

1) I have just seen this: 2021-09-23 EU countries buy more time to scrutinise green investment rules, <https://www.eceee.org/all-news/news/news-2021/eu-countries-buy-more-time-to-scrutinise-green-investment-rules/>
This 'more time' is two months - until say 23rd November.

2) I recently saw this: 2021-09-10 As German election nears, EU plays for time on nuclear's green recognition, <https://www.euractiv.com/section/energy/news/as-german-election-nears-eu-plays-for-time-on-nuclears-green-recognition/>
This includes:

'The inclusion of nuclear power in the EU's green finance taxonomy is "the most likely" outcome in view of the scientific reports submitted to the European Commission in the past months, EU experts believe. But Brussels is not entirely decided yet and is seen playing for time before the German election this month'.

And:

'Following positive expert assessments submitted to the European Commission before the summer break, the EU executive is now widely expected to recognise nuclear power as a 'green' technology under the EU's sustainable finance taxonomy.

"It is very complicated today to scientifically demonstrate that nuclear waste poses a 'significant' environmental problem that cannot be overcome," said Thomas Pellerin-Carlin, a researcher and director at the Jacques Delors Institute's energy centre.

The Commission's in-house scientific body, the Joint Research Centre, released a much-awaited report on nuclear power on 2 April. Its conclusions were clear: nuclear power is a safe, low-carbon energy source comparable to wind and hydropower, and as such, it qualifies for a green investment label under the EU's green finance taxonomy.

These conclusions were subsequently backed by two other EU bodies, the Euratom Article 31 expert group and the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER).

"In view of all this, what seems to me the most likely indeed is that the Commission will make a proposal in favour of the integration of nuclear energy within the framework of the taxonomy," Pellerin-Carlin said.

"That would be consistent with the dynamics of the past few months," he told EURACTIV in an interview.

Diplomats and industry lobbyists consulted by EURACTIV concurred: the most likely outcome is that European Commission will table a proposal in the coming months, possibly as late as November or December, after the formation of the new German government.

"From what we understand, the [proposal] itself will likely come out around October–December this year," said Jessica Johnson, communications director at Foratom, the trade association representing the nuclear industry in Brussels.

An EU diplomat, for his part, spoke of "September–November".

(See: 2021 Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU) 2020/852 ('Taxonomy Regulation'), https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf).

Regarding the remarks of Pellerin-Carlin, at the Jacques Delors Institute, it is logically impossible to prove today that nuclear waste can be prevented from reaching the biosphere for the billions of years that the earth may support life. So his remarks are entirely untrue, as the PEW report and this document also show.

Regarding the JRC Taxonomy report, it failed to consider several key documents, as the PEW reports and this document show. Perhaps the most notable is the German Ethics Commission Report of 2011, which disagrees entirely with the JRC report.

Regarding the Euratom Article 31 expert group and the Scientific Committee on Health, Environmental and Emerging Risks (SCHEER), they too are ignoring the evidence in the PEW report and this document.

2021-06-30 Opinion of the Group of Experts referred to in Article 31 of the Euratom Treaty on the Joint Research Centre's Report..., https://ec.europa.eu/energy/sites/default/files/opinion_of_article_31_goe_on_the_jrc_report_28_june_2021.pdf

Errors include the effect of probability of nuclear disasters (which is unknowable), and omissions include the 2010 European Committee on Radiation Risk report, the 2011 German Ethics Commission report and reports on the status of high level nuclear waste storage (which is unfit for purpose).

2021-06-29 Scientific Committee on Health, Environmental and Emerging Risks SCHEER, SCHEER review of the JRC report..., https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210629-nuclear-energy-jrc-review-scheer-report_en.pdf

Omissions include the 2010 European Committee on Radiation Risk report, the 2011 German Ethics Commission report and the effect of concentration of radioactive releases via human food chains.

3) I recently noted this report analysing the JRC report, commissioned by the Heinrich Boell Foundation: 2021-09 Sustainability at risk, A critical analysis of the EU Joint Research Centre technical assessment of nuclear energy with respect to the "do no significant harm" criteria of the EU Taxonomy Regulation, By Dr. Christoph Pistner, Dr. Matthias Englert and Dr. Ben Wealer, https://eu.boell.org/sites/default/files/2021-09/Sustainability_at_risk_2021_final_0.pdf

This is referred to here as the PEW report, after the names of the authors.

This report raises the crucial issues, but there is additional important evidence that also invalidates the JRC Report.

This is given below under the issues and in the sequence used in the Executive Summary of the PEW report.

1 Introduction

For a matter this serious, only one original report is not enough. For example, to inform the 'Energiewende', Germany has drawn on overlapping reports from at least six organizations independent of the energy industries. (See: 2011-11-22 Power-to-Gas aus Sicht eines Windparkbetreibers, Slide 7, https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/VortraegeVeranstaltungen/RedeErnst.pdf?__blob=publicationFile&v=1). The JRC report has several crucial errors and omissions. Moreover, these have not been corrected in two EU review reports.

2 Nuclear power generation in the EU

The possible contribution nuclear power can make to climate change mitigation in the EU27 (objective 1 in the Taxonomy Regulation) is disputed.

2.1 The GHG emissions for the complete fuel cycle of nuclear power, from mining to waste storage, are about 117 gCO₂/kWh. (See: 2017 Climate change and nuclear power: An analysis of nuclear greenhouse gas emissions, Storm van Leeuwen, p 49, <https://www.stormsmith.nl/Resources/nucl%26climate2017.pdf>). Moreover, p 54 shows that uranium ore depletion would increase it to 400 gCO₂/kWh, that of gas-fired power, by 2055 with 2%/a growth, and 2075 with no growth of nuclear power.

2.2 Nuclear plants require very large outlays of energy, GHG emissions and money for the concrete, steel and other materials. However, unlike other energy saving and supply options, much of these materials cannot be recycled due to radioactive contamination. Instead they add to the energy, GHG emissions and money burdens of very long term nuclear waste storage.

3 Nuclear waste management

3.1 The PEW report refers to the 'BASE' report.

This finds that the JRC report 'fails to comprehensively assess the sustainability of using nuclear energy'. 2021-06 BASE – Federal Office for the Safety of Nuclear Waste Management (2021). Expert response to the report by the Joint Research Centre entitled "Technical assessment of nuclear energy with respect to the "Do No Significant Harm" criteria in Regulation (EU) 2020/852, the "Taxonomy Regulation". Federal Office for the Safety of Nuclear Waste Management, https://www.base.bund.de/SharedDocs/Downloads/BASE/EN/reports/2021-06-30_base-expert-response-jrc-report.pdf.pdf;jsessionid=1EB9FEB661D74F730F6EEAA7133DA848.1_cid391?__blob=publicationFile&v=6
The Summary includes:

'This expert response finds that the JRC has drawn conclusions that are hard to deduce at numerous points. Subject areas that are very relevant to the environment have also only been presented very briefly or have been ignored. For example, the effects of severe accidents on the environment are not included when assessing whether to include nuclear energy in the taxonomy register – yet they have occurred several times over the last few decades. This raises the question of whether the JRC has selected too narrow a framework of observation. The aspects mentioned and others listed in this expert response suggest that this is true.

This expert response also points out that the JRC mentions topics, but then fails to consider them further or in more detail, although they must be included in any assessment of the sustainability of using nuclear energy. The need to consider them is partly based on the fact that certain effects on the other environmental objectives in the Taxonomy Regulation must be expected if the matter is viewed more closely or at least cannot be excluded. In other cases, this need results from the fact that the Taxonomy Regulation refers to the UN approach in its 2030 Agenda in its understanding of sustainability – and the latter, for example, contains the goals of "considering future generations" and "participative decision-making". Any sustainability, particularly for future generations, can only be guaranteed if attempts are made at an early stage to achieve acceptance in the population, enable future generations to handle the use of nuclear energy and its legacy or waste appropriately and ensure that information and knowledge are maintained in the long term.

Generally speaking, it should be noted that the problem of disposing of radioactive waste has already been postponed by previous generations to today's and it will 'remain' a problem for many future generations. The principle of "no undue burdens for future generations" (pp. 250ff) has therefore already been (irrevocably) infringed, while the DNSH-hurdle "significant[ly] harm" has also been infringed.

Generating huge quantities of dangerous waste is being continued for decades without any effective disposal solution being available. The JRC itself says that the primary and best waste management strategy is not to generate any radioactive waste in the first place. However, this assessment is not consistently applied within the report.

The JRC Report only provides an incomplete view of the consequences and risks of using nuclear energy for people and the environment or for future generations or does not even mention them in its assessment. Where it does mention them, some of the principles of scientific work are not correctly considered at some points. The JRC Report is therefore incomplete and therefore fails to comprehensively assess the sustainability of using nuclear energy'.

3.2 Regarding the storage of nuclear waste in deep geologic formations, the authors of the JRC and the PEW reports appear to be unaware of these reports, freely available on the internet:

2012 November, The Swedish KBS-3 nuclear waste repository concept: Problems and implications for the UK, David Smythe, <https://www.davidsmythe.org/nuclear/KBS%20concept%20problems%20nov2012.pdf>

His expertise is set out on his web site: <https://www.davidsmythe.org> and: <https://www.davidsmythe.org/nuclear/nuclear.htm>
Slide 8 of the presentation includes: "Why the KBS method will not work"

"After the emplacement of the canisters and clay the oxygen in the repository is quickly consumed by bacteria and chemical processes. The fundamental assumption in the KBS method is that very little corrosion takes place in an oxygen-free

environment. The canister walls are 5 centimetres thick and only a millimetre or two of the copper is supposed to corrode in a million years.

Pitting can result in penetration

Once copper begins to corrode, the process can proceed quickly through so-called pitting, which gives pox-mark indentations in the surface. The risk of pitting has led critical researchers to fear that the copper canisters may start to leak after only some hundreds of years — instead of after hundreds of thousands of years. (Fig 4).”

2014-01-01 Collected Submissions on the Proposed Forsmark Nuclear Waste Repository, Chris Busby, Ditta Rietuma, http://www.mkg.se/uploads/Aktbilagor/297_Nacka_TR_M_1333-11_aktbil_297.pdf

This includes three major documents at logical pages 3, 23 and 38.

They address the issues of the Waste Repository and of the nuclear Health Effects.

The expertise of the lead author - Chris Busby- is at logical page 40. References by him and others are at logical page 66.

Logical page 57 includes: ‘However I can use a conservative approach by employing the total repository value of 1.4×10^{19} Bq to make some interesting schoolboy calculations. In this I ignore the decays of the parent in the series since as Table 4.1 shows there are a whole series of alpha emitters downstream of the shorter half-life parent alpha-emitter nuclides.

If there are 6000 canisters, the content of one canister by simple division is 2.3×10^{15} Bq of alpha emitters, and since an alpha particle is a charged Helium ion, this means there are the same number of Helium gas atoms being produced every second. In 100,000 years (the kind of time frame we are being invited to consider) this is 7.25×10^{27} atoms.

One Mole of an element contains 6×10^{23} atoms and so there will be 12088 Moles of Helium produced in the canister in 100,000 years. Since Gay Lussac’s law tells us that at STP (ambient temperature and pressure) one Mole of a gas occupies 22.4 litres, we can say that the volume V of the Helium in a canister at STP would be 270789 litres i.e without any consideration of heating expansion. Let us turn to the canister. The BWR canister is a cylinder of diameter 100cm and length 483 cm. It is full up with an iron cylinder containing 12 square cross section channels of 16cm x 16cm. Thus the total available volume without the spent fuel assemblies is 1483 litres. If I assume that this space is filled up by the assemblies to 90% capacity, the remaining volume will be 148.3litres. But we have 270289 litres of Helium. Using Boyles Law, which can be written $P_1V_1 = P_2V_2$ the pressure in the canister is now 1829 atmospheres (185.3MPa).

This ignores Temperature effects which we can happily also model. Such a model is far simpler than “Pandora”. I assume a temperature in the canister of 200 degrees greater than the initial Argon fill temperature. This brings the internal pressure up to about 3000 atmospheres (304MPa). I think we can assume that the canister would have violently exploded long before the 100,000 years are up since the design was made to withstand isostatic pressure of 45MPa from the outside (geophysical effects), not the inside (Flik 16 Section 12.7.1)’.

Thus the design of the KBS nuclear waste canister shows inexcusable incompetence, and is not fit for purpose.

4 Risk assessment and severe accidents

The human harms from operational releases from nuclear fuel and nuclear power plants must also be considered.

4.1 Regarding nuclear harms to human health, the authors of the JRC and PEW reports appear to be unaware of this report: 2010 Recommendations of the ECRR, The Health Effects of Exposure to Low Doses of Ionizing Radiation, Regulators' Edition, Edited by Chris Busby with Rosalie Bertell, Inge Schmitz-Feuerhake, Molly Scott Cato and Alexey Yablokov, <https://euradcom.eu/wp-content/uploads/2016/04/ecrr2010.pdf>

This document of 258 pages acknowledges the assistance of 24 individuals, of whom 15 are Professors, and 6 Doctors.

Page 4 includes:

‘In 2004, Dr Okeanov of the Belarus cancer registry visited Switzerland and presented data on increased incidence rates which were in line with those predicted by ECRR2003. Also in 2004, a study of cancer in northern Sweden showed that there was a statistically significant 11% increase per 100kBq m-2 Caesium-137 contamination the 5 years following the Chernobyl fallout (Tondel et al 2004). This can be shown to demonstrate a 600-fold error in the ICRP model, and supports the evidence given in ECRR2003 that the weapons test fallout had a similar effect with a similar error factor. The data from Belarus and the findings in Sweden 2004 could therefore be seen as a confirmation of the new model.

In 2007, the latest of a long series of childhood leukemia studies was published: this one from the German Childhood Cancer Registry, showing a statistically significant effect on child cancer in those living within 5km of nuclear plants (KiKK 2007). The size of this study, and the affiliation of the authors, made it impossible to conclude that this was anything but proof of a causal relationship between childhood cancer and nuclear plant exposures to radioactive releases. This study thus added to those highlighted in ECRR2003 which collectively put the error in the ICRP model as about 500 to 1000-fold.

In 2009, in an update of the study reported in ECRR2003, a meta-analysis of data on the epidemiology of infant leukemia after Chernobyl, showed a statistically significant 43% excess in those children who were in utero at the time of the Chernobyl fallout: the error that this highlighted in comparing external and internal exposures was a 600-fold error (Busby 2009)’.

Page 5 includes: ‘Although the Greens were unable to significantly affect the Basic Safety Standards Directive 96/29, they were able to amend it so that Article 6.2 required that: Member States must review Justifications of all classes of practice involving exposures if new and important evidence emerges.

Such is now clearly the case on both epidemiological and theoretical grounds’.

4.2 All nuclear plants risk shutdown of the whole fleet, as happened in Japan and Germany after Fukushima in 2011.

In Japan, of the 54 reactors, 24 are being decommissioned, and only 9 have been restarted. (See: Nuclear power in Japan, https://en.wikipedia.org/wiki/Nuclear_power_in_Japan). In Germany, the shutdown of the 17 nuclear plants was phased, with completion due by end 2022. Belgium, Spain and Switzerland plan nuclear phase-outs by 2030. (See: Nuclear power phase-out, https://en.wikipedia.org/wiki/Nuclear_power_phase-out). Another such disaster in any of the worldwide fleet of some 400 ageing nuclear plants could well lead to them all being shut down. Even by itself, this makes nuclear power unsustainable.

4.3 The German phase-out followed the recommendation of the Ethics Commission, set up by Chancellor Merkel. (See: 2011-05-30 Germany's energy transition – A collective project for the future, produced by the Ethics Commission for a Safe Energy Supply, <https://archiv.bundesregierung.de/resource/blob/656922/457334/784356871e5375b8bd74ba2a0bde22bf/2011-05-30-abschlussbericht-ethikkommission-en-data.pdf>). Page 4 includes: 'The Ethics Commission is strongly convinced that the withdrawal from nuclear energy can be completed within one decade using the measures presented here for the energy transition....The withdrawal from nuclear energy is necessary and is recommended to rule out future risks that arise from nuclear in Germany. It is possible because there are less risky alternatives'.

For the JRC report to have omitted this Ethics Commission report is inexcusable. Several independent reports are essential.

4.4 My publications on nuclear power are at: <http://cms.energypolicy.co.uk/nuclear/>

They include a major report on Fukushima, of 85 pages with 231 references: <http://cms.energypolicy.co.uk/nuclear/244>

I produced this because no adequate report of the disaster was produced by the IAEA or the UK Office for Nuclear Regulation. This documents the magnitude of the radioactive release, the area affected by radioactive fallout, the fact that the release and area could have been many times larger, and the resulting human harms, including cancers, deaths and genetic effects.

5 Nuclear Proliferation

5.1 Sellafield in the UK has re-processed used nuclear fuel to recover Plutonium for use in nuclear weapons. This has given rise to significant radionuclide releases to the Irish Sea, which is now detectable as far away as the Baltic Sea.

2018 Controls on Anthropogenic Radionuclide Behaviour in the Sellafield-Impacted Eastern Irish Sea, UK, Daisy Ray, https://www.research.manchester.ac.uk/portal/files/102607534/FULL_TEXT.PDF

The Abstract includes: 'Radioactive effluent has been discharged from the UK Sellafield nuclear reprocessing facility to the Eastern Irish Sea since 1952. Waste storage ponds and process liquors from spent fuel reprocessing activities are the main source of this effluent, and contain actinides and fission products (Am, Pu, Np, U, Tc, Cs)'.

2021-02-05 An unknown source of reactor radionuclides in the Baltic Sea revealed by multi-isotope fingerprints, <https://www.nature.com/articles/s41467-021-21059-w>

Page 2 includes: 'The known sources of reactor 236U, i.e., deliberate releases from the two European reprocessing plants at La Hague, France (LH), and Sellafield, UK (SF) since 1950s, can be traced throughout the North Atlantic and the Arctic water currents 6. Emissions from other known sources of reactor 236U, e.g., the Springfield nuclear facility and the Fukushima accident, are negligible 5,7'.

5.2 In the PEW Report, Page 5 includes: 'Any use of nuclear weapons would have catastrophic impacts on human health and the environment'.

This has been confirmed by the human harm caused by the nuclear weapons tests conducted in the atmosphere.

(See: 2010 Recommendations of the ECRR, The Health Effects of Exposure to Low Doses of Ionizing Radiation, Regulators' Edition, Edited by Chris Busby with Rosalie Bertell, Inge Schmitz-Feuerhake, Molly Scott Cato and Alexey Yablokov, <https://euradcom.eu/wp-content/uploads/2016/04/ecrr2010.pdf>)

Page 4 includes: 'In 2004, Dr Okeanov of the Belarus cancer registry visited Switzerland and presented data on increased incidence rates which were in line with those predicted by ECRR2003. Also in 2004, a study of cancer in northern Sweden showed that there was a statistically significant 11% increase per 100kBq m⁻² Caesium-137 contamination the 5 years following the Chernobyl fallout (Tondel et al 2004). This can be shown to demonstrate a 600-fold error in the ICRP model, and supports the evidence given in ECRR2003 that the weapons test fallout had a similar effect with a similar error factor. The data from Belarus and the findings in Sweden 2004 could therefore be seen as a confirmation of the new model'.

4) I recently listened to: 2021-09-13 BBC Radio 4, The Nuclear Priesthood, <https://www.bbc.co.uk/programmes/m000zdg9>

This sets out the extreme difficulty of communicating to future generations, perhaps millenia or even billions of years into the future, what the nuclear waste repositories are, and how dangerous they are and will remain for all living things. It did not address the question of advice if the radioactive waste was released to the biosphere. In such a context, permitting the creation of any more nuclear waste must be considered criminal by the world community. So rather than permitting nuclear power within the EU Taxonomy, all nuclear power plants should be phased out as quickly as possible, as is almost complete in Germany, ending at the end of 2022. As the fallout from nuclear releases is carried worldwide, with that some 2400 km downwind from Chernobyl to the hill farms of Wales and Scotland being considered still dangerous to life 26 years later, this must apply to all reactors worldwide. (See: 2019-06-03 How Chernobyl made Welsh sheep radioactive and paralysed some farms for 26 years, <https://www.walesonline.co.uk/news/wales-news/how-chernobyl-made-welsh-sheep-16360676>).

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