



SCIENCE DIPLOMACY

Iran's atomic czar describes the art of the deal

Ali Akbar Salehi tells *Science* how he helped seal the Iran nuclear agreement

By Richard Stone, in Tehran

Last February, nuclear talks between Iran and world powers were foundering. The two sides had found common ground on the deal's broad outlines, but the devil lay in the technical details. Stymied, Iranian officials asked their top nuclear scientist to join the talks: Ali Akbar Salehi, president of the Atomic Energy Organization of Iran (AEOI).

In an exclusive interview with *Science* at AEOI headquarters in north Tehran, Salehi, 66, related how he would only agree if his opposite number in the United States, Energy Secretary Ernest Moniz, sat across from him at the table. The result was several weeks of intense science diplomacy between the two physicists, who overlapped at the Massachusetts Institute of Technology (MIT) in Cambridge in the mid-1970s, when Salehi was earning a Ph.D. there in nuclear engineering. They helped overcome technical obstacles, and last month Iran and the P5+1—the United States and its five allies—reached an agreement that is designed to block Iran's paths to a nuclear weapon in exchange for a gradual lifting of sanctions imposed as a result of Iran's nuclear program.

As the U.S. Congress reviews the deal,

the battle for public opinion is heating up. In a letter to President Barack Obama on 8 August, 29 prominent U.S. physicists and nonproliferation experts (including *Science's* executive publisher, Rush Holt), praised the “innovative agreement” for providing “much more stringent constraints than any previously negotiated non-proliferation framework.” In a 7 August interview with *Der Spiegel*, Israel Defense Minister Moshe Yaalon called the deal “a historic mistake” that will “allow Iran to become a military nuclear threshold state.”

Framed photos of five Iranian nuclear scientists assassinated over the past decade hang in Salehi's office, with a bouquet of red roses set on a table below. Salehi claims their deaths emboldened, rather than deterred, Iran's nuclear establishment, and insists that his country's enrichment program is intended only to produce fuel for civilian power reactors. This transcript was edited for brevity and clarity; the full interview is available online. <http://scim.ag/Salehi>

Q: What stands out as the most memorable moment you spent with Secretary Moniz during the negotiations?

A: One came when I asked Moniz in our last days in Vienna, “Do you have any news

about Professor Mujid Kazimi?” He's a professor of nuclear engineering at MIT. The next day, Moniz comes to me and says, “I have bad news for you.” I thought it's about the negotiations. I said, “What is it?” He said, “Mujid has passed away.” I said, “My God. Yesterday we were talking about him and you said he's fine.” I requested Moniz to see if we can get his family's telephone number. And he found it and gave it to me, and I called the family. I expressed my condolences.

We know each other through all these [mutual] friends. It was very natural for him to look out for his country's interests. But this did not prevent either of us from being rational. We tried to be logical and fair. We understood each other. I understood his constraints. He understood mine. That's how we could move forward.

Q: How did you and Moniz end up as negotiating partners?

A: The negotiations were stalled. It was about a year and a half that they were negotiating, and they couldn't move forward. In February, I was summoned by my superiors. One of the officials said, “Well, Ali, you have to join the negotiations.” I said, “You're joking. What can I do? [Foreign Affairs Minister Mohammad Javad] Zarif has

done his best. What more can I do?"

But my superiors insisted. I said, "OK, I will go, but on condition that my counterpart also participates." They said, "Who is your counterpart?" I said, "The secretary of the DOE [Department of Energy]." Our side contacted [chief U.S. negotiator] Wendy Sherman, saying "Look, we are intending to bring Mr. Salehi with us. But on condition that the DOE secretary also joins." After a few hours, Sherman responded and said, "We welcome this and we'll bring along Secretary Moniz." [laughs] And when I heard the news that he's coming, I said, "OK, I will go." [A DOE spokesperson confirmed Salehi's account.]

I thought I was going on a mission impossible. I'm so happy that the final outcome made all of us happy. Yes, we have some constraints, but what are those constraints? From the American perspective, they are to prevent us from diverting to nonpeaceful activities. But then we never ever had this idea of diverting to nonpeaceful activities.

Q: You're said to have a close relationship with the supreme leader, Seyyed Ali Khamenei.

A: Well, I wouldn't say we have a special relationship, but the supreme leader knows me because I have been in different government responsibilities since the revolution started. I was chancellor of a university. I was deputy minister of higher education two times. I'm happy that the supreme leader, yes, has put his trust in me.

Q: One of the most contentious issues in the negotiations was R&D on advanced centrifuges. From your perspective, what was hard to accept?

A: When you are negotiating, each party is trying its best to have the bigger piece of the cake. That's very natural. The Americans said, "If there's no research on centrifuges, we will be very happy." We said, "We would not be happy. We understand you have some concerns. Let's see how we can mitigate them." Neither side got the ideal it was looking for. We met in the middle.

Q: Your program is slowed.

A: Yeah. If we were free, probably within 8 years we could have come up with a cascade of 164 [advanced IR8 centrifuges]. That is not a big constraint for us, but that pleases the other side so we said, "OK." It could have been better, of course, if we had a bigger cascade because then even the process of enrichment would have been assessed, not only the mechanical characteristics of the machines.

We do not take that as a constraint. So I would say on R&D, the apparent limitations

that we have accepted, that we have agreed to, it's not really a limitation.

Q: So there's nothing in particular in the sphere of R&D that you consider a huge sacrifice for the sake of the pact?

A: I don't think so. We would be working on different advanced machines. We would be working on the IR8, on the IR6. The IR8 and IR6 are the two candidates that could really meet our needs in terms of producing enough enrichment capacity to meet the annual needs of [the Bushehr power reactor]. And 10 years from now, we will have two other nuclear power reactors. But using [the permitted] centrifuges, in 15 years we will be in a position to meet the fuel requirements of these reactors.



Salehi's sparring partner: U.S. Energy Secretary Ernest Moniz.

Q: U.S. negotiators were concerned about other forms of enrichment, like laser enrichment. Was Iran pursuing these?

A: No. We did some laser enrichment in the past. We informed the IAEA [International Atomic Energy Agency] and dismantled the equipment.

Q: Siegfried Hecker, the former director of Los Alamos National Laboratory, told me he was surprised Iran would agree to a blanket prohibition on studying metallic uranium and plutonium, because there are other uses for these, not just for weapons.

A: Yes. We had a lengthy discussion on that in the negotiations. Depleted uranium metal can be used as shielding, for example. I insisted that we would have to make an exception for depleted uranium. Then the other side said, "Look, we need to tell our officials that we have blocked all the pathways to weapons production. And one of the pathways is metal production."

I finally accepted that. We do not intend to enrich uranium to 90%, so we will not have 90% enriched uranium to turn into metal. We said that if we need some

depleted uranium, we may ask for it from [the P5+1] during this period. But we will not produce the metal. We did [produce] plutonium. And we told the IAEA, that's it. That was in 2003.

Q: As part of the agreement, the Fordow enrichment facility will be turned into an international research center. What do you have in mind?

A: It's very difficult to say offhand. I would have to discuss it with my colleagues and with colleagues from the P5+1.

Q: You've already hosted Russian scientists. They're going to help modify the uranium centrifuges to produce stable isotopes for industry.

A: That is for sure. Fordow has two wings. Part of one wing will be dedicated to stable isotopes. That is already agreed upon.

Q: Fordow is a military site. Is the military going to easily relinquish it?

A: It's not controlled by the military. Decades ago, it was a place where the military stored ammunition.

Q: The nuclear agreement calls for increased Iranian participation in ITER, the international fusion experiment. Does Iran have a fusion research program?

A: Yes. Near where you're sitting, we have three tokamaks. We are one of the leading countries in West Asia working on fusion. This is my second time heading the Atomic Energy Organization. In my previous appointment, I made fusion our essential goal. It was given our highest priority because fusion is the future source of energy.

Q: AEOI went through some very dark days a few years ago, when five nuclear scientists were assassinated. Do their deaths cast a shadow on international collaboration?

A: No. We have a very peculiar characteristic of our nation. Being Muslims, we are ready for any kind of destiny because we do not look upon it like you have lost your life. OK, but you have gained martyrdom and we believe in eternity.

For our people, it's easy to absorb such things. I mean, this did not really turn into an impediment to our nuclear activities. In fact it gave an impetus to the field, in the sense that after [the assassinations], many students who were studying in other fields changed to nuclear science.

Q: What do you want to be remembered for?

A: As a person who did good for mankind. That's it. ■