We can meet all our needs through space development

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- *From*: Willie.Mookie@xxxxxxxxx
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We can meet all our needs through space development.

Here is the program I propose;

(1) Develop a stretched External Tank massing 1,000 metric tons,
with a 120 metric ton structural fraction
propelled by an annular aerospike nozzle
using 3 RS−68 pumpsets
generating 1,400 metric tons of thrust at lift off
with a specific impulse of 430 seconds

(2) Build 30 of these elements and operate them up to 7 at a time
to launch 535 metric tons into Earth orbit every 15 days

(3) Build 660 satellites, each 10 to 20 tons mass, and launch them
over an 18 month period to create a global wireless
communications
capability that generates $83 billion per year in revenue

(4) Adapt the satellite launcher to launch;
manned payloads, space tourism, lunar hotel
large mars direct type vehicles for
mars development and exploration
lunar development and exploration
power satellites

(5) use power satellites to create abundant hydrogen fuel to
displace
crude oil coal and natural gas and support expanded industry
this increases revenue stream from space to over $4 trillion
per year.

(6) develop telepresence and telerobotics capabilities as well as
a host of related business, financial and banking services
over
the wireless broadband created in step 3.

(7) use power satellite capacity to create a beam powered

propulsion
unit. Adapt the reusable flight elements with improved
engine,
increase launch rate and capacity.

(8) adapt power satellites to operate close to solar surface and
beam
energy at far higher levels to any point of use in the solar
system

(9) use improved beam handling to beam energy directly to users
displacing in most instances the use of hydrogen/oxygen

(10) capture asteroids using improved propulsion systems,
develop those asteroids into industrial feestocks using
telerobotic labor and solar power − disperse the finished
goods and products to users by GPS guided aeroshells
launched from the space facility by rail gun, and landed
by MEMS based braking rockets

(11) build large pressure vessels at low cost on Earth orbit to
create farms and industrial forests at less cost and
greater
yields than possible on Earth. Add food and fiber to the
mix of low cost products freely available across Earth at
low market rates.

(12) MEMs based propulsive skins, powered by high intensity
infrared lasers, available at low cost make reliable,
safe
travel to orbit and anywhere on Earth common reality
for everyone. This combined with low cost pressure
vessels equipped with their own biosphere − cause the
first mass exodus off world.

This can all be achieved within the next 50 years.

As an example of what might be possible lets look at the food
situation;

Here is what the USDA says the Average American eats per capita;

http://www.ers.usda.gov/Data/FoodConsumption/spreadsheets/foodloss/servings.xls#Totals!a1

6.5 ounces of meat eggs and nuts a day
1.8 cups Dairy
0.7 cups Fruit
7.5 cups vegetables
5.3 ounces Flour, cereal
71.6 grams added fats
25.1 teaspoons added sugar

Converting each ounce to 28.35 grams, and
1 cup to 8 ounces.
1 teaspoon of sugar to 4.2 grams

184.3 grams meat/eggs/nuts
408.3 grams dairy
158.8 grams fruit
1,701.0 grams vegetables
150.3 grams flour, cereals
105.5 grams
2,708.2 grams per day total

Assuming a 20% structural/propellant fraction this means that a daily supply of food could be delivered from orbit for every person

2.8 kg − food
0.6 kg − structure/propellant

This would be contained in a 3 liter volume. Reducing this to '3− squares a day' we have a module with a total volume of 1 liter per meal, containing up to 1 kg, with a 50 gram shell, 20 grams of MEMs engines and active componetns (1000:1 thrust to weight on these tiny tiny engines) and 30 grams of propellant for braking from high subsonic speeds − soft landing the payload precisely − and another 100 grams for spares/cooking in place. The thermal protection system permits combined with pressure sealed operation allows the 1 liter container to double as a cooking element.

With 7 billion people − we have 21 billion continers dispatched per day from orbit. in response to a satellite telephone call. From several sun synch polar orbits, a demand for food can be resolved in 5 minutes or less − following a satellite phone call, which also provides precise GPS coordinates for delivery. It takes about 1 km/ sec delta vee from 700 km sun synch orbit to deorbit a payload quickly and reliably. This is imparted by solar powered rail gun.

In large quantities − with highly automated production and low labor rates − the materials −whether organic or technical − may cost as little as $0.40 per kg to produce and delivery. So meals cost as little as $0.48 each without subsidy. Of course people pay far more than that for meals in most areas. The US spends something like $1.5 trillion per year on food − about 1/3 of what the entire planet spends. $4.5 trillion per year spent on food translates to $0.59 per meal.and $843 billion per year profit from food sales.

It takes about 1/2 acre of farmland to support the average American consumer. Enclosed agriculture such as that provided by greenhouse cultivation increases yeilds 5x. Large pressure vessels placed on orbit can control all factors including the weather and gravityas well as atmospheric composition − to increase yields beyond this level.

So, 10 people per acre translates to 2,469 per square kilometer of pressure vessel growth area. Vertical farming methods with lighting control, increases it beyond that by having vertical growth areas

http://en.wikipedia.org/wiki/Aeroponics
http://en.wikipedia.org/wiki/Image:Spacecolony1.jpg
http://www.nas.nasa.gov/About/Education/SpaceSettlement/75SummerStudy/Table_of_Contents1.html

An O'Neill style pressure vessel was surounded by dozens of agricultural modules. A design for a small agricultural unit that is 1 km in diameter and 0.75 km tall, has a pseudo gravity area of 2.35 sq km. Installed in the center of each rotating cylinder is a conical thin film mirror that illuminates the gravity area. The cylinder wall area is related to the cone base area.

The area illuminated is divided into 3 zones around the cylinder wall − the plants are grown aeroponically − and each plant grouping is illuminated according to a cosine curve − which peaks at 73% space levels of illumination (that balance is used to power solar panels on board) which is distributed as a 3 phase half wave system. Total power stays the same, even while the power on each phase rises from zero to full illumination over 6 hours and falls to zero 6 hours after − and is dark 12 hours. − with unused light being used to charge up energy systems on board the station.

Each station provides food for 10,000 people. Each station is crewed by 50 farming droids − manned by 150 telerobotic workers.

The microgravity portion at the center of the rotating cylinder − behind the conical reflector illuminating the gravity portions at the periphery − process the foods into meals − ready to be shot by rail gun out of the vehicle to Earth below. 30,000 meals per day are prepared in this way. Another 150 droids with another 450 robot drivers maintain this service.

So, each station employs 600 people on a continuous basis, and provides meals for 10,000.

The station houses surplus materials left over from the asteroidal processing that created the station. This material provides the consumable feedstock needed to supply the station as it ships 36 tons of product per day to Earth. A 150 meter diameter sphere contains mostly water, and some smaller amounts of other materials needed to supply the station with these consumables.and spares for a period of 134 years. As stated this is mostly water, but also includes 1.47 billion 1 liter meal conainers − fabricated along with the station.

There are 6.7 billion people on Earth at present. So, at 10,000 per station, this implies a total number of stations 670,000 to supply all the food needs of humanity with 40 million workers.

http://www.nas.nasa.gov/About/Education/SpaceSettlement/75SummerStudy/4appendE.html

1000 small bodies each approximately 2 km in diameter, each massing approximately 3 billion metric tons − gathered from the asteroid belt over a 10 year period brought into a sun synchronous polar orbit − above the terminator for Earth − staying in constant sunlight − flying at an altitude of 1,000 km altitude and separated by 26 km − form the basis of the system propose here. Using vacuum forming described in the URL above large pressure vessels are formed − 676 per captured fragment.forming an area of stations facing the sun with with 26 by 26 stations per asteroidal fragment. At a rate of 1 ag station every 3 days from each asteroid, fragment, the entire ring can be completed in 5.55 years. A 10 to 15 year program, including the the time it takes to capture the asteroids, could build a ring like this for use on Earth.

A production setup per asteroidal fragment, produces all components on orbit − with a productive crew of 10,000 droids and 35,000 drivers per asteroidal fragment. That's 35 million workers.for the whole ring.

Careful control of production timing and return of asteroids would provide cointnous employment for up to 50 million people, especially if post ag operations were added to the mix after the 15 year period.

In the end a ring, similar to the rings of saturn, flies above the terminator of Earth 1,000 km above the surface, that is 26 km wide, and houses enough farm area − and other equipment, to provide custom made meals within minutes to anyone anywhere at any time on Earth without using any materials on Earth.

21 billion one liter containers massing 70 grams are deposited per day on Earth's surface, but a small processing operation on Earth would take care of this. .

With sufficient raw material to supply the 21,000 metric tons per day for 134 years − the system can be rresupplied by capturing a 10 million ton 200 meter diameter asteroid every year.

A similar analysis can be done to determine the size and scope of interplanetary supply chains for wood, building products, metals, or anything used by people of Earth.

Supply chains to support habitation on orbit on a large scale, as well as habitation and transport throughout the solar system in large space homes − are also possible.

This is doable today with technology immediately avaialble today.
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