
Interview: Dr. José Goldemberg

Brazilian physicist: 'Nuclear energy makes no sense at all in this country'

Dr. José Goldemberg, head of the Physics Department at the University of São Paulo, Brazil, is well-known both inside and outside that country as the leading scientific advocate of sharply reducing the scope of Brazil's nuclear program. In an April 15, 1982 conversation in São Paulo with EIR Ibero-American Editor Dennis Small, Goldemberg spoke frankly about his views on energy and economics; on his philosophy; and on the "strange bedfellows" he finds himself allied with in his battle to limit Brazil's nuclear endeavors.

Small: You have a reputation internationally for being one of the leading anti-nuclear scientists in Brazil. Is that a deserved reputation?

Goldemberg: No, because I am not against nuclear energy as such—I am against the methods that the Brazilian government chose to introduce nuclear energy in Brazil.

Small: O.K., then let's focus in on this by parts. In *Fusion* magazine and elsewhere it has been demonstrated, with simple arithmetic, that there is no basis for solving fundamental world problems, such as providing an adequate diet for the world's existing population, with the existing energy-resource base. That is to say, you would exhaust the world's oil, coal, and hydroelectricity just feeding everyone in the world 3,000 calories a day. This is one of the strongest arguments in favor of the rapid development of nuclear energy. Do you share this point of view?

Goldemberg: I think that the view that you express is an extreme one. I think that the Club of Rome is on one end of the spectrum, and the position that you describe is on the other end. To accept as a postulate, as an axiom, that people in the less-developed countries want to become as affluent and as extravagant in the use of energy as Americans or Frenchmen is just a wrong assumption, it's technically wrong. We could get along very well, extremely well, with probably one-third or one-half of the energy that the average American uses today—and without giving up anything. So, I would question the extrapolations. I think that nuclear energy might make a lot more sense in France or Japan than it does in Brazil. Actually, I think it makes no sense at all in Brazil before the end of the century.

Small: So, you would agree with the argument that there can be a de-linkage between energy growth and GNP growth?

Goldemberg: I do, very much, I believe strongly that the de-linking can be done to a large extent.

Small: But if you look at a broader sweep of the history of mankind—and not a 10- or 20-year period, which is the period for which these studies have done statistical work—if you look over various thousands of years, you will find that the progress of humanity, particularly as demonstrated in the growth of population density, is very closely associated with the exponential growth not only of consumption, but also of energy-flux density. Can we stop that at this point and expect humanity to continue growing? Or will we, by so doing, restrict the size of the world's population?

Goldemberg: Well, the problem is the peculiar understanding people have of growth. Because growth is not having a Cadillac as a vehicle that takes you around; you can also use a very small Volkswagen. I mean, growth is not the stage which Americans have reached: that's a wrong definition of growth. It is the definition of the Romans—and see what happened to the Romans.

Small: I define growth as potential relative population density, which is a term coined by LaRouche to describe the capability of a society's economy to maintain a certain population density per economic area. In other words, economic viability is measured by the ability to maintain a growing population—not by the size of a Cadillac.

Goldemberg: Well, an expanding population growth might not be desirable at all. Evolution, not only of mankind but of all species, shows that is a very questionable thing. Why would we want 15 or 10 billion people? That's not clear at all, I mean, that's not the way the species have evolved. So, maybe we should curb the population to 8 billion.

Small: Do you think we should?

Goldemberg: I think that's a moral issue, and a very complicated one. But I see no reason for not limiting our population, because it happens in all animal species. It probably should happen to man, too.

Small: Do you see a fundamental distinction between man and other species?

Goldemberg: No, oh no! Not at all. I think we are on the top of the species, fortunately for us, but there is no fundamental distinction.

Small: What about the human mind, and the principle of creativity and science?

Goldemberg: Well, it's part of it. When you have as much storage capacity as we have in our brain, you learn how to do lots of things, to understand what goes around. There are people arguing that dolphins have a lot of brain capacity too and maybe they understand the world better than we think they do. The case can be made, technically, that we do have enough information storage in our brain computer to do what we do. Let me give you an example: in the genetic code, when the first cell is formed, there is enough information about the future human being that will come out of that cell, which could fill 4,000 volumes of 300 pages. That's a calculation made by Carl Sagan, who I think is a very talented man—that's the information that could determine if your hair is going to be brown, your eyes blue and so on. That's a lot of information!

Small: Our view is that the physical universe itself has as its fundamental principle of organization the qualities that religious people ascribe to God, that is to say it has a negentropic principle of expansion. I don't think that it is an accident that many of the greatest physicists and scientists of the world have been religious, in exactly that sense of the word.

Goldemberg: I am familiar with the argument, but I think it is irrelevant.

Small: Let me proceed on the topic that you raised, which is: you argue that nuclear energy is possibly desirable for advanced-sector nations like France and Japan, but not for the case of Brazil. Why the distinction?

Goldemberg: Because we do have a lot of alternatives, and they are better than nuclear, so I think we should use the alternatives before getting into nuclear energy. Eventually we will get nuclear energy—I am not against nuclear energy as such. But Brazil has enough hydro-power to last until the beginning of the century, probably until 2010 or 2020.

Small: At what rate of growth of energy consumption per year?

Goldemberg: Historical rates of growth in Brazil have been very high, 8 percent, 10 percent.

Small: The existing plan of Eletrobras, Plan 2000, projects 10 percent, 11 percent per year. Is that feasible with hydro?

Goldemberg: Yes, until 2010. I was considered, until two weeks ago, a major critic of the government. Now the government and I are on the same side. This is the official projection: Brazil has enough hydro-power until the year 2010.

What happened to the nuclear people in Brazil is that they went at it blindly, with too much eagerness. Their projection that Brazil would run out of hydro-power by 1990 was technically wrong. Therefore what makes sense in Brazil is to follow up technology and have one or two reactors, or as many as are needed to train people and install in Brazil an industry whose base can grow—and that's all. So, the role of nuclear energy should be a minor one; it should be kept open as an option, but not as a major contribution to the generation of energy.

Small: Many of the hydro sources are quite far from the industrial areas, and so, to the costs of hydroelectric generation, we have to add transmission costs. I have seen calculations which indicate that this puts it over the costs of nuclear.

Goldemberg: That's not true. And even if what you said were true, I would counter-argue in another way: why in hell should people move into the suburban areas of Brazil? They should move to where the power is. São Paulo grows by 600,000 people a year, 6 per cent per year, a fantastic rate of growth. It doubles every 13 years. That should be avoided. If necessary, one should put the police on the roads to drive people back, which is a very bad way of doing it. But what the government should do—and they are trying to do it—is to make other places more attractive.

Small: But you are arguing against high rates of industrial growth, and in favor of a model that is more based on income redistribution?

Goldemberg: Yes, that is true. This is what political life in our country is all about. If you don't try to understand that, you are not understanding what's happening in the country. If you talk to the industrialists, you're talking to the very high elite, who would like to convert Brazil into a second United States.

Small: How would your alternate redistributionist approach work? And what rate of growth would you project?

Goldemberg: Brazil has been growing in the last 30 years at 6 percent or 7 percent per year. I imagine that this could go on for another 20 or 30 years. Then you'll reach physical limits. I imagine that a more reasonable rate of growth would be 4 to 5 percent a year.

Small: And there would be energy growth rates of less than that?

Goldemberg: No, of more than that, probably. It depends on the structure of the country. If we invest very heavily in heavy industries, then energy grows more than the GNP. If we invest in food, which Brazil probably needs more than anything else, the growth of energy is not so great.

Small: Even in agriculture, doesn't it depend on what kind of agriculture you are talking about? If you are talking about labor-intensive agriculture, energy inputs can be kept to a

minimum. If you are talking about modern, technologically advanced agriculture, then you also need heavy industry and lots of energy.

Goldemberg: Well, it depends on how much land you have. If you have a lot of land, and you have a lot of people to feed, maybe you should not move into the most modern agriculture. The problem is that there is a saturation point. As you increase the energy inputs into production through fertilizers, heavy machinery and so forth, the yield of agricultural production grows at first, but then it becomes saturated. So I think that if Brazil grows at 5 percent a year and if income is reduced in the middle, then we will be doing quite well.

Small: Let me turn to a more political side of these matters. You yourself said a moment ago that the extreme anti-nuclear argument leads quickly down the road to an anti-progress argument generally: if you are against nuclear, why not be against other forms of technology too? How do you feel about the fact that your arguments have been used widely by precisely the forces who share the anti-growth views of the Club of Rome? Where do you personally draw the line, and what do you think of the political implications of your arguments?

Goldemberg: I know my arguments have been used, and I am embarrassed by that. Inside Brazil, the people involved in the environmentalist movement, generally speaking, do not have much technical training. Generally they are artists, lawyers, and people in the social sciences who have great feelings about things. They do not have very strong technical backgrounds, and the fact that I do have a technical background made my position in the nuclear discussion in Brazil a very valuable one. So it was of great interest to the environmentalists to argue that I was on their side—which was not true. I was always considered a moderate by them. Who can control these things? People use your ideas any way they can. The government sometimes uses my arguments against the ecologists.

Small: Why? What are the problems with the West German-Brazilian deal? And are there any positive aspects of it which you think should be mentioned?

Goldemberg: The positive aspect is that it is a deal that in principle could lead to technology transfer from Germany to Brazil, and Brazil wants to be self-sufficient in energy as in many other things. What is negative about it is that the Germans and the Brazilians who negotiated the agreement started from the assumption that there was no technical capability in Brazil, so everything had to be imported from Germany. So it was a deal which was very heavily favorable to Germany and not to the real development of Brazilian technology. It soon became a method of transferring German companies to Brazil.

Small: I would be the last person to defend every last detail of what Germany and Brazil agreed on, as the model for the future. But aren't you throwing out the baby with the bath

water?

Goldemberg: Yes, I wonder about that. I think that is a very good question, because the opposition of the United States on the deal is exactly for all the wrong reasons. I think that there is a great danger in this, which is why my own position has evolved to the point of saying that Brazil should go ahead—this is my present position, which the environmentalists are pretty annoyed with. Brazil should go ahead with all the reactors programmed for Angra dos Reis—this is the Westinghouse reactor, and two German reactors.

But the idea that Brazil needs eight reactors to learn the technology, that is what any salesman will tell you. The fight now is going on around the following point: how many reactors is Brazil going to build by the year 2000? Nuclebras, the nuclear enterprise, wanted two; at one time they wanted 60 by the year 2000. That number was cut down to 27, and now it has been cut to eight. This is an arbitrary number, but the justification for that number is that Brazil needs to build eight reactors to master the technology. But the fight today is on whether there are going to be two or four, because eight reactors will come only in the next decade. The present government has said, "Look, fellows, it is going to be two until the next government comes in." In 1986 there is going to be a new president. So there will be two reactors in this presidential period, and I am fully in favor of that.

Small: I do not think that the issue is two or four. I think the issue is whether Brazil is going to go nuclear at all. The issue as it is posed by the World Bank and the International Monetary Fund, for instance, is that they want to stop Brazil's nuclear program, period. Many of the commercial banks in the United States want to stop Brazil's major projects, especially the nuclear project, as part of their plan to stop Brazil's growth and development generally. Many European banks, including the Bank for International Settlements, share this approach. I want to ask you the uncomfortable question: how do you feel being in bed politically with the World Bank, the International Monetary Fund, the world environmentalist movement, former U.S. Deputy Secretary of State Warren Christopher and the rest of the Carter administration, and many large commercial banks—all of whom, like you, are opposed to the West German-Brazilian nuclear deal and are trying to keep Brazil a backward, underdeveloped country?

Goldemberg: I feel very bad about it. I don't know; I'm fully aware of this. Warren Christopher and all these creeps made our life very uncomfortable in 1976-77, very uncomfortable. We had to close ranks with the government, you know, because it is certainly no business of Warren Christopher to come here and say, "You cannot do that." So I feel uncomfortable with these fellow travelers, with the environmentalists and the banks. The way that I keep my self-respect, you know, is by saying that we should go full speed with these two reactors and work on the technology. I think that represents a rather wide consensus among scientists and the government, which is not going to be easy to stop.