HumanProgress

2022 was a momentous year for nuclear power.

Facing the energy crisis, governments around the world reversed course on denuclearization.

And in December, scientists at the Lawrence Livermore National Laboratory achieved fusion ignition for the first time in history, giving new momentum to the industry.

In the latest episode of The Human Progress Podcast, Chris Barnard, the Vice President of External Affairs at the American Conservation Coalition, joins Chelsea Follett to discuss these developments and the future of nuclear power.

Watch the episode **here**.
Or, listen to the **audio**.

Below is an abridged transcript featuring some highlights from the interview.

Before we get into nuclear fusion, could you walk through the history of nuclear energy?

Nuclear energy emerged from the Second World War, primarily within a military context. But scientists soon realized that nuclear could also be an energy source that was abundant, clean, and very reliable. In the '60s and the '70s, nuclear took the world by storm, and countries across the world started building lots of nuclear plants.

At the same time, with the looming specter of World War II and the bomb, there were growing anti-nuclear movements that saw this energy source as a threat to world peace. Then you had Chernobyl, and a lot of people began fearing that nuclear plants were a huge threat to the local community.

Obviously, that doesn't really reflect the facts. The death toll from Chernobyl was mostly due to communist incompetence rather than inherent problems with nuclear energy. But because of that public relations perspective, the Nuclear Regulatory Commission created all kinds of regulations around the production of nuclear plants.

Ultimately, as Lord Matt Ridley said, we turned nuclear energy from a very, very safe energy source into a very, very, very safe energy source, but at what cost? And that cost really is clear; in a period of three decades starting in the 1990s, the Nuclear Regulatory Commission approved only one new reactor design. Globally, nuclear energy provided around 17% of energy production in 1996. Today, it's only around 10%.

You published a piece last year in The Wall Street Journal titled "The Global Nuclear Power Comeback." Could you describe this shift that we're seeing in how people are thinking about nuclear power?

The Russian invasion of Ukraine caused many countries to wake up to the fact that they can't have clean energy, reliable energy, and secure energy without nuclear energy.

Japan pretty much reversed its denuclearization decision, South Korea is building new nuclear plants, and even Germany has been talking about extending the lifespan of their nuclear plants. Belgium, which had set a deadline to close all the nuclear plants in the country, reversed that decision.

Could you describe nuclear fusion and this latest breakthrough? How big of a deal is it?

All the nuclear plants that exist today use nuclear fission, meaning they split atoms to create energy. Nuclear fusion is the process of bringing atoms together. It can theoretically produce four times more energy than fission with a lot less radioactivity and very minimal waste.

However, in practice, producing a fusion reaction has always required more energy than the reaction itself produces. But that was up until a month ago, when the Livermore National Lab achieved fusion ignition for the first time in history, meaning they created a fusion reaction that produced more energy than it used.

The catch is that the reaction lasted less than 100 trillionths of a second. And when you consider the electricity used to charge the lasers, the whole process consumed more energy than it produced. But it showed that fusion energy is scientifically possible; it will just take continued innovation and technological breakthroughs.

Lord Matt Ridley, who I mentioned earlier, believes that we might see a commercial fusion reactor within the next 15 years. Others say it'll take a little bit longer. It might be by 2050, but whatever the date is, it's going to be huge for humanity. Fusion can produce basically limitless clean energy at an extraordinarily affordable cost, and abundant energy is the basis of a modern economy. It'll help us develop more quickly, lift people out of poverty, and it will reduce air pollution from fossil fuels, which still kills thousands of people every year. And obviously, it will help reduce climate change and hopefully minimize our climate impacts.

What role does the private sector have in the development of nuclear fusion?

There's an enormous amount of interest from the market in nuclear fusion. There are over 20 privately funded nuclear fusion ventures worldwide, with around 2.8 billion dollars in investment between them. Each company wants to be the first to commercialize fusion, and that competition will drive innovation and build upon the investments that the government has already made in R&D.

You've also urged continued support for traditional fission reactors. Could you expand on that?

Nuclear fusion may still be a few decades away from being commercialized, and we have significant energy needs today. If we want to start tackling climate change right now, provide clean and affordable energy right now, and reduce our reliance on countries like Russia and China right now, we need traditional nuclear plants.

Why is nuclear power preferable to wind or solar?

There is no example of an advanced economy fully powering itself on wind and solar energy. Wind energy only works when the wind blows, and solar energy only works when the sun shines. And since neither the wind nor the sun blow or shine 24/7, wind and solar have capacity factors, or the amount of time that they produce energy, of between 20% and 30%, as opposed to nuclear, which has upwards of 90%.

You need to have what we call a base load source of energy to back up these less reliable sources of energy. Fossil fuels have done that for most of recent history, but so has nuclear, especially in countries like France and Sweden.

Another issue with wind and solar is the sheer amount of physical space they take up. Solar panels require 400 times more space than nuclear to produce the same amount of energy. One nuclear plant can provide electricity for several hundred thousand homes on a few acres of land. The third problem I'll mention is the material input. Solar power requires all kinds of critical minerals, most of which get sourced from China, often unethically. Nuclear, by contrast, provides a ton of electricity with minimal material input.

*Read the full transcript **here**.*
