I think, frankly speaking about Putin and [President] Medvedev, that both of them are, let's say, practical people. So, they are realistic people. And I think they are very open to all kinds of alliances and partnerships, which will bring us forward. So, I think this can be taken for granted that, the hand is open.

Question: With the development of fusion energy over the next 20 to 25 years, the fuel for our economies will be helium-3, the isotope of helium, which will be mined from the surface of the Moon. And without collaboration in the life sciences, this will be very difficult. Because, we know that Russia, with its long-term space exploration, has had the longest stays in space.

And with the ISS, the International Space Station.

Question: Yes, your experience is maybe 10 or 15 years ahead of us in the life sciences, and we are looking into areas where we can collaborate with this. . . .

This collaboration, I agree with you, only can be on, really a global basis. Let's say, the big nations have to work on this together, because it's one of the big future questions of mankind. And I agree, neither Americans, Chinese, or Russians can fulfill this question themselves, or alone. . . .

Question: I have a couple of economic questions. Since 2007, when the economic derivatives market exploded, we have had decision by the Bush Administration, and a commitment by the Obama Administration as well, to commit the U.S. government and the Federal Reserve to a bailout of the U.S. banks—already $26 trillion. And I know this is a concern of the Russian government as well, because if the dollar collapses you will lose your savings. So, the belief that you are rich because you have "money," will disappear; you are going to discover that you don't have anything.

It could be a real implosion!

Question: We have had serious economic crises since the Versailles treaty. . . . We had a successful solution by the Bretton Woods conference, which established a fixed-exchange rate system, capital controls, exchange controls, stable raw material prices, which, until 1974, were determined by governments. We are organizing now internationally, to reestablish a fixed exchange rate. And Russia is an essential player—

Of course.

Question: What do you think about the prospect for a conference, as we have proposed, to deal with these economic questions?

I think, it is a need, and I think that Russia will play an active role in this conference, and will collaborate in this discussion. Because, as you said before, it is in our common interest. And, it's about keeping the world going. I mean, we are all in the same boat in that. That's another side of globalization. You can't divide from the rest, or say: "It's not my ball game." It's the same for the Chinese, for the Russians, the Europeans, and the Americans. So, we are sitting in one boat.

INTERVIEW: BERNARD BIGOT

We Need International Cooperation for Nuclear Power


CEA

Bernard Bigot, is Chairman of the French Atomic Energy Commission (Commissariat à l'Energie Atomique), CEA. He was interviewed by 21st Century *correspondent Ilko Dimov, and this is an abridged transcript. The interview was translated from the French by Matthew Ehret-Kump.*

Question: In France, we are associated with Jacques Cheminade, who has just announced his candidacy for the next Presidential elections.

I know him well.

Question: One of Mr. Cheminade's programs is based upon nuclear development, using the expertise of France with nuclear and great projects in making the nation a motor for global development, and returning France to de Gaulle's vision, with nations collaborating together, not competing. . . . But there is an absence of credit for the development of industry and, in particular, science. What are your thoughts about what is necessary for providing the financing and vision required to accomplish the necessary miracle of rebuilding the world?

Listen, I think that with the problems which are occupying us today, here, in Montreal, that is to say, energy, there are no solutions if we do not develop solidarity. Resources are, as we know, limited. They are not necessarily equally distributed. There isn't one legitimate reason why a country which has easy access to one or another resource, should not share it with the rest of the world. Otherwise, we will move towards tension, we will move towards conflicts, without anyone benefiting globally. No one will win.

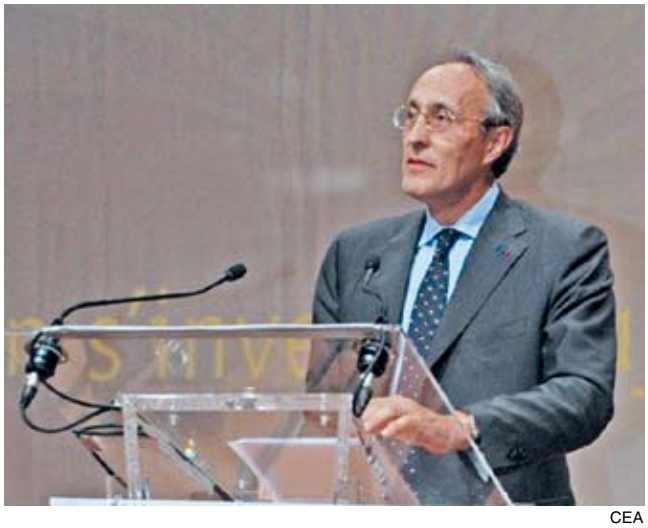
Thus, we should try to build mechanisms which maximize solidarity. So, the first point which you bring up, is the access to financing. *Voilà*: It's clear as we saw earlier with the speaker from the Congo, and we see it in many other countries. One of the major handicaps to the development of energy production to the scale many countries need, is the obstacle of financing, that is to say, the power to obtain financial channels, to obtain loans at reasonable rates. This is the chief obstacle.

For me, this is a first priority. It is absurd, for example, in the domain of nuclear, that the World Bank cannot contribute anything to a country which

desires to go in that direction. On the other hand, the World Bank would contribute if there is an installation that will consume coal.

That runs contrary to the global interest. We should respect this possibility to diversify. I'm not saying that loans should not be offered for coal as well, if we develop it alongside of carbon-sequestering technologies. But why exclude one or another technologies? That is the first point.

The second point involves access to technology. It is clear that many countries do not have the capacity to conduct what we call research and development, in order to make their own demonstrations. We must, therefore, try to develop large international programs with access to intellectual property.



CEA

CEA chairman Bernard Bigot: It's absurd that the World Bank doesn't fund nuclear projects.

The challenge in energy, is not that an industry will lose its power to sell and produce a technology, simply because a demonstration is created which proves that this or that technology is feasible. There is a step which is an industrial competence, which is not in the R&D. Thus, in everything we call research and development upstream, up to the point of demonstration, we should move more towards international cooperation.

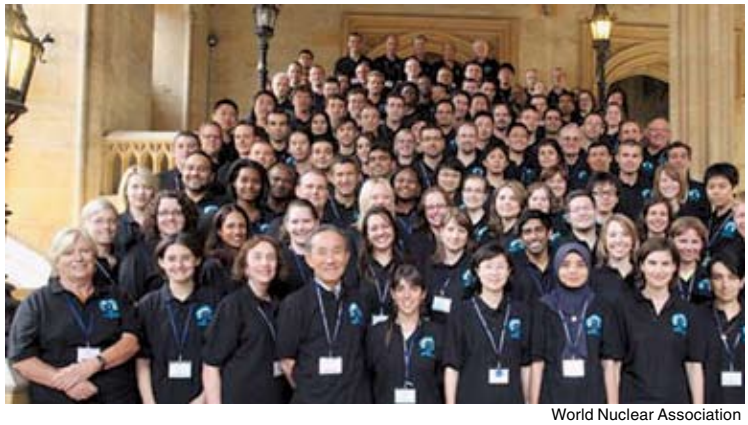
The last stage is training. It is clear that all of these systems are complex. It can't work if you don't have people who are well trained, who have access to knowledge, and the experience of working with this sort of large-scale equipment.

Thus, these are the three stages which for me, are necessary, and I see no obstacles which should stop us from going in this direction, and which France in her place may take favorable initiatives for this process.

Question: Can you give us a sense of the international collaboration in which France is involved today, in terms of promoting and constructing nuclear reactors?

We are engaged, in particular, in what is called the Gen4Forum. That is, the Generation 4 Forum, in which a dozen large countries are re-uniting today and in which we have made common programs for researching materials, designs, and security, in order to effectively advance the development of nuclear energy.

So, there are Japan, Korea, Argentina, Brazil—there is an assembly of countries, some very advanced, and others much less so, who are sharing knowledge. Honestly, I think that it's a good example of what it is possible to accomplish. Simply, it must be done with continuity, and it is true that some countries, such as the United States, which were once a very active driver in this process, today, are a little behind.



World Nuclear Association

Training of younger nuclear workers is essential, Bigot said. Here, participants in the 2009 World Nuclear University Summer Institute which trains promising young nuclear professionals from around the world.

Question: In reality, the United States does not have the capacity to produce nuclear reactors today.

There you go. But that does not diminish the competence which they have developed. It is the greatest park in the world and at one moment or another, they will be obliged to return to it.

Question: Our publication is widely read by young people who are looking for leaders who represent these solutions and who will transform these dreams into reality. What can you say to these youth between the ages of 20-30, who have lived through the last 15 years in pessimism?

I think that we must share with these youth, the following idea: The last 50 years have seen some technical and economic advances, but we have not overcome many challenges which are still ahead of us. And my vision is that these youth must invest themselves in science, in technology, because my deep conviction is that this is the most common language on the planet.

There isn't a boundary for science. Science reproduces results, in conducting the same demonstration. It is to lift ourselves to that level, that will perhaps be the determining factor for economic development. I believe that the idea of contributing in this way, will fuel their enthusiasm and their conviction, and we need these youth to invest themselves in order to help us.

Question: Dr. G.S. Lee has made the prediction that we would have fusion by July 2036 [See interview, *21st Century*, Winter 2009-2010.] What is your prognosis, your vision?

I am not as precise as Dr. G.S. Lee, who is a very formidable man. For me, I think that accord-

D. Calma/IAEA

"There isn't a boundary for science." Here international flags at the International Atomic Energy Agency headquarters in Vienna.

ing to the program which we have, in 2026-2027, we will have the first experiment which demonstrates that we are capable of producing a balance of positive fusion energy through heated plasma.

If this stage is realized, in 2026-2027, I think effectively at that moment, we will need a decade to explore superior conditions, to optimize the process as well as the massive production of fusion energy which will benefit the planet. That is to say, the first reactors of several thousand megawatts could be installed by 2075.

This might seem far, but it isn't really, if you reflect on the development of energy from our use of coal, to petrol, to gas. We are dealing with scales of time in this magnitude. It could accelerate a bit if nations worked all together, but I don't believe that we can take shortcuts, and it would be formidable, if we achieve this demonstration, and then find that it will give us abundant resources not just for 100 years, 1,000 years, but rather hundreds of thousands of years.

There will be a limited impact on the environment, on the climate, on the limitation of resources, and even on the danger that this could represent. It is a challenge that merits this investment, but don't be impatient. There is a step still to go, but we are on the right track. Progress is moving in the right direction. In my view, it can't be solved in the blink of an eye, so I don't know if it will be in July 2036, but why not?