# There's No Good Reason For Anti-Nuclear Hysteria

*Physicist Veit Ringel demolishes the greenies' anti-nuclear arguments, and rings an alarm bell about the destruction of Germany's leadership role in high-technology development.*

*The Schiller Institute held a conference in Berlin on Sept. 25, 2010, on "Rebuilding the World Economy—NAWAPA, the Bering Strait, and the Eurasian Land-Bridge." The speeches by Helga Zepp-LaRouche, Dr. Hal Cooper, Dr. Sergei Cherkasov, and Portia Tarumbwa-Strid were covered in* **EIR** *numbers 39-41.*

*Here we publish the presentation by Diplomphysiker[1] Veit Ringel, formerly of the Rossendorf Central Institute for Nuclear Research of the Academy of Sciences of the G.D.R. (former communist East Germany). The transcript has been slightly revised and supplemented by the author, and was translated from German.*

EIRNS/James Rea

*Nuclear physicist Veit Ringel addresses the Berlin conference, holding his "pebble" from a pebble-bed nuclear reactor.*

Good evening, dear friends. First of all, I thank you for the opportunity to tell you a few thoughts that really concern me. As a staff member of the former Rossendorf Central Institute for Nuclear Research[2] of the Academy of Sciences of the G.D.R., I worked for my entire professional life in the field of nuclear technology. I see an audience here that is willing to listen, and that also recognizes the problems that I am going to address.

Today's topic is so vast, that one wonders at first, "What can I do, as an individual?" Speaking for myself now—and I will only talk about things that I know myself and can speak to directly—I want to point out what is completely wrong-headed in our country's current policy. . . .

At the present in Germany, as a look at the current

1. This German degree has no direct equivalent in English; it requires more education and experience than a Master's Degree, but less than a Doctorate. All footnotes are supplied by the translator.

2. The Zentralinstitut für Kernforschung was founded in 1956. In 1992, after Germany's reunification, its name was changed to the Dresden-Rossendorf Resesarch Center (Forschungszentrum Dresden-Rossendorf), eliminating the word "nuclear." Today it is engaged in research into advanced materials, cancer, and nuclear safety.


EIRNS/James Rea

*An anti-nuclear scare-mongering demonstration in Berlin, Sept. 28, 2010.*

press shows, they are trying to disparage the nuclear industry in the public mind, and this is ultimately inflicting huge damage upon us.

If we do not wake up and save our "know-how"-based industrial economy, and if we do not guard against ideologically driven hysteria against modern, advanced nuclear technology, but continue to develop cutting-edge technologies in Germany that are then only put to use abroad, we will see that one day our granddaughters will be sewing T-shirts for the Chinese market. To prevent this, we need affordable energy, and therefore the continued operation of German nuclear power plants is indispensable. So, what we are doing is extremely important.

## German Nuclear Technology

I want to show you something I've got in my pocket: This is a pebble from the Hamm-Uentrop Pebble-Bed Reactor—without uranium, but equal in size. This very special type of nuclear reactor, which unfortunately only operated for a very short time in Hamm-Uentrop, differs significantly from the other 17 currently operational pressurized-water and boiling-water reactors in Germany. In contrast to those, the nuclear fuel is not contained in large fuel elements, but rather in very small units: these 5 cm pebbles. It is this type of reactor, which was originally developed at the research centers in Jülich and Karlsruhe in Germany, and was brought to a more technically advanced level internationally, the pebble-bed reactor, which is particularly suitable for the kind of major projects we are discussing here today. It is one possible form of nuclear-reactor technology that could solve everything that the opponents of nuclear power today are constantly complaining about.

First of all, this type of reactor is inherently safe; a meltdown is basically impossible, for physical reasons. Second, there is the question of disposing of spent fuel, which supposedly poses uncontrollable risks for future generations. The most stupid images are publicized, according to the slogan: "Using nuclear technology is like starting up an airplane and not knowing where it is going to land." Well, nuclear technology knows where it is going to land. Safe, permanent disposal is possible; we just have to implement the results of the studies that demonstrated the safety of permanent waste disposal sites, rather than banning them, as the "Red-Green" coalition government did.[3]

Germany is continuing to lose its reputation and international recognition for its former leading position in the field of nuclear research and nuclear technology. At Rossendorf, near Dresden, we also made our contribution in these areas over the past 30-40 years, with our 10 MW research reactor. Radiopharmaceutical products, among other things, were produced there for many years, and delivered weekly to the Federal Republic [West Germany]. Through our scientific and technical supervision of the G.D.R. nuclear power plants of Soviet design, we also acquired a great deal of know-how. After reunification, Germany could have continued to be at the pinnacle of the nuclear technology field worldwide. At the present time, in terms of the safety

3. The Social Democratic-Green coalition government pushed through an "exit" from nuclear power in 2000, according to which the country's 19 nuclear plants would be phased out, and completely closed by 2020.

and effectiveness of our 17 nuclear power plants, we in Germany are still among the top 10 of the approximately 440 operational nuclear reactors in the world.

But there is reason to fear that we will not be able to hold this leadership position much longer. There are too few scientists being trained, there are too few technicians being trained, and public opinion is based on superficial knowledge, on half-truths. And half-truths are much worse than lies. Half-truths create the feeling: "Oh well, there must be something to it, there really is a risk, and we don't want that." And people think no more about it.

In my short interview with *Fusion*[4] I described some of my experiences when I tried to figure out what sort of people would be against nuclear power. What kind of education do they have? On what basis do they oppose it? I came up with three groups:

The first group are those who find it fun to play cops and robbers with the police, to provoke the police and then run away, and things like that. We can dismiss them, since they are ultimately in need of psychiatric treatment.

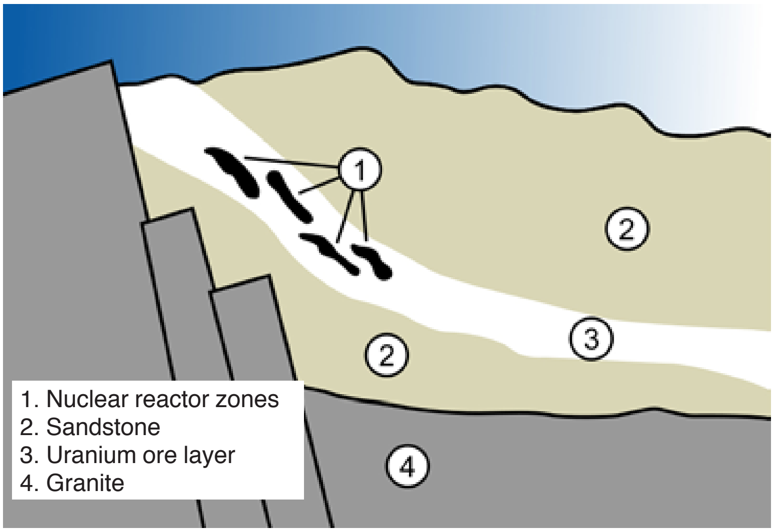
Much more important are those in the Green movement who have real concerns. I can understand and empathize if someone says, "All this radioactivity, this strange radiation that I can neither smell nor hear nor see, for which I would need measuring instruments that I don't have: I worry about it." I call this an honest reason.

But it is particularly important that such people who are honest, be informed about what radiation really is, because all mankind, all life on Earth is influenced by ionizing radiation. Without radiation, we would never have developed as we did. There is terrestrial radiation, there is cosmic radiation, and if had a meter right now, it would be ticking away vigorously, because all rooms contain minuscule amounts of radioactivity, in the materials of which they are constructed.

## A Natural Nuclear Reactor

But back to the problem of permanent disposal of spent fuel from nuclear power plants.

FIGURE 1
**Natural Nuclear Fission Reactors in Gabon**



Wikimedia Commons

Since we have been talking about Africa, I want to mention something else: Nature had its own "natural nuclear reactors." This phenomenon was discovered in 1972, during uranium mining in Gabon, on the west coast of Africa. Along what is now the Oklo River, about 2 billion years ago, water-soluble uranium compounds in the soil were swept along by rainfall into so-called uranium lenses,[5] forming local uranium concentrations that were high enough that the neutrons generated sustained nuclear fission chain reactions. With rain water as a moderator, quite natural "reactors" operated for some 500,000 years, with interruptions.

The reason I tell you this, is that this process resulted in fission products, just as they occur in every reactor—an entire spectrum of fission products, which, of course, are still there. An employee who was working there in uranium mining, measured the isotopic composition of the uranium very precisely, extremely meticulously, more than was actually required for his job. He wondered: Why is there less uranium-235 here than everywhere else around the world? Only later was it found, by long and intensive investigations, that yes, indeed, natural nuclear fission had occurred here. There are actually still some products of fission in the vicinity, but most have decayed in the meantime. There was also plutonium there.

The interesting thing was that it was now possible to

4. "Warum Tschernobyl nicht überall ist," *Fusion* No. 1, 2010. http://www.solidaritaet.com/fusion/2010/1/fus1001-tschernobyl.pdf

5. A geological term referring to one possible shape of an ore deposit squeezed between two layers of surrounding rock.

study exactly how far the fission products had naturally migrated from the spot. Did this cause great harm to nature? Is what today's Greens talk about—"For God's sake, we would have to store radioactive materials safely for thousands of years in permanent repositories, and that we cannot do!"—really such a big risk? It was shown that the natural plutonium had been moved, by natural diffusion processes, only a few meters away from the site where it had been created by the chain reaction. And this, even though the "spent fuel" was not secured in special Castor containers or put into a permanent repository!

This is yet another indication that terrible fear is being fomented for no good reason. But those who are doing it the most are precisely those who have absolutely no idea what they are talking about. Or they deliberately spread falsehoods, and I can name Jürgen Trittin[6] or Renate Künast,[7] as well as the chairman of the Social Democratic Party [Sigmar Gabriel]. These people are shaping public opinion and trying to stoke such fears, on matters of which they themselves are ill-informed. They have no desire to improve safety, but only to keep their own sinecures and gain votes. Scientific facts are deliberately presented in a superficial and inaccurate way, to serve the ideological agenda.

And that is a very, very bad thing.

## The Question of Dosage

Let's take a look backwards. The discovery of radioactivity itself was a very interesting process; what happened in the last century was extraordinarily exciting.

The first discovery of usable ionizing radiation was by Wilhelm Röntgen, who in 1895 discovered what later became known as Röntgen rays, which he called X-rays. This posed the question: What is radiation really? In this case, it is electromagnetic radiation. Röntgen himself demonstrated within two years that they can be used for positive purposes, on the one hand, such as limiting the growth of a tumor. But on the other hand, he recognized that if he left his hand in the ray's path too long, the skin would develop redness. He reached the conclusion that further exposure of the skin to radiation would not be exactly beneficial for the tissue. That gave rise to the very first dose limit, the so-called erythema dose.

Throughout the past century, it always came down to the concept of dose: What dose would result in what effect? Multifaceted research and investigation sought to better understand the effect of dosage in ionizing radiation. Only then could a maximum permissible dose for humans be established.

If a person is exposed to ionizing radiation, he can suffer somatic damage, above a certain dose. The unfortunate victims of the Chernobyl incident on April 26, 1986 suffered severe somatic damage. The first responders were literally sent into the fire without protection and without the knowledge of the firefighters, and they received a lethal dose. There was no way to save them.

That is the extreme case, the lethal dose. But how high is the dose of radiation that causes death, and what dose would be sure to cause no damage to health?

During the century, the limits of human tolerance for ionizing radiation were studied in more and more detail. This was mainly led by the International Commission on Radiological Protection (ICRP), which consisted of individual independent scientists, including physicians, radiation biologists, physicists, and other specialists. This expert commission published its findings regularly in the form of recommendations that the individual nations could use to set their legal limits for protection from radiation.

But at the beginning, those values were still unknown.

Madame Curie, for example, who worked with tons of uranium pitchblende under very primitive spatial configurations, discovered a new, hitherto unknown, element, which was much more radioactive than uranium itself. She gave little thought to protecting herself, being unaware of any dosage limit for protection from radiation in the chemical separation of this new element, which she called radium. As the result of [what would seem to us today to be] this recklessly high radiation exposure, Marie Curie died of leukemia.

In her honor, the unit of radioactivity was named the "curie." One curie is the amount of radioactivity of a substance that corresponds to the number of decays per second of 1 gram of radium.

The evaluation of many tragic incidents involving ionizing radiation during the past century provided the scientific basis for a more precise definition of limits in dealing with radioactive substances or ionizing ra-

6. Green party politician who as Federal Minister of the Environment, Nature Conservation and Nuclear Safety in the Red-Green coalition government, oversaw the "exit" from nuclear power.

7. Green party politician.

*Marie and Pierre Curie in their laboratory. Marie Curie's discovery of radium led to her death from leukemia; she was unaware of the vital importance of the dosage of radiation to which the human body is exposed.*

diation. Such findings on dose-response relationships were provided, not only by Marie Curie's leukemia, but also, for example, by accidents in the watch-making industry, where women painted the dials with radium-containing luminescent colors, and tapered the brush tips to a point with their lips. And especially for the huge number of victims of Hiroshima and Nagasaki, the individual radiation exposures and effects on health were recorded precisely and analyzed. Today there is no doubt about the effect of ionized radiation and the dose limits that have to be observed. But anxieties of any kind, when dealing with radioactivity, are completely unfounded, if you know what you're talking about.

I myself have spent my entire professional life dealing with radioactivity and ionizing radiation, and therefore belong to the group of people who have been exposed to radiation because of occupation.

During my studies, I was very pleased when my professor gave me a container and said: "Mr. Ringel, here you have a millicurie of cesium-137; please be careful with it—you know the drill. Be careful that none of it gets lost!" That was all. Such a thing could not happen today. I was, of course, able to use it for research, and I was proud to be able to work with it [for my diploma].

Many years later, I also looked at a piece of plutonium. No one here will ever have seen plutonium, because today you absolutely cannot get access to it. Plutonium looks like aluminum—i.e., not particularly interesting. It was sealed in a glass vial. I just wanted to see it. That was still possible at that time, if you observed the necessary safety precautions. Today, plutonium is one of the best secured and protected materials there is, and is subject to strict international controls.

But now let's ask: What are the causes of the public's many unwarranted fears? One cause dates back to the very redefinition of the unit of radioactivity.

### The Difference Between 1 Curie and 1 Becquerel

As you know, the federal Physical-Technical Institution [Physikalisch-Technische Bundesanstalt] is tasked with keeping all units of physical measurement in the country standardized, such as the meter for length, the kilogram for mass, and the second for time. Officials at the Bureau of Standards ensure that any butcher can weigh meat in grams with the same accuracy. An international agreement was reached in Paris on a unit for radioactivity. Instead of the relatively artificially set unit of 1 curie for the radioactivity of 1 gram of radium, a new unit, the becquerel, was introduced, meaning 1 decay per second. But this led, in practice, to a new feeling about the activity in question, because 1 curie of radium has $3.7 \times 10^{10}$ decays per second: $10^{10}$, that's 1 with 10 zeros. What seemed to be not very much activity when you dealt with one 1,000th of a curie, which is a millicurie, was suddenly redefined as 37 million becquerels (which sounds quite large). With the reference-point for radioactivity now being each individual decay of a radioactive substance, the very large becquerel values often caused doubts or fears about dealing with these substances.

www.fzd.de

*Nuclear safety research at the Dresden-Rossendorf Research Center: the Transient Two-Phase-Flow Test Facility. This is the center that Veit Ringel worked at for many years.*

This was important for people who had nothing directly to do with these issues, but who nevertheless played a role. But if one *does* know what amount of radiation one is dealing with, and handles it competently, there is no problem.

At our Nuclear Research Center, the 10 MW research reactor used radiation to generate, among other things, radionuclides, which were then further processed into radiopharmaceutical products. In doing so, highly radioactive substances had to be handled, such as would never be encountered, for example, in a nuclear power plant, where the radioactivity is safely embedded in the fuel elements. But we, for example, had to completely chemically dissolve individual fuel elements in order to obtain the radioactive products of fission required for our medical products. Such work required, of course, a very high level of technical safety for radiation protection, professional competence, and personal dependability on the part of the employees. These processes functioned for many years, and apart from some minor problems, there were never any serious incidents or accidents.

What I want to say is, that one can deal quite normally with such large quantities of radioactive material, confidently and without fear. And these are activities with which the ordinary citizen will never have to deal. Fears are often based on ignorance. To generate or to stir up fears, and even use them for political purposes, is irresponsible and dangerous.

## Radioactive Half-Lives

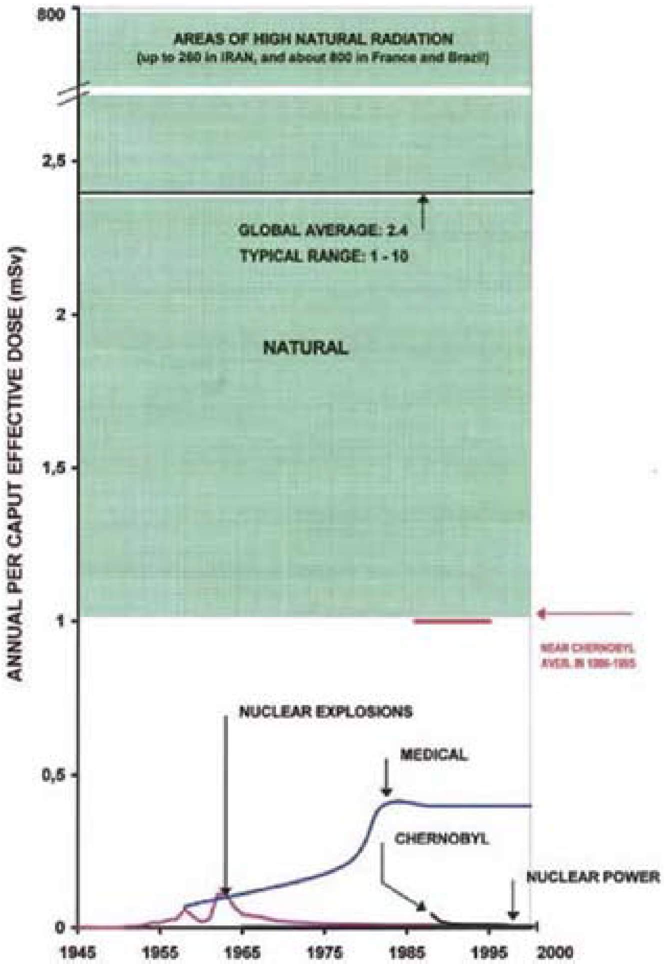
Now I return to the nuclear power plants, and the concerns that people have. I showed you this pebble and said, this shows there is basically no longer any permanent waste disposal problem, because the pebble contains such a relatively small amount of nuclear material, compared to the entire pebble-bed reactor, and so there is, of course, also relatively very little radioactivity requiring permanent disposal in a pebble like this.

The radioactivity of this pebble is based on the fission products that are created by fission of uranium, and it is reduced as this whole spectrum of fission products decays. Each individual fission product decays according to its own half-life. You may know this for individual radioactive substances: Cobalt-60 (still sometimes known as the "cobalt bomb" irradiation device for tumors), for example, has a half-life of 5.2 years; iodine-131 (used mainly for diagnostics of the thyroid gland) has a half life of about 8 days. One half-life means that the radioactivity of the particular radionuclide has decreased to half, and after two half-lives, to one quarter. After seven half-lives, 1% of the initial radioactivity is still present, and after ten half-lives, 1 per thousand—i.e., for iodine-131, I would have to wait 56 days, and for cobalt-60, approximately 36.4 years, for the radioactivity to be reduced to 0.01% of the initial value.

Considering now the different radiation energies that are emitted by the various fission products, we can calculate how long we have to wait until the radioactivity of the pebbles has declined to the point that they can be handled. Since the uranium content is relatively low in a pebble from the pebble-bed reactor, in comparison to the fuel elements in power plant reactors of a different design, after 200 years, the radiation level in a single pebble will have subsided so much that it can again be held in one's hand. So much for the hysteria

*The aftermath of the 1986 Chernobyl accident, showing damage to the main reactor hall and the turbine building. This type of plant was never intended for electric power generation.*

FIGURE 2
**Worldwide Radiation Doses Compared with Chernobyl**




Source: Graph based on UNSCEAR studies. Zbigniew Jaworowski, M.D., Ph.D., D.Sc., "Observations on Chernobyl After 25 Years of Radiophotobia," *21st Century Science & Technology*, Summer 2010, http://21sci-tech.com/Articles_2010/Summer_2010/Observations_Chernobyl.pdf

about the supposedly uncontrollable risks of permanent disposal!

## Handling of Radioactivity

One more word about the fear of radioactive substances. The use of radionuclides in medicine is often very beneficial and necessary, provided that non-radiation methods are not possible. For example, our research institute produced iodine-131 capsules, which were used for the diagnosis of thyroid dysfunction. The amount that the patient takes is relatively small and can be swallowed safely. I myself took it, by the way, at my own request. I will tell you briefly why. (The Greens always responded to this with disbelief and horror.)

The reason for doing so was the reactor accident at Chernobyl on April 26, 1986. The next day, a colleague of mine, whose job was radiation monitoring at our research reactor, had detected small traces of iodine-131 in the air of the reactor building. Since he did not know where this contamination came from, and our media reported nothing about the accident on the first day, he searched in vain for the cause. Only on the following day did it become clear that we were having fallout and rainout throughout Germany, as a result of the accident. As a research institution that was well equipped for doing such measurements, we were commissioned by the authorities to investigate and document what degree of contamination there was in the Dresden area. How did it look? There was contamination on the surface—slight, but measurable.

Now, man's thyroid gland is the best collector of iodine. It can be taken in through inhalation (from the air) as well as through ingestion (by eating). So if I eat green salad that was not washed very well, I'll take it in, which was exactly what I wanted. So I said to my wife: "Buy green salad!" People who heard this said to my wife: "My dear woman, don't you know. . . ?" "Yes, that's exactly what my husband wants to eat!"

I wanted to find out how much iodine-131 I had really ingested. And indeed, some was found in my thyroid, but probably I had just inhaled it. With our extremely sensitive measurement techniques, we could take a curve and say: "Yes, at the beginning it was such-and-such an amount." But we could not determine it exactly in this case, because the amount of radioactive iodine decreases not only with its physical half-life, but also with its biological half-life. Every substance is biologically excreted in the natural way, and the combination of physical and biological half-lives defines how quickly it disappears from the body. Because every thyroid gland acts slightly differently, it was hardly possible to recalculate the radioactivity that had actually been ingested.

So then I said, "No problem, we will do it all again, but this time in a very targeted way." Since we ourselves produced iodine-131, I drank a glass of water containing a very small sample of it, so that we would know exactly how much additional radioactivity there was in my thyroid. So, the measurements were done a second time.

There is simply no problem, if you know what dose of radioactivity was absorbed. This of course is not something people are allowed to do who are not experts—no question about it—but the licensing authorities said: "Yes, do it, that's good, it will give you better values for the analysis of the whole G.D.R."

By the way, since I mentioned the Chernobyl accident, I'll comment on it briefly. Unfortunately I don't have the time to go into the causes and errors that led to the accident, but there are plenty of detailed reports, which anyone can examine.

This particular type of reactor, a so-called RBMK,[8] or graphite-moderated pressure tube reactor, was not primarily developed for power generation at all, but because of its ability to refuel during operation, it was used mainly for the extraction of plutonium bred for Soviet weapons production. This "advantage" came at the price of very unstable reactor performance, which ultimately contributed to the accident. It goes without saying that there are no such reactors in Germany!

## We Need Reprocessing!

One more comment on the situation in Germany. I believe that we will recognize, sooner or later, that renewable energy sources will never gain a real competitive edge, because of production costs. I have no objection to their development and use. They are important and a necessary part of the energy mix, but only where special conditions require them. There are circumstances in which they are the only option. But we will not solve the energy problem with them, contrary to all the propaganda and politically motivated public opinion. As long as the big breakthrough to fusion energy has not been achieved, the peaceful use of nuclear fission energy worldwide is essential, unless people are willing to accept a gradual decline in living standards because of constantly rising energy costs in the construction of huge North-South power lines, e.g., for offshore wind power. A prosperous industry, however, needs the cheapest possible electricity.

Many other countries have recognized this and are thinking about how the fuel elements that are going to be brought to the permanent repositories could be reclaimed at a later time (perhaps after 20 or 30 years, or even much longer), and meanwhile used in reprocessing.

In Germany, we co-developed the technology to separate the still-existing and mostly unused nuclear fuel from the radioactive fission products, and this effort achieved technical maturity. The failure to utilize this material is ultimately an irresponsible waste of resources. The Karlsruhe reprocessing facility was the way to go, but it was not chosen.

Similarly, the technology was made available in Hanau that would make it possible to redeploy recovered uranium, perhaps along with plutonium, in mixed-oxide fuel rods (MOX). That also seems to have become politically undesirable in Germany. But this technology offers an incalculably huge advantage, that of allowing the gradual worldwide conversion of the huge quantities of plutonium in nuclear arsenals, for power generation. Considering that these weapons have an "overkill factor," such that they could kill the entire world population several hundred times over, it seems to me that Germany's abandonment of the idea of working with such projects is simply unbelievable!

The application of many beneficial inventions has

8. The Russian-made High-Power Channel-Type Reactor, the type that was at Chernobyl.

been abandoned in our country, the country that developed them. The list of examples is large. Let's think back to the pebble-bed reactor that we discussed at the outset: The technology comes from Germany, but it is others who will use it. The high-temperature reactor offers the possibility of providing process heat for the chemical industry; for example, it could be used to liquefy coal, producing gasoline or plastics, which would certainly be much better than burning coal. This type of reactor could also be used in Africa to solve the problems there which we have been discussing. I am thinking, for example, of seawater desalination for areas with water shortages.

*The fast-breeder reactor in Kalkar, Germany, was closed down in 1991 and turned into an amusement park. Its cooling tower is now a "climbing wall." Without reprocessing of nuclear fuel, Germany faces a cold, dark future.*

Specifically in the nuclear field, high technology was developed in Germany that was never used in our own country. We can also think of the fast-breeder reactor, which could definitely be permitted in a resource-poor country. Developed in Karlsruhe, built in Kalkar. The technology was discarded, as many others have been. Hundreds of billions went down the drain. It is really unimaginable.

And we even shrink from using conventional technologies in our own country. Think of the Transrapid. I was lucky enough to see it in operation in Shanghai. It was advertised in the airport that the travel time from the airport to the city center is given to the exact second. In Germany, nothing like that is feasible.

What's going on in Germany? It often seems impossible to persuade the masses. But over longer periods of time, this is easily conceivable. Sometimes it takes a legislative session, sometimes it takes a little longer. Today's youth provide an example: They can no longer imagine that a very large majority of Germans once cheered for Hitler, although all they had to do was look in his book *Mein Kampf*, to find out what sort of a person he was. So the hope is not unfounded, that we will once again reach a paradigm shift, in terms of science-based, pro-technology environmental awareness. As I said, it is often a matter of lack of knowledge of mathematics and natural sciences; but often it is political-ideological power struggles that play the decisive role.

Let's listen to what Greenpeace founder Patrick Moore said in an interview.

He was asked, "Mr. Moore, why did you leave the Greenpeace organization in 1986?"

The answer: "The environmental movement is not always guided by science. At first, many of the causes we [at Greenpeace] championed, such as opposition to nuclear testing and protection of whales, stemmed from our scientific knowledge of nuclear physics and marine biology. But after six years as one of five directors of Greenpeace International, I observed that none of my fellow directors had any formal science education. They were either political activists or environmental entrepreneurs. Ultimately, a trend toward abandoning scientific objectivity in favor of political agendas forced me to leave Greenpeace in 1986."

"They are simply against something, without having really examined it scientifically and objectively. I just didn't want to be a part of that any longer."

I think that Patrick Moore has expressed what I also wanted to say. We must all draw the appropriate conclusions together.

Thank you for your attention.