



Article



Anthropocene Institute

32 w • Open for Climate Dialogue™



The Fossil-Free Future of Coal Plants

The mining and burning of coal is worsening the effects of the climate crisis. We all know that.

However, can we do something about the coal processing plants themselves? Can these dirty coal plants be retrofitted to process fossil-free energy instead of dirty energy? It may surprise you to know that the answer is yes.

In a recent panel discussion sponsored by the Anthropocene Institute, experts gathered at the [Reuters SMR & Advanced Reactor 2023 conference](#) to explore the possibilities of repurposing coal plants using advanced nuclear reactor technologies. The panel, titled *Recommissioning Sites & Re-Engaging People*, shed light on the benefits, challenges, and potential paths forward in transitioning from coal to nuclear power. It explored the challenges, opportunities, and ways to create the capacity for a just transition that benefits workers and the environment.



So, why is it worth repurposing coal plants instead of simply tearing them down? The repurposing of coal plants is worthwhile because it allows for the preservation of valuable assets and helps support the energy professionals working in those communities.

"As I look at achieving a cleaner economy, and how much we need to build, not just technology but many technologies, you start to understand the importance of preservation of assets," said Christine King, Director, Gateway for Acceleration in Nuclear Initiative. *"And then when you think about the retirement of these coal stations and the communities they're in, if you are not compelled to help those energy professionals continue to be energy professionals, I'm not sure you've got a heart."*

The importance of using data

Christine King highlighted the need for comprehensive planning, including workforce training, economic considerations, and technical aspects like integrating steam supply, water, and permitting.

Adam Stein, Director, Nuclear Energy Innovation Program, emphasized the importance of using data that some coal sites have been collecting for decades, as it can help determine the suitability. He also discussed the site characterization process, including assessing boreholes, weather data, and other important factors.

Mitigating risks

Kirsty Gogan, Co-Founder and Co-CEO of TerraPraxis, highlighted the need to optimize existing infrastructure, utilize current transmission systems, transfer skills, and act swiftly to mitigate risks. She noted that it is a \$2 trillion opportunity globally, but also recognized the challenges posed by community reliance on coal plants for jobs and reliable power. Gogan emphasized the need to act quickly at scale, ensuring the availability of the workforce and communities during the transition.

The transition from coal to nuclear can be facilitated by state laws and regulations. Considering the critical factors in siting, the panelists agreed on the importance of valuing existing coal plant assets and honoring the communities reliant on them for jobs and reliable power. They stressed the need for state laws and regulations that encourage and speed up the optimization of existing infrastructure, and utilize current transmission capabilities, transfer skills, and action to mitigate the risk of losing the existing coal fleet.

The experts highlighted the importance of swiftly addressing [coal ash](#) contamination at the existing sites, supporting energy professionals, preserving assets and planning for a just transition in coal-dependent communities. Only then a successful transition from coal to nuclear power can be achieved, benefiting both workers and the environment.

The growing need for energy

At [the conference](#), Anthropocene Institute also sponsored a presentation by [TerraPraxis](#), titled *Fast, Low Cost, Repeatable: Designing the Global Coal Repowering System*.

Eric Ingersoll and Kirsty Gogan, Co-CEOs of TerraPraxis, began by presenting the ambitious IPCC targets for tackling the climate crisis, as well as the massive scale of clean energy required to meet global energy demand. As much as [installed 700 gigawatts of nuclear per year by 2050](#) would be needed to repower all the coal plants and to replace oil and gas. The speed and scale needed to achieve these goals can be daunting, but nuclear energy could play a big role in electricity generation and in targeting the hardest to decarbonize sectors, including coal — the single largest source of global carbon emissions today.

accommodate a variety of site conditions and quickly, repeatedly, and without new safety reviews each time," said Gogan.

While the nuclear industry has not been known for speed and scale in the past, Ingersoll provided the example of one conventional nuclear plant that achieved 560 megawatts per year and employed 5,000 workers on site — that's 112 kilowatts per worker per year at a cost of \$4,285 per watt. TerraPraxis seeks to take these types of achievements and convert successful nuclear technologies and capabilities into products that can be deployed quickly and at scale.

The kind of difference we need for x50 - x100 scale up



Basic Gigafactory Stats

- 5 years: from construction start to full production
 - 500,000 vehicles per year
 - 20,000 employees
 - ~\$30B in annual revenue per factory
 - ~250kW per car
 - 125,000MWe per year
 - 5,000kW per worker per year
 - \$240/kW



Basic Project Stats

- 5,600MWe
- ~10 years, excluding commissioning
- \$24B construction
- ~5,000 workers
- 560MWe per year
- 112kW per worker per year
- \$4,285/kW

X 223 more
 X 45 more
 X 18 less

TerraPraxis / Repowering Coal Fleets for Deep Decarbonization

Retraining of existing workforce

The TerraPraxis solution consists of standard reactor units that go into a standardized set of seismically isolated buildings equipped with the proper safety systems. "The high-temperature reactors can be linked to the existing plant via a thermal storage energy system. There's also the possibility to repurpose the existing coal plant infrastructure and retrain the existing workforce," said Ingersoll.

Added Gogan, "Fundamentally, this is about lowering all the barriers to entry, making this a very investable and easy decision for coal plant owners. Or, project developers can decide to deploy these standardized building systems designed for new, clean steam generation and supply that to existing coal plants and to other industrial applications as well."



Kirsty Gogan and Eric Ingersoll, Co-CEOs of TerraPraxis speak to the crowd at Fast, Low Cost, Repeatable: Designing the Global Coal Repowering System about TerraPraxis' climate solution.

To achieve its vision, TerraPraxis has assembled a world-class consortium of partners including Bryden Wood, Microsoft, Massachusetts Institute of Technology (MIT), and University at Buffalo, along with a consortium of global utilities.

Find out more about the [Repowering Coal initiative](#).

100 agrees

1M 6 4

Agree

Comment

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Anna Michel • 31 w

Awesome article and such an important topic to spread awareness about!
If anyone wants to learn more about Repowering Coal and likes podcasts, I highly recommend this episode by SpaceshipOne: <https://spotifyanchor-web.app.link/e/CKoKU1xOEAb>

Reply Agree Share ...



Patrick Kiash • • • 32 w

A very informative article, nice to know it can be doable...and the process through data,etc.

Reply Agree Share ...

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Tabitha Kimani • • 32 w



Munene Mugambi •  • 32 w