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Nuclear Power and the Taxonomy Regulation

On behalf of the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology

Final report

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A.
Summary

(1) Regulation (EU) 2020/852 (Taxonomy Regulation; TR) sets out uniform criteria for determining whether an economic activity qualifies as environmentally sustainable. It aims at promoting activities that qualify as sustainable by creating transparency for investors. It does not, however, establish regulatory requirements for economic activities, nor does it entail a ban on activities or investments not considered sustainable.

(2) Under the TR, an activity is considered sustainable if it:

- contributes substantially to one or more of the environmental objectives;
- does not significantly harm any of the other environmental objectives;
- is carried out in compliance with minimum social safeguards; and
- complies with technical screening criteria established by the Commission.

(3) As regards the first criterion, Article 10(1) and (2) TR set out three exhaustive categories of activities that may be considered as contributing substantially to climate change mitigation. Generating nuclear power does not fall under any of these categories. Although it is frequently considered a low-carbon activity, this is as such not sufficient to satisfy the criteria laid down by the Union legislature.

(4) Namely, nuclear power is not mentioned in the list of 'green activities' set out in Article 10(1) lit. (a) to (h) TR. In effect, a reference to "*climate neutral energy (including carbon neutral energy)*", mentioned in Art. 10 (1) lit (a) TR expressly in addition to renewable energy, was deliberately deleted from that list in the course of the legislative procedure leading to the adoption of the TR. Moreover, nuclear power does not qualify as an 'enabling activity' since it does not meet the respective requirements enshrined in Article 10(1) lit. (i) and Article 16 TR. Finally, nuclear power cannot be regarded as a 'transitional activity' within the meaning of Article 10(2) TR. According to a literal, systemic and purposive interpretation, that provision only applies to carbon-intensive activities for which there is currently no low-carbon alternative. If one considers nuclear power a low-carbon activity, it hence cannot be regarded a transitional activity from the outset. Moreover, there is considerable doubt

whether nuclear power could fulfil the other requirements laid down in Article 10(2) TR.

(5) As regards the second sustainability criterion, nuclear power cannot be considered to do no significant harm to the environmental objectives set out in Article 17(1) lit. (b) to (f) TR on the basis of the available evidence. This follows from the scope of the results produced by scientific studies and analyses and the lack of conclusive scientific proof existing to date that there is no such significant harm. Article 17 TR in conjunction with the precautionary principle, laid down in EU primary law and declared applicable by Article 19 TR, hence militate for the existence of significant harm:

- With respect to the objective of climate change adaptation, there appears to be a lack of conclusive scientific evidence regarding the resilience of nuclear power generation to climate change. This concerns not only the increase in the frequency of extreme weather events, but also the rise of sea levels and temperatures, leading to droughts, lack of cooling water, rising water temperatures and conflicts of interest regarding the use of water.

- Moreover, there seems to be no sufficient basis to conclude that uranium mining and milling does not cause significant harm to the other environmental objectives laid down in Article 17 TR. Namely, these activities take place largely outside the EU, so that the application of EU environmental standards cannot be relied on. International standards and guidelines, such as the ones developed by the International Finance Commission (IFC) appear insufficient to avert significant harm within the meaning of the TR.

- In view of the empirically proven risk of severe accidents in nuclear power plants, and considering the serious consequences of such accidents for human health and the environment, there is arguably no sufficient basis to consider that the operation of nuclear power plants does no significant harm to the environmental objectives regarding the sustainable use and protection of water and marine resources, pollution prevention and control and the protection and restoration of biodiversity and ecosystems. In particular, these environmental objectives require that the assessment not be restricted to humans or human fatalities. Rather, effects on ecosystems and biodiversity must also be examined, because these are not usually covered by disaster control measures and (unlike humans) cannot, for example, be evacuated or relocated from contaminated

environments. This applies even if such a separate investigation might not be necessary for other forms of electricity generation, because they do not pose any risks of long-term effects on land and water comparable to nuclear power.

- Regarding the storage and disposal of spent fuel and high-level radioactive waste, there is arguably no sufficient basis to consider that the requirement to do no significant harm can be met in relation to the sustainable use and protection of water and marine resources, the circular economy, pollution prevention and control and the protection and restoration of biodiversity and ecosystems. This is especially true for the disposal of high-level radioactive waste and spent fuel. There are no empirical examples of disposal facilities, and even scientifically based forecasts naturally become increasingly uncertain the further they extend into the future. With regard to the disposal of waste that remains radioactive and ecotoxic for more than 100,000 years, increasing uncertainties cannot be dismissed. Moreover, a lack of available capacities makes it necessary to rely on interim storage for the foreseeable future, which causes further unresolved risks.

(6) An interpretation of the TR in the light of EU primary law also confirms that nuclear power cannot be included in the European taxonomy. Namely, the TR is based on Article 114 TFEU, which is the legal basis for measures aiming at the establishment and functioning of the internal market. This fact indicates that Union legislators did not intend to cover nuclear power. In effect, the Euratom Treaty contains specific provisions on investment in nuclear power which, according to well-established case law, take precedence over the general internal market competence.

(7) Moreover, substantive requirements set out in EU primary law, such as the protection of the environment and human health as well as the precautionary principle, also militate against including nuclear power in the European taxonomy. Under these principles, a measure which expressly aims at furthering 'sustainable' investment must proceed from a particularly high level of protection. Mere compliance with EU safety and environmental rules, which is a precondition for any activity to be exercised legally in the Union, cannot be sufficient in that regard. What is more, according to the precautionary principle, it is not required to prove the reality of a risk to take countermeasures. Rather, it suffices that there is no proof of the absence of such risk, as long as the risk is not merely hypothetical. In this respect, the non-excludable risk of severe nuclear accidents and the uncertainties that extend far into the future due to the necessary disposal of high-level radioactive nuclear waste militate against nuclear power, even as a transitional technology.

(8) In contrast, primary law principles such as equal treatment, energy safety or the Member States' right to choose their energy mix do not require nuclear power be included in the European taxonomy. In particular, the right of Member States to choose their energy mix is not affected since the TR in no way prevents Member States from using and promoting nuclear power.

(9) Regarding the procedure for adopting delegated acts, the Commission's unusual approach in requesting several expert reports from bodies which are not foreseen in the TR prior to involving the Platform on Sustainable Finance according to Article 20 TR raises questions. This could affect the competences of the Platform. In that regard, the further developments until the potential adoption of a delegated act must be awaited. In any event, as far as the scope of the investigations conducted by the Commission is concerned, there is good reason to consider that, at least at this stage, the Commission's investigation has fallen short of the obligation to gather all necessary expertise for potentially considering nuclear power a sustainable activity in accordance with the TR. In view of both the expert reports already published and the terms of reference for further on-going assessments, there appear to be important gaps.

(10) Any delegated act adopted on the basis of the TR that somehow included nuclear power in the European taxonomy would be open to legal challenge before the EU courts. The most obvious course of action would be to bring an action for annulment in accordance with Article 263 TFEU. Moreover, upon the initiative of a national court, the validity of such a delegated act could also be the subject of a preliminary ruling under Article 267 TFEU.

B.
Background

I. Facts

(11) To meet its climate and energy targets and reach the objectives of the European Green Deal, the EU is striving to channel investments into sustainable activities by enhancing investor awareness of the environmental impact of financial products. For this purpose, the TR provides harmonised criteria to determine whether an economic activity qualifies as environmentally sustainable. Under the TR, an economic activity qualifies as environmentally sustainable where that activity:

- makes a substantial contribution to one of six environmental objectives;
- does no significant harm (DNSH) to the other five objectives;
- meets minimum social and governance standards;
- complies with certain technical screening criteria, specified by the Commission in delegated acts.

(12) In March 2020, the EU Technical Expert Group on Sustainable Finance (TEG) adopted its final report. Regarding nuclear power, the TEG essentially concluded:

> *"Nuclear energy generation has near to zero greenhouse gas emissions in the energy generation phase and can be a contributor to climate mitigation objectives. […]*
> *On potential significant harm to other environmental objectives […] the evidence about nuclear energy is complex and more difficult to evaluate in a taxonomy context. […] The TEG has therefore not recommended the inclusion of nuclear energy in the Taxonomy at this stage. Further, the TEG recommends that more extensive technical work is undertaken on the DNSH aspects of nuclear energy in future and by a group with in-depth*

technical expertise on nuclear life cycle technologies and the existing and potential environmental impacts across all objectives."[1]

(13) In view of the TEG report, the Commission requested its Joint Research Centre (JRC), to conduct an assessment of nuclear power with respect to the 'do no significant harm' criterion. The JRC report published in 2021 namely concludes that "the analyses did not reveal any science-based evidence that nuclear energy does more harm to human health or to the environment than other electricity production technologies already included in the Taxonomy".[2]

(14) At the Commission's request, the JRC report is subsequently reviewed by the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) and the Group of Experts Referred to in Article 31 of the Euratom Treaty (Article 31 Group).

(15) On 21 April 2021, the Commission presented a proposal for a Delegated Regulation in that regard. This proposal expressly excludes nuclear power and natural gas from its scope. These activities are reserved to another delegated act to be adopted later, subject to further assessment. In this respect, Recital 16 to that proposal reads:

"Regulation (EU) 2020/852 recognises the importance of 'climate-neutral energy' and Article 10(2) of that Regulation requires the Commission, within the context of economic activities that support the transition to a climate-neutral economy, to assess the potential contribution and feasibility of all relevant existing technologies. For nuclear energy, that assessment is still ongoing and the Commission will report on its results in the context of the review of this Regulation."

(16) Similarly, the Commission's Communication "EU Taxonomy, Corporate Sustainability Reporting, Sustainability Preferences and Fiduciary Duties: Directing finance towards the European Green Deal (COM(2021)188 final)" states as follows:

"This complementary Delegated Act will cover nuclear power subject to and consistent with the results of the specific review process underway in

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[1] See EU Technical Expert Group on Sustainable Finance (TEG), Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, Technical Annex, 2020, pp. 209 et seq.

[2] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 7.

accordance with the EU Taxonomy Regulation. This process is based on the independent and scientific technical report published in March 2021 by the Joint Research Centre, the European Commission's science and knowledge service. A review of this report is ongoing through two groups of experts, Euratom Article 31 experts group and the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER), to complete the scientific evaluation and it will be finalised in June 2021."

II. Mandate

(17) The Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology of the Republic of Austria commissioned us to provide a legal opinion on whether nuclear power can be recognised as a sustainable activity under the first two criteria set out in the TR. We were in particular asked to cover the following issues:

1. Which requirements of European and/or international (environmental) law could be infringed by a qualification of nuclear power as "sustainable" by the European Commission?

2. What provisions of the Taxonomy Regulation would justify an exclusion of nuclear power?

3. To what extent are the terms of reference of the reviews by TEG, JRC, Art. 31 Group, SHEER consistent and comparable?

4. To what extent are the terms of reference of the reviews by TEG, JRC, Art. 31 Group, SHEER adequate for a comprehensive assessment of the issue of environmental sustainability?

5. What are the limits of an assessment by the expert groups (TEG, JRC, Art. 31 Group, SHEER) in a comprehensive assessment of the issue of environmental sustainability?

6. What is the relationship between the expert groups (TEG, JRC, Art. 31 Group, SHEER) and the Platform on Sustainable Finance according to Article 20 Taxonomy Regulation (Platform) and which role should the Platform have in the further proceedings?

7. To what extent is the assessment by the expert groups (JRC, Art. 31 Group, SHEER) in conflict with the legal provisions of the Taxonomy Regulation regarding the development of technical criteria?

(18) The requested legal opinion should take into account the findings of a literature review conducted by Professor Sigrid Stagl. Article 18 TR is not part of the mandate.

C.
Legal analysis

I. Taxonomy Regulation

(19) In this section, we will assess whether generating nuclear power qualifies as a sustainable activity in terms of the TR. After a brief outline of the basic aims and structure of the TR (see sub-section 1), we will deal with the requirement to contribute substantially to one or more of the environmental objectives (see sub-section 2) and the requirement to do no significant harm (see sub-section 3).[3]

1. Basic aims and structure

(20) The TR is an instrument developed as part of an ambitious and comprehensive strategy on sustainable finance.[4] It essentially aims at channelling capital flows towards sustainable investment.[5] This goal is not only pursued on a national and European level, but is also shared by international instruments such as the 2030 Agenda of Sustainable Development adopted by the General Assembly of the United Nations and the Paris Agreement concluded under the framework of the United Nations Convention on Climate Change.[6]

(21) To this effect, the TR sets out uniform criteria for determining whether an economic activity qualifies as environmentally sustainable.[7] In other words, it creates a sort of common language that investors and economic actors can use. In doing so, the Union legislator is seeking to provide economic actors with clarity in order to inform their

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[3] Our liability for the statements, assessments and recommendations for action contained in this expert opinion is exclusively governed by the terms and conditions agreed between us and the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology. We are not liable to third parties, regardless of whether this expert opinion has been made available to third parties with or without our consent.

[4] See Recital 6 TR.

[5] See Recitals 6, 9 and 11 TR.

[6] See Recitals 2 and 3 TR.

[7] See Article 1(1) TR.

investment decisions.[8] Consequently, in order to achieve this goal, the taxonomy established by the TR must be credible and reliable. 'Greenwashing' must be avoided.[9]

(22) On the other hand, activities not covered by the TR are neither prohibited, nor are the EU, Member States or private investors generally prevented from funding them. In other words, such activities may be continued or even taken up, but they must not be labelled 'sustainable'.

(23) It follows that mere compliance with EU safety and environmental rules, which is a precondition for any activity to be exercised legally in the Union, cannot be sufficient to qualify as sustainable under the TR. To the contrary, Article 3 TR sets out the basic criteria that an activity must satisfy in order to be considered sustainable. This provision reads:

> *"Article 3*
> *Criteria for environmentally sustainable economic activities*
> *For the purposes of establishing the degree to which an investment is environmentally sustainable, an economic activity shall qualify as environmentally sustainable where that economic activity:*
> *(a) contributes substantially to one or more of the environmental objectives set out in Article 9 in accordance with Articles 10 to 16;*
> *(b) does not significantly harm any of the environmental objectives set out in Article 9 in accordance with Article 17;*
> *(c) is carried out in compliance with the minimum safeguards laid down in Article 18; and*
> *(d) complies with technical screening criteria that have been established by the Commission in accordance with Article 10 (3), 11(3), 12(2), 13(2), 14(2) or 15(2)."*

(24) As regards the technical screening criteria mentioned in Article 3 lit. (d) TR, it should be noted that Article 10(3) TR empowers the Commission to "supplement" two criteria set out in the TR: First, the criterion concerning a substantive contribution to climate change mitigation, as defined in Article 10(1) and (2) TR. Second, the requirement to

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[8] See European Commission, Proposal for a Regulation on the establishment of a framework to facilitate sustainable investment, COM(2018) 353 final, p. 1.

[9] See Recital 11 TR.

avoid significant harm, in accordance with Article 17 TR. These criteria will be dealt with in more detail in the following sub-sections.

(25) However, it is important to note that, in accordance with Article 290(1) TFEU, the Commission is only authorised to flesh out the relevant provisions of the TR.[10] A delegation of power (and any discretion it may involve) is delimited by the bounds fixed in the basic act.[11] Hence, the delegated act to be adopted by the Commission on the basis of Article 10(3) TR cannot extend the scope of the TR, nor can it classify an activity as sustainable which does not fulfil the criteria set out by Union legislators.

2. Substantial contribution to climate change mitigation (Article 10 TR)

(26) According to Article 3 lit. (a) TR, an economic activity is deemed to qualify as environmentally sustainable only if it contributes substantially to one or more of the environmental objectives set out in Articles 9 to 15 TR, among which is climate change mitigation, as defined in Article 9 lit. (a) and Article 10 TR.

(27) It is quite frequently assumed that nuclear power may contribute to climate change mitigation due to its potential role in low-carbon energy supply.[12] However, Article 10 TR contains a dedicated legal definition of what is considered a "substantive contribution to climate change mitigation". Comparatively low CO2 emissions as such are not a sufficient condition for an activity to satisfy that definition. Any legal assessment of nuclear power under the TR is bound to apply the criteria laid down by the Union legislator.

a) Legal standard

(28) Article 10(1) and 10(2) TR define the concept of "substantial contribution to climate change mitigation" for the purposes of the TR. These provisions read:

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[10] See, to that effect, judgment of 17 March 2016, Parliament v Commission, C-286/14, EU:C:2016:183, paragraph 41.

[11] See judgment of 26 July 2017, Czech Republic v Commission, C-696/15 P, EU:C:2017:595, paragraph 52.

[12] See EU Technical Expert Group on Sustainable Finance (TEG), Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, Technical Annex, 2020, p. 208; Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 39.

"Article 10

Substantial contribution to climate change mitigation

1. An economic activity shall qualify as contributing substantially to climate change mitigation where that activity contributes substantially to the stabilisation of greenhouse gas concentrations in the atmosphere at a level which prevents dangerous anthropogenic interference with the climate system consistent with the long-term temperature goal of the Paris Agreement through the avoidance or reduction of greenhouse gas emissions or the increase of greenhouse gas removals, including through process innovations or product innovations, by:

(a) generating, transmitting, storing, distributing or using renewable energy in line with Directive (EU) 2018/2001, including through using innovative technology with a potential for significant future savings or through necessary reinforcement or extension of the grid;

(b) improving energy efficiency, except for power generation activities as referred to in Article 19(3);

(c) increasing clean or climate-neutral mobility;

(d) switching to the use of sustainably sourced renewable materials;

(e) increasing the use of environmentally safe carbon capture and utilisation (CCU) and carbon capture and storage (CCS) technologies that deliver a net reduction in greenhouse gas emissions;

(f) strengthening land carbon sinks, including through avoiding deforestation and forest degradation, restoration of forests, sustainable management and restoration of croplands, grasslands and wetlands, afforestation, and regenerative agriculture;

(g) establishing energy infrastructure required for enabling the decarbonisation of energy systems;

(h) producing clean and efficient fuels from renewable or carbon-neutral sources; or

(i) enabling any of the activities listed in points (a) to (h) of this paragraph in accordance with Article 16.

2. For the purposes of paragraph 1, an economic activity for which there is no technologically and economically feasible low-carbon alternative shall qualify as contributing substantially to climate change mitigation where it supports the transition to a climate-neutral economy consistent with a pathway to limit the temperature increase to 1.5 C above pre-

industrial levels, including by phasing out greenhouse gas emissions, in particular emissions from solid fossil fuels, and where that activity:
(a) has greenhouse gas emission levels that correspond to the best performance in the sector or industry;
(b) does not hamper the development and deployment of low-carbon alternatives; and
(c) does not lead to a lock-in of carbon-intensive assets, considering the economic lifetime of those assets. For the purpose of this paragraph and the establishment of technical screening criteria pursuant to Article 19, the Commission shall assess the potential contribution and feasibility of all relevant existing technologies."

(29) It is clear from the wording of these provisions that low CO2 emissions as such are not sufficient for an activity to qualify as contributing substantially to climate change mitigation. Quite to the contrary, further conditions must be fulfilled. In this respect, Article 10(1) and 10(2) TR define three different categories of activities that qualify as contributing substantially to climate change mitigation:

(30) First, Article 10(1) lit. (a) to (h) TR sets out a list of activities that, according to the Union legislator, contribute *inherently* to climate change mitigation. These are hereinafter referred to as *green activities*. The list of green activities is exhaustive, as is clearly indicated by the wording of Article 10(1) TR. Furthermore, the existence of two other categories, set out in Article 10(1) lit (i) TR and Article 10(2) TR, would not make sense if one considered the list of green activities as somehow open-ended. According to well-established case-law, EU law provisions must be interpreted, to the extent possible, in a way that gives them useful effect.[13]

(31) Second, according to Article 10(1) lit. (i) TR an activity that *enables* any of the green activities listed in points (a) to (h) in accordance with Article 16 are also considered to contribute substantially to climate change mitigation. These activities are hereinafter referred to as *enabling activities*.[14]

(32) Third, according to Article 10(2) TR, for the purposes of paragraph 1, an economic activity for which there is no technologically and economically feasible low-carbon

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[13] See, for example, judgment of 19 December 2019, GRDF, C-236/18, EU:C:2019:1120, paragraph 35.

[14] See also Article 19(1) lit. (h) (i) TR.

alternative is to qualify as contributing substantially to climate change mitigation where it supports the transition to a climate-neutral economy and complies with a number of other conditions. These activities are hereinafter referred to as *transitional activities*.

b) Green activities

(33) In this section, we will assess whether nuclear power falls under one or more of the green activities listed in Article 10(1) lit. (a) to (h) TR. Our analysis will focus on the three most relevant provisions.

aa) Renewable energy

(34) Article 10(1) lit. (a) TR applies to "generating, transmitting, storing, distributing or using renewable energy in line with Directive (EU) 2018/2001".

(35) The concept of renewable energy is defined in Article 2(1) of Directive (EU) 2018/2001. The definition reads:

> *"energy from renewable sources' or 'renewable energy' means energy from renewable non-fossil sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal energy, ambient energy, tide, wave and other ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, and biogas".*

(36) It follows from the wording of Article 2(1) of Directive (EU) 2018/2001 that the list of renewable energy sources thereby established is exhaustive. Nuclear power is not listed there and hence does not qualify as renewable energy.

(37) Moreover, the legislative history of the TR shows that the Union legislature deliberately chose not to include nuclear power in Article 10(1) lit. (a) TR. In effect, the wording first proposed by the Commission not only referred to "renewable energy" but also to "climate-neutral energy (including carbon-neutral energy)".[15] The latter reference was then deleted from the final text of the TR upon the European Parliament's request.[16] Apparently, this request was also backed by some Member

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[15] See COM(2018) 353 final, Article 6(1) lit. (a).

[16] See European Parliament, legislative resolution of 28 March 2019, TA/2019/0325.

States that explicitly voiced concerns regarding nuclear power.[17] It is hence clear that the current wording of Article 10(1) lit. (a) TR is the direct result of a decision by the Union legislature not to list nuclear power alongside renewable energy.

(38) By way of compromise, a reference to "climate-neutral energy" and "low-carbon economic activities" was, however, included in Recital 41 TR,[18] which reads as follows:

> *"In establishing and updating the technical screening criteria for the environmental objective of climate change mitigation, the Commission should take into account and provide incentives for the ongoing and necessary transition towards a climate-neutral economy in accordance with Article 10(2) of this Regulation. In addition to the use of climate-neutral energy and more investments in already low-carbon economic activities and sectors, the transition requires substantial reductions in greenhouse gas emissions in other economic activities and sectors for which there are no technologically and economically feasible low-carbon alternatives. […]".*

(39) It should be noted that Recital 41 in no way implies that nuclear power must be considered as renewable energy within the meaning of Article 10(1) lit. (a) TR. In any event, Recital 41 cannot extend the scope of application of Article 10(1) lit. (a) TR. It is well-established in case law that the preamble to a Union act has no binding legal force and cannot be relied on either as a ground for derogating from the actual provisions of the act in question or for interpreting those provisions in a manner clearly contrary to their wording.[19]

(40) Consequently, nuclear power is not covered by Article 10(1) lit. (a) TR.

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[17] See the joint statement by Germany, Luxembourg and Austria and the statement by Greece, annexed to the mandate for negotiations with the European Parliament, 12360/2/19.

[18] See COM(2020) 155 final, p. 3.

[19] Judgment of 19 June 2014, Karen Millen Fashions, C-345/13, EU:C:2014:2013, paragraph 31.

bb) Energy efficiency

(41) Article 10(1) lit. (b) TR covers "improving energy efficiency, except for power generation activities as referred to in Article 19(3)". Article 19(3) TR refers to power generation activities that use solid fossil fuels.

(42) The concept of energy efficiency is defined in Article 2(17) TR as follows:

"'energy efficiency' means the more efficient use of energy at all the stages of the energy chain from production to final consumption".

(43) It is clear from this definition that the term 'energy efficiency' refers to the *use* of energy. This includes the use of energy at the production stage – except for power generation activities that use solid fossil fuels. However, the generation of power as such is not covered.

(44) This view is also supported by other Union acts to which Recital 33 TR refers. For instance, according to Article 2(17) of Regulation 2017/1369 and Article 2(4) of Regulation 2012/27, 'energy efficiency' means "the ratio of output of performance, service, goods or energy, to input of energy".

(45) It follows that an activity that consists in the generation of energy as such does not fall under Article 10(1) lit. (b) TR. In contrast, improving energy efficiency in power plants may fall under that provision – to the extent that it leads to the avoidance or reduction of greenhouse gas emissions, in accordance with Article 10(1) TR.

(46) Consequently, generating nuclear power is not covered by Article 10(1) lit. (b) TR. However, the mere activity of improving energy efficiency in a nuclear power plant could in principle be covered, provided that the requirements set out in Article 10(1) TR are fulfilled.

cc) Energy infrastructure

(47) Article 10(1) lit. (g) TR applies to "establishing energy infrastructure required for enabling the decarbonisation of energy systems".

(48) The TR does not contain a definition of the term 'energy infrastructure'. The concept is, however, also used in other EU acts, such as Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure and Regulation (EU) 2021/523 establishing the InvestEU Programme. In that context, the term 'energy infrastructure'

refers to facilities for the transmission, distribution and storage of energy. It does not cover power plants.[20]

(49) According to the case law of the Court of Justice, the unity and coherence of the European Union legal order require that concepts used in related legal acts must have the same meaning, unless the European Union legislature has, in a specific legislative context, expressed a different intention.[21] In the case at hand, Union legislators have not expressed an intention to diverge from the concept of 'energy infrastructure', as it is used in other EU acts.

(50) Consequently, the construction of power plants, including nuclear power plants, does not qualify as 'establishing energy infrastructure' in terms of Article 10(1) lit. (g) TR. Even less so does the activity of generating power.

dd) Conclusion

(51) The remaining activities listed in Article 10(1) lit. (c) to (f) and (h) TR are even less amenable to an interpretation that could result in the inclusion of nuclear power. They will hence not be assessed in more detail here. Against this background, we conclude that nuclear power does not fall under any of the green activities listed in Article 10(1) lit. (a) to (h) TR.

c) Enabling activities

(52) Next, we will assess whether nuclear power qualifies as an enabling activity in accordance with Article 10(1) lit. (i) and Article 16 TR.

aa) Baseload power

(53) It is sometimes argued that nuclear power complements renewable energy because it is a baseload power source that can be used as a backup for solar and wind.[22] Against this background, it will be verified whether generating nuclear power qualifies as an

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[20] See Article 1(1), Article 2(1) and Annex II of Regulation (EU) No 347/2013 and Annex II (1) lit. (c) of Regulation (EU) 2021/523.

[21] See judgment of 4 October 2011, Football Association Premier League, joined cases C-403/08 and C-429/08, EU:C:2011:631, paragraph 188.

[22] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 41.

enabling activity for the generation, transmission or use of renewable energy in accordance with Article 10(1) lit. (a) and (i) and Article 16 TR.

(1) Article 10(1) lit. (i) TR

(54) Article 10(1) lit. (i) TR provides that "enabling any of the activities listed in points (a) to (h)" shall also qualify as contributing substantially to climate change mitigation.

(55) In its regular meaning, to 'enable' essentially denotes making something possible.[23] Therefore, an interpretation of Article 10(1) lit. (i) TR according to its regular meaning[24] militates against considering another power source, regardless of type, as enabling the generation, transmission or use of renewable energy. Where that other source is used as a backup, it may increase the overall security of energy supply. Yet, the fact remains that it does not make the generation, transmission or use of renewable energy *possible*.

(56) Moreover, it follows from a systemic and historic interpretation that Union legislators deliberately chose not to include nuclear power in Article 10(1) lit. (a) TR.[25] Against this background, the generation of energy is exhaustively regulated by Article 10(1) lit. (a) TR. Generating energy from sources not mentioned in this provision hence cannot qualify as an enabling activity. Any other interpretation would deprive Article 10(1) lit. (a) TR of its useful effect and circumvent the will of Union legislators. According to well-established case-law, EU law provisions must be interpreted, to the extent possible, in a way that gives them useful effect.[26]

(57) The proposal for a Delegated Regulation recently published by the Commission offers further support. It names, for instance, the "manufacture of renewable energy technologies" or the "installation, maintenance and repair of renewable energy technologies" as enabling activities.[27] In contrast, the generation of non-renewable energy is not envisaged as an activity enabling the generation, transmission or use of

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[23] See, for instance, https://dictionary.cambridge.org/dictionary/english/enable (last access on 22 June 2021).

[24] For that method of interpretation see, *inter alia*, judgment of 26 January 2021, Hessischer Rundfunk, joined cases C-422/19 and C-423/19, EU:C:2021:63, paragraph 47.

[25] See *supra* paragraph (37).

[26] See, for example, judgment of 19 December 2019, GRDF, C-236/18, EU:C:2019:1120, paragraph 35.

[27] See the proposal for a Commission Delegated Regulation supplementing Regulation (EU) 2020/852, C(2021) 2800/3, Annex 1, pp. 38 and 176.

renewable energy. Of course, the Commission has no competence for providing legally binding interpretations of Union law. According to Article 19 TEU, that power rests with the CJEU. However, the proposed Delegated Regulation may serve as an indication how the Commission understands the concept of enabling activities.

(2) Article 16 TR

(58) Article 16 TR sets out additional requirements that an activity must fulfil in order to qualify as enabling activity. It reads:

> *"Article 16*
> *Enabling activities*
> *An economic activity shall qualify as contributing substantially to one or more of the environmental objectives set out in Article 9 by directly enabling other activities to make a substantial contribution to one or more of those objectives, provided that such economic activity:*
> *(a) does not lead to a lock-in of assets that undermine long-term environmental goals, considering the economic lifetime of those assets; and*
> *(b) has a substantial positive environmental impact, on the basis of life-cycle considerations."*

(59) It should be noted that the wording of Article 16 TR differs slightly from the wording of Article 10(1) lit. (i) TR: Under the latter provision it is sufficient that an enabling activity enables any of the green activities. In contrast, the wording of Article 16 appears to be stricter. In that regard, merely enabling a green activity is not sufficient. On the contrary, it is required that an enabling activity *directly enables* any of the green activities *to make a substantial contribution* to one or more of the environmental objectives.[28]

(60) However, nuclear power does not satisfy that requirement. It clearly does not enable the generation, transmission or use of renewable energy to make a substantial contribution to climate change mitigation. Renewable energy contributes to climate change mitigation through the avoidance of greenhouse gas emissions. This

[28] In this respect, e.g. the German, French and Spanish text of the TR appear to be clearer than the English version.

characteristic is inherent to renewable energy sources. It is not made possible by another energy source, such as nuclear power.

(61) Moreover, Article 16 lit. (a) TR excludes activities that "lead to a lock-in of assets that undermine long-term environmental goals, considering the economic lifetime of those assets". Nuclear power plants take a considerable time to build[29] and have an economic lifetime of several decades. In the recent past, the operation of a considerable number of power plants has been extended to 60 years.[30] Nuclear power is also highly capital-intensive, probably even the most capital-intensive energy supply.[31] This is not limited to new construction of power plants: Retrofitting required for license extensions or higher regulatory standards also makes considerable investments necessary.[32] So-called small modular reactors (SMRs) aim at reducing capital costs. It is however unclear whether they are technologically and economically feasible. There is no commercially operating SMR model to date.[33] Against this background, it appears reasonable to conclude that nuclear power leads to a considerable lock-in of assets.

(62) What is more, it appears questionable whether the requirement not to undermine long-term environmental goals is fulfilled. This issue will be dealt with in more detail below.[34]

(63) In addition, Article 16 lit. (b) TR requires that an enabling activity "has a substantial positive environmental impact, on the basis of life-cycle considerations." The wording indicates that this condition goes beyond the requirement to make a substantive contribution to one of the environmental objectives. Arguably, it implies that the overall environmental benefits must substantially outweigh the adverse effects, on the basis of a life-cycle assessment. This interpretation is also supported by Recitals 34

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[29] See Lovins et al., Relative deployment rates of renewable and nuclear power, Energy Research & Social Science 38 (2018), 188; International Atomic Energy Agency (IAEA), Climate Change and Nuclear Power, 2018, p. 86.

[30] See International Atomic Energy Agency (IAEA), Climate Change and Nuclear Power, 2018, p. 54.

[31] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 38.

[32] See International Atomic Energy Agency (IAEA), Climate Change and Nuclear Power, 2018, pp. 54 et seq.

[33] See Mignacca/Loccatelli, Economics and Finance of Small Modular Reactors, Renewable and Sustainable Energy Reviews 118 (2020), 109519.

[34] See *infra* section C.I.3.

and 40 TR, according to which an activity must not qualify as sustainable if it does more harm than good.

(64) In this respect, it should be noted that there appears to be scientific disagreement on whether nuclear power actually complements renewable energy. Studies indicate that nuclear power plants are not suited for load-following operation. Beside the technical aspect, these plants also need to operate at high capacity on a long-term basis in order to compensate for high investments and fixed costs. On the other hand, wind and solar power require a flexible backup, or smart grids and storing technology. Therefore, nuclear power and renewables tend to cannibalise rather than complement each other.[35] What is more, there are doubts whether nuclear new-built could actually make a timely contribution to climate change mitigation, regarding the considerable planning and building time on the one hand and the necessity of immediate action on the other hand.[36]

(65) Consequently, generating nuclear power does not qualify as an activity enabling the generation, transmission or use of renewable energy.

bb) Clean fuels and mobility

(66) It is sometimes argued that nuclear power could facilitate the production of carbon-neutral fuels, such as hydrogen.[37] Against this background, one might ask whether the generation of nuclear power qualifies as an enabling activity for climate neutral mobility and/or for producing clean and efficient fuels in accordance with Article 10(1) lit. (c) and (h) TR.

(67) Upon closer analysis, however, this claim again cannot be upheld. To start with, it is highly doubtful whether any power source can be referred to as 'enabling' activities such as increasing climate neutral mobility or producing clean fuels, within the meaning of Article 10(1) lit. (i) TR. In effect, energy is versatile and may be used for virtually any purpose. This is particularly so where electricity generated by a power plant is fed into the grid. In such a case a power plant operator could not credibly claim

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[35] See Institute for Advanced Sustainability Studies (IASS), Can reactors react?, IASS discussion paper, January 2018; Verbruggen, Renewable and nuclear power: A common future, Energy Policy 36 (2008), 4036; Brown et al., Response to 'burden of proof', Renewable and Sustainable Energy Reviews, 92 (2018), 834.

[36] See Stagl, Does Nuclear Power Comply with the DNSH Criteria?, 2020, pp. 32 et seq.

[37] See, for example, Partanen et al., Sustainable Nuclear, 2019, pp. 27 et seq.

that power generated in his or her plant is specifically used for sustainable activities rather than, for instance, consumer electronics or industrial production not covered by the TR.

(68) Moreover, it is recalled that Article 16 requires enabling activities to *directly enable* any of the green activities *to make a substantial contribution* to one or more of the environmental objectives.[38] Admittedly, clean fuel production requires a large amount of climate-neutral energy. That energy can, however, also be provided by other, namely renewable energy sources. Against this background, we find it hard to argue that any particular energy supply as such directly enables clean fuel production to make a substantial contribution to climate change mitigation.

(69) In any event, as explained above, the generation of energy is exhaustively regulated by Article 10(1) lit. (a) TR. Generating power from sources not mentioned in this provision hence cannot qualify as an enabling activity from the outset.[39] This interpretation also has the advantage of avoiding serious problems of delimitation that would inevitably come with the question to what extent a versatile activity such as power generation can be said to directly enable specific green activities.

(70) Finally, it is again highly doubtful whether the requirements set out in Article 16 lit. (a) and (b) TR can be satisfied. In this respect, we refer to our above assessment.[40]

(71) Consequently, the generation of nuclear power does not qualify as an activity that enables increasing climate neutral mobility or producing clean fuels.

cc) Carbon capture

(72) According to Article 10(1) lit. (e) TR, "increasing the use of environmentally safe carbon capture and utilisation (CCU) and carbon capture and storage (CCS) technologies that deliver a net reduction in greenhouse gas emissions" are considered sustainable activities. Since CCU and CCS require large amounts of climate-neutral energy, it may be asked whether nuclear power qualifies as an enabling activity in that regard.

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[38] See *supra* paragraph (59).

[39] See *supra* paragraph (56).

[40] See *supra* paragraphs (61) et seq.

(73) However, the inconsistencies identified in respect of clean fuel production also apply here: Energy is versatile, which is why it is hard to argue that any particular energy source directly enables any specific activity. Moreover, Union legislators regulated the activity of generating energy exhaustively in Article 10(1) lit. (a) TR. Finally, nuclear power does not meet the requirements set out in Article 16 TR.[41]

(74) Consequently, the generation of nuclear power does not qualify as an activity that enables increasing the use of environmentally safe CCU or CCS technologies.

dd) Conclusion

(75) Generating nuclear power does not qualify as an enabling activity in terms of Article 10(1) lit. (i) TR. Neither does building nuclear power plants.

d) Transitional activities

(76) Given that generating nuclear power does not qualify as a green or enabling activity in terms of Article 10(1) TR, we will now turn to the question whether it can be considered a transitional activity within the meaning of Article 10(2) TR.

aa) Scope of application

(77) Article 10(2) TR applies to economic activities "for which there is no technologically and economically feasible low-carbon alternative".

(78) By requiring that there is no "low-carbon alternative", Article 10(2) TR implies that low-carbon activities themselves are excluded from the provision's scope. In other words, Article 10(2) TR only covers carbon-intensive activities.

(79) Article 10(2) lit. (a) TR also supports this interpretation. It provides that a transitional activity shall have "greenhouse gas emission levels that correspond to the best performance in the sector or industry". This indicates that Article 10(2) TR is an expression of the so-called best-in-class approach: It allows an activity to be considered sustainable which, given the current state of technology, is necessarily carbon-intensive but has the best performance in the relevant sector and offers a path towards climate neutrality. In this respect, the proposed Delegated Regulation may

[41] See *supra* paragraphs (61) et seq.

serve as an illustration in that it sets out technical screening criteria under Article 10(2) TR for e.g. the manufacture of cement or aluminium.[42]

(80) Moreover, Article 10(2) lit. (b) TR requires that a transitional activity "does not hamper the development and deployment of low-carbon alternatives". Article 10(2) lit. (c) TR stipulates that a transitional activity must "not lead to a lock-in of carbon-intensive assets, considering the economic lifetime of those assets". Again, these provisions show that Union legislators assumed that transitional activities covered by Article 10(2) TR are carbon-intensive.

(81) Recital 41 further confirms this view. It reads:

> *"In establishing and updating the technical screening criteria for the environmental objective of climate change mitigation, the Commission should take into account and provide incentives for the ongoing and necessary transition towards a climate-neutral economy in accordance with Article 10(2) of this Regulation. In addition to the use of climate-neutral energy and more investments in already low-carbon economic activities and sectors, the transition requires substantial reductions in greenhouse gas emissions in other economic activities and sectors for which there are no technologically and economically feasible low-carbon alternatives. Those transitional economic activities should qualify as contributing substantially to climate change mitigation if their greenhouse gas emissions are substantially lower than the sector or industry average, they do not hamper the development and deployment of low-carbon alternatives and they do not lead to a lock-in of assets incompatible with the objective of climate-neutrality, considering the economic lifetime of those assets. The technical screening criteria for such transitional economic activities should ensure that those transitional activities have a credible path towards climate-neutrality, and should be adjusted accordingly at regular intervals."* (emphasis added).

(82) Hence, it follows from the second sentence of Recital 41 that reductions in greenhouse gas emissions are necessary in "other economic activities" which are not "already low-carbon economic activities". As the third sentence of Recital indicates, "those" other

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[42] See the proposal for a Commission Delegated Regulation supplementing Regulation (EU) 2020/852, C(2021) 2800/3, Annex 1, pp. 51 and 53.

economic activities are considered transitional activities. According to the last sentence of Recital 41, the technical screening criteria should ensure that transitional activities "have a credible path towards climate-neutrality". Thereby, it is again made clear that transitional activities need to be carbon-intensive activities and, thus, activities already being considered as 'low-carbon' cannot qualify as transitional activities.

(83) However, it should be noted that a number of official documents, including the TEG and JRC reports, consider generating nuclear power to be a low-carbon activity.[43] Assuming this is correct, Article 10(2) TR does not apply to nuclear power from the outset.

(84) This conclusion is also supported by the aim of the TR to establish a credible and reliable European taxonomy.[44] In this respect, it should be noted that a considerable number of pre-existing sustainability labels or criteria, similar to those set out in the TR, expressly exclude nuclear power. This is e.g. the case with the Energy and Ecological Transition for the Climate (TEEC) label established by the French Government, the taxonomy created by the private Climate Bonds Initiative, the so-called Nordic Swan – the eco-label of nordic countries – and the Austrian *Umweltzeichen*.[45] The first example is particularly remarkable, given that nuclear power accounts for a considerable share in the French energy mix.

bb) Conditions

(85) Article 10(2) TR sets out strict requirements for transitional activities in order to avoid greenwashing.[46] As we have just shown, nuclear power does not fall within the scope

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[43] See EU Technical Expert Group on Sustainable Finance (TEG), Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, Technical Annex, 2020, p. 208; Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 39; International Atomic Energy Agency (IAEA), Climate Change and Nuclear Power, 2018; Intergovernmental Panel on Climate Change (IPCC), Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment, p. 20.

[44] See *supra* paragraphs (20) *et seq*.

[45] See European Commission, Staff Working Document, Impact Assessment, SWD(2018) 264 final, pp. 172 and 174.

[46] See COM(2020) 155 final, p. 3.

of Article 10(2) TR from the outset. Nevertheless, for the sake of completeness, we will now assess whether, in any event, it would satisfy these requirements.

(1) No alternatives

(86) Article 10(2) TR requires that there are "no technologically and economically feasible low-carbon alternatives". As the term "feasible" indicates, it is not sufficient for a transitional activity to be somehow more convenient or slightly cheaper.

(87) However, it may well be argued that there are indeed technologically and economically feasible low-carbon alternatives to nuclear power. Namely, studies indicate that renewable energy offers such alternatives, if combined with smart grids and storage technology.[47]

(88) We note that so far none of the reports drawn up at the Commission's request has assessed whether there are technologically and economically feasible low-carbon alternatives to nuclear power. On this factual basis, any delegated act referring to nuclear power as a transitional activity in terms of Article 10(2) TR could be vitiated by a manifest error of assessment. According to well-established case law, Union institutions are under an obligation to rely on factually accurate, reliable and consistent data and must make sure that the evidence contains all the information which must be taken into account in order to assess a situation.[48]

(89) What is more, it appears doubtful whether nuclear power actually has an economic advantage over renewable energy – bearing in mind that this would not even be sufficient under Article 10(2) TR.

(90) As regards new-built, on the one hand, a great number of authors from various backgrounds seem to essentially agree that planning and constructing nuclear power plants has become extremely expensive and this constitutes a major challenge for the

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[47] See, for example, Ram et al., A comparative analysis of electricity generation costs from renewable, fossil fuel and nuclear sources in G20 countries for the period 2015-2030, Journal of cleaner production 242 (2020), 118530; Markard et al, Destined for decline? Examining nuclear energy from a technological innovation systems perspective, Energy Research & Social Science 67 (2020), 101512.

[48] See, for example, judgment of 6 November 2008, Netherlands v Commission, C-405/07 P, EU:C:2008:613, paragraphs 55 and 56.

sector.[49] Namely, according to the JRC report, solar, wind and hydro perform considerably better than nuclear power regarding the levelised cost of electricity (LCOE) of new capacities.[50] Against this background, for instance the JRC, the IAEA and the International Energy Agency (IEA) call for public financial support in order to encourage the establishment of new nuclear capacities.[51]

(91) Regarding existing capacities, on the other hand, it is often argued that nuclear power has very low LCOE, even considering the costs of refurbishments required for a lifetime extension.[52] However, this position appears to be increasingly challenged since it does not (sufficiently) take into account external costs, such as long-term waste management, managing intermittency with other energy sources and nuclear accidents.[53] In this respect, it should be noted that, according to Recital 44 TR, the Commission should also take into account environmental, social and economic externalities when establishing technical screening criteria. However, so far none of the reports drawn up on the Commission's request has assessed the external costs related to nuclear power. Therefore, any delegated act referring to nuclear power as a transitional activity could be vitiated by a manifest error of assessment also in this respect.

(92) Finally, in any event, under the 'no alternatives' requirement set out in Article 10(2) TR, nuclear power would have to be limited to a share of the energy mix that,

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[49] See, for instance, International Atomic Energy Agency (IAEA), Climate Change and Nuclear Power, 2018, pp. 86 et seq.; Ram et al., A comparative analysis of electricity generation costs from renewable, fossil fuel and nuclear sources in G20 countries for the period 2015-2030, Journal of cleaner production 242 (2020), 118530; Markard et al., Destined for decline? Examining nuclear energy from a technological innovation systems perspective, Energy Research & Social Science 67 (2020), 101512; Mignacca/Loccatelli, Economics and Finance of Small Modular Reactors, Renewable and Sustainable Energy Reviews 118 (2020), 109519.

[50] See Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 39.

[51] See Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 38; International Atomic Energy Agency (IAEA), Climate Change and Nuclear Power, 2018, pp. 86 et seq.; International Energy Agency (IEA), European Union 2020 Energy Policy Review, p. 223.

[52] See Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 39.

[53] See, for instance, Ram et al., A comparative analysis of electricity generation costs from renewable, fossil fuel and nuclear sources in G20 countries for the period 2015-2030, Journal of cleaner production 242 (2020), 118530; Timilsina, Demystifying the Costs of Electricity Generation Technologies, World Bank Policy Research Working Paper 9393, 2020; Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, pp. 26 et seq.

according to scientific evidence, cannot under any circumstances be covered by renewable sources. This share would then probably have to decrease over time.

(2) Best performance

(93) Article 10(2) lit. (a) TR requires that a transitional activity "has greenhouse gas emission levels that correspond to the best performance in the sector or industry".

(94) We understand that there is no scientific agreement on the relative performance of nuclear power, based on a life-cycle analysis. While it is clear that its greenhouse gas emissions are considerably lower than those of fossil fuel technologies, studies indicate that at least certain renewable energy sources perform (even) better.[54]

(95) However, the Commission so far has failed to task the relevant bodies with an in-depth assessment of that issue. It is hence clear that, on the basis of the available evidence, the Commission may not be able to consider that the requirement set out in Article 10(2) lit. (a) TR is fulfilled. Again, a delegated act referring to nuclear power as a transitional activity could be vitiated by a manifest error of assessment also in this respect.

(3) No obstacle to alternatives

(96) Article 10(2) lit. (b) TR provides that a transitional activity must not hamper the development and deployment of low-carbon alternatives.

(97) However, as explained above, studies indicate that nuclear power tends to cannibalise rather than complement renewable energy.[55] According to Article 19(1) lit. (i) TR, the delegated act to be adopted by the Commission is to take into account the risk of creating inconsistent incentives for investing sustainably.

(98) Therefore, at least on the basis of the available evidence, the Commission could not be able to consider that the requirement set out in Article 10(2) lit. (b) TR is fulfilled.

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[54] See, for instance, Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, pp. 26 et seq.; Dong et al., CO2 emissions, economic growth, and the environmental Kuznets curve in China, Journal of Cleaner Production 196 (2018), 51.

[55] See *supra* paragraph (64).

cc) Technological neutrality

(99) Article 10(2), second subparagraph, TR provides that "for the purpose of this paragraph and the establishment of technical screening criteria pursuant to Article 19, the Commission shall assess the potential contribution and feasibility of all relevant existing technologies."

(100) Similarly, Article 19(1) lit (a) TR provides that the technical screening criteria to be established shall "identify the most relevant potential contributions to the given environmental objective while respecting the principle of technological neutrality, considering both the short- and long-term impact of a given economic activity".

(101) This indicates that Union legislators placed some importance in the principle of technological neutrality. However, it follows from a literal, systemic and purposive interpretation that the principle of technological neutrality only applies to activities that as such satisfy the conditions for being considered sustainable set out in the TR. In effect, nothing indicates that 'technological neutrality' could be some sort of higher-ranking norm that derogates from all the other requirements and leads to the inclusion of activities that otherwise do not qualify as sustainable. Such an interpretation would clearly deprive the criteria set out in Article 10, 16 and 19 TR of any useful effect.[56]

(102) As we have shown, nuclear power does not fulfil the criteria set out in Article 10(2) TR. Therefore, also in view of the principle of technological neutrality, it does not qualify as a transitional activity.

dd) Conclusion

(103) Generating nuclear power is not a transitional activity within the meaning of Article 10(2) TR.

3. DNSH (Article 17 TR)

(104) Even if nuclear power fulfilled the definition of "substantial contribution to climate change mitigation" in terms of Article 10 TR, it could only be included in the taxonomy if it met the DNSH criterion provided by Article 3 lit. (b) and Article 17 TR.

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[56] Cf., to this effect, judgment of 19 December 2019, GRDF, C-236/18, EU:C:2019:1120, paragraph 35.

The following section will hence examine whether nuclear power fulfils this requirement.

a) Legal standard

(105) Pursuant to Article 3 lit. (b) and Article 19(1) lit. (b) TR, the DNSH criterion requires that no significant harm be caused to *any* of the environmental objectives. Hence, where significant harm to one or more environmental objectives cannot be avoided, the activity cannot be included in the taxonomy.[57]

(106) Moreover, Article 19(1) lit. (f) and Recital 40 TR provide that the technical screening criteria (TSC) must be based on conclusive scientific evidence. Since the TSC establish the minimum requirements which must be fulfilled to satisfy the DNSH criterion, this implies that any assessment of whether the DNSH criterion can at all be met must itself be based on conclusive scientific evidence. Where scientific evaluation does not allow for a risk of significant harm to be excluded with sufficient certainty, the precautionary principle enshrined in Article 191 TFEU applies. In such a case, the activity concerned cannot be included in the taxonomy.[58]

(107) It also follows from Article 17(1) and (2), Article 19(1) lit. (g) and Recitals 34 and 40 TR that compliance with the DNSH criterion must be examined by taking into account the entire life cycle of the products and services concerned.

(108) Overall, an activity can hence only be included in the taxonomy, if there is conclusive scientific evidence that the DNSH criterion is met for all the environmental objectives at all stages of the entire life cycle of the concerned products and services.

b) Application to the case at hand

(109) We will now address each of the environmental objectives mentioned in Article 17(1) lit. (b) to (f) TR.

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[57] Cf. TEG Report, March 2020, Technical Annex, p. 35; Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 22; Terms of reference for a technical assessment implemented by the JRC on: Nuclear energy under the "do no significant harm" criterion, under 3.

[58] Cf. TEG Report, March 2020, Technical Annex, p. 33.

aa) Climate change adaptation

(110) Pursuant to Article 17(1) lit. (b) TR, an economic activity is considered to significantly harm climate change adaptation where it leads to an increased adverse impact of the current climate and the expected future climate on the activity itself or on people, nature or assets. This criterion implies that an activity can only be included in the taxonomy if it is itself resilient to climate change and does not adversely affect the adaptation efforts of others.[59]

(111) In view of the available evidence, it is highly doubtful whether nuclear power meets this requirement, in particular at the generation stage.

(112) Climate change implies, on the one hand, more gradual changes like the rise of mean annual temperatures and sea levels. On the other hand, it leads to more frequent extreme weather events like heatwaves, droughts or floods and storms. It is broadly acknowledged that those consequences can in turn have a negative impact on the generation of nuclear power. Prof. Stagl sums up the current position of the academic literature as follows:

> "*The resilience of nuclear power production is further challenged by increasing costs for construction and operation of nuclear power plants to protect against the impacts of climate change. Nuclear power plants require concentrated, large amounts of blue water. Increased water temperatures and reduced river flows have already led to reductions or even interruptions of electricity generation in recent years.*"[60]

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[59] Cf. TEG Report, March 2020, Technical Annex, pp. 29 et seq.

[60] Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, available under: https://www.bmk.gv.at/service/presse/gewessler/20210203_kernenergie.html (last access on 22 June 2021).

(113) Shut-downs of nuclear power plants that are attributed to climate change have, for instance, occurred in France regularly since 2015, due to heatwaves and droughts[61], and in South Korea in 2020, as a consequence of a typhoon[62].

(114) A recent IAEA report underlines that the change in mean temperatures will have its most important impact on nuclear and fossil thermal generation, in which higher ambient temperatures reduce the efficiency of thermal conversion and, by warming ambient water bodies, the efficiency of cooling.[63] The report stresses that nuclear power plants will face particular safety risks:

> *"Nuclear plants are exposed to an additional level of vulnerability beyond those that other types of generating plant face. Various types of EWE [extreme weather events] can affect critical safety systems and increase the risk to human health and the environment, making adaptation more than an economic calculus for plant owners.*"[64]

(115) Public institutions also recognise that there is insufficient knowledge about the resilience of nuclear power generation to climate change. For instance, Greg Rzentkowski, Director of the IAEA's Division of Nuclear Installation Safety, is quoted in the IAEA Bulletin of September 2020 as follows:

> "*While rising water and air temperatures may pose challenges to the continuity of reactor operation by limiting its cooling capacity, it's the extreme floods and winds that may affect reactor safety by posing threats to the installation's design. […] One of the challenges with climate change is that, as it continues to progress and make conditions more extreme, past observations and predictive models become less reliable. We should thus start anticipating these events and periodically reassess the relevant risks*

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[61] Thibault Laconde, Effet de la météo sur la disponibilité du parc nucléaire français : quelle réalité ?, Energie & Développement, 28 July 2020, available under: http://energie-developpement.blogspot.com/2020/07/meteo-climat-disponibilite-nucleaire.html (last access on 22 June 2021); World Nuclear Industry Status Report, 2020, p. 139, available under: https://www.worldnuclearreport.org/ (last access on 22 June 2021).

[62] World Nuclear Industry Status Report, 2020, p. 15, available under: https://www.worldnuclearreport.org/ (last access on 22 June 2021).

[63] IAEA, Adapting the Energy Sector to Climate Change, 2019, p. 12.

[64] IAEA, Adapting the Energy Sector to Climate Change, 2019, p. 35.

to ensure that accident prevention and mitigation measures remain adequate."[65]

(116) The Nuclear Energy Agency of the OECD has established an Ad Hoc Expert Group on Climate Change (NUCA), tasked with assessing the vulnerability of nuclear power plants and the cost of adaptation. Its homepage contains the following statement:

"*The evidence of current energy policy in both, developed and developing economies, is a cause of concern since it points to a below optimal reduction in greenhouse gas emissions. Climate projections in some regions show increased likelihood of intense heat waves accompanied by droughts, or violent storms, flooding, etc. The effects of such extreme climate events could undermine the operation and output of thermal power plants, and nuclear power plants in particular, which require large quantities of water for cooling.*

Given the expected lifetime of nuclear power plants (60 years for new designs), it is clear that climate change considerations must be addressed in the design, planning and licensing stages. Additionally, there may be the need to retrofit existing nuclear power plants to make them more resilient in the face of climate change. Closed cooling systems, more robust water intake systems, more efficient heat exchangers are examples of adaptation measures. The adoption of these measures will have an impact on the cost of nuclear electricity, which must be compared to the cost of inaction, i.e. the risk of forced outages due to extreme weather."[66]

(117) The work of this expert group is ongoing. As far as can be ascertained, no results have been published so far.

(118) In a similar vein, the Commission states in the recent staff working document "Overview of natural and man-made disaster risks the European Union may face":

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[65] The resilience and safety of nuclear power in the face of extreme events, September 2020, available under: https://www.iaea.org/nuclear-power-and-the-clean-energy-transition/the-resilience-and-safety-of-nuclear-power-in-the-face-of-extreme-events (last access on 22 June 2021).

[66] Ad hoc Expert Group on Climate Change: Assessment of the Vulnerability of Nuclear Power Plants and Cost of Adaptation (NUCA), available under: https://www.oecd-nea.org/jcms/pl_28742/ad-hoc-expert-group-on-climate-change-assessment-of-the-vulnerability-of-nuclear-power-plants-and-cost-of-adaptation-nuca (last access on 22 June 2021).

> "*The role of nuclear power is being revisited in the context of strategies aimed at reducing greenhouse gas emissions and fighting climate change. In view of the latter, one report draws attention to the fact that operations in nuclear power plants will need to be adapted to changes in climate. This is because climate change may lead to a reduction in available cooling water as well as higher risks stemming from extreme weather events. While the outcomes of these developments are not easy to predict, it is recognised that they will influence the nuclear safety landscape in Europe for years to come.*"[67]

(119) Against this backdrop, there appears to be a lack of conclusive scientific evidence regarding the resilience of nuclear power to climate change. It follows from Article 19(f) and Recital 40 TR that such a lack of evidence leads to the application of the precautionary principle, implying that nuclear power cannot be considered as causing no significant harm to climate change adaptation.

(120) Even if one were to assume that sufficient climate change resilience can be reached by new nuclear power plants, it would remain doubtful whether the same holds true also for existing nuclear power plants. It is widely acknowledged that refitting existing nuclear power plants to meet enhanced safety standards may exceed what is reasonably practicable.[68] Refitting existing nuclear power plants to make them resilient to climate change may face the same problems.

(121) Moreover, it is doubtful whether mere compliance with the EU stress tests and existing safety provisions, such as the WENRA Safety Reference Levels for Existing Reactors and the WENRA Safety Objectives for New Nuclear Power Plants, which are not legally binding, and the Euratom Nuclear Safety Directive[69], suffices to exclude significant harm to climate change adaptation. Neither the EU stress tests, nor the mentioned safety provisions address specifically the concerns raised by climate change. The previously mentioned IAEA report highlights that although safety

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[67] SWD(2020) 330 final/2, 22 March 2021, p. 135.

[68] See Article 8a(2) of Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, amended by Council Directive 2014/87/Euratom of 8 July 2014; WENRA Guidance, Article 8a of the EU Nuclear Safety Directive: "Timely Implementation of Reasonably Practicable Safety Improvements to Existing Nuclear Power Plants", 2017, p. 5.

[69] Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, amended by Council Directive 2014/87/Euratom of 8 July 2014.

analyses of nuclear power plants take into account weather-related events, they do not yet typically consider climate change.[70]

(122) In any event, the fact that existing safety standards are complied with does not demonstrate the absence of harm to climate change adaptation. The environmental objective of climate change adaptation is broader than guaranteeing the safety of nuclear power plants. It also encompasses other goals such as an undisrupted and affordable supply of energy and the reduction of the use of water.[71] Such goals can be adversely affected by a society's reliance on nuclear power, regardless of whether the existing safety provisions are complied with. For instance, whilst safety risks brought about by climate change may potentially be encountered by more frequent shutdowns of nuclear power plants, such shutdowns in turn mean important disadvantages for societies.[72] Likewise, the use of new technologies, for instance for cooling, brings about an increase in costs that can adversely affect the resilience of nuclear power to climate change adaptation, because it makes the supply of energy less affordable.[73]

(123) Overall, there hence seems to be no sufficiently robust basis to consider that nuclear power does not cause significant harm to climate change adaptation.

(124) In any event, it is questionable whether the Commission and the experts tasked by it have sufficiently analysed the resilience of nuclear power to climate change adaptation. The insufficiency of their investigation is reflected in the terms of reference for the expert reports which have been commissioned by the Commission. Neither the terms of reference for the JRC Report, nor those for the Article 31 Euratom and SCHEER reports specifically raise the question whether nuclear power causes significant harm to the objective of climate change adaptation. The terms of reference for the JRC Report refer explicitly to the objectives of the protection of water and marine resources, the circular economy, pollution and biodiversity, but do not

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[70] IAEA, Adapting the Energy Sector to Climate Change, 2019, p. 35.

[71] Cf. Commission, Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change, Communication of 24 February 2021, COM(2021) 82 final.

[72] IAEA, Adapting the Energy Sector to Climate Change, 2019, p. 34.

[73] Cf. Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, pp. 3 and 10, available under: https://www.bmk.gv.at/service/presse/gewessler/20210203_kernenergie.html (last access on 22 June 2021).

specifically mention the objective of climate change adaptation.[74] Whilst the JRC Report examines in detail whether nuclear power causes significant harm to the other environmental objectives laid down in Article 9 and 17 of the Taxonomy Regulation,[75] it does not contain any specific analysis of the harm caused to climate change adaptation.[76] In the absence of such an analysis, there is, however, no sufficiently robust basis to include nuclear power in the Taxonomy.

bb) Water and marine resources

(125) Pursuant to Article 17(1) lit. (c) TR, an economic activity is considered to significantly harm the sustainable use and protection of water and marine resources where that activity is detrimental:

(i) to the good status or the good ecological potential of water, including surface water and groundwater; or

(ii) to the good environmental status of marine waters.

(126) We will now apply this standard to different stages of the life-cycle of nuclear power.

(1) Mining and milling phase

(127) The contribution of the uranium mining and milling phase to the environmental impact of the complete nuclear power lifecycle is important.[77] It is widely acknowledged that uranium mining and milling activities can pose a significant challenge to several of the

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[74] Terms of reference for a technical assessment implemented by the JRC on: Nuclear energy under the "do no significant harm" criterion, under 3.A.

[75] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 41 et seq.

[76] It is true that the "Illustrative TSC tables" in Annex 4 of the JRC Report suggest TSC regarding the impact of nuclear power generation on climate change adaptation. However, the JRC Report does not explain how these TSC have been developed. Nor does it show that they suffice to exclude significant harm to climate change adaptation. Those TSC simply posit that EU stress tests and existing safety provisions, such as the WENRA Safety Reference Levels for Existing Reactors and the WENRA Safety Objectives for New Nuclear Power Plants and the Euratom Nuclear Safety Directive suffice to exclude significant harm to climate change adaptation. However, as shown above, such an approach appears highly doubtful.

[77] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 72.

environmental objectives laid down in the TR and cause, in particular, important water pollution.[78]

(128) It appears doubtful that compliance with the general regulatory framework can nevertheless justify the inclusion of nuclear power in the Taxonomy.[79] First, it is questionable whether compliance with the general regulatory requirements of EU law is sufficient to satisfy the DNSH criterion. The TR pursues an "ambitious" approach, aiming at "a high level of protection and the improvement of the quality of the environment".[80] It strives "to address concerns about greenwashing".[81] In this regard, Recital 49 of the draft first delegated act on sustainable activities for climate change adaptation and mitigation objectives[82] underscores that the DNSH criteria play an essential role in ensuring the "environmental integrity" of the classification of environmentally sustainable activities.

(129) Against this backdrop, it would run counter to the objectives of the TR and the requirement of its effective application[83] if mere compliance with the general regulatory framework were as such considered sufficient to fulfil the DNSH criterion. Such an approach would deprive the DNSH criterion of its useful effect and render Article 17 TR superfluous. It would ultimately imply that all activities satisfy the

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[78] Whilst the JRC Report states that uranium mining and milling activities "do not represent significant challenge to the climate change mitigation and adaptation TEG objectives", it also finds that "they can significantly challenge the four remaining environmental objectives, as most of the LCA indicators can exert `high´ or `critical´ impacts on all these four objectives". In line with the scientific literature, the JRC Report finds in particular that uranium mining and milling causes water pollution of "critical importance". "Critical importance" is the highest impact an indictor can have in the analysis relied on in the JRC Report, cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 81.

[79] The JRC Report posits that the challenges brought about by uranium mining and milling can be averted by appropriate measures, due application of which is considered to be ensured by applying the TSC. The TSC suggested in the JRC Report require, in turn, compliance with EU legislation, such as the Water Framework Directive (2000/60/EC) and the Environmental Impact Assessment Directive (2011/92/EU). The JRC Report considers the fulfilment of the requirements laid down in EU law "of prime importance", cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 75.

[80] See Article 3(3) TFEU and Recitals 1 and 6 TR.

[81] Recitals 6 and 11 TR.

[82] COM, Draft of Commission delegated Regulation supplementing Regulation (EU) 2020/852, COM(2021) 2800/3.

[83] On this requirement see, for instance, judgments of 4 March 2021, Föreningen Skydda Skogen, C-473/19, EU:C:2021:166, paragraphs 38 and 60; of 10 November 2020, Commission v Italy (Limit values – PM10) C-644/18, EU:C:2020:895, paragraph 81.

DNSH criterion on the sole condition that they are legal. It would hence conflate two distinct questions, namely that of the general legality of an activity and that of its sustainability within the meaning of the TR. The rules pertaining to the general legality of an activity determine the conditions under which the activity can at all be exercised. The TR does not, however, govern this question. It determines whether an activity merits being promoted due to its sustainability. Such promotion must be subject to stricter requirements than the general admissibility of an activity.

(130) Moreover, the general regulatory requirements do not necessarily exclude important adverse effects of an activity on the environment. For instance, the Environmental Impact Assessment Directive provides only procedural rules to ensure that the environmental impact of a project is considered, but no substantive requirements. Other sets of rules which contain substantive requirements, such as the Water Framework Directive, allow adverse effects on the environment for reasons of overriding public interest.[84] Overall, there is hence good reason to consider that fulfilling the DNSH criterion demands more than mere compliance with general regulatory requirements.

(131) Second, about 90 % of the global production of uranium comes from seven countries: Kazakhstan (40%); Canada (13%); Australia (12%); Namibia (10%); Niger (5%); Russia (5%) and Uzbekistan (4%). Europe is not a significant uranium supplier any more.[85] The EU imports its uranium mainly from Russia, Kazakhstan and Niger.[86]

(132) Given that EU legislation does not apply to uranium mining and milling outside the Union, it cannot ensure that no significant harm is caused.[87]

(133) Third, international non-binding standards, such as the ones adopted by the IFC, also appear insufficient to guarantee that uranium mining and milling meets the DNSH

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[84] See Article 4, paragraph 7, of the Water Framework Directive, which allows, under certain conditions, deteriorations of the status of water for reasons of overriding public interest. It is criticised in the academic literature that this provision is formulated in overly vague terms and leaves too much discretion to the Member States to deviate from the requirements of the directive, cf. Epiney, Umweltrecht der Europäischen Union, 4th Ed. 2019, Chapter 7 paragraph 41.

[85] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 64.

[86] ESA annual report 2019, p. 21, available under: https://ec.europa.eu/euratom/ar/ar2019.pdf (last access on 22 June 2021).

[87] Therefore, the JRC report is highly questionable to the extent that it relies on EU standards.

criterion. On the one hand, such standards do not ensure a level that is essentially equivalent to that of EU legislation.[88] The IFC standards and guidelines constitute a "collection of performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs" and serve "to identify Good International Industry Practice (GIIP)"; they are "not written specifically for uranium mines".[89] On the other hand, it should be noted that the IFC explicitly excludes "production or trade in radioactive materials" from its financing, with some minor exceptions such as the purchase of medical equipment.[90] Given that uranium mining and milling is hence explicitly excluded from the financing of the IFC, the IFC standards militate clearly against, and not for, including nuclear power in the Taxonomy.[91]

(2) Generation of nuclear power

(134) The generation of nuclear power can have significant adverse effects on the sustainable use and protection of water and marine resources. The review of the academic literature undertaken by Prof. Stagl shows that nuclear power plants have an above-average water consumption and lead to thermal and radioactive pollution.[92]

(135) It appears doubtful that the inclusion of nuclear power in the Taxonomy can be justified despite these adverse effects. On the one hand, even if nuclear power

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[88] See, by analogy, judgment of 6 October 2015, Schrems, C-362/14, EU:C:2015:650, paragraph 73; Opinion 1/15 (EU-Canada PNR Agreement) of 26 July 2017, EU:C:2017:592, paragraphs 93 and 134; judgment of 16 July 2020, Facebook Ireland and Schrems, C-311/18, EU:C:2020:559, paragraph 98.

[89] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 77.

[90] IFC Exclusion List (2007), available under: https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/company-resources/ifcexclusionlist#2007 (last access on 22 June 2021).

[91] For this reason, the JRC report also appears highly questionable to the extent that it relies on the IFC standards and guidelines.

[92] Cf. Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, pp. 11 et seq., available under: https://www.bmk.gv.at/service/presse/gewessler/20210203_kernenergie.html (last access on 22 June 2021); Likewise, the JRC Report finds that the operation of nuclear power plants has an impact of "high importance" on the non-radioactive indicators 'water withdrawal' and 'water consumption' and on the radioactive indicator 'liquid radioactive releases', cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 149.

generation were, as is sometimes contended,[93] comparable to other technologies which have been included in the Taxonomy in terms of water consumption, it remains the only technology that entails the additional adverse effect of radioactive pollution.

(136) On the other hand, for the reasons mentioned above, it is doubtful that the general requirements of EU law and international standards and guidelines, such as the ones developed by the IFC, provide a sufficient guarantee that nuclear power causes no significant harm to the sustainable use and protection of water. In addition to the points already mentioned,[94] it bears mention that the Euratom Drinking Water Directive (2013/51/Euratom)[95] applies only to water intended for human consumption.[96] Already by virtue of its scope of application, it does not provide a comprehensive safeguard against significant harm to the sustainable use and protection of water.

(3) Storage and disposal of high-level radioactive waste

(137) There is good reason to consider that the risks pertaining to the storage and disposal of high-level radioactive waste preclude nuclear power from meeting the DNSH criterion regarding the sustainable use and protection of water. The reasons set out below for the objective of the circular economy apply accordingly.

(4) Risk of severe accidents

(138) There is good reason to consider that the risk of severe accidents in nuclear power plants precludes nuclear power from meeting the DNSH criterion in relation to the sustainable use and protection of water and marine resources. The considerations set out below regarding pollution prevention and control apply accordingly.

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[93] The JRC Report posits that nuclear power does not cause more harm to the sustainable use and protection of water than other energy technologies included in the Taxonomy. This reasoning is based on the finding that the water consumption of nuclear power is comparable to or lower than that of concentrating solar power, hydropower and biomass and the premise that radiological pollution is sufficiently addressed by the regulatory framework, in particular the Water Framework Directive, and, for nuclear power generation performed outside the EU, the IFC standards, cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 42, 48 and 358.

[94] See *supra* paragraphs (128) et seq.

[95] This directive is relied on in the JRC Report, cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 48 and 326.

[96] Article 1 of Directive 2013/51.

(5) Interim conclusion

(139) Overall, there is hence good reason to consider that nuclear power causes significant harm to the objective of the sustainable use and protection of water and marine resources at several stages of its life cycle. In any event, the analysis conducted so far by the Commission and its experts appears to provide an insufficient basis for excluding such harm.

cc) Circular economy

(140) Pursuant to Article 17(1) lit. (d) TR, an economic activity is considered to significantly harm the circular economy, including waste prevention and recycling, where:

(i) that activity leads to significant inefficiencies in the use of materials or in the direct or indirect use of natural resources such as non-renewable energy sources, raw materials, water and land at one or more stages of the life cycle of products, including in terms of durability, reparability, upgradability, reusability or recyclability of products;

(ii) that activity leads to a significant increase in the generation, incineration or disposal of waste, with the exception of the incineration of non-recyclable hazardous waste; or

(iii) the long-term disposal of waste may cause significant and long-term harm to the environment.

(141) We will now apply this standard to different stages of the life-cycle of nuclear power.

(1) Mining and milling phase

(142) It is widely acknowledged that uranium mining and milling causes adverse effects of high importance on the circular economy, due to land use and the production of solid radioactive waste.[97] For the reasons set out above, there are considerable doubts as to whether those effects can be averted by compliance with EU legislation or international standards such as the ones developed by the IFC.[98] In particular, it would

[97] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 81.

[98] But see Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 75 et seq. What is more,

run counter to the objectives of the TR and the requirement of its effective application if mere compliance with the general regulatory framework were as such considered to be sufficient to fulfil the DNSH criterion.

(2) Storage and disposal of high-level radioactive waste and spent fuel

(143) The use of nuclear power inevitably leads to large amounts of high-level radioactive waste, resulting, *inter alia*, from the spent nuclear fuel and the (future) decommissioning of the nuclear power plants.[99] The decay time required to reduce the radiotoxicity down to an acceptable threshold amounts to a hundred thousand years; it takes several hundred thousand years until the radioactivity of spent nuclear fuel has decayed to the level of natural uranium.[100] Whilst it is broadly accepted that deep geological repositories (DGR) represent the safest and most sustainable option for the long-term management of this waste,[101] this does not imply that there is a sufficient guarantee of the absence of significant long-term harm to the environment. In fact, the best available solution is not automatically good enough to exclude significant harm within the meaning of the TR.

(144) The compliance of nuclear power with the DNSH criterion regarding the circular economy is called into question in particular by two reasons, namely the risks and uncertainties pertaining to DGR on the one hand and the lack of sufficient DGR capacities on the other hand.

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the TSC suggested by the JRC Report in relation to the objective of a circular economy do not even require compliance with the mentioned standards. The TSC suggested in the JRC Report require only the following: "A plan for the management of conventional and radioactive waste is in place and ensures maximal reuse or recycling at end of life in accordance with the waste hierarchy. During operation and facility closure (including site remediation), the amount of radioactive waste is minimized and the amount of free-release waste is maximized." However, it appears highly questionable whether conditions set out in such vague terms can offer any effective protection.

[99] Cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 224; Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, pp. 14, available under: https://www.bmk.gv.at/service/presse/gewessler/20210203_kernenergie.html (last access on 22 June 2021); The World Nuclear Waste Report, Focus Europe, 2019, pp. 33 et seq., 40 et seq., available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[100] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 200 and 250.

[101] Recital 23 of Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.

Risks and uncertainties pertaining to Deep Geological Repositories

(145) Even if DGR seem to be the best-known solution for the disposal of inevitably generated high-level radioactive waste, it appears doubtful whether there is sufficient evidence to conclude that DGR disposal causes no significant long-term harm to the environment.

(146) In particular, DGR must be safe for a very long time span, in the order of a hundred thousand years. The length of this time span makes any safety prognoses prone to error. In view of the lack of empirical evidence, the safety of DGR over the necessary time span must be essentially based on theoretical models.[102]

(147) It is broadly acknowledged that the treatment of uncertainties regarding DGR safety constitutes a main challenge.[103] It implies assumptions concerning unknown future events that cannot be based on empirical evidence and are hardly verifiable.[104]

(148) Whilst it is sometimes contended that the uncertainties inherent to DGR analysis can nevertheless be handled safely and that the availability of the necessary technologies for DGR disposal is "generally acknowledged", there is wide agreement that "there remain contrasting views".[105]

(149) A contrasting view is, for instance, expressed in the World Nuclear Waste Report (WNWR), which finds that DGR disposal entails important safety risks and its complexity

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[102] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 12. As the JRC Report highlights: "*The design and operation of deep geological repositories constitutes an unequalled scientific and technological challenge due to the geological time-scales and the complexity of processes that control the safety functions, which infers a number of uncertainties, `known unknowns´ as well as `unknown unknowns´.*", cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 254.

[103] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 255.

[104] The JRC Report also mentions that, due to their assumed low probability, the what-if scenarios used to deal with such uncertainties "do not necessarily have to show compliance with regulatory dose limits". Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 263.

[105] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 8, indent 7. Those contrasting views are, however, neither further described nor examined in the JRC Report.

"is still massively underestimated today". According to the WNWR, the risks and unresolved questions of DGR pertain, inter alia, to the physical-chemical aging of waste materials; the heterogeneity of the waste inventory and the carrier and consolidation materials involved; fire risks due to chemical reactions; the reaction of waste mixtures in contact with in contact with deep waters, pore waters or brines of the host rocks; the long-term behaviour of facilities extending over many square kilometres in tension-sensitive underground and the possibility to seal such facilities tightly at all; and the long-term development of fuel elements and the potential effects on their possible recoverability."[106]

(150) The WNWR also mentions empirical evidence militating against the safety of DGR. The Waste Isolation Pilot Plant (WIPP) of the U.S. military, which is the only high-level radioactive waste repository in operation, was rebuilt on a second site after the site initially chosen had to be abandoned due to pressurised gas and brine inclusions. Moreover, the WIPP experienced a radioactive incident in 2014. Compliance with the condition foreseen in the operating license that the waste be retrievable over several hundred years has become extremely unlikely.[107] Another example are the yet unresolved questions regarding the corrosion of copper canisters that have occurred in Sweden.[108] Similar concerns regarding corrosion have recently been voiced by scientists.[109]

(151) Further yet unresolved questions seem to concern, for instance, the retrievability of DGR and, in particular, the question whether DGR should or should not at all be retrievable after the closure of a facility.[110] Whilst countries like France require

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[106] The World Nuclear Waste Report, Focus Europe, 2019, p. 64, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[107] The World Nuclear Waste Report, Focus Europe, 2019, p. 68, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[108] The World Nuclear Waste Report, Focus Europe, 2019, p. 69, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[109] Cf. Guo, X., Gin, S., Lei, P. et al. Self-accelerated corrosion of nuclear waste forms at material interfaces. Nat. Mater. 19, 310–316 (2020), available under: https://www.nature.com/articles/s41563-019-0579-x (last access on 22 June 2021); Zhang, Q., Zheng, M., Huang, Y. *et al.* Long term corrosion estimation of carbon steel, titanium and its alloy in backfill material of compacted bentonite for nuclear waste repository. *Sci Rep* 9, 3195 (2019), available under: https://www.nature.com/articles/s41598-019-39751-9 (last access on 22 June 2021).

[110] The JRC Report highlights the need to "carefully assess" whether DGR should or should not at all be retrievable after the closure of a facility, implying that no consensus has yet been reached

retrievability, some experts underscore that retrievability introduces additional cost and generates necessarily safety compromises, as it could interfere, e.g., with the protection of the facility against intrusion.[111]

(152) Against this background, there appears to be good reason to consider that there is a lack of conclusive scientific evidence regarding the long-term safety of DGR. Such a lack of evidence leads to the application of the precautionary principle, implying that nuclear power cannot be considered as causing no significant harm to climate change adaptation.

Lack of DGR capacities

(153) In any event, sufficient DGR capacities will not be available for the foreseeable future. No civil DGR is currently in operation. DGR can only be deployed when public and political conditions are favourable.[112] The safe disposal of high-level radioactive waste and spent fuel is hence not guaranteed by the sole availability of the necessary technologies for DGR. It hinges also on the existence of a public and political climate that is favourable to DGR. Such a climate does, however, not exist. Plans to set up DGR are constantly delayed, not least due to the lack of public acceptance.[113] The Commission has repeatedly stressed the insufficiency of the national concepts for the disposal of high-level radioactive waste and spent fuel.[114] The Commission also initiated several infringement procedures against Member States, one of which led to a judgement of the Court of Justice upholding the claims of the Commission.[115]

(154) The delay in the setting up of operational DGR leads to a prolongation of the interim storage phase and an additional need for interim storage capacity. The WNWR and the

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regarding this question or, at least, that there is no unequivocal answer, cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 243.

111 Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 243 and 259.

112 Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 8.

113 The World Nuclear Waste Report, Focus Europe, 2019, pp. 68 et seq., available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

114 Second Report on the implementation of Directive 2011/70, COM/2019/632 final.

115 Judgment of 11 July 2019, Commission v. Italy, C-434/18, EU:C:2019:603.

JRC Report both mention time frames "in the order of one century", during which increased reliance of interim storage will be necessary.[116]

(155) It appears doubtful, however, whether there is a sufficiently robust basis to consider that the increased reliance on interim storage causes no significant long-term harm to the environment. The interim storage technologies were, in fact, not designed for long-term use.[117] It is widely acknowledged that the prolonged reliance on those technologies raises unresolved safety questions, e.g. regarding retrievability, repackaging, transportation, and long-term behaviour of radioactive material and the degradation of canisters.[118] The TEG report stated that the present situation was "unsustainable" and that there was "an international consensus that a safe, long-term technical solution is needed".[119] The JRC report recognises the challenge brought about by the increased reliance on interim storage and the ensuing important need for further research. It does not, however, offer another solution:

> "*As the storage of spent fuel is expected to last much longer than initially foreseen, the effects of the extended storage conditions on the conditions and behaviour of the spent fuel assemblies after such long storage periods are currently the subject of systematic research programmes.*
> *Both the wet and dry storage technologies currently implemented guarantee storage conditions in which corrosion and other negative ageing effects do not compromise the safety function and performance during subsequent management steps. Extending the safety assessment to cover very long storage timespans requires the characterization and full understanding of potential long term ageing mechanisms (e.g. the effect of thermal cycles/history on spent fuel rods during the different steps of spent fuel management, effects of auto-irradiation) and their potential effect on*

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[116] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 232; The World Nuclear Waste Report, Focus Europe, 2019, p. 73, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[117] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 239; The World Nuclear Waste Report, Focus Europe, 2019, p. 75, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[118] The World Nuclear Waste Report, Focus Europe, 2019, p. 73, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

[119] TEG Report, March 2020, Technical Annex, p. 210.

the relevant properties of the spent fuel assemblies and of the container system (e.g. mechanical integrity, resistance against corrosion, tightness). The goal is to confirm that spent fuel assemblies and containers will retain their integrity and functionality, allowing repackaging and transportation after extended storage in excess of one century, and/or to define preventing or mitigating measures potentially necessary to cope with significant degradation of any containment system (cladding, canister, cask, welds/sealing, etc.)."[120] (emphasis added)

(156) In almost identical terms, the WNWR finds that:

"[…] interim storage of spent fuel and HLW will continue for many decades up to more than 100 years and even longer. […]
This approach across countries will result in the further construction of extended interim storage capacities and their operation for a very long time (from many decades to 100 years or more). […] The integrity and retrievability of spent fuel (and HLW) over such storage periods is thus a growing challenge, as is the task of monitoring and maintenance. The goal is to keep options open for further waste management paths and their requirements such as transport, conditioning, and packaging. In consequence, there is a great need for research, for example on the long-term behaviour of fuel, degradation mechanisms, and other knowledge gaps."[121] (emphasis added)

(157) It merits pointing out that both reports consider the development of solutions as a "goal", implying that no solutions have yet been found. Therefore, at least for the time being, there appears to be good reason to consider that there is no sufficient basis to conclude that the increased reliance on interim storage causes no significant long-term harm to the environment.

(158) What is more, the increased reliance on interim storage places an undue burden on future generations in respect of spent fuel and radioactive waste, contrary to Article 1

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[120] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 239 et seq.

[121] The World Nuclear Waste Report, Focus Europe, 2019, p. 73, available under: https://worldnuclearwastereport.org/ (last access on 22 June 2021).

and Recital 24 of Directive 2011/70/Euratom. Activities that entail inter-generational risks should, however, not be included in the taxonomy.[122]

(159) The aspect of inter-generational justice was recently also highlighted by a decision of the German Federal Constitutional Court (FCC) on climate change. The FCC essentially held that the rights of future generations must also be taken into account. Therefore, measures that basically postpone important steps to some future date, thereby placing an unacceptable burden on future generations, are in conflict with constitutional law.[123] Arguably, these findings apply in the context of the TR and the precautionary principle all the more, given that the TR explicitly aims at promoting sustainable activities.[124]

(160) In any event, in view of the lack of solutions presented in the course of the Commission's investigation regarding the acknowledged challenges brought about by the increased reliance on interim storage, there is good reason to consider that the Commission and the experts tasked by it have not sufficiently examined this question.

(3) Interim conclusion

(161) There is hence good reason to consider that nuclear power causes significant harm to the objective of the circular economy, at least at the life cycle stages of the uranium mining and milling and the storage and disposal of high-level radioactive waste and spent fuel. In any event, the analysis conducted so far by the Commission and its experts appears to provide an insufficient basis to exclude such harm.

dd) Pollution prevention and control

(162) Pursuant to Article 17(1) lit. (e) TR an economic activity is considered to significantly harm pollution prevention and control, where that activity leads to a significant increase in the emissions of pollutants into air, water or land, as compared with the situation before the activity started.

(163) We will now apply this standard to different stages of the life-cycle of nuclear power.

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[122] Cf. TEG Report, March 2020, Technical Annex, p. 33.

[123] See Federal Constitutional Court, Decision of 24 March 2021, 1 BvR 2656/18.

[124] See also *infra*, paragraphs (207), (211) and (213).

(1) Mining and milling phase

(164) It is widely acknowledged that uranium mining and milling causes significant adverse effects on the objective of the prevention and control of pollution, due to water pollution, atmospheric pollution, ozone-creation potential, ecotoxicity, human toxicity and gaseous radioactive release[125]. For the reasons set out above, there are considerable doubts as to whether these effects can be averted by compliance with EU legislation or international standards such as the ones developed by the IFC.

(2) Storage and disposal of high-level radioactive waste and spent fuel

(165) There is good reason to consider that the risks pertaining to the storage and disposal of high-level radioactive waste and spent fuel preclude nuclear power from meeting the DNSH-criterion regarding the prevention and control of pollution. The reasons set out above in the context of the objective of the circular economy apply accordingly.

(3) Risk of severe accidents

(166) In any event, the compliance of nuclear power with the DNSH-criterion regarding the prevention and control of pollution is called into question by the inevitably remaining risk of severe accidents in nuclear power plants and the disastrous consequences for humans and the environment that such accidents bring about.

(167) Severe accidents with core melt have happened in the past. The three major accidents are Three Mile Island (1979, USA), Chernobyl (1986, Soviet Union) and Fukushima (2011, Japan). It is broadly acknowledged that, given the current state of technology, safety measures can only reduce the risk of such accidents but not fully rule them out. If such accidents happen, they have very serious effects both on human health and the environment.[126] Although severe accidents occur with low probability, recent statistical research indicates that despite all improvements in nuclear safety there is a 50% probability that at least one severe nuclear accident will occur every 60 to 150

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[125] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 81.

[126] Cf. Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, pp. 3, 17, 18, 29 and 34, available under: https://www.bmk.gv.at/service/presse/gewessler/20210203_kernenergie.html (last access on 22 June 2021); Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 9 et seq., 175 et seq., 186.

years and that, if the scope of the consequences is considered, the aggregate risk of nuclear power to society remains high.[127] Hence there is an ongoing scientific discussion about the probabilities of severe accidents with a wide range of results.[128]

(168) Against this background, the risk of severe accidents arguably precludes nuclear power from meeting the DNSH criterion. As the German Federal Constitutional Court held,

> "*the public has become increasingly aware over the past few decades that the peaceful use of nuclear energy is a high-risk technology which is encumbered with extreme risks of harm, among other issues, as well as still-unclarified problems of final disposal*".[129]

(169) Certainly, based on the current state of EU law, each Member State retains in principle the right to accept this risk and rely on nuclear power as part of its national energy strategy.[130] However, this does not imply that nuclear power can be qualified as causing no significant harm and is sustainable in an act that is uniformly applicable throughout the EU. It is precisely the purpose of the TR to classify the economic activities that are permitted in principle and to differentiate them with regard to their ecological sustainability.

(170) Whilst comparing human fatality rates of accidents in nuclear power plants to other accidents of other technologies included in the taxonomy, such as hydropower, seems to be a possible first approach to assessing the harm caused,[131] it would appear crucial

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[127] Wheatley/Sovacool/Sornette, Reassessing the safety of nuclear power, Energy Research & Social Science 15 (2016), pp. 96 et seq and 99: The study analyses 216 events (incidents and accidents) occurring in nuclear energy systems on the basis of a dataset twice as large as any of the best ones previously available in the scientific literature and makes the data used available with two links published in the article.

[128] The JRC assumes that so-called Generation III nuclear power plants imply a probability of one accident in ten billion years of operation: Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 179.

[129] German Federal Constitutional Court, judgment of 6 December 2016, 1 BvR 2821/11, paragraph 219, available under: https://www.bundesverfassungsgericht.de/SharedDocs/Entscheidungen/EN/2016/12/rs20161206_1bvr282111en.html (last access on 22 June 2021).

[130] Article 194(2) TFEU; see, to that effect, judgment of 22 September 2020, Austria v Commission, C-594/18 P, EU:C:2020:742, paragraphs 48 et seq. (Hinkley Point).

[131] As regards human fatalities, the JRC Report acknowledges that the so-called "maximum credible number of fatalities in a single accident […] is high for nuclear energy based on both Generation II and III nuclear power plants". The JRC Report however goes on to state that the maximum number of fatalities of a severe accident in a nuclear power plant, which are estimated in the range

to look into historical accident data for both kinds of technologies in the same way.[132] Moreover, a comparison of fatality rates gives, in any event, only an incomplete picture and is therefore insufficient to exclude significant harm to the objective of pollution prevention and control within the meaning of Article 17(1) lit. (e) TR.

(171) In fact, the objective of pollution prevention (of air, land and water) and control within the meaning of Article 17(1) lit. (e) TR goes beyond human toxicity[133] and also encompasses the natural environment. It is broadly acknowledged that severe accidents in nuclear power plants have important other adverse effects, including on the natural environment.[134] The best evidence thereof are the disaster plans and measures required for nuclear accidents. They are established to prevent immediate fatalities (evacuation of the population) and imply long-term protection measures to avoid possible long-term consequences (resettlement of the population and bans on land use). Especially the latter demonstrate how dangerous nuclear accidents are judged to be in the long term due to the radiation exposure involved. Hence, the environment and any other living wild species that cannot be evacuated remain exposed to that risk – in contrast to the evacuated residents of e.g. restricted areas. Looking at human death rates thus cannot be seen as sufficient to ensure that other species are not put at risk by severe accidents.

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of 30,000, are comparable to those of hydropower in case of a hypothetical dam failure, estimated in the range of 10,000. This comparison appears doubtful, however. Even on the assumption that the estimates are correct, the figure for a severe accident in a nuclear power plant remains three times higher than that of a hypothetical dam failure. Cf. Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 177.

[132] The JRC Report appears, however, to disregard historical death rate data from the Chernobyl and Fukushima accidents: Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 175 and footnote 114, where it is explained that the methodical approach to evaluate risks differs according to the extent of data available in the database. Chernobyl reactor design is not seen as representative of operating plants in OEDC countries using different, safer technologies, nor of reactor designs for future deployment globally. This seems to imply that the JRC Report does not sufficiently take potential lifetime extensions of existing power plants all over the world into account. Regarding the Fukushima accident, the JRC Report states that it is not included in the results by Hirschberg et. al since a reliable assessment of its consequences were still an open issue at that time. Therefore even experiences from the Fukushima accident seem to be excluded.

[133] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 56 et seq.

[134] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 10 and 178.

(172) Therefore, any assessment whether nuclear power complies with the DNSH criterion must take the broader adverse effects on the natural environment and ecosystems into account. If this requirement is complied with, the consequences of severe accidents of nuclear power plants seem hardly comparable e.g. to the effects caused by water in case of a dam failure. The particular characteristics of severe accidents in nuclear power plants, including the resulting long-term radioactive contamination of the environment, appear to militate strongly against the conclusion that nuclear power does not cause significant harm within the meaning of the TR. [135]

(173) The circumstance that the broader impacts of severe accidents may not have been assessed for other economic activities included in the Taxonomy does not dispense the Commission from the necessity to examine those impacts in the context of nuclear power. On the one hand, the particular characteristics of nuclear power, including the dangers of radioactivity, require special scrutiny. If only certain technologies can have certain long-term consequences for the environment (e.g. through the release of radiation) that go beyond the immediate mortality of humans, animals and plants, then it is in the nature of things that the consequences are to be included in the assessment only for this technology. On the other hand, there seems to be good reason to consider that, if other activities had impacts on the environment which are comparable to those of a severe accident in a nuclear power plant, the neglect of those impacts would be erroneous also regarding the other activities concerned. The latter activities would then have been wrongfully included in the taxonomy. The principle of equal treatment does not, however, from the outset apply to unlawful situations.[136]

(174) The shortcomings of the investigation conducted so far are again reflected in the terms of reference for the commissioned expert reports. Neither the terms of reference for

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[135] In any event, there is good reason to consider that the Commission and the experts tasked by it have so far not sufficiently analysed the broader impacts of severe accidents in nuclear power. The JRC Report examines the impacts of severe accidents only succinctly, dedicating merely five out of overall 383 pages to the impact of severe accidents. Moreover, the JRC Report examines those impacts only in relation to human health, focussing essentially on human fatalities (under 3.5.). Although the JRC Report recognises the importance of the broader impacts of severe accidents in nuclear power plants on the environment, the report explicitly excludes those other impacts from its scope, stating merely that they are "difficult to assess", Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 10 and 178.

[136] See, to that effect, judgments of 31 March 1993, A. Ahlström Osakeyhtiö, C-89/85, EU:C:1993:120, paragraph 197 and of 10 March 2011, Agencja Wydawnicza Technopol/OHMI, C-51/10 P, EU:C:2011:139, paragraphs 73 et seq.; Jarass, Charta der Grundrechte der Europäischen Union, Commentary, 4th edition 2021, Art. 20, paragraph 13.

the JRC Report nor those for the Article 31 Euratom and SCHEER Reports specifically address the question whether nuclear power plants can be considered as causing no significant harm within the meaning of the TR despite the risk of severe accidents.

(175) In any event, assessing the risk of severe accidents in nuclear power plants is no pure mathematical exercise. The risk cannot be correctly assessed by simply multiplying the probability of the occurrence of a severe accident by the magnitude of its damage. Rather, a complete assessment must take into account how the risk is perceived by the concerned population and to what extent the latter is willing to accept it. Risk aversion may lead the public to attach a higher importance to a severe damage caused by a single event occurring with low probability than to the same damage spread over a larger number of events occurring with higher probability.[137] In this respect, it appears highly questionable to rely on the fact that other human activities such as air pollution, tobacco smoke or road traffic also lead to fatalities.[138]

(176) Finally, it warrants mention that the TR aims to provide a "shared" understanding of the environmental sustainability of activities and investments".[139] However, besides concerns regarding the management of nuclear waste and spent fuel, concerns over the risk of severe accidents in nuclear power plants are the major reason for the lack of social acceptance of nuclear power in many countries.[140] Most of the EU Member States do not operate nuclear power plants or have opted for the phase-out of nuclear power. Even countries like France, which rely on nuclear power, strictly exclude the entire nuclear sector from their national sustainability labels.[141] Therefore, there seems to be no shared understanding among the Member States and their populations that

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[137] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 179.

[138] See however Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 179.

[139] Recital 6 TR.

[140] Cf. IPCC, Special Report: Global Warming of 1.5 ºC, 2018, Chapter 4, p. 324; Stagl, Does Nuclear Power Comply With the DNSH Criteria of the EU Taxonomy for Sustainable Activities? A Literature Review, September 2020, p. 25, available under: https://www.bmk.gv.at/service/presse/gewessler/20210203_kernenergie.html (last access on 22 June 2021).

[141] See French Ministry for ecology and inclusive transition, Greenfin label, criteria guidelines, April 2019, p. 26, available under https://www.ecologie.gouv.fr/label-greenfin (last access on 22 June 2021); Kahlenborn/Cochu/Georgiev/Hogg, Defining `green´ in the context of green finance, final report prepared for the Commission, 2017, p. 68.

nuclear power plants can be considered as not causing any significant harm to the environment despite the inevitably remaining risk of severe accidents.

(4) Interim conclusion

(177) There is hence good reason to consider that nuclear power causes significant harm to the objective of pollution prevention and control at several stages of its life-cycle. In any event, the analysis conducted so far by the Commission and its experts appears to provide an insufficient basis to exclude such harm.

ee) Protection and restoration of biodiversity

(178) Pursuant to Article 17(1) lit. (f) TR an economic activity is considered to significantly harm the protection and restoration of biodiversity and ecosystems, where that activity is:

(i) significantly detrimental to the good condition and resilience of ecosystems; or

(ii) detrimental to the conservation status of habitats and species, including those of Union interest.

(179) We will now apply this standard to different stages of the life-cycle of nuclear power.

(1) Mining and milling phase

(180) It is widely acknowledged that uranium mining and milling causes significant adverse effects on the protection and restoration of biodiversity, due to water pollution, atmospheric pollution, ozone creation potential, ecotoxicity, human toxicity, land use and gaseous radioactive release.[142] For the reasons set out above, there are considerable doubts as to whether those effects can be averted by compliance with EU legislation or international standards such as the ones developed by the IFC.

(2) Storage and disposal of high-level radioactive waste

(181) There is good reason to consider that the risks pertaining to the storage and disposal of high-level radioactive waste preclude nuclear power from meeting the DNSH

[142] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 81.

criterion regarding the protection and restoration of biodiversity. The reasons set out above in the context of the objective of the circular economy apply accordingly.

(3) Risk of severe accidents

(182) There is good reason to consider that the risk of severe accidents in nuclear power plants precludes nuclear power from meeting the DNSH criterion regarding the protection and restoration of biodiversity. The reasons set out above in the context of pollution prevention and control apply accordingly. The objective of Article 17(1) lit. (f) TR requires even more to also take even long-term radiation exposure and its effects on ecosystems and biodiversity – especially in contaminated evacuated areas or areas prohibited for agricultural use or water bodies – into account. According to the precautionary principle,[143] if there is no conclusive scientific evidence showing the absence of significant harm to ecosystems and biodiversity, the DNSH criterion laid down in Article 17(1) lit. (f) TR is not met.

(4) Interim conclusion

(183) There is hence good reason to consider that nuclear power causes significant harm to the objective of the protection and restoration of biodiversity and ecosystems at several stages of its life-cycle. In any event, the analysis conducted so far by the Commission and its experts appears to provide an insufficient basis to exclude such harm.

ff) Conclusion

(184) On the basis of the available evidence it cannot be considered that nuclear power does no significant harm to any of the environmental objectives set out in Article 17(1) lit. (b) to (f) TR. To the contrary, there are important elements indicating that the life-cycle of nuclear power causes significant harm to each of those objectives or that there is, at least, no conclusive scientific evidence to exclude such harm. In any event, the analysis conducted so far by the Commission and its experts appears to be insufficient to exclude such harm.

[143] See *infra* paragraphs (203) and (209) et seq.

4. No prevailing benefits to the environment

(185) Even on the assumption that nuclear power fulfils the definition of "substantial contribution to climate change mitigation" in terms of Article 10 TR and satisfies the DNSH criterion provided by Article 17 TR, there is good reason to consider that it cannot be included in the taxonomy, because the pro-environmental effects of its life cycle do not outweigh its adverse effects.

(186) It follows from Recitals 34 and 40 TR that the inclusion of an activity in the Taxonomy requires an overall balancing of the environmental benefits and costs of the activity. An activity may only be included in the Taxonomy if the pro-environmental effects of the life-cycle of the concerned product or service outweigh its adverse effects.

(187) In view of the reasons set out above, there is good reason to consider that this is not the case regarding nuclear power or that there is at least a lack of conclusive scientific evidence, leading to the application of the precautionary principle. This implies, in turn, that nuclear power cannot be included in the Taxonomy.

(188) In any event, the Commission and the expert groups tasked by the Commission have to date not performed the overall balancing required. Nor has the Commission asked the Article 31 and SCHEER expert groups to shed light on this question.

5. Conclusion

(189) Generating nuclear power is not a sustainable activity within the meaning of the TR.

II. EU primary law

(190) In this section, we assess whether the above findings are confirmed – or contradicted – by EU primary law. In this respect, particular regard will be given to the legal basis of the TR (see sub-section 1) and substantial requirements such as environmental protection and the precautionary principle (see sub-section 2). In addition, we shall briefly address primary law arguments presented in favour of including nuclear power in the EU taxonomy (see sub-section 3).

1. Legal basis

(191) The TR is based on Article 114 TFEU. This provision serves as a legal basis for measures which have as their object the establishment and functioning of the internal market. The TR essentially aims at channelling capital flows towards sustainable investment.[144] It is rightly based on Article 114(1) TFEU to the extent that it seeks to eliminate barriers to the free flow of investments in sustainable activities across borders.[145]

(192) It should be noted, however, that Chapter 9 of the Euratom Treaty contains specific rules on the "nuclear common market". Moreover, the Euratom Treaty aims at facilitating investment in nuclear power. For instance, according to Article 1 of that treaty, it is the task of the European Atomic Community to create "the conditions necessary for the speedy establishment and growth of nuclear industries". Chapter 4 of the Euratom Treaty is entitled "investment" and sets out specific provisions for investment in nuclear power. Finally, Article 203 of the Euratom Treaty contains a legal basis in the event that action is necessary to attain one of the objectives of the European Atomic Community and there is not a specific power to that effect.

(193) According to Article 106a(3) of the Euratom Treaty, the TFEU "shall not derogate from the provisions of this Treaty". It is well established in case law that the provisions of the Euratom Treaty constitute special rules in relation to the TFEU. Measures that can be based on the Euratom Treaty cannot be adopted on the basis of the TFEU.[146]

(194) Hence, if the TR were intended to cover nuclear power, it would have been based on the Euratom Treaty – if necessary by having recourse to Article 203 thereof. Moreover, Article 192(2) lit. (c), Article 193 and the second subparagraph of 194(2) TFEU also militate in favour of this view. These provisions reflect, *inter alia*, that nuclear power is a particularly sensitive and disputed issue among the Member States. Regulating investment in nuclear power on the basis of Article 114 TFEU would thus not only circumvent specific provisions and voting modalities foreseen by the Euratom Treaty, but also safeguards included in the TFEU.

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[144] See Recitals 6, 9 and 11 TR.

[145] See Recitals 11 and 12 TR.

[146] See, for example, judgment of 12 February 2015, Parliament v Council, C-48/14, EU:C:2015:91, paragraphs 36 et seq.; judgment of 12 April 2005, Commission v United Kingdom, C-61/03, EU:C:2005:210, paragraph 44.

(195) In this respect, it is also interesting to note that, in order to specify the environmental objectives, Recitals 24 to 33 refer to numerous EU acts adopted in the field of environmental protection. In contrast, acts on nuclear safety adopted on the basis of the Euratom Treaty are not mentioned. This is further evidence that Union legislators did not intend to include nuclear power in the TR – since otherwise it would have been a logical choice to refer to these acts as a basis for the DNSH criterion.

(196) Therefore, the legal basis as well as the broader context of the TR indicate that Union legislators did not intend to cover nuclear power.

2. Substantive requirements, in particular the precautionary principle

(197) Substantive requirements set out in EU primary law also militate against including nuclear power in the European taxonomy.

a) Legal standard

(198) Numerous provisions of EU primary law ensure a high level of protection of the environment and of human health. According to Article 114(3) TFEU, legal acts based on Article 114(1) TFEU must pursue a high level of protection. Similarly, according to Article 3(3) TEU, the internal market is to work for the sustainable development of Europe and aim at a high level of protection and improvement of the quality of the environment. Article 11 TFEU and Article 37 of the Charter of Fundamental Rights provide that a high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development.

(199) A specific expression of this high level of protection is the so-called precautionary principle. It is enshrined in Article 191(2) TFEU, but is also a general principle that applies to all Union measures,[147] including the nuclear sector.[148] Moreover, it is referred to in Article 19(1) lit. (f) and recital 40 TR. The precautionary principle essentially means that, where there is uncertainty as to the existence or extent of risks to human health, protective measures may be taken without having to wait until the

[147] See, for example, judgment of 5 May 1998, National Farmers' Union, C-157/96, EU:C:1998:191, paragraph 64.

[148] See judgment of 22 September 2020, Austria v Commission, C-594/18 P, EU:C:2020:742, paragraphs 42 et seq.

reality and seriousness of those risks become fully apparent.[149] In this case, notwithstanding the existing scientific uncertainty, a scientific risk assessment must enable the competent public authority to ascertain, on the basis of the best available scientific data and the most recent results of international research, whether matters have gone beyond the level of risk that it deems acceptable for society. A scientific assessment is required, for which the Community institutions must ensure that their decision is based on the best available scientific data and on the most recent international research.[150]

(200) In accordance with the precautionary principle, it is hence up to Union legislators to determine the level of protection deemed appropriate for society. It is by reference to that level of protection that EU legislators must then determine the level of risk which in their judgment is no longer acceptable for society and above which level it is necessary, in the interests of protecting human health, to take preventive measures.[151] This means that the level of protection required – and hence the level of risk acceptable – differs according to the context and the political aims pursued. The higher the determined level of protection, the lower the risks that can be acceptable. In this regard, elements to be taken into account include, *inter alia*, the severity of the impact on human health were the risk to occur, namely the extent of possible adverse effects, the persistency or reversibility of those effects and the possibility of delayed effects as well as of the more or less concrete perception of the risk based on available scientific knowledge. [152]

b) Application

(201) The above provisions, and in particular the precautionary principle, have a twofold effect that is also of relevance for the interpretation and application of the TR.

(202) First, they confirm that an activity may only be classified as sustainable under the TR where it can be *determined* with reference to *scientific evidence* that the activity

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[149] See judgment of 9 June 2016, Pesce and Others, C-78/16 and C-79/16, EU:C:2016:428, paragraph 47.

[150] See judgment of 11 September 2002, Pfizer Animal Health, T-13/99, EU:T:2002:209, paragraphs 154 and 158.

[151] See judgment of 11 September 2002, Pfizer Animal Health, T-13/99, EU:T:2002:209, paragraphs 151 et seq.

[152] See judgment of 11 September 2002, Pfizer Animal Health, T-13/99, EU:T:2002:209, paragraph 153.

contributes substantially to one or more of the environmental objectives (Art. 3 (a) TR) and does *not* cause significant harm (Art. 3 (b) TR). In this respect, the General Court namely held that the precautionary principle does not require that the reality of a risk be demonstrated to take countermeasures. Rather, it is sufficient that there is no proof of the absence of such risk, as long as the risk is not merely hypothetical.[153]

(203) Against this background, the JRC's statement that "the analyses did not reveal any science-based evidence that nuclear power does more harm to human health or to the environment than other electricity production technologies already included in the Taxonomy"[154] clearly misses the point. It does not satisfy the standard of proof required by the TR and EU primary law to include nuclear power in the Taxonomy.

(204) Second, the level of protection required – and hence the level of risk acceptable – differs according to the context and the political aims pursued. As regards the TR, it is clear that EU legislators have decided to pursue a high level of protection and adopted an ambitious approach.[155]

(205) Against this background, compliance with the general regulatory framework, for example safety regulations at the EU level for nuclear facilities (like Council Directive 2009/71/EURATOM[156]), is not automatically sufficient to consider that an activity causes no significant harm to the environment within the meaning of the TR. In accordance with Article 194(1), second subparagraph, TFEU, the choice of nuclear power is a matter for the Member States. In this respect, measures such as Directive 2009/71/EURATOM set out binding safety standards that Member States must ensure if they decide to include nuclear power in their energy mix. They have the objective to make nuclear power as safe as possible in line with the state of present-day knowledge, ensure the best available technology and limit radiological risks to as low a level as is reasonably achievable. However, it is undisputed that a certain risk inevitably

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[153] See judgment of 11 September 2002, Pfizer Animal Health, T-13/99, EU:T:2002:209, paragraphs 142 and 164.

[154] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 7.

[155] See *supra*, paragraphs (128) et seq.

[156] OJ 2009 L 172/18.

remains.[157] Under the constitutional framework of the EU, it is for the Member States to bear that risk.[158]

(206) The TR, in contrast, pursues a different logic. It seeks to specifically promote 'sustainable' investment. To this effect, it aims at providing a shared understanding of which activities and investments are environmentally sustainable.[159] In other words, the regulation is intended to create transparency as to which activities are considered "green" or "sustainable" in Europe, in order to inform investment decisions.[160] The TR does not establish stricter regulatory requirements, nor does it entail a ban on activities not considered sustainable.

(207) The concept of 'ecological sustainability' seeks to ensure that economic activities respect the limited resources of the planet ("planetary boundaries") as well as the well-being of future generations. Therefore, the general level of protection provided by European safety standards cannot at the same time serve as a yardstick for the level of protection required by the TR. A measure which expressly aims at furthering 'sustainable' investment must proceed from a higher level of protection. Mere compliance with EU rules, which is a precondition for *any* activity to be legal, hence cannot automatically be sufficient to qualify as sustainable under the TR. Art. 17 TR would be superfluous if regulatory standards, inside and outside the EU, were considered to automatically guarantee the level of protection required by the TR.

(208) Hence, in particular regarding the risks of serious accidents, it appears necessary to look beyond binding safety standards. Furthermore, the existence of rules does not guarantee they will be followed. At least to the extent that information is available on deficient implementation of safety standards, it should be included in the assessment. Moreover, EU institutions recognise that there are safety issues in third countries. For this reason, the EU "nuclear cooperation" program intends, *inter alia*, to extend the

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[157] See *supra*, paragraph (167).

[158] See judgment of 22 September 2020, Austria v Commission, C-594/18 P, EU:C:2020:742, paragraph 49.

[159] See Recital 6 TR.

[160] See Recital 5 TR.

acquis communautaire in the field of nuclear energy to third countries, especially with respect to the carrying out of stress tests in the EU neighbourhood and abroad.[161]

(209) Against this background, two aspects of nuclear power appear to be of particular concern: First, the risk of accidents in nuclear facilities cannot be excluded. The presence of this risk has been demonstrated by events in the past. As the Commission stated, the "Fukushima Daichii accident in 2011 after the Chernobyl disaster showed that any accident has trans-boundary effects and impacts the international community widely".[162] But there is no scientific agreement on the frequency of the expected realisation of this risk in the future: The JRC assumes that so-called Generation III nuclear power plants imply a probability of one accident in in ten billion years of operation.[163] In contrast, a recent scholarly publication concludes that, despite all improvements in nuclear safety, there is a 50% probability that at least one event like the Fukushima accident (or even larger) will occur every 60 to 150 years.[164] This shows that there are a wide range of different assessments. Moreover, the Chernobyl and Fukushima incidents have shown that nuclear accidents have irreversible consequences and entail a permanent burden on persons and ecosystems affected.

(210) As regards natural hazards, including earthquakes, it is sometimes contended that the resilience of existing EU nuclear power plants was demonstrated in an EU-wide stress-test exercise conducted after the Fukushima incident.[165] However, as is shown by Article 8a(2) of the Nuclear Safety Directive and the WENRA safety reference levels, refitting existing nuclear power plants to meet enhanced safety standards may exceed

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[161] EU Budget. Programmes' performance overview. EU budget 2014-2020, p. 124, available under: https://ec.europa.eu/info/sites/info/files/about_the_european_commission/eu_budget/ppo_db2020.pdf (last access on 22 June 2021).

[162] EU Budget. Programmes' performance overview. EU budget 2014-2020, p. 124, available under: https://ec.europa.eu/info/sites/info/files/about_the_european_commission/eu_budget/ppo_db2020.pdf (last access on 22 June 2021).

[163] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 179.

[164] Wheatley/Sovacool/Sornette, Reassessing the safety of nuclear power, Energy Research & Social Science 15 (2016), p. 97, 99: The study analyses 216 events (incidents and accidents) occurring in nuclear energy systems on the basis of a dataset twice as large as any of the best ones previously available in the scientific literature and makes the used data available with two links published in the article.

[165] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, p. 358.

what is reasonably practicable.[166] Existing installations in the vast majority of cases provide less safety features than new concepts. Moreover not all recommended actions after the stress tests appear to have been implemented yet, more than ten years after the accident in Fukushima and almost ten years after the findings were first published (e.g. the "Hardened Safety Cores" in France).[167]

(211) Second, the generation of nuclear power is inextricably linked to the storage and disposal of high-level radioactive waste. It is indisputable that the radioactive waste currently being produced will have to be disposed of at some point and somewhere. As shown above, there is no operational DGR to date. Hence, no demonstrations of the short-term performance have been possible yet. In addition, in its second report on the progress of implementation of Council Directive 2011/70/EURATOM (Nuclear Waste Directive) the Commission states that experience in decommissioning and waste management is *progressively being gained*, thus creating *better conditions* for setting effective policies to ensure safe and timely decommissioning and waste disposal.[168] This shows that the Nuclear Waste Directive is dealing with the challenge to find the *possibly most* effective, secure and feasible solution for waste generated in about 70 years of use of civil nuclear power. Therefore, risk management *must* be undertaken. However, risk management is getting more difficult the longer the time span is, because uncertainties in predictions or assumptions increase in terms of natural or material assumptions as well as in terms of the development of political and social conditions. Hence with regard to far more than 100,000 years of waste management,

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[166] See Article 8a(2) of Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, amended by Council Directive 2014/87/Euratom of 8 July 2014; WENRA Guidance, Article 8a of the EU Nuclear Safety Directive: "Timely Implementation of Reasonably Practicable Safety Improvements to Existing Nuclear Power Plants", 2017, p. 5.

[167] Formally, many points from the original French National Action Plan have been classified as completed, see Autorité de sûreté nucléaire (ASN), Follow-up to the French nuclear power plant stress test, 2020, e.g. p. 17, available under: http://www.ensreg.eu/document/national-final-report-france-2020 (last access on 22 June 2021) ; however, hardware upgrades, which are part of the "hardened safety core", will no longer be carried out as post-Fukushima measures, but will be implemented as part of the periodic safety reviews VD4 of the 900 and 1300 MW reactors ; the ASN states e.g.: «le quatrième réexamen périodique est l'occasion d'achever l'intégration des modifications qui découlent des prescriptions de l'ASN émises à l'issue des études complémentaires de sûreté réalisées à la suite de l'accident de la centrale nucléaire de Fukushima Daiichi », see ASN, Position de l'ASN sur les orientations de la phase générique du quatrième réexamen périodique des réacteurs de 1300 MWe d'EDF, p. 2, available under https://www.asn.fr/Informer/Actualites/Orientations-de-la-phase-generique-des-quatriemes-reexamens-periodiques-des-reacteurs-de-1-300-MWe (last access on 22 June 2021).

[168] Second Report on the implementation of Directive 2011/70, COM/2019/632 final, p. 17.

significant uncertainties cannot be denied. Even if the process of building a DGR is seen as stepwise and therefore reversible to a certain extent, there is no guarantee that it will be possible to make all the adaptations required by future developments. The burden to deal with those situations and the risk of the prolongation of interim storage is shifted to future generations. Thus, it seems that there cannot be any guarantee or proof of *no* remaining risks for future generation if high-level radioactive nuclear waste and spent fuel has to be stored for time spans in the range of a hundred thousand years.

(212) There is considerable scientific disagreement on how high those remaining risks ultimately are. The JRC report posits that the risks inherent to interim storage and final disposal are acceptable if the European legal framework or national and international regulations and standards are complied with.[169] But there is also recent research questioning these regulations and standards, for example regarding materials proposed to store high-level radioactive waste. A recent study conducted at Ohio State University come to the conclusion that the currently planned methods for storing high-level nuclear radioactive waste are "severely" unsafe. In particular, the study finds that the proposed materials corrode far more quickly than previously thought and may not be sufficient to keep high-level waste safely stored.[170]

(213) It should be noted that both existing and future plants necessarily increase the amount of nuclear waste and spent fuel. Both types of plants would hence contribute to the risks identified above. Under the TR, the entire life-cycle of an activity in question must be assessed. This not only includes the operating period of a nuclear power plant, which may already be more than 60 years for new nuclear plants, but also the period for dismantling and disposing of the waste. The latter leads to *faits accompli* for future generations over a long period of time. The well-being and protection of future

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[169] Joint Research Centre (JRC), Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852, 2021, pp. 199 et seq. and 366 et seq. The report inter alia fails to mention deficiencies in implementing the Nuclear Waste Directive within the Union and the initiation of several infringement procedures against Member States, see Second Report on the implementation of Directive 2011/70, COM/2019/632 final, p. 18; see also CJEU, C-434/18, Commission v. Italy, EU:C:2019:603.

[170] Guo, et al., Self-accelerated corrosion of nuclear waste forms at material interfaces, published in: Nature Materials 2020, 310, not mentioned by JRC, JRC Science for Policy Report, Technical assessment of nuclear energy with respect to the "do no significant harm" criteria of Regulation (EU) 2020/852 ('Taxonomy Regulation'), 2021.

generations is an important part of the precautionary principle.[171] Thus, *faits accompli* for future generations, having to accept risks and not being able to decide for oneself whether to accept them, arguably exceeds the limits of what can be considered as sustainable in accordance with the TR and the precautionary principle.

(214) Such considerations apply all the more to 'transitional activities' within the meaning of Article 10 (2) TR. As the term 'transition' suggests, such activities are intended to be short- or medium-term phenomena. An activity that necessarily has effects for more than 100,000 years hence cannot be regarded as a transitional activity. Moreover, the precautionary principle arguably excludes considering activities as sustainable that necessarily entail risks for a virtually indefinite period of time.

(215) To sum up, EU primary law, in particular the precautionary principle, also militates against including nuclear power in the EU taxonomy.

3. Arguments presented in favour of including nuclear power

(216) In contrast, it is sometimes claimed that other provisions of primary law even require the inclusion of nuclear power in the taxonomy.[172] For this reason, these arguments will be briefly assessed in the following sub-section.

a) Equal treatment

(217) First, it is sometimes claimed that the principle of equal treatment requires treating nuclear power in the same way as renewable energy.

(218) The equal treatment principle is enshrined in Article 20 of the Charter of Fundamental Rights and also mentioned in Article 19(1) lit. j) TR. According to well-established case law, that principle requires that comparable situations must not be treated differently and that different situations must not be treated in the same way unless such treatment is objectively justified.[173]

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[171] See COM(2000) 1 final, Communication from the commission on the precautionary principle, p. 9.

[172] See, for instance, Partanen et al., Sustainable Nuclear, 2019; Darrois Villey Maillot Brochier, Analysis of the unlawfulness of the exclusion of nuclear energy from the European taxonomy of sustainable activities and legal ways to challenge it, 2021.

[173] See judgment of 3 June 2021, Hungary v Parliament, C-650/18, EU:C:2021:426, paragraph 98.

(219) Therefore, the equal treatment principle in no way implies that all sources of energy must be treated in the same way. To the contrary, the crucial question is whether there are differences that allow – or even require – differentiated treatment.

(220) As shown above, there are important differences between nuclear power and renewable energy, namely in respect of their respective contribution to climate change mitigation and the harm done to other environmental objectives. Consequently, treating them in the same way does not appear to be warranted.

b) Member States' choice between different energy sources

(221) Another argument refers to the second subparagraph of Article 194(2) TFEU, according to which measures adopted on the basis of the EU's energy policy competence "shall not affect a Member State's […] choice between different energy sources".

(222) However, the TR is not a measure of the Union's energy policy. Article 194(2) TFEU hence does not apply from the outset.

(223) Moreover, the TR in no way prevents Member States from using and promoting nuclear power. Therefore, in any event, the right of Member States to choose their energy mix is not affected.

(224) Finally, the EU General Court already held that Article 194(2) TFEU certainly does not establish a general prohibition on measures that may somehow affect the conditions under which energy is produced.[174]

c) Security of energy supply

(225) According to Article 194(1) lit. (a) and (b) TFEU, the EU's energy policy is to aim to ensure the functioning of the energy market and security of energy supply in the Union. It is sometimes argued that this provision requires the inclusion of nuclear power in the European taxonomy.

(226) However, as explained above, Article 194 TFEU does not apply from the outset as the TR is not a measure of the Union's energy policy.

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[174] See, to this effect, judgment of 7 March 2013, Poland v Commission, T-370/11, EU:T:2013:113, paragraph 17.

(227) Moreover, the TR in no way prohibits the generation or use of nuclear power or the funding of such activities. To our knowledge, there is no evidence that a mere refusal to include nuclear power in the European taxonomy would significantly impair the functioning of the energy market or security of energy supply in the Union.

4. Conclusion

(228) EU primary law confirms that nuclear power cannot be included in the European taxonomy established by the TR.

III. Procedural questions

(229) Regarding the procedure leading to the adoption of a delegated act, in particular two questions arise: On the one hand, it may be asked whether the Commission infringes the competences of the Platform on Sustainable Finance (the 'Platform') by repeatedly commissioning expert reports from other bodies which are not provided for in the TR. On the other hand, the question arises whether the Commission complies with its obligation to gather all necessary expertise.

1. Infringement of the competences of the Platform

(230) Article 20 TR establishes the Platform as a permanent Commission expert group.[175] The Platform took up its work in October 2020. Article 20(1) TR provides very detailed rules for its composition. Whilst Article 20(1) TR requires that, *inter alia*, representatives of the European Environment Agency and of the European Supervisory Authorities (ESAs) referred to in Recital 36 TR are to form part of the Platform, no such provision is made for a body or institution of the European Atomic Community.[176] Article 20(2) lit. (a) and (b) TR explicitly assign the Platform the competence to advise the Commission on the TSC and to analyse their impact.[177]

(231) In the present case, after the TEG had not recommended including nuclear power in the Taxonomy, the Commission mandated three further expert groups to assess this

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[175] Available under: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en (last access on 22 June 2021).

[176] This demonstrates again that EU legislators did not want to include nuclear energy in the TR.

[177] See also Recitals 50 to 52 TR.

question, namely the JRC, the Article 31 Euratom and the SCHEER expert groups. However, as far as can be ascertained, the Platform – which is chaired by the Commission in accordance with Article 20(4) TR – has not yet been called upon to address this question.

(232) Against this backdrop, it could be argued that the Commission infringes the competences of the Platform on Sustainable Finance and the procedure provided by the TR. Such an argument could also be based on the second phrase of Article 20(4) TR, which provides that the Commission may invite experts with specific expertise "in the context" of the Platform. Moreover, the Commission itself stated in the TEG scoping paper that "the Platform may […] have to pick up where the technical expert group left off",[178] implying at least a primacy of the Platform over other expertise.

(233) The approach pursued by the Commission may, in the absence of more specific rules governing the question, ultimately be covered by the Commission's discretion and hence not constitute an error of law amenable to judicial review. However, the unusual procedure should, in any event, be pointed out in the course of the political process preceding the potential adoption of a delegated act.

(234) Moreover, should the Commission adopt such a delegated act without involving the Platform at all or should the Commission deprive the Platform of a meaningful influence on the delegated act, for instance by not granting it timely and complete access to the reports, this would constitute an error in law. It remains to be seen whether this will be the case. The draft first delegated act C(2021)2800/3 was discussed with the Platform after the TEG had delivered its expert report. Moreover, it was presented to and discussed with the Member States' experts and observers from the European Parliament, at several meetings of the Member States Expert Group.[179] This could indicate that the Commission will proceed in the same manner in the future.

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[178] Scoping paper for the Commission Technical Expert Group on Sustainable Finance, p. 1.

[179] COM, Draft of Commission delegated Regulation supplementing Regulation (EU) 2020/852, COM(2021) 2800/3, pp. 2 et seq.

2. Infringement of obligation to gather all necessary expertise

(235) Article 23(4) TR provides that, prior to the adoption and during the development of delegated acts, the Commission must gather all necessary expertise. This obligation is a specific expression of the Commission's general obligation to investigate.

(236) Unlike with regard to the first delegated act, the Commission asked for additional expertise besides the TEG Report to assess whether nuclear power complies with the DNSH criterion. The TEG itself had, in fact, recommended that more extensive technical work should be undertaken on the 'do no significant harm' aspects of nuclear power by a group of experts with in-depth technical expertise on nuclear life cycle technologies and regarding existing and potential environmental impacts across all objectives.[180]

(237) In 2020, the Commission launched in-depth work to assess whether or not to include nuclear power in the Taxonomy. As the first step, the JRC drafted a technical report on the 'do no significant harm' aspects of nuclear energy.

(238) The JRC Report will be reviewed by two other expert groups, the Group of Experts on radiation protection and waste management under Article 31 of the Euratom Treaty, as well as the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER). The reports of those groups are planned to complete the scientific evaluation and to be finalised in June 2021.[181] Both groups of experts (Art. 31 Euratom and SHEER) were generally asked to review the JRC Report and provide an independent opinion on the findings and recommendations of the report and on the completeness and robustness of the assessment that underpins them. Like the mandate of the JRC, the mandates for the two expert groups reviewing the JRC Report are restricted to the DNSH criterion.

(239) The terms of reference of both Article 31 Euratom and the SCHEER report ask in general terms for an evaluation of the JRC Report as a whole. The sub-questions of the two reports each have a slightly different focus. This appears, however, hardly objectionable. The TR does not further specify the procedure the Commission must

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[180] EU Technical Expert Group on Sustainable Finance (TEG), Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, Technical Annex, 2020, p. 211.

[181] COM, Communication EU Taxonomy, Corporate Sustainability Reporting, Sustainability Preferences and Fiduciary Duties: Directing finance towards the European Green Deal, COM (2021)188 final, p. 8.

follow to comply with its obligation to gather "all necessary expertise". In the absence of any contrary provisions, the Commission may, without doubt, ask different groups of experts to focus on different questions. Whilst it is important that the terms of references logically build on each other and do not show any contradictions, such contradictions could not be identified in the present case.

(240) Furthermore, scientific advice must be based on the principles of excellence, independence and transparency.[182] Although the independence of the JRC report was challenged by NGOs with the argument that it is a structurally pro-nuclear Commission Service[183], no objective elements justifying the assumption of an error in law could be identified. The same applies to the potential argument that the so-called Art. 31 Euratom expert group could be also pro-nuclear-oriented. In any event, the SHEER expert group does not have a nuclear, but a broader focus that also covers environmental risks.[184] Overall, there hence appears to be no objective basis to consider that the choice of experts relied on by the Commission is severely imbalanced.

(241) Ultimately, what matters most is, however, whether the Commission has actually gathered all the information necessary to decide on the individual requirements of the TR. In this regard, the foregoing analysis has revealed several aspects where the investigation conducted by the Commission appears, at present, incomplete or insufficient.

(242) On the one hand, it was shown above that, for legal reasons, the criteria laid down in Article 10 TR preclude nuclear power from being classified as contributing substantially to climate change mitigation. However, even on the assumption that nuclear power could, legally, satisfy these criteria, neither the Commission nor the experts tasked by it have sufficiently examined the question whether these criteria are factually met. On the assumption that nuclear power can legally satisfy the criteria laid down in Article 10 TR, the limitation of the terms of reference of the JRC, Article 31

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[182] See judgment of 11 September 2002, Pfizer Animal Health, T-13/99, EU:T:2002:209, paragraph 172.

[183] Available under: https://www.dnr.de/eu-koordination/eu-umweltnews/2021-politik-recht/eu-taxonomie-streit-um-gas-und-atomkraft-spitzt-sich-zu/ (last access on 22 June 2021).

[184] According to the terms of reference of the SCHEER report, the Commission seeks an opinion "from an independent environmental expert group or scientific committee". As is apparent from the JRC Report (p. 7), the latter will be reviewed by "experts on environmental impacts" from the SCHEER.

Euratom and SCHEER expert reports to the DNSH criterion reflects, in this regard, an important gap in the investigation conducted so far by the Commission.

(243) On the other hand, as far as the DNSH-criterion is concerned, the investigation conducted to date appears incomplete or insufficient regarding, in particular, the following points:

- The resilience of nuclear power to climate change adaptation, not only regarding extreme weather events, but also in terms of the more gradual impacts of climate change like rising sea levels and rising temperatures (drought, lack of cooling water, water temperature, or cause of water conflict).[185]

- The fact that uranium mining and milling takes place mostly outside the EU and the additional difficulties for guaranteeing appropriate standards this implies.[186]

- The impact of severe accidents in nuclear power plants, beyond human fatalities, on human health and the environment in general.[187]

- The risks and uncertainties pertaining to DGR and to the increased reliance on interim storage of high-level nuclear waste and spent fuel, which is rendered necessary by the unavailability of DGR for an undetermined period of time. [188]

(244) Overall, there is hence good reason to assume that, at least at this stage, the Commission has not fulfilled its obligation to gather all necessary expertise.

IV. Legal action

(245) Any delegated act that has somehow included nuclear power in the European taxonomy would be open to legal challenge before the EU courts.

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[185] See *supra* paragraph (110) et seq.

[186] See *supra* paragraphs (127) et seq

[187] See *supra* paragraphs (166) et seq., (182) and (209) et seq.

[188] See *supra* paragraphs (143) et seq. and (211) et seq.

1. Direct actions

(246) The most obvious course of action would be to bring an action for annulment in accordance with Article 263 TFEU.

(247) Member States have privileged standing for such actions, pursuant to Article 263(2) TFEU. Their actions must only be instituted within the prescribed limitation period.[189]

(248) In contrast, standing of natural and legal persons is more limited, in accordance with Article 263(4) TFEU. To have standing, natural and legal persons must either establish that they are directly and individually[190] concerned by the contested act or challenge "a regulatory act which is of direct concern to them and does not entail implementing measures". As non-legislative acts of general application, the delegated acts adopted on the basis of the TR qualify as regulatory acts within the meaning of Article 263(4) TFEU. Whether an applicant could establish direct concern and the absence of implementing measures depends, to a large extent, on the circumstances of the case at hand.[191]

(249) An action for annulment against a delegated act must be brought before General Court.[192] Decisions of the General Court may be appealed before the Court of Justice.

2. Indirect review

(250) A delegated act that includes nuclear power in the taxonomy could also be reviewed in the course of a preliminary reference procedure before the Court of Justice pursuant to Article 267 TFEU. This would require a procedure before a national court, the

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[189] According to Article 263(6) TFEU in conjunction with Article 60 of the Rules of Procedure of the General Court, the limitation period is two months plus a general ten days' extension on account of distance.

[190] According to the Plaumann formula consistently relied on by the EU courts, to establish individual concern, natural and legal persons must show that the act in question affects them by reason of certain attributes which are peculiar to them or by reason of circumstances in which they are differentiated from all other persons and by virtue of those factors distinguishes them individually just as in the case of the person addressed by such an act (cf. judgment of 13 March 2018, European Union Copper Task Force v Commission, C-384/16 P, EU:C:2018:176, paragraph 93).

[191] See, to this effect, judgment of 6 November 2018, Scuola Elementare Maria Montessori Srl v European Commission, C-622/16 P, EU:C:2018:873.

[192] Article 256(1) TFEU in conjunction with Article 51 of the Statute of the Court of Justice.

outcome of which depends on the validity of the delegated act. Such a procedure could, for instance, arise in the context of a claim based on the law of unfair competition.

3. Standard of review

(251) Although the Commission enjoys a certain discretion in the appraisal of complex technical questions,[193] there are strong arguments to assume that the inclusion of nuclear power in the taxonomy would exceed the boundaries of this discretion and could hence be sanctioned by the EU courts.

(252) On the one hand, many of the above-mentioned objections against the inclusion of nuclear power in the Taxonomy concern questions of law, which are subject to full judicial review. This is in particular so regarding the interpretation set out above regarding the legal criteria provided by Articles 10(1) and (2) TR.

(253) On the other hand, even where the TR and higher-ranking law leave room for discretion, the EU courts review the Commission's appraisal for manifest errors of assessment. They verify not only whether the evidence relied on is factually accurate, reliable and consistent, but also whether the evidence contains all the information which must be taken into account in order to assess a complex situation and whether it is capable of substantiating the conclusions drawn from it. Moreover, the EU courts place an emphasis on the observance of procedural guarantees, including the obligation to examine carefully and impartially all the relevant elements of the individual case and to give an adequate statement of the reasons for its decision.[194]

(254) There is good reason to consider that, at least at the present stage of the Commission's analysis, the inclusion of nuclear power in the taxonomy would amount to manifest errors of assessment. Our assessment in the foregoing has revealed several aspects where the Commission's analysis appears incomplete or insufficient or the evidence relied on seems not sufficiently reliable to justify the conclusion that nuclear power contributes substantially to climate change mitigation and does not cause significant harm within the meaning of the TR.

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[193] Judgment of 9 June 2016, Pesce and Others, C-78/16 and C-79/16, EU:C:2016:428, paragraph 49.

[194] Judgment of 6 November 2008, Netherlands v Commission, C-405/07 P, EU:C:2008:613paragraphs 55 and 56.