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NUCLEAR ENERGY AND THE GREEN TRANSITION

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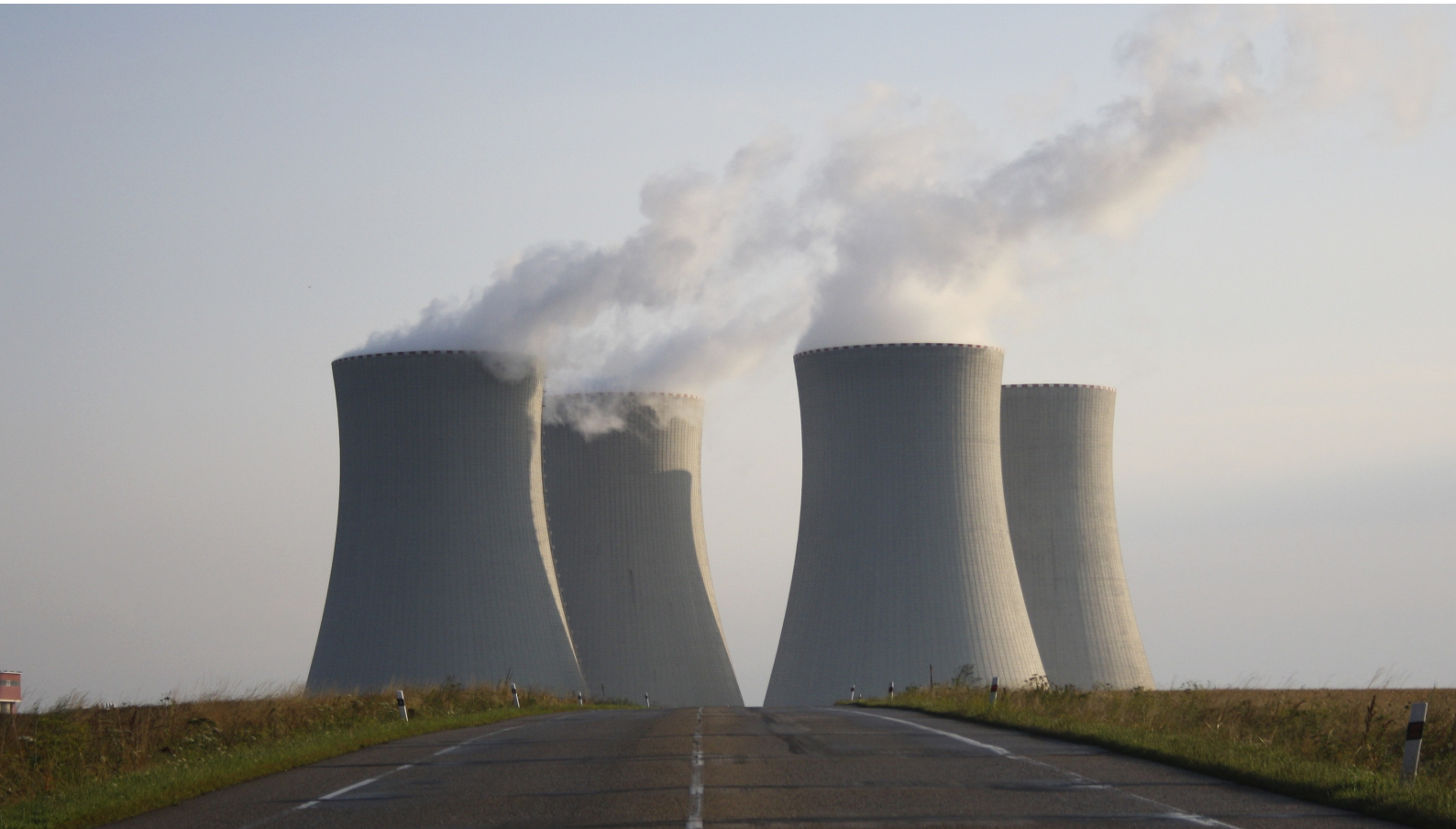
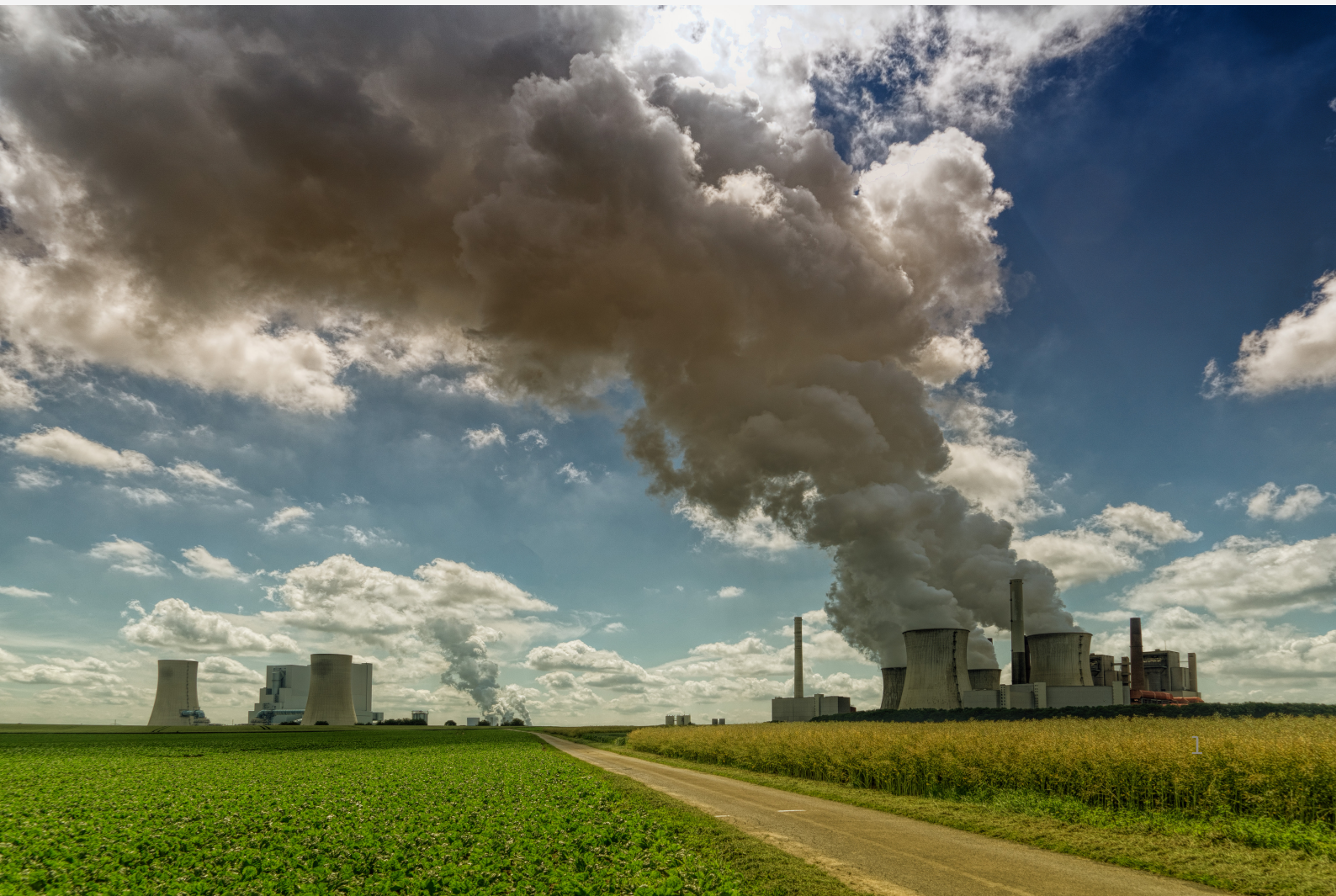
Written by Arthur Kearney, Researcher, Ethical Screening



Nuclear energy and the green transition

Does the EU Joint Research Centre's Nuclear energy assessment signal a shift in the Nuclear investment debate?

For decades, nuclear energy has occupied an uneasy and deeply politicised position in energy policy frameworks, and has often been shunned by investors. In light of ever more ambitious climate targets and the announcement of the EU Joint Research Centre's Assessment of Nuclear Energy as a clean and safe alternative, EU policymakers are expected to label nuclear energy a green investment under the EU's green finance Taxonomy. Its potential implications could signal a defining shift in the role of nuclear energy in investment frameworks, and therefore the green transition more broadly.



Introduction

Since 1996, the share of nuclear power as a percentage of global energy has almost halved. Spain, Germany and other western European countries have rapidly denuclearised, labelling it a "technology of the past", and have pursued decarbonisation strategies driven by a planned 100% conversion to renewables.

Public opposition also remains high. Nuclear disasters in Fukushima, Chernobyl and ‘Three Mile Island' have become deeply engrained in the public imagination - reflected in the recent success of HBO drama ‘Chernobyl'. International groups such as Greenpeace and Friends of the Earth have also consistently opposed the expansion of nuclear power, continuing an energised body of activism that originated in the denuclearisation movements of the latter half of the 20th century.

In this year alone, both the EU and UK have unveiled ambitious carbon reduction targets with the EU committing to achieving continent-wide carbon neutrality by 2050, and the UK committing to a world-leading 78% reduction by 2035. Despite substantial investment in renewables around the world, most countries are alarmingly behind the necessary progress required to meet the Paris targets with global energy demand expected to rise a further 50% by 2050.

Investors are expected to play a key role in providing the private capital required to fuel the European Green Deal and the green transition, particularly given the potential for governmental fiscal restraint in the aftermath of the Covid-19 pandemic. The EU Taxonomy for sustainable activities is arguably the most comprehensive roadmap available to guide environmentally responsible investors, and the absence of nuclear energy in the framework has remained a contentious issue since its inception.

In February 2021, the EU commission's Joint Research Centre published the findings of an extensive technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of the Taxonomy, which deemed nuclear energy a clean and safe alternative given the comprehensiveness of European regulatory frameworks on safety. In April 2021 EU experts were set to label nuclear energy a green investment under the EU Taxonomy, with progress being subsequently delayed by complaints from member states. If successful, the inclusion of nuclear energy in the Taxonomy could represent a sea-change in investor perceptions of the sustainability of the nuclear sector, and therefore the role of nuclear energy in the EU Green Deal and wider green transition. The following discussion will evaluate the potential role of nuclear energy in the green transition from the perspective of sustainable investors, and in particular, those wishing to offer tangible support to Sustainable Development Goal 13 on Climate Action.

Are policymakers warming to nuclear again?

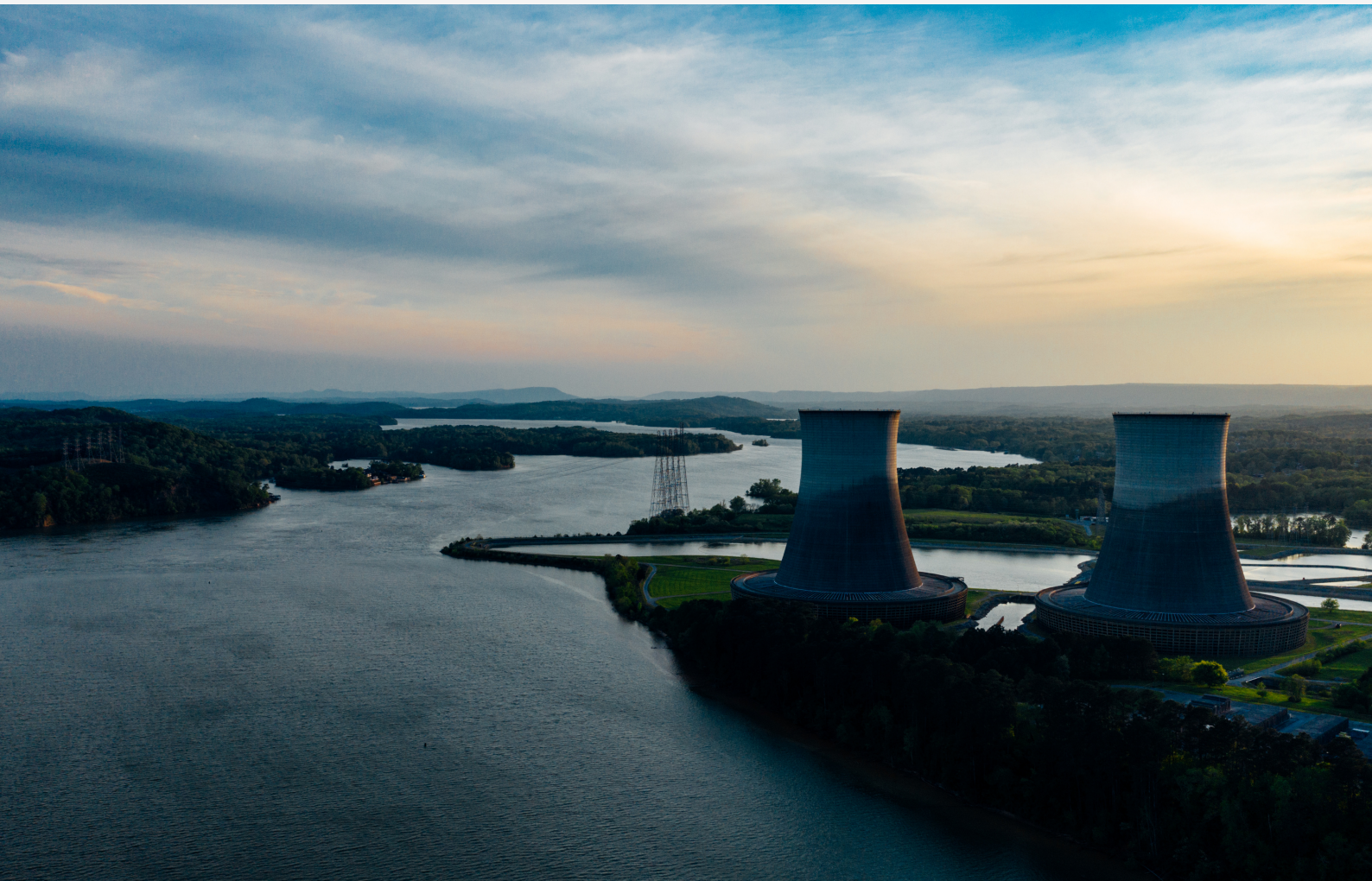
Emmanuel Macron recently reaffirmed France's commitment to nuclear power, stating that nuclear energy was "the future for eco-friendly France". The UK's 10-Point Plan for a Green Revolution has committed around six hundred million pounds to the construction of small and advanced nuclear power plants, whilst nuclear is expected to be the "core" of China's 2021-25 5-year green energy plan.

Support is also growing amongst environmental movements, ranging from the long-standing Environmentalists for Nuclear Energy (EFN) organisation, to more recent Eco-Modernist movements, as well as public environmental activists and commentators such as George Monbiot. Perhaps most tellingly, Greta Thunberg recently softened her stance and admitted that there is a place for it as "part of a carbon free energy solution" - ideally as a transitional alternative to coal.

Is there a case for nuclear energy?

Nuclear energy remains one of the lowest-carbon sources of energy available. Nuclear fission generates heat from the splitting of Uranium 235 nuclei in a moderated chain reaction, and there is no direct emission of carbon dioxide from this process. Its advocates cite its carbon reducing potential when used in the systemic replacement of fossil fuels such as oil and coal, as a primary justification in categorising it as a green investment.

Most countries have justified their nuclear phase-out on the basis of a planned shift to renewables. However, according to a 2014 report by the Intergovernmental Panel on Climate Change (IPCC), when accounting for all carbon dioxide emitted over a life-cycle, 1kg of nuclear fuel produces roughly 4x less carbon pollution than even solar alternatives. Also, in regards to resource-intensity, around 100x more metal is needed to generate electricity from solar power than a nuclear reactor per unit of output, and by some estimates nuclear is between 400-600x less land-intensive than wind power.



Evidence from Germany and France

When scaled to the level of national energy systems, nuclear also holds a number of other advantages. Arguably the clearest evidence of this can be seen in the differing energy profiles of Germany and France over the past ten years. Following the Fukushima disaster in 2011, the German government promised to accelerate its 100% switch to renewables by 2050, and phase out nuclear by 2022. So far, it has delivered on its promise, increasing its share of renewables from around 18% of total power supply in 2010 to 46.3% in 2020, whilst remaining on track to close its final nuclear plant by 2022.

Despite increasing its share of renewables to nearly 50% of energy supply, Germany's total carbon reductions have been stagnant throughout the 2010s, and actually increased during 2013, 2015 and 2016. Despite decreasing emissions sharply in 2020 during the Covid-19 pandemic, it remains one of the largest carbon emitters in Europe, with domestic energy constituting the largest segment of its carbon footprint (32%) and has seen its electricity prices nearly double since 2010.

The weather-dependent nature of wind and solar means that energy production in Germany is prone to fluctuation, and currently the battery technology to store surpluses does not exist. The need for backup sources during shortfall periods has forced Germany to increase its use of dirtier but more reliable fuel sources, such as oil and coal. In fact, around 20% of Germany's carbon emissions result from burning lignite coal, which has also led Germany to repeatedly exceed European air-pollution limits in recent years.

On the other hand, France has long been an advocate of nuclear power, with nuclear accounting for around 70% of its electricity, and 17% coming from recycled nuclear fuel. As a result, French electricity costs just 59% that of German electricity, France is the world's largest net exporter of electricity, and the French energy sector was 10x less carbon polluting than Germany's in 2019.

Biodiversity and waste

According to some estimates, nuclear energy requires 148x - 536x less land than solar and wind respectively. Renewables have also been found to negatively impact biodiversity by disrupting the migratory routes of birds, as well as the movement of fish through river systems. In regards to waste - outside of the EU there is no comprehensive recycling system for wind turbines and solar panels, meaning that panels and turbines containing a range of toxic heavy metals are merely added to the waste cycle.

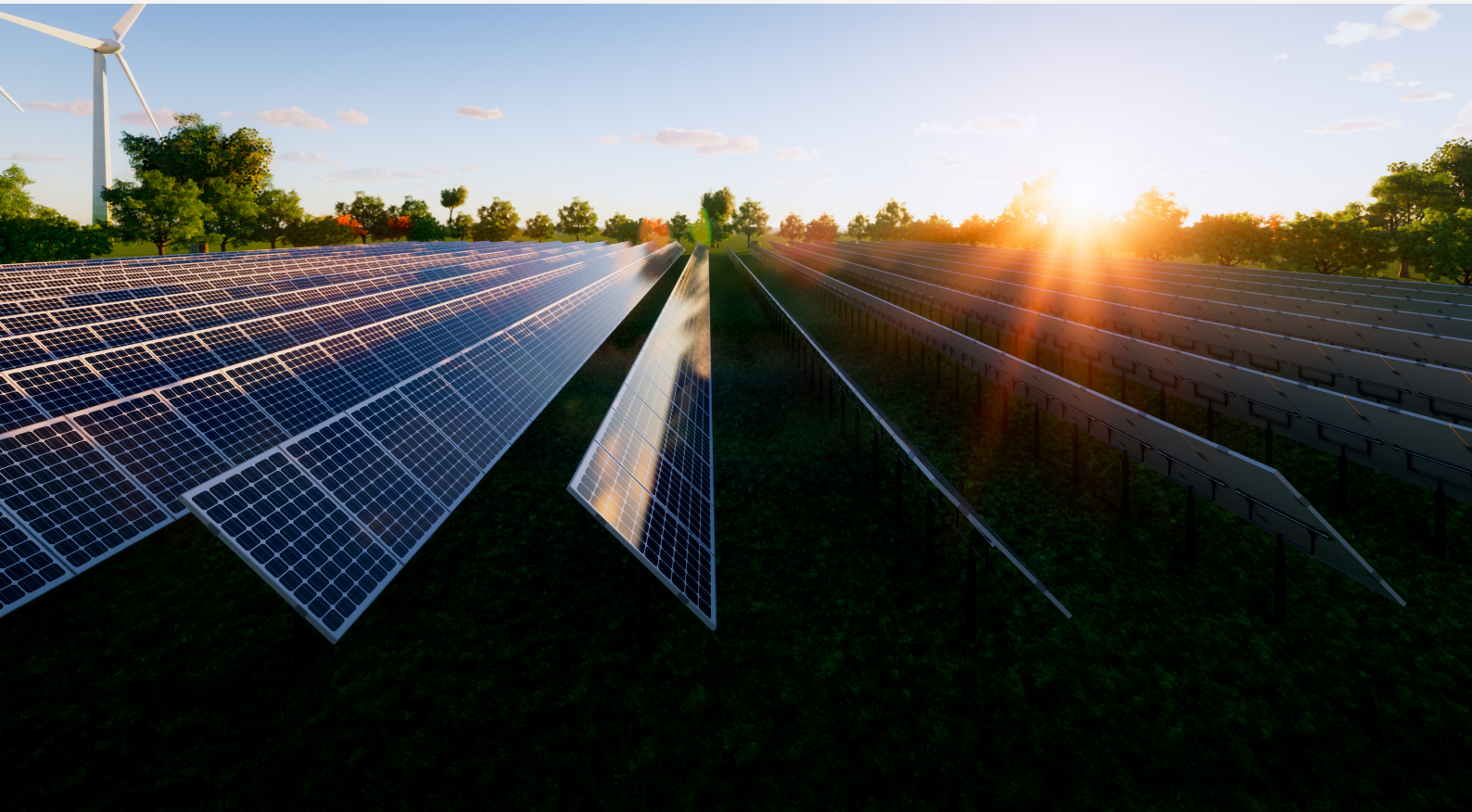
Job creation

The planned transition from coal to renewables has been criticised by various governments due to fears of producing unemployment and widening social inequality, often by subsidising large land owners who have tended to benefit from the low upkeep and large land requirements of wind and solar farms. Nuclear plants are best situated in rural areas near reserves of coolant water, which would be suitable for installation in a number of deindustrialised rural regions across Europe. They are more importantly large employers of both skilled and unskilled labour, with far higher levels of workforce unionization compared with other sectors.

Where does nuclear fit within the EU Taxonomy?

The EU Taxonomy on green finance is designed to offer a roadmap to investors, through classifying the sustainability of economic activities using fixed values to determine their carbon reducing potential. Currently, nuclear power is neither included nor excluded from the EU Taxonomy, and is in many ways conspicuous in its absence.

It is argued by some that its absence may in fact undermine the validity of the taxonomy itself as a means of guiding green investors across Europe. Under the classification, investments are calculated to produce a carbon reduction value, meaning an investment in wind, solar or hydro can be quantified in terms of the reduction of total carbon output ensured by the installation of those technologies. However, as shown by the IPCC report, investing in countries such as Germany that are replacing their nuclear capacity with renewables, would in the long run constitute a carbon-increasing investment when accounting for the full life-cycles of those technologies.



Obstacles, risks and drawbacks

Will the renaissance be sustained?

Nuclear remains politically divisive, and the decision to expand the taxonomy has been delayed by complaints from EU member states including Germany and Spain. Public fears of nuclear proliferation and catastrophe also remain, which may impact the scope for private capital to drive change. Such factors may undermine political support, and for investors, firm long-term governmental commitment remains critical due to the long-time scales required for nuclear development.

The long-time scale required to get nuclear up and running is also an issue in regards to meeting climate targets, the earliest of which will be in 2035, and there are also some issues in regards to scalability due to resource limitations. By most estimates, nuclear could only form part of a more sustainable energy system. For more details read here.

Is it clean?

Although the volume of waste produced per unit of energy is far lower than almost all other fuel sources, there is no reliable method of disposing of nuclear waste, aside from securely storing it, where it remains radioactive for some thousands of years. That said, it is worth stating that nuclear waste can, and is, being be stored unlike the majority of waste gases from fossil fuel combustion which (developments in carbon capture and storage notwithstanding) are normally released into the atmosphere where they can remain for between 300 and 1,000 years.

There has also been some progress on the development of integral reactors which can burn nuclear waste to produce even higher rates of energy. For more details read here.

Is it safe?

Its approval as a green investment is being delayed under the ‘do no significant harm' criteria of EU Taxonomy regulations. Fukushima and Chernobyl have been correctly described as anthropogenic disasters, with estimates of the long-term death tolls ranging from the WHO's reported figure of 4,000, to higher scientific estimates of 30-60,000 deaths.

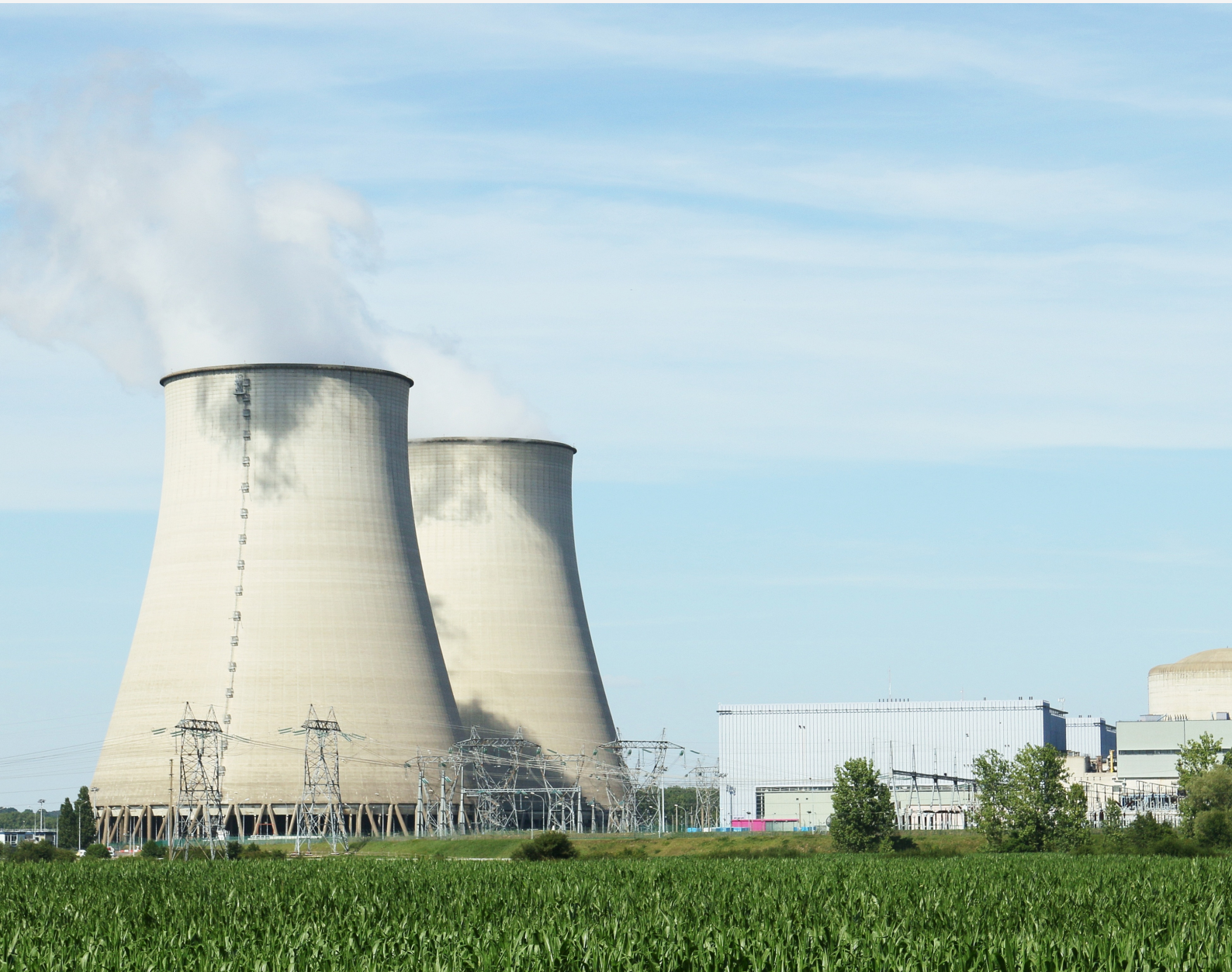
However, recent evidence of the carcinogenic effects of airborne particulates, indicate that the burning of coal and fossil fuels is far more deadly and consistent over time. A recent Greenpeace funded report indicated that emissions from coal plants in China alone were responsible for a quarter of a million premature deaths in 2011.

Is it sustainable?

Nuclear fission is fuelled by the consumption of finite uranium resources, most of which are situated in developing countries in central Asia and sub-Saharan Africa. The required large-scale extraction of reserves presents clear risks from an ESG perspective due to often poor labour and human rights standards in uranium-abundant regions, and at a broader scale may incentivise the sorts of neo-colonial trade practices that are evident in the extraction and trade of conflict minerals. However, this is similarly true of the rare metals needed for renewables. A 2017 report by the World Bank estimated the resources required get all the way to zero emissions through renewables alone -and the results are staggering: 34 million metric tonnes of copper, 40 million tonnes of lead, 50 million tonnes of zinc, 162 million tonnes of aluminium, and no less than 4.8 billion tonnes of iron. The majority of these resources are also predominantly based in the global south and an unimaginable expansion in mining operations would be needed to access them.

Conclusion

The results from the European Joint Research Centre's (JRC's) Assessment appear to correlate with a wider wave of opinion that, despite its flaws, views nuclear energy as an important means of contributing to a controlled transition from fossils fuels without triggering a long-term structural recession. Further as has been shown in the case of Germany, we do not yet have the battery technology to sustain a full shift towards renewables and the considerable ESG risks associated with resource extraction are common across sectors. Overall, there is a growing body of evidence suggesting that nuclear could in the medium term provide a low-carbon base upon which renewable infrastructure can be developed. Given the ambition displayed by recent climate targets, for now, all means of reaching net zero appear to be on the table and, as a result, nuclear power may feature more in investment portfolios in the coming years.



ES ETHICALSCREENING

Contact

Ethical Screening
Formal House, 60 St. George's Place
Cheltenham, GL50 3PN
Tel: 01242 539 850
www.ethicalscreening.com
info@ethicalscreening.com
@ethicalscreening