that looks like the ET on the space shuttle, but twice as big, and eight times as massive. At the tail is an aerospike engine, made of a large number of combustion chambes made into a ring − fed by RLX based LOX/LH engine components. The tail has a truncated plugged nozzle shape, with a heat shield at the base. The tank also has deployable swing wings like that of a cruise missle.

The tank is joined in clusters of 7 and each tank can be fed and provide fuel to neighboring tanks. four of the 7 tanks feed all 7 engine arrays at lift off. Then, are dropped. The tanks slow to subsonic speed, deploy their wings, and are captured by a modified airliner− each − and towed back to launch center. Meanwhile, 3 tanks coninue on, being fed by 2 of the 3 tanks. When those tanks are empty , they separate, leaving 1 tank to propel the payload to LEO.

Each tank, fully loaded masses 5,680 metric tons. − The orbital payload, which rests upon the central tank of 7 − is an outsized ET as well, but it masses fully loaded only 4,000 metric tons. Carrying 1,400 metric tons of payload,and structure and 2,600 metric tons of hydrogen. This stage docks with a nuclear thermal rocket tug − capable of producing 250 tons of thrust − and massing 150 metric tons empty.

The nuclear tug docks with the orbital stage, and uses the hydrogen on board to propel the combined sytem, massing 4,250 to L1 to deposit the payload, and return with the orbiting tank. An aerocapture maneuver is performed, and both enter Earth orbit which the pair skips off. The orbiting stage re−enters again, and this time descends to a landing, while the nuclear stage having drained all propellant from the orbital stage, uses it to circularize its orbit and connect with the next orbiting stage.

660 tons of payload are deposited in this way at L1 every half hour. 600 launch vehicles and 400 nuclear thermal flight vehicles operate around the clock to maintain this flight rate of 48 launches per day − from 4 launch centers around the Earth. One in the US, one in South America, one in China and one in Russia.

A lunar base is also constructed during this period, and nuclear pulse units are placed there, along with components for a nuclear pulse rocket fleet that is assembled there and operated from the moon base.

The nuclear pulse rockets deploy payloads sent to the moon by the spacecraft assembling the mirror, to Mars, which is basically a copy of the moon base. Components of these bases are deployed throughout the solar system in manned outposts tended by nuclear pulse rockets.

A complete survey of the small bodies of the solar system is completed, and rich bodies are returned to Earth orbit. These bodies are mined by robotic systems deployed on orbit by the large launchers, and raw materials (about 10,000 tons per hour) is deployed on Earth to various industrial centers built around the off−world power receivers.Indeed this approach is vastly preferable to a giant rocket program. A

robotic system could be established without too much (ie. well within current capabilities) launch capacity. I would EVENTUALLY envisage a totally self replicating space system. The goal of only using rockets to transport sophisticated parts such as chips is envisageable without too much development.

American Desert, Atacama Desert, Gobi Desert, Sahara Desert.

As industrial capacities on orbit expand larger amounts of material are dispatched to the moon and beyond. No − material is dispatched FROM the Moon.

One use is the creation of
large pressure vessels for agriculture and forestry − producing food and fiber for off−world as well as terrestrial use.−

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