

Europe's 'science-based' Sustainable Finance Taxonomy is politicised to include nuclear power.

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The Science-based case for excluding Nuclear Fission Technologies from the EU Taxonomy

One of the most influential policy initiatives of the European Commission in the past years has been the "EU Taxonomy", essentially a shopping list of investments that may be considered environmentally sustainable across six environmental objectives. To be deemed EU Taxonomy aligned, the activity must demonstrate a substantial contribution to one environmental objective, such as climate change mitigation, whilst causing no significant harm to the remaining five environmental objectives (climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems). All eligible activities are required to comply with technical screening criteria (TSC) for 'substantial contribution' and 'do no significant harm' and to demonstrate that social safeguards are in place.

The EU Taxonomy provides a common language for sustainability reporting, a foundation for green bond reporting and much more. It is intended to be used by international financial markets participants whose products are sold within the EU in order to evaluate the sustainability of their underlying investments. The use of the EU Taxonomy is furthermore compulsory for the EU and member states when introducing requirements and standards regarding environmental sustainability of financial products, such as an EU ecolabel for investment products or an EU Green Bond Standard. It will also apply to 37% of activities earmarked as 'climate-friendly' financed by the EU COVID-19 recovery funding. Its science-based approach is designed to give confidence to a wide range of international stakeholders that environmental claims are not greenwashing.

The question whether nuclear fission energy complies with the 'do no significant harm' (DNSH) criteria of the EU Taxonomy was the focus of the Technical Expert Group (TEG) DNSH assessment on nuclear fission technologies which recommended to the Commission that nuclear should not be included in the EU Taxonomy of environmentally sustainable activities. Taking into account the significant financial implications of adopting the TEG recommendations, it became the starting point of intense behind-door lobbying. France led a coalition of 10 EU Member States arguing that nuclear fission as well as gas-fired power plants should be included in the Taxonomy. Together with Finland (Olkiluoto-3), France is at present the only EU country constructing a new nuclear power plant (Flamanville-3). The Finnish and French construction sites were meant to be the industrial demonstration of an evolutionary nuclear technology (the "European Pressurised water Reactor" or EPR). Olkiluoto-3 was meant to start generating power in 2009, followed by Flamanville-3 in 2012. Instead, the projects turned out to have multiple engineering difficulties and financial constraints that resulted in significant delays culminating in missed deadlines for various production start dates and tripling unit cost. Nevertheless, in October 2021 president Macron announced that France will continue to invest heavily in the construction of EPR 'light' versions, next to research into small modular reactor (SMR) technology.

Following consultation with Member States, the Commission charged its former -nuclear Joint Research Centre (JRC) to draft another technical report in 2020 – the "*Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852*". This report was reviewed by two sets of experts, the Group of Experts on radiation protection and waste management under Article 31 of the Euratom Treaty (having no specific competences in sustainability impact assessment other than impacts incurred by radiation) and the Scientific

Committee on Health, Environmental and Emerging Risks on environmental impacts (Sheer). While the Sheer group pointed out some omissions, the Article 31 Group of Experts, unsurprisingly supported the conclusions of the JRC. Nevertheless, a minority report opposed the lack of integration of economic and environmental aspects, as put forward by the Rio principles for Sustainable Development.

The JRC, supported by the Art. 31 experts, concluded amongst others that:

“...deep geological repositories are considered, at the state of today’s knowledge, appropriate and safe means of isolating spent fuel and other high-level waste (HLW) from the biosphere for very long timescales and the necessary technologies are now available;”

“...the standards of environmental control needed to protect the members of the public are likely to be sufficient to ensure that other species are not put at risk;”

“... the requirements in the [EU Taxonomy] TSC regarding protection of humans and the environment from harmful effects of ionising radiation are automatically satisfied in the EU if a licence can be issued.”

Notwithstanding the findings of the JRC and the Article 31 Group of Experts, members of the TEG DNSH maintain our position that nuclear fission energy should not be included in the EU Taxonomy of environmentally sustainable activities.

We the TEG DNSH members observe that the above JRC/Article 31 Group of experts’ statements and conclusions drawn thereof cannot be fully based on scientific evidence as deep geological disposal of high-level nuclear waste entails the need for adequate quality assurance and control of waste form compatibility, as well as for monitoring of health impacts and preservation of knowledge and memory for possibly thousands of years. It also requires operational demonstration of disposal within Europe. The fact that according to the current technical state of knowledge there is no alternative to deep geological disposal as a ‘solution’ for the nuclear waste problem does not take away from its ethically problematic character.

Moreover the independent scientific evidence which the TEG presented to the European Commission, shows evidence of adverse impacts to the natural environment arising from the many processes involved in the nuclear power lifecycle (from uranium mining to waste disposal) that are operational today. Therefore, we maintain our recommendation to the European Commission that nuclear fission energy has no place on the EU Taxonomy of sustainable activities, whether or not it is licensed. It is furthermore our view that the proponents of nuclear energy have guided the interpretation of scientific knowledge and the framing of sustainability assessment in order to use the EU Taxonomy to place a ‘scientific’ stamp on what is primarily a political position on nuclear fission energy aiming to satisfy the few EU member states that wish to promote the associated technologies.

Does the present generation of nuclear fission power plants ‘do no significant harm’?

To answer this question, two specific issues for nuclear power stand out: the risk of a catastrophic accident and the management of high-level nuclear waste (HLW).

Nuclear fission energy is characterized by low probability, high consequence risks to humans and the environment. Even the JRC recognizes that the risk of a severe nuclear accident cannot be excluded, even in the best commercially available nuclear power plants. The disaster in Fukushima (2011) was

triggered by a process that these nuclear reactors were not “designed” to withstand. These circumstances shed light on the limitations of the technical risk assessments, which have not fully taken into account beyond design risks in particular of core melt accidents. The events in Fukushima have made it apparent that such assessments are based on specific assumptions, for example on seismic safety or the maximum height of a tsunami, and that reality can disprove these assumptions. Deciding whether such risks belong to the category of ‘tolerable risks’ for a given society depends on the various risk regulation measures put in place. Especially relevant for nuclear fission power is the fact that the liability of the operator in the case of a severe accident is limited and the remaining costs are (largely) taken on by the state (privatization of profits, socialization of risks).

The Taxonomy architecture is not designed to cater for such risks that carry an intergenerational impact lasting for thousands of years, making it an unsuitable instrument to decide on the sustainable nature of nuclear power.

The characteristics and nature of HLW generated by the nuclear fission process presents long-term intergenerational risks and thereby challenge the principle of ‘do no significant harm’ to the extent that nuclear fission energy may not be considered eligible for the EU Taxonomy. This was made abundantly clear to the Commission in the TEG’s recommendations, which were not published in their entirety. Independent, scientific, peer-reviewed evidence compiled by TEG provided confirmation of the risk of significant harm arising from nuclear waste. The back end of the fuel cycle is currently dominated by the containment of spent fuel rods and waste from nuclear power facilities. Safe and secure long-term storage of nuclear waste remains unresolved and has to be demonstrated in its operational complexity. Whilst the nuclear industry and international nuclear waste experts provide assurances of multiple engineered safeguards designed to reduce the risks from nuclear waste through geological disposal, the question remains whether, despite the solid scientific basis and thorough geological knowledge gathered, in the absence of experience with this technology, one can really guarantee that HLW will remain isolated from humans and the environment for thousands, let alone millions of years. The fact that a ‘solution’ has to be found for the existing quantities of waste (as well spent fuel as conditioned high level waste forms), and that geological disposal is the least bad solution for this, does not imply that nuclear power can suddenly be classified as a ‘green’ energy source.

It is therefore reasonable to conclude that the risks presented by nuclear fission energy to the ‘do no significant harm’ principle and technical screening criteria of the EU Taxonomy means that it can not be considered EU Taxonomy eligible or aligned as long as the technology and fuel cycle management has not proven to be sustainable as a whole.

Other concerns with regard to DNSH criteria

Nuclear fission power plants require about three cubic metres of cooling water per megawatt hour (MWh) produced. A nuclear plants’ cooling water consumption is higher than that of fossil-fuel plants. Throughout the world, new nuclear plants and existing plants increasingly face cooling water scarcity induced by heat waves, a situation that is likely to be aggravated by climate change. More efficient cooling technologies could be considered, but this adds to the already high costs of nuclear power plants. For reasons of having access to enough cooling water, nuclear plants are mostly sited in coastal or estuarine locations, but this makes them vulnerable to flooding and extreme events that climate change may occasion.

The siting of nuclear power plants along coastal zones presents adaptation risks associated with sea-level rise, water temperature rise, coastal erosion as well as natural catastrophes such as the Fukushima disaster demonstrates. The Fukushima disaster reveals how powerless human operators are when nuclear systems escape full, continuous control. Instead of helping to address the impacts of the Tsunami as renewable energy sources would have, the devastated nuclear power plant strongly aggravated the emergency relief in the province and left huge new problems of liquid waste and radioactive waste resulting from infrastructure and land cleaning activities, never encountered before in densely populated industrial areas.

Furthermore, when major nuclear plant accidents occur significant land areas become unsuitable for human habitation (e.g. Chernobyl, Fukushima). Advocates of nuclear power draw attention to the survival of natural flora and fauna in zones contaminated by radioactive materials and precluding human access. However, this is presumably not the type of ecological protection and resilience that the EU Taxonomy aims to achieve.

Surface or underground mining and the processing of uranium ore can substantially damage surrounding ecosystems and waterways. The huge volumes of associated mining waste in developing countries are normally not considered in life cycle waste inventories of nuclear energy producing countries. More critically, the adverse effects on local environmental conditions of routine discharging of nuclear isotopes to the air and water at reprocessing plants have not been considered thoroughly enough. A number of adverse impacts (of radiation) on soil/sediment, benthic flora and fauna and marine mammals has been demonstrated.

Should nuclear fission power be included in the taxonomy as a transition activity?

According to Article 10 (2) of the Taxonomy Regulation, which is the law underpinning the EU Taxonomy, activities that are incompatible with climate neutrality but considered necessary in the transition to a climate-neutral economy can be labelled and supported as '*transition activities*'. A key principle of the EU Taxonomy is to avoid environmentally harmful 'lock-in' effects of activities. Lock-in describes the phenomenon whereby it is difficult to set a technical and political system on a new path once it has developed a momentum of its own and once it is 'locked-in' on a certain path. Carbon-intensive lock-in represents one kind of environmentally harmful lock-in; however, several other kinds of lock-in effects are also relevant during the economic lifetime of an economic activity, such as technological and economic lock-ins, the latter two being inextricably linked.

Nuclear fission plants require at least 10 years to be built (with recent experience even pointing in the direction of 20 years for the EPR), while they have to remain operational for 50-60 years. Decommissioning will then take another 20-50 years. This means that a decision to build new nuclear power plants will lock in societies for some 80-130 years, not counting the years needed to store spent fuel or dispose of high-level waste. A decision to include nuclear fission into the energy mix of the EU Taxonomy sustainable activities will during this period therefore channel much needed capital away from renewable energy technologies, which do not present long-term and catastrophic risks to humans and the environment as nuclear fission does. Furthermore, nuclear fission power plants create a monopoly of power and are therefore incompatible with renewable energy generation which communities and other stakeholders can influence, such as, wind, solar, bioenergy. Small scale hybrid nuclear systems are put forward, but their commercial demonstration will take decennia. Now the incompatibility between nuclear and renewable energy is real and means that it is either nuclear power or renewable energy – not both, in particular because of the

propriety ranking that nuclear receives and the low capacity for load following . Excluding nuclear therefore resonates with the logic of avoiding further lock-ins of largely unknown waste management and associated environmental risks for future generations.

Further issues of justice beyond the DNSH criteria

Justice-related issues beyond the concerns addressed by the DNSH criteria further hamper the development of nuclear power. Safe disposal of nuclear waste transcends national boundaries and human lifetimes with a high potential to adversely affect future generations' ability to safeguard their natural resources. Those whose interests are, knowingly or unknowingly affected have most at stake. The EU Taxonomy's social safeguards will be eroded as the nuclear waste quantities grows and more nuclear waste (short, medium and long term) storage facilities need to be commissioned. Will all communities have a say on how and where the nuclear waste is to be disposed?

In reality, the polluter pays principle will never apply to those who hold the economic power and profit from nuclear energy, as the timelines and enormity of the risk of catastrophic accident are beyond the ability of any organization or even a member state to deal with. For this reason, economic activities eligible for the EU Taxonomy may not be considered sustainable when they carry major catastrophic hazards that have direct adverse impact on the lives of future generations.

The Way Forward

Controlling nuclear technologies, investments, and practices requires a high level of technical expertise, which emphasizes the need for expert structures which are independent of the nuclear industry and can therefore better safeguard the common good at international, European and national level. The nuclear industry is currently self-regulating with oversight provided by the IAEA (with a mandate to promote the peaceful applications of nuclear technology), EURATOM framing and international committees such as UNSCEAR depending too much on international diplomacy (which recently cast doubt on the health effects of exposure to low levels of radiation). We highlight the need for an independent international agency requiring revision of the EURATOM treaty as well in order to be able to review nuclear power issues with a focus on society's need of sustainable development above nuclear sectoral interests , in terms of safeguarding public and environmental health, economic and energy security and general issues of justice.

The proposed inclusion of nuclear fission energy in the EU Taxonomy will channel much needed capital away from proven sustainable energy sources, create more long-term operational and waste management risks and adverse environmental and social impacts that will undermine the principles and technical screening criteria of the EU Taxonomy and crucially, undermine Europe's credibility and standing amongst its own citizens and international peers. Instead of giving the nuclear industry a new financial injection for solutions of the past such as the large scale EPR, the EU should focus on pressing issues such as looking for common solutions to the existing HLW problem in EU Member States (and internationally) and taking up a strong regulatory position on nuclear safety and peaceful developments in nuclear technology. It is the responsibility of Euratom to demonstrate a real European collaboration in solving the technical as well as the environmental and economic challenges related to HLW management (emergency management, harmonised safety and QA/QC criteria for waste forms, insurances).

The signatories of this letter understand the need of the nuclear industry to receive ongoing regulatory support to ensure that their current operations, management of waste, and decommissioning are authorized and carried out in a safe manner. We therefore encourage the JRC and EU Institutions to extend and harmonise their support and strategic direction of the nuclear industry in the new energy transition paradigm, but we state categorically that the proposed inclusion of nuclear fission energy on the EU Taxonomy of environmentally sustainable activities is contrary to the TEGs recommendation to the European Commission.

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Signed by EU Taxonomy subgroup DNSH TEG members and other expert supporters

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