The Solar System's Next 50 Years

by Benjamin Deniston

The following is an edited presentation of Deniston's remarks as prepared.

EIRNS/Sylvia Spaniolo

Benjamin Deniston

July 20—I am happy to be here today, not only to celebrate mankind's remarkable achievement 50 years ago of landing on the Moon, but to look 50 years into the future, with Lyndon LaRouche's Moon-Mars colonization program.

Let's start with Mr. LaRouche's own words. We have a short clip from ten years ago, from a presentation Mr. LaRouche gave on August 1, 2009 on one of his international webcasts. Following the major global, financial collapse, there was a surge of interest in Mr. LaRouche's views because he was one of the few people who had forecast it, said this was coming; and that had caught a lot of people's attention. When there were many eyes upon him, he used the opportunity to relaunch his long-standing campaign for a Moon-Mars program.

So, I'd like to start with Mr. LaRouche from an Aug. 1, 2009 webcast. The full transcript is available here.

> **Lyndon LaRouche:** What do you do, when you want to develop a society? Do you build from the bottom up? Not really. Animals build from the bottom up, like beavers. And beavers are good for beavers—but I'm not a beaver. I don't do this underwater thing, too well. I get cold.
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> Anyway, what we do, is we simply take, and go to a space program. Why? Because if you want to accomplish something, you want to accomplish something in progress, you have to mobilize yourself, by going to a higher platform than you're standing on, now. Go in the imagination, beyond what you think you should be doing now, and go to a higher level. Because, remember: Progress is building something for the future.
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> So, to build for the future, you have to define the future. You have to define your destination. Building for the future, you're talking about generations, generally, at least two generations. You're talking about 50 years ahead.
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> So, look at the horizon, where do we want to be 50 years from now? In terms of technology, in terms of effects for humanity? People can understand 50 years, it's a short time. Some people live 50 years; even these days, it's a short time. So, look 50 years ahead.
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> Well, I say, 50 years ahead, we're going to be on Mars. And we define where we are today, by defining the objectives we have to fulfill to get to Mars, 50 years from now. . . .
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> We have people, left over from 40 years ago, who are thinking in this direction, and even some people who were still thinking in that direction in the early 1980s, as I was, and before. Now, 40 years later, a younger generation has no knowledge of this, or virtually no knowledge of this, and yet, this younger generation, people who are now in their 20s and 30s, young 30s, are the people who are going to have to decide on this, because they are the adult generation which is going to decide on this thing.
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> We, therefore, as a nation, and a people, and among nations, have to see this objective that we are going to reach within 50 years, now. We're going to then think about the technologies that will get us there, and we're going to think about the technologies that we are going to need when we arrive!

So, that is the theme for this presentation: looking at the present requirements for mankind as defined by a future mission, two generations, fifty years, from now.

President Trump's program to put mankind back on the Moon by 2024 to stay—including the first woman on the Moon—is an excellent first step, and should be done in collaboration with China, Russia, Europe, and

other leading space nations.

In the United States, after decades of devastating underfunding (and two presidencies of total disorientation), we are finally getting back on the right track. However, succeeding in returning to the Moon by 2024 will be a huge political fight within the United States—not only a fight against those who refuse to fund this, but against two generations of cultural pessimism—pessimism about basic notions of human progress, as typified by the space program.

Let's review the basic elements of LaRouche's two-generation Moon-Mars mission.

Basic Elements of LaRouche's Moon-Mars Mission

In 50 years, we want to have mankind on Mars, developing a colony for advanced scientific research and exploration.

As Mr. LaRouche originally defined in the 1980s, the Mars outpost is designed to support new scientific capabilities, including revolutionary observation systems which will be required to investigate the most advanced frontiers of fundamental science.

So, what infrastructure is needed to support and sustain a growing human presence on Mars? Fusion-powered spacecraft will be key.

With present technologies, it takes 200 days to get to Mars—a trip time that is very dangerous and damaging to human beings, given the zero-gravity and high radiation environments.

Nuclear fission systems can speed that up a bit, but fusion is required to achieve the real goal: constant acceleration for half the trip, and constant deceleration for the second half—creating an environment on the ship equivalent to 1*g*—one Earth gravity. This reduces the trip time from half a year or more, to a few days.

For fusion fuel, we want to focus on helium-3, a special isotope of helium, which provides the most efficient thrust.

Although, helium-3 is incredibly rare on Earth, it's relatively abundant on the lunar surface, and for years, leading scientists in the USA, China, Russia, and other nations have promoted the idea of mining helium-3 from the Moon for fusion power on Earth, and in space.

And this takes us to Krafft Ehricke's program: the mining and industrial development of the Moon. Not only does the Moon have this unique fusion fuel, helium-3, but once we get mining and manufacturing operations going on the Moon, it becomes far more economical to lift material up off the Moon's surface (as compared to Earth), because the gravitational field is so much less.

As much as possible, we want to build the systems to go to Mars from material produced with lunar industrial operations. Much of this may sound grand, and perhaps far-fetched. It shouldn't.

We're in fact looking at the basic, next steps in mankind's natural process of self-evolution. It is the most natural state for mankind to constantly be achieving revolutionary changes in mankind's relation to the natural world around us. How are these changes supported? By revolutions in our technologies and in our infrastructure—what Mr. LaRouche called the development of successive economic *platforms*.

For example, in the 1700s, traveling across the North American continent was a terrifying and incredibly difficult process. Then we mastered the steam engine and created the transcontinental railroad—what had been an incredibly difficult, dangerous, and rare endeavor, became a trivial activity, accessible to the average person.

The railroad (and its associated technologies) became central to a new economic platform, which supported an entirely new relation to the interior territories of the Earth's landmasses.

This is typical of normal human progress.

And now we look to the Moon and Mars.

The infrastructure and technologies needed for lunar industrialization, together with fusion propulsion systems, are the basis for a new economic platform—tomorrow's interplanetary railroad—completely transforming mankind's relation to the Solar System.

We've briefly outlined our perspective on relations with the Moon and Mars in two generations, but what about the Earth? What does the world's population require one and two generations from today?

Energy-Flux Density Growth Is Vital to Future Wellbeing

According to the United Nations' population projections, there will be 9.5 billion people on this planet one generation from now, that is, by 2045; and 10.5 billion people in two generations, by 2070. What will all those people require for decent and meaningful lives? What will the world economy need to look like?

According to Mr. LaRouche's physical economic science, a healthy, progressing economy should have roughly half of the labor force employed as productive operatives—specifically capital intensive "agriculture, mining and refining, industrial production of physical

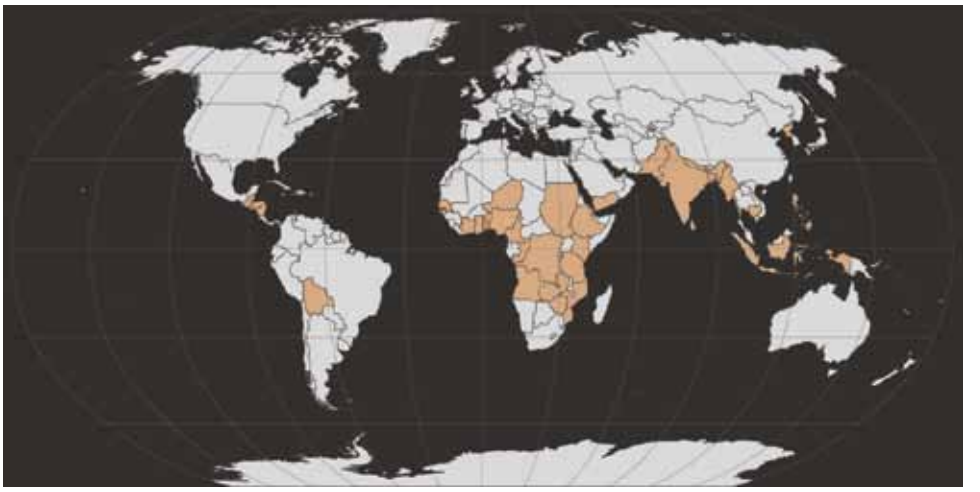
goods, and as operatives developing and maintaining basic economic infrastructure."

Applying this to the UN population projections, the world will need 1.75 billion productive jobs by 2045, and 2 billion productive jobs by 2070.

Additionally, LaRouche says, about 5% of the labor force should be employed in science and research and development—for example, in the space program, fusion development, etc.

So, by 2045 that would be 90 million, and by 2070, 100 million people around the planet employed in advanced science and high technology.

FIGURE 1
Nations Consuming Less than 200 W of Electricity per capita



One of the most critical global requirements will be energy—which should always be approached in terms of LaRouche's notion of energy-flux density. For brevity, let's focus on national electricity consumption per capita as a proxy for energy-flux density of a given nation.

In one study we've been working on, we looked at 34 sample countries with the lowest levels of energy-flux density. These countries presently have levels similar to what China had a generation ago, in 1990. See **Figure 1**.

If, over the *next* generation, these 34 nations go through the same energy-flux density increase as China has, over the *past* generation, we'll need an additional 1,900 gigawatts of power just for those countries. That's nearly 2,000 large nuclear power plants.

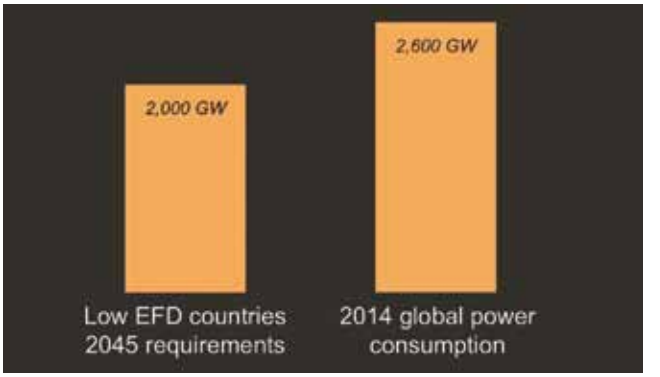
That alone is 70% of present global levels of electricity consumption. See **Figure 2**.

And these are life and death issues. National energy-flux density is strongly correlated with many quality-of-life and mortality effects. For example, a nation's energy-flux-density will strongly predict infant mortality rates. See **Figure 3**.

So, taking the values demonstrated here, we can estimate: if these 34 low-energy-flux-density nations remain at their low levels, in one generation from now 85 million infants will die as a consequence of this lack of development.

That's the equivalent of a country the size of the Democratic Republic of Congo, or Turkey, or Iran, or Germany, ceasing to exist.

FIGURE 2
Energy Flux Density



Energy-flux density growth is vital to the future wellbeing of the people on this planet.

Needed Growth Levels for Nations

If we look at the needed growth levels for other nations as well—including the perspective that so-called developed nations should continue to develop and progress—we're easily talking about 10,000 gigawatts of total power required globally by 2045. See **Figure 4**.

Additionally, we can look at the requirements for high-speed rail. See **Figure 5**. Again, we can use China's remarkable achievements as a reference. China already has the largest high-speed rail network of any country and is on pace to have completed 45,000 kilometers by 2030—the culmination of a roughly 25-year process.

Using China's development as a benchmark, the

global requirements would be in the range of 600,000 kilometers of high-speed rail.

And we have similar challenges providing global water needs for the 9.5 and then 10.5 billion people one and two generations from now. Presently 35% of global water use comes from groundwater supplies, most of which are being depleted faster than replenished, many at rates approaching crisis conditions.

Water transfer megaprojects, such as China's South Water North project, and the proposal to transfer water from the Congo River tributaries to Lake Chad in Africa, will be critical, along with large-scale nuclear desalination and advanced weather modification technologies.

When we take this multigenerational perspective, the global development requirements are immense, just to cover the basic physical infrastructure elements of power, water, and transportation:

- Thousands of gigawatts of electrical power
- Hundreds of thousands of kilometers of high-speed rail
- Massive freshwater development projects throughout the planet.

FIGURE 3
Infant Mortality vs. Electricity Consumption Per Capita

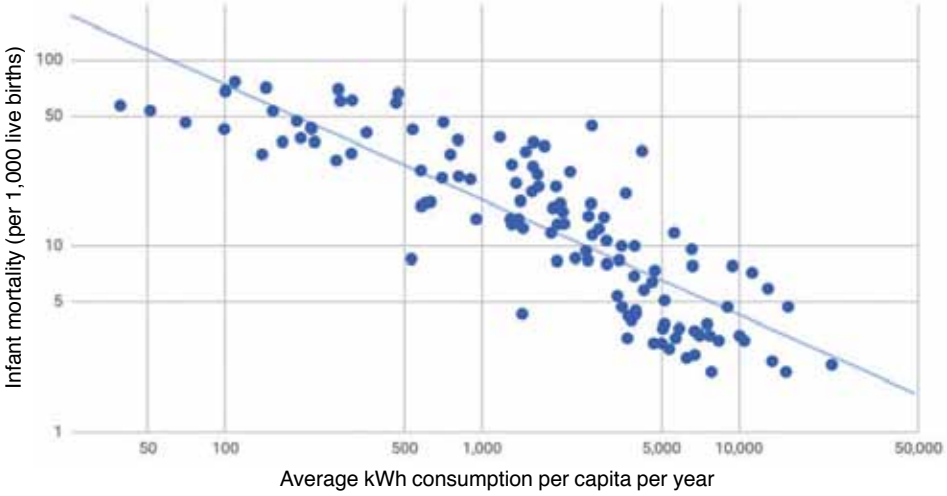


FIGURE 4
Energy Flux Density

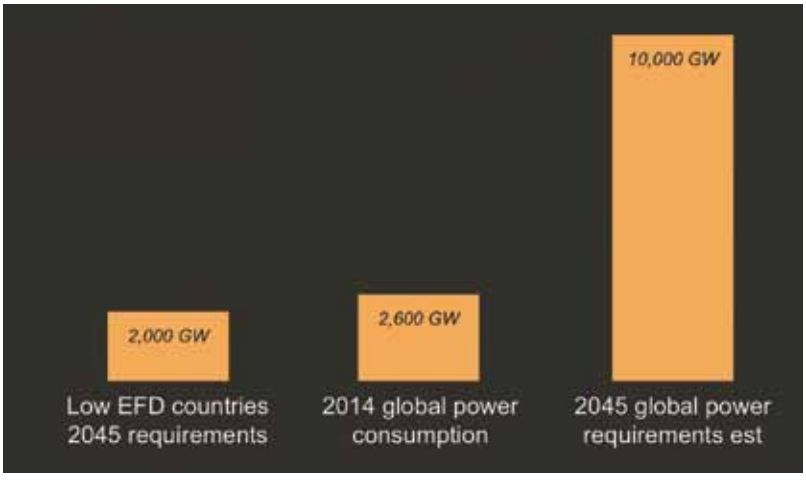


FIGURE 5
Global Requirements for High Speed Rail

Why a Moon-Mars Mission Is Required

Foolish people will say, we can't afford a space program, given all these requirements. They couldn't be more wrong. We can't afford *not* to have a space program—exactly because of these requirements. And not just a small-scale operation. Mankind *requires* a program that will:

- Push the frontiers of mankind's productive capabilities
- Push the frontiers of science
- Push the frontiers of technology
- Push the frontiers of the creative imagination.

LaRouche's Moon-Mars mission is a required program. It does not compete with the requirements on Earth, it accelerates their development.

Let's return to Mr. LaRouche, with an excerpt from his keynote to the Schiller Institute's September 2, 2000 conference, in which he summarizes his earlier, 1980s, argument for the space program as a joint driver for the then-Soviet and U.S. economies. The full speech is available here.

> **Lyndon LaRouche:** Why don't we go back to the space program of Kennedy, and let's do what we proved with Kennedy? Remember, according to the estimates that were made in the middle of the 1970s, the United States got more than a dime of additional GNP out of every penny the United States invested in the space program, the Kennedy space program. The point is, that since increases in productivity come directly, only, from improvements in technology derived from fundamental scientific discoveries, the higher the rate you convert fundamental physical discoveries into practice, the greater the rate of increase of productivity per capita of population, and per square kilometer of area.
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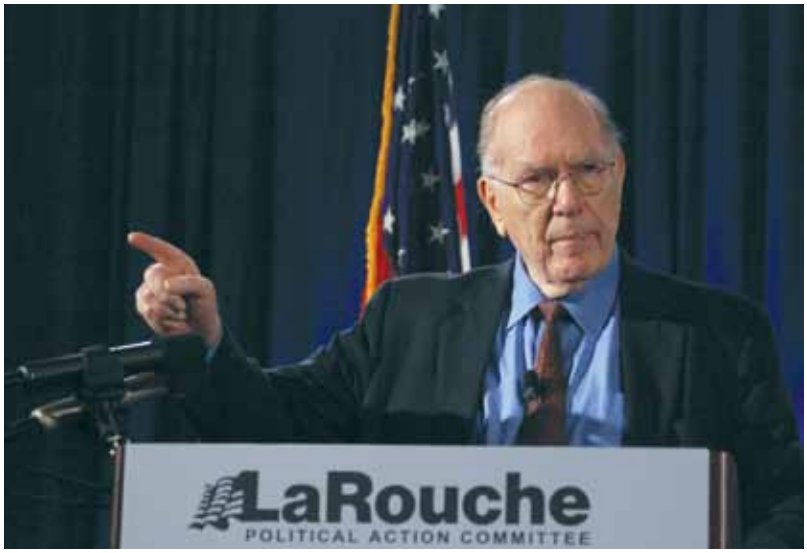
> The problem of both the Soviet system and our own, although in different degrees, I said at the time, was that the United States was not generating a rate of net growth in physical productivity, sufficient to maintain the economy. Therefore, we needed a program for forced draft, science-driven technological progress, with some mission, like the Moon mission, but as a by-product of that mission, such as the Moon mission, we would generate spillovers in terms of technological progress, by such a crash program, to put the United States economy back on the plus side, in terms of net growth.

More details could be provided, but I think Mr. LaRouche made the point pretty clearly.

There were economic studies in the 1970s which showed that the technologies developed by the Apollo program, when implemented throughout other sectors of the economy, increased the total productivity of the economy dramatically—ensuring that the U.S. economy gained, simply through increased productivity, far more than it spent on Apollo.



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Lyndon H. LaRouche, Jr.

Additionally, our own studies have demonstrated that capital goods development incorporating higher technologies grew at a faster rate in non-aerospace and non-defense parts of the economy—thus illustrating the profound and far-reaching impact of the Apollo program throughout the entire economy.

Today, the mission isn't simply to return to the Moon, but to commit to this 50-year Moon-Mars colonization perspective—forcing breakthroughs in the key areas of frontier science and technology needed over the next two generations and beyond.

In broad terms this includes:

- Advanced and compact nuclear fission power, for space propulsion and electric power
- Fusion for propulsion and for electric power
- Opening up the entire fusion economy and broader directed energy domain

• Advanced mining, processing, and manufacturing on the Moon and other extraterrestrial locations

• Sustaining life in extraterrestrial environments, both human life and space agriculture for food production

• Advanced space launch technologies, hypersonic space planes, and scramjet technologies; vacuum tube magnetic levitation space launch systems.

A Realistic Goal for Mankind in the Solar System

This is our perspective: to define a realistic goal for mankind in the Solar System two generations from now—and tracking from there, backwards, to the present; mapping what needs to be done, step by step, to achieve this mission.

And this emphatically includes the development of both the productive powers and also the creative imagination of the younger generations. Just as President Franklin Roosevelt created his Civilian Conservation Corps program in the 1930s to train and develop the youth at that time—today we need to be looking at reviving those types of programs, asking: What do we need to do to upgrade the skills, capabilities, and creative passion of the younger generations to complete this mission?

With that, I would like to conclude with one last excerpt from Mr. LaRouche, from August 1, 2009. The full presentation is available here.

> **Lyndon LaRouche:** Let's take the space program. We need to get at the heart of these matters, in an exemplary way, and an exemplary way should also be a highly practicable way. I think the objective— see, it involves a concept, of a change in the image of what man is. When you go to constant acceleration, as a required modality, in flight of a human being from one planet to another, you're operating in a completely new kind of domain, the domain of the relativistic relations, relativistic transport. And this is a great challenge: Because you have to think about when you're getting out of a 1-gravity situation on Earth, into this kind of artificial gravity, you are in a relativistic environment. Your definition, your terms of thinking about the same old things you knew before, are now presented in a new way.
>
> The human race, eventually, has to live in the universe; we have to live in the Solar System; we have to live in the galaxy, in the longer term. We have to face the challenge that that represents. See, you have to think like an immortal person: that is, to think in such terms that you are thinking about mankind in the distant future, and you're thinking about your place in relationship to mankind, in the distant future, and even distant planets. Because you're looking for something in yourself, which has permanent value. We're all mortal. We're born and we die. But we're not animals. We're creatively thinking creatures. And the meaning of our life does not lie in our biological existence as such. It lies in the meaning for humanity, before us and after us, in what our lives have contributed to the existence of humanity as a whole. We have to see ourselves as human, in that way. And therefore, the best way, the practical way, is always to look ahead, to look as far ahead as you can look, into the future, and see what it is you must do for the future, so that your hand is at the tiller, long after you're dead, in that way.
>
> And obviously, if you're going to chart a course, you have to chart a good choice of course. So, pick one! Pick a destiny! Pick a destiny, two generations, three generations, four generations beyond your life today! Try to reach that far. Try to make something, that you do something, that contributes to the *future* of humanity! Find your identity in the future of humanity, after death; commit the kind of acts and kind of development that mean that. And act accordingly: Because *that is the secret of true happiness. That is the "pursuit of happiness," as understood by Leibniz*, as recorded in his second reply to Locke, which became the cornerstone of our Constitution, though, first, the Declaration of Independence, where it is the meaning of our existence as a nation, and was reflected again, in the Preamble of the Constitution, in its own way.
>
> We have to be immortal. We have to be immortal, by assuming immortal responsibilities. Reach beyond our own life, to what we can do now, which will touch in a beneficial way, generations of people after we're dead. In that way, you know, you're immortal. If you *think like that*, you know you are immortal. If you can *act like that*, you do even better.