

A CONVERSATION WITH PATRICK MOORE

Why Former Greenpeace Leader Supports Nuclear Energy

Gregory Murphy, associate editor of 21st Century Science & Technology and a veteran of the Nuclear Navy, spoke with Dr. Patrick Moore on April 28. Moore, one of the five co-founders of Greenpeace in 1971, is currently the chairman and chief scientist of Greenspirit Strategies, which he set up in the 1990s to promote scientific and pro-development solutions to environmental problems. Moore also serves as the co-chair of the Clean and Safe Energy Coalition and a consultant for the Nuclear Energy Institute.

Murphy: I haven't talked to you since the 2005 American Nuclear Society meeting, when you gave a presentation. It was quite a shock that you were the only upbeat person on that panel. It's hard to believe, because the 2005 Energy Bill had just given the nuclear industry loan guarantees—perhaps not enough, but a good start—but they were still in the mode of the underdog, under attack. Things have changed in the last three years.

Moore: Yes, thank goodness; it is a different atmosphere now, most definitely in that regard.

Murphy: Yes, it's changing, and the possibilities for nuclear are increasing. I'd like to start with how you went from being a founder of Greenpeace, and against nuclear power, to where you are now.

Moore: The reason I changed my mind on nuclear energy is fairly simple, and it started with the fact that our initial campaign in Greenpeace was against nuclear weapons testing, and against the use of nuclear weapons in general, and the fear of an all-out nuclear war. It was during the Cold War, in the late 1960s, early 1970s. It was also the height of the Vietnam War. There was just a lot of war going on, and we were afraid that there was going to be an all-out exchange of



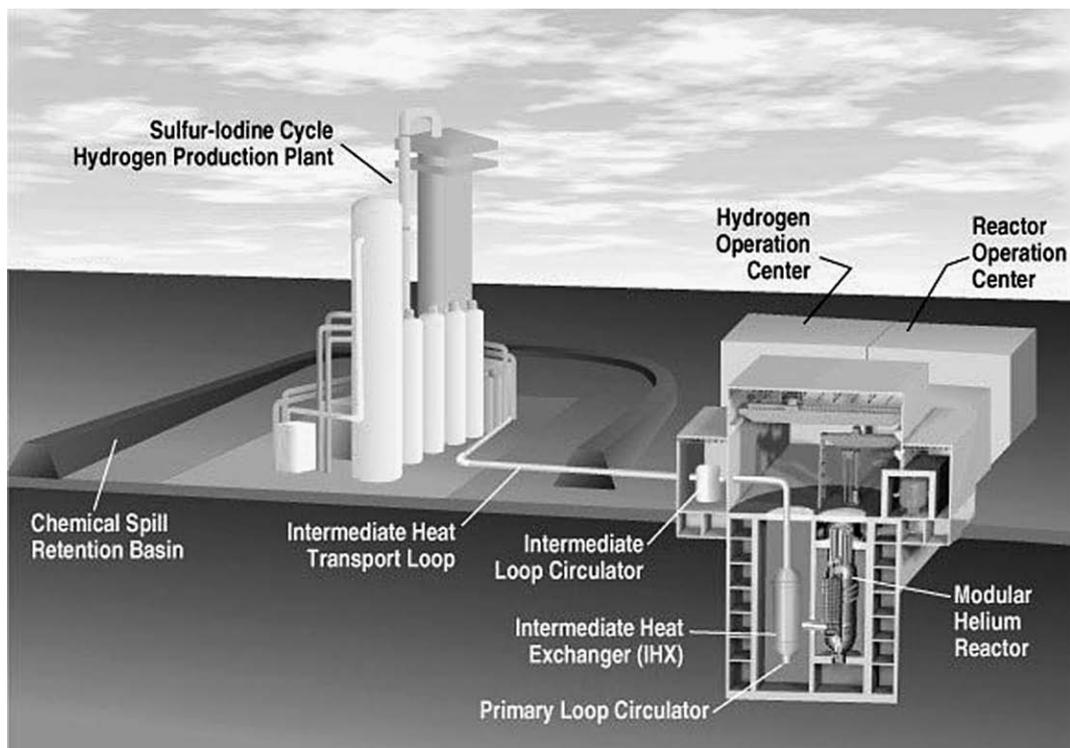
Clean and Safe Energy Coalition

Patrick Moore says he was forced to leave Greenpeace in 1986, because the organization changed to focus on political activism, leaving science in the dustbin.

nuclear weapons, and we determined that we were going to stop that possibility.

So, we were totally focussed on the weapons side. And I believe, in retrospect, that we made the mistake of lumping nuclear energy in with nuclear weapons, as if all things nuclear were evil. And in retrospect, that would be as wrong as lumping nuclear medicine in with nuclear weapons. Obviously, nuclear medicine is a beneficial use of radiation and nuclear technology; it successfully diagnoses and treats millions of people per year. Most of those radioactive substances, the medical isotopes that are used, are actually produced in nuclear reactors, so that is clearly a good use for nuclear reactors.

And, of course, one of the other good uses of nuclear reactors is to produce electricity for peaceful purposes.



General Atomics' GT-MHR (Gas Turbine-Modular Helium Reactor) and the South African Pebble Bed Modular Reactor, are high-temperature gas-cooled nuclear reactors that are meltdown proof and versatile, providing high quality heat for industrial processes, in addition to electricity. This schematic shows the GT-MHR in combination with a hydrogen production plant.

Courtesy of General Atomics

So, we made a mistake in my estimation. I don't think it was a very discerning approach to the technology, because there are lots of different technologies that can be used for both good and evil, many different things, including fire. So, if we had said, "We're not going to use fire, because you can burn down a city with it," then we would be forgoing all the beneficial uses of fire, like staying warm and cooking food.

I think that applies to many technologies, and for me it should be no different for nuclear energy, that we should use the beneficial uses of nuclear energy and avoid using the destructive ones. It's as simple as that—just like we do with other technologies.

So that's what caused me to change my mind. And also the realization, as I was beginning to think about climate change, in particular, of how do we get out of having 86% of the world's energy as fossil fuel? How do we change that? And it was obvious to me—it's been obvious to me all along—that wind and solar can't really change that very much. But what can change it, is nuclear power, plus hydroelectricity where it is available, and there's still a lot of potential hydroelectric power in the world.

The environmental movement has been busy over the last 25 years, stopping hydroelectric projects around the world, and trying to prevent nuclear power from being adopted, when these are clearly the two most promising and realistic alternatives to fossil fuels for electricity production.

So my analysis, I think, is fairly clear. We made a mistake,

and I'm trying to do my best to correct it, from my point of view.

New Reactors: Meltdown Proof, Versatile

Murphy: It sounds like you've gone a long way to do that. I moved to the Washington, D.C. area a few years ago from Idaho, which is a state that has used a lot of hydroelectric power, with also nuclear power. Adm. Hyman Rickover set up a nuclear power school there in the late '40s, early '50s. . . .

Moore: I was just at the Idaho National Lab last week. I spent two days there, touring, and lecturing, and community meetings and all that. It was really interesting. And learning about their version of the high-temperature helium-cooled reactor, which I guess will end up being in competition with the Pebble Bed Modular Reactor out of South Africa.

Murphy: Yes, that's the General Atomics model, the GT-MHR. And both of them are great designs, and they are really taking apart some of the things that the general public questions about nuclear power—the safety issue and meltdowns. And then the other question that comes up is the "waste" that is produced—which is actually not waste at all—and the proliferation issue. How do you address those issues when you get asked about them at public meetings?

Moore: Well, certainly the Pebble Bed Reactor is a meltdown-proof design, which is a new thing, so there's no

We have no right—it's an ethical or moral issue for me—that here we enjoy these benefits of modern technology, and medicine, and communications, and energy production, and yet some people among us think it is their duty to prevent other people from having those very technologies which have made it possible for themselves to have good and long lives.—Dr. Moore

need for as many safety systems and backup systems with it, as there is with conventional reactors. Also, it will be a very versatile reactor with high temperature, not only producing hydrogen directly, but also producing high-temperature steam, which is what's needed for a lot of industrial processes. So I think it's going to be a revolutionary machine.

Murphy: The Japanese have already shown on their test reactor at the Japan Atomic Energy Research Institute, that they can maintain the reactor outlet temperature at a high enough level to make hydrogen, using their water cracking system. That's a great achievement in a Pebble Bed-type reactor. Also, that the high process heat could produce better fertilizers and desalination of seawater for places that are water-stressed—

Moore: —as a by-product, essentially. Desalination could be an additional thing you could do, along with producing hydrogen and steam. I realized how powerful the technology was when I was shown what it could do to the conversion of coal to liquid fuels. There is a big plant in South Africa, called Sasol, which is now the world's largest plant of this nature, and it's also the largest single emitter of CO₂ on the planet—30 million tons a year from one factory.

That's because two-thirds of the coal is used either to produce heat, or to produce hydrogen. And the carbon from those two processes is going into the atmosphere. Whereas with the pebble bed reactor, all the heat and all the hydrogen can be provided by the reactor, thus allowing 100% of the coal to be converted into liquid fuels, without CO₂ emissions, as opposed to now, with only one-third being turned into the liquid fuels, with huge emissions. So that's the kind of fundamental change it can make to an industry.

I was impressed by that, and it's true that since I've joined the Clean and Safe Energy Coalition as co-chair, I have been exposed to a very wide range of knowledge about nuclear, and energy in general, and I have had the benefit of travelling to quite a few places, like South Africa, like the Idaho labs, where great groundbreaking work is being done on the future of energy technologies, and that's been very exciting and interesting for me. I've been one who's been trying to keep learning all my life, and always open to new information and

new ideas, and I've sure managed to learn a lot since I became reacquainted with this industry.

Poverty: The Worst Environmental Problem

Murphy: Your public presentations and debates show that you have a wide understanding and knowledge base. You've identified the role of nuclear power with the climate change issue, and the American Nuclear Society is trying to campaign on that, trying to base the nuclear renaissance on that. But in reality, we need these new nuclear technologies, like the Pebble Bed Modular Reactor, for developing the world. Has the need for development broadened your view of nuclear, beyond the climate change issue?

Moore: I've long been pro-development, maybe even before I changed my view on nuclear energy. I've long agreed with [journalist] Greg Easterbrook, that poverty is the worst environmental problem in the world. I understand the relationship between people becoming wealthier and caring about their environment, about people becoming urbanized, having smaller families, and being better educated. I believe that mechanization of agriculture in the developing world is really important, and the electricity supply is very important for that to happen. Electricity underlies a lot of things, and is particularly very strongly correlated with literacy, and education, and health care.

Also, people who have electricity live longer than people who don't have electricity! People without electricity have an average life expectancy, I've heard, of 44 years. And I believe it.

The reason I wanted to appear in the "Great Global Warming Swindle"¹ documentary was not so much because I wanted to debunk or deny climate change, but because I wanted to talk about the effect the environmental movement was having on people in the developing world, basically holding them back and denying them the very technologies that they themselves benefit from every day. To me, that's the key point when it comes to the development equation.

1. A film by the documentary-maker Martin Durkin, which presents the arguments of scientists and commentators rebutting the hoax that CO₂ produced by human activity is the main cause of climate change. It particularly debunks the hokus-pokus presented in Al Gore's movie, "An Inconvenient Truth."



Courtesy of Patrick Moore

This 1971 photo, taken sometime after the founding of Greenpeace that year, shows Moore with other Greenpeace protesters. He is in the top row, under the letter “P.”

We have no right—it’s an ethical or moral issue for me—that here we enjoy these benefits of modern technology, and medicine, and communications, and energy production, and yet some people among us think it is their duty to prevent other people from having those very technologies which have made it possible for themselves to have good lives and long lives.

That, to me, is really bad stuff.

Murphy: The environmental movement doesn’t see poverty as having an impact on the environment.

Moore: They’re wrong. I tell them, “You go to Bangladesh, or Kenya, or Guatemala, and tell me that poverty isn’t having an impact on the environment.” I just can’t believe that people think like that. You go to Sub-Saharan Africa, and look at the fact that every last bush has been removed, and that goats are eating anything that tries to grow back out of the ground—and that is largely caused by poverty. Overpopulation and poverty are a bad combination.

Murphy: [Malthusian author] Paul Ehrlich says that one American’s use of resources equals 80 Bangladeshis.

Moore: I know, but he’s wrong. He’s just plain wrong. Your negative impact on the environment has far less to do with the absolute amount of material and energy you use, than it has to do with the practices and technologies you employ in getting your stuff from the environment. To me, that’s clear.

Murphy: Another whipping boy of the environmental movement is “industrial society,” which they benefit from also.

Moore: Yes: People should be able to see that the environment in the United States is actually pretty clean, especially compared to what it was 30 years ago. The rivers and the air, etc., are relatively not too bad, and the forest and farmlands are in beautiful condition by and large. But you go to some of these other places, and it’s not that way. There’s the worst soil erosion and deforestation and destruction of species; people hunting species that are totally endangered. We’ve gotten pretty well away from that here.

An Anti-Science Religious Movement

Murphy: The whole environmental movement seems to be geared now towards PR campaigns, heavy lobbying. That’s always been part of it, but since the late ’80s, early ’90s, it seems that more of the wilder, more anarchistic factions have taken over. They’re totally reactionary, not even thinking about science and any kind of intellectual work.

Moore: It’s purely political and ideological. And [author] Michael Crichton is right that the environmental movement, to a large extent, has become a religious movement. It is about belief and not about science. Whereas I’m the first to be accepting of religious belief, I don’t think that has a place in determining our environmental policies, because they have to be based on science and good knowledge. The environmental movement was basically hijacked by the political activists a long time ago. And they prefer to use sensation and fear and misinformation—propaganda—as a way to get people to support them. Whereas I think science and logic are the correct elements that we should be using, to try to get people to understand what’s going on, and what the best way to deal with it is.

As a result, we have an environmental movement that has so many logical inconsistencies in its basic policies. They’re saying we should use less wood. Well, great, then you use more steel and concrete, and it takes fossil fuels to make steel and concrete, whereas wood is made from sunshine. So they end up being *against* the most abundant renewable material on Earth.

And then there are hydroelectric dams, which are the most abundant renewable energy sources on Earth by far—nothing

else comes close to it—and they are against that too. So they end up being against the two main renewable resources on the planet—wood and hydroelectric power. And they are against them, even though they say they are in favor of renewables. That makes absolutely no sense to me.

Murphy: And wind—

Moore: It's not as if wind energy doesn't have environmental impacts. So if they are going to argue that hydro has environmental impacts, well, so does wind. So how do you choose one over the other? When you make a hydro dam, you basically turn a valley into a lake. It's not as though you are turning it into a toxic waste dump. It's a lake, for goodness' sake. What's wrong with a lake? Should we drain the Great Lakes because we want more valleys? We don't like lakes? I never did understand that one.

I understand that you lose a valley when you put a dam in, and sometimes there's things in that valley that you don't want to lose, like maybe there's an old graveyard in there, or a town. Well, you have to weigh the pluses and minuses of that. The Chinese had to build new towns for a million people, when they flooded the Three Gorges, but that dam [generated enough electricity to prevent] 40 coal-fired power plants from being built, and stopped flooding, which killed tens of thousands of people in bad years. And it made controlled irrigation possible so that they could grow twice as much food.

So you weigh all that up and you decide, instead of just being anti-dam. Period. End of question. That doesn't make much sense, especially when it's renewable. "Solar powered." Everything is solar powered, you know. If solar power is good, then hydro is good. So is wood.

Murphy: The environmental movement supports solar, but they don't realize how toxic the process is to make solar collectors.

Moore: Exactly! Not only that, there's so little energy produced from them, that they cost about 75 cents per kilowatt hour.

Murphy: What you get is totally ridiculous. The wind energy guys are always complaining about the potential cutting of the production tax credits or whatever. But if they didn't have these subsidies, they wouldn't exist. Yet, they complain about nuclear "subsidies."

Moore: Per kilowatt hour, nuclear gets very little, compared with wind and solar, which get a lot.

We Need Nuclear Reprocessing!

Murphy: So in talking to the public, when they bring up nuclear waste, how do you respond?

Moore: I just remind them that France has already figured this out, and so has Japan; and Britain and Russia are doing it too; and that recycling is the solution. And we

TABLE 1

U.S. Federal Energy Subsidies per Megawatt Hour (2007)

Refined coal	\$29.81
Solar power	\$24.34
Wind power	\$23.37
Nuclear power	\$ 1.59

Sources: Nuclear Energy Institute/DOE.

These figures are from a DOE Energy Information Agency report, "Federal Financial Interventions and Subsidies in Energy Markets 2007," requested by Sen. Lamar Alexander (SR/CNEAF/2008-01) and released April 9, 2008. The full report is at www.eia.doe.gov/oiaf/servicrpt/subsidy2/index.html?featureclicked=2&

The breakdown per megawatt can be found at <http://neinuclearnotes.blogspot.com/2008/04/inside-us-energy-subsidies.html>.

should look at that so-called nuclear "waste" as actually one of our most important future energy resources, because the energy is in there and we know how to get it out! France has 22 of its 60-odd reactors refined in their design to use the recycled nuclear fuel, and they're burning it. Basically, you turn 5 years of fuel into 50 years of fuel overnight. It's crazy to throw away the uranium and plutonium and not use it as a fuel, when we know how to do it.

Murphy: In the United States, until 1975, we were set up to reprocess, but that year, the neocons—Cheney, Rumsfeld, et al.—decided that because of the "proliferation" issue, we shouldn't reprocess nuclear waste any more.

Moore: Well, they were wrong. No one else agreed with them on that.

I don't know why they thought that if the United States did that it would change anything. Because France has continued to recycle, so how has the American decision in any way contributed to the reduction of proliferation in nuclear weapons? No way. It was a wrong-headed decision in the first place. Those guys have made a few wrong-headed decisions along the way!

Murphy: Most recently, quite a few.

Moore: Too bad they got in charge.

Murphy: We've tried all we could to get Congress to right that situation, but it's the silly season now with the election—deciding that they can just make do until January.

Moore: I guess. But I hope it sorts itself out then, though.

Murphy: They're going to inherit a situation that is quite interesting....

The other question I have for you is on genetically modified food. You've been in favor of it, and now, with the food crisis going on, which is mainly driven by the World Trade Organization, bad trade policy, telling countries that used to be self-sufficient in food—like Pakistan, India, the Philippines—that: “No, no you can't be. What you have to do is put out a cash crop, and buy what you need on the market.” Over time, they did that. And all it took was two years of this ethanol boom around the world to block the food supply.

Moore: Do you think that the ethanol boom is more responsible for the crisis than the rising price of fossil fuel inputs into agriculture?

Murphy: I think what's happened is twofold: Speculation on the energy end to bring up the prices, and food scarcity because market forces are speculating on commodities. People who were speculating on mortgages a year ago, are now speculating on food prices.

Moore: Bastards!

Murphy: And now you have the same people who were doing that, promoting the WTO idea, “Don't be self-sufficient in food.” The United States, 30 years ago, realized, with the Green Revolution, that self-sufficiency in food was a way to have security in a country. Now you have countries falling apart because food has become scarce. And in most places they get told, “Buy it on the market.” But the food is just not there now.

And people like Lester Brown [of the Earth Policy Institute] say the industrialized world needs to come down the food chain, and go back to basics. But the basics are just not there now, because of all these foolish policies, which are totally Malthusian driven. I'm surprised Malthusian Paul Ehrlich hasn't put out an op-ed saying “I told you so,” because he thinks people outstrip resources. He's laying low on this.

Moore: So are all the climate folks.

Murphy: Most of them realized about a year ago, that you're using a lot of water out of the aquifers to make ethanol—so that's why I was bringing up the idea of desalination of seawater. Because in certain areas of the world—aquifers in the Darfur region and Egypt, for instance—that's the main issue: water.

Moore: They're depleting the water table.

The Opportunity in the Crisis

Murphy: Well, the Chinese character for “crisis” is the same one for “opportunity,” so if we can get the energy sector going with nuclear power in a big way—several hundred plants have been announced all over the world now.

Moore: Well, we need a couple of thousand.

Murphy: Jim Muckerheide [Massachusetts State Nuclear Engineer] says 6,000....

Moore: That would produce twice as much electricity as the whole world is producing today. There's no need to replace the hydro part, and you can't eliminate all the fossil fuels. I think 6,000 is a bit much. It seems to me that the last time I looked, 3,000 would do the job....

Murphy: You have to think really big!

Moore: Well there's 400 and some odd now, and all we have to do is multiply that by seven or so. It's not exactly a far-fetched idea.

Murphy: Not at all. And instead of burning fossil fuels in your tank, or to make electricity, you can use them to make better plastics and better materials. This campaign to ban phthalates in plastics is insane.

Moore: Oh, it drives me crazy! They have all these campaigns to ban things where there's no harm been found. It's the same thing that happened with the BPAs, bisphenol A [an organic compound in polycarbonate plastics]. The Canadian government did studies, found it wasn't causing any harm, but they banned it. That's the way it works.

Murphy: It's a good way to shut down development.

Moore: They said that the margin of error wasn't enough. They wanted a bigger margin of error. They wanted to be more cautious.

Murphy: The precautionary principle....

Moore: The truth is, that when it comes to baby bottles, there are many other things you can make them with, so you can say, “So what? It's not a big cost/benefit problem.” But they never stop at that; they'll be trying to ban it in everything, and then it does get to be a cost/benefit issue, especially when it's not hurting anything they know of.

Murphy: That's how you shut down the advance of technology, development. They're totally anti-science and anti-technology. Some of the Greenpeace canvassers you see on the street, trying to get people to sign up and give money, they say “We're against technology.” So I tell them, “Well, if you give me your keys, your cell phone, and computer, and I might believe what you're saying.”

Right now, in the middle of a financial crash, food price inflation, and everything, it's time for the power of human creativity to start making the discoveries necessary to advance society again.

Moore: If they would let it.

Murphy: That part is our job, to get that going.

Moore: Absolutely.