Greenpeace in Zentral- und Osteuropa
Fernkorngasse 10
1100 Wien, Österreich

t: +43 (1) 5454580 0
i: www.greenpeace.at

Correspondence address:
Jan Haverkamp

t: +31 621 334 619
e: jan.haverkamp@greenpeace.org

SUBMISSION reacting on the notification and scoping documentation of a transboundary Environmental Impact Assessment for the proposed life-time extension of the Zaporizhzhya NPP (ZNPP) and South-Ukraine NPP (SUNPP)

Greenpeace Central and Eastern Europe
Greenpeace Romania
Greenpeace Hungary
Greenpeace Slovakia

Ir. Jan Haverkamp

15 May 2017

(picture on the front side: © Greenpeace; Protest against the investments of EBRD in the life-time extensions of Ukrainian nuclear power stations, Kiev, 2012)

List of abbreviations

PSR	Periodic Safety Review

My name is Jan Haverkamp. I have a candidate (equivalent with Bachelors) degree and an academic engineering degree (Ir. - equivalent with a Masters degree) in Environmental Hygiene from the Agricultural University in Wageningen as well as a candidate (equivalent with Bachelors) degree in Biochemistry from the State University in Leiden, both in the Netherlands. I studied also nuclear physics and energy policy at the State University in Leiden.

I work as an expert in energy issues with specialisation in nuclear energy for the World Information Service (WISE) in Amsterdam and am an independent expert for among others the global environmental organisation Greenpeace and work since 1987 in Central and Eastern Europe. Previously to this Environmental Impact Assessment (further: EIA), I have participated in the EIA procedures for the first two blocks of the Temelín nuclear power plant (NPP) in the Czech Republic, the Belene NPP in Bulgaria, the Cernavoda 3,4 NPP in Romania, the Visaginas NPP in Lithuania, the Mochovce 3, 4 NPP in Slovakia, the blocks 3, 4 of the Temelín NPP in the Czech Republic, the Paks II NPP in Hungary, the Strategic Environmental Assessment of the Polish Nuclear Energy Programme and the transboundary scoping phase of the EIA for the first Polish nuclear power station. I have advised different stakeholders in the EIA procedures for Borssele 2 in the Netherlands, Hinkley Point C in the United Kingdom, Hanhikivi in Finland and EIA procedures relating to nuclear plant lifetime extension in Hungary, Ukraine, Belgium, Sweden, Spain, the Czech Republic, Finland and the Netherlands. I have participated as expert for the complainant or adviser in court procedures concerning public participation in Bulgaria, Slovakia, Lithuania, Poland, and Belgium and in procedures for the Aarhus Convention Compliance Committee in complaints against Slovakia, the Czech Republic, the United Kingdom, Germany and the Netherlands.
I am a board member of the organisation Nuclear Transparency Watch, based in Brussels.

I have been asked by the independent legal entities Greenpeace Central and Eastern Europe, Greenpeace Romania, Greenpeace Slovakia and Greenpeace Magyarország Egyesület to prepare a submission reacting on the proposed life-time extension of the Zaporizhzhya NPP (ZNPP) and South-Ukraine NPP. I wrote these comments on personal title and my opinion – though partly based on my experience within Greenpeace and benefiting from input from other Greenpeace colleagues and experts – does not necessarily coincide with the opinion of different Greenpeace entities or of WISE as organisations.

Greenpeace Central and Eastern Europe as well as its offices in Romania, Hungary and Slovakia, as organisations do, however, endorse my recommendations that the there need to be fundamental additions and adaptations and these additions and adaptations should be resubmitted to public participation before the full EIA stage is started.

The documentation made available – that is the non-technical summary and the transboundary chapters as made available by the Ukrainian Deputy Minister for European Integration, Mykola Kuzyo and published by the Romanian government in the framework of the transboundary EIA – is not sufficient for a proper analysis. For a proper analysis, access to the full documentation available to the Ukrainian authorities for the scoping phase of this EIA is necessary.

The scope of this scoping documentation is furthermore so much below what can be expected that I would advice to cancel this round in the public participation procedure, have a new scoping report produced taking into account the remarks made by the public, and submitting that once more for consutation.

I have had access to the English version in the following documentation:

- 2017-04-05_Notification.pdf
- 2017-04-05_SUNPP_IEA_Nontechnicalreview_en.pdf
- 2017-04-05_SUNPP_IEA_Transboundary assessment_en.pdf

- 2017-04-05_ZNPP_EIA_Nontechreview_en.pdf
- 2017-04-05_ZNPP_IEA_Book7_Transboundary assessment_en

For this submission, I have studied the Notification document (2017-04-05_Notification.pdf) and the non-technical review for the SUNPP (2017-04-05_SUNPP_IEA_Nontechnicalreview_en.pdf) and scanned the other documentation. The conclusions I have drawn on the basis of these two documents are also valid for the other documents, as the basic problems with the procedure are the same.

Ir. Jan Haverkamp

I. General remarks and conclusions

1 This EIA procedure is started when the nuclear power plants in South Ukraine and Zaporizhzhya already underwent extensive upgrades under an upgrading programme co-financed by the EBRD and Euratom / the EIB. Furthermore, for several of the reactors, life-time extension already has been granted by the Ukrainian authorities. For that reason, this EIA comes too late. According to the Aarhus Convention, art. 6(4), public participation (also transboundary public participation in an EIA) should take place when all options are open. In case of tiered decision processes, whereby public participation in earlier decisions did not take place, according to the Maastricht Recommendations on Public Participation in Decision-making to the Aarhus Convention, the decisions taken earlier should be considered still open and still be subjected to public participation.[1]

2 In this case, this means:

2.1 The upgrades as made in the South Ukraine and Zaporizhzhya NPPs have to be considered to be upgrades made for the remaining life-time until 30 years of operation time. The investment into these upgrades has to be considered written off and cannot be considered as relevant factor in the decision for life-time extension of the reactors in these nuclear power stations;

2.2 All earlier decisions concerning life-time extension of reactors in these nuclear power plants (ZNPP 1,2 and SUNPP 1,2) need to be considered as invalid. New decisions on all reactors under consideration need to be informed by the process and outcome of a public participation process, e.g EIA;

2.3 All work preparing reactor life-time extension at every reactor of these two nuclear power plants needs to be suspended until the EIA procedure has been finalised and decisions concerning life-time extensions are taken informed by this EIA procedure.

3 As long as Ukraine does not fulfil these criteria, it is in non-compliance with both the Aarhus Convention and the Espoo Convention.

4 I have for this submission looked in detail to two documents, the Notification Document and the non-technical summary for the SUNPP. It appeared that the issues raised on the basis of these documents are also valid for the other documents. I have referred to the page numbers of the documents indicated, but the remarks, viewpoints and conclusions are also valid for the other documents and the ZNPP. This means that I expect in the response to this submission, that the explanations referring to the documentation concerning the SUNPP should also address the situation for the ZNPP.

II. Notification document (2017-04-05_Notification.pdf)

5 **Notification Page 1** – It would be good to improve the English translation. *"Description of proposed activity (e.g. technology used) – Water-water energy reactor WWER-1000 on thermal neutrons"* is nonsense. The technology used consists of VVER 1000/320 pressurised light-water reactors of 30 years of age.

6 **Notification Page 1** – *"Ensuring the production of electricity at the achieved level before the new capacities construction or the decommissioning of power units"* is a sentence that does not make sense (it may well not make sense in the Ukrainian original either). What is meant here? Continuation of electricity production on same level as the NPPs achieved before the life-time

1 UNECE, Maastricht Recommendations on Promoting Effective Public Participation in Decision-making in Environmental Matters prepared under the Aarhus Convention, Geneva (2014); http://www.unece.org/index.php?id=41803

extension decision? The second part of the sentence makes one assume there is an intention to operate the reactors in the two nuclear power plants until new capacity has replaced them. New capacity compared with what? Where? When? Is that indeed meant? But why does it then talk about decommissioning of power units? This sentence needs to made comprehensible.

7 **Notification Page 1** – Rationale for the proposed activity: *"Accumulation of the necessary funds for the decommissioning of power units without a significant increase of consumer load"*.
I presume that the latter means: without a significant increase in financial burden of electricity consumers. But this, of course, can never the be the rationale for operating nine (!) dangerous nuclear reactors.
First of all, the necessary funds for decommissioning and waste management should have been aggregated already during the technical life-time of the reactors, which was 30 years. That they were not, means that Energoatom as operator has so far sold electricity under cost price and should be kept fully liable for this.
Secondly, it is not at all guaranteed that further operation of ageing nuclear reactors will generate sufficient financial rewards, and most certainly will not, when electricity prices remain too low. Bad management of these NPPs may never be an argument in the justification for the environmental risk that these NPPs are causing during further operation. Especially, because the impacts of a severe accident whereby large emissions of radioactive substances in the environment cannot be excluded and can cause damage in the magnitude of hundreds of Billions of USD. These impacts, even with a very small technical chance, cause a considerable environmental risk that requires a solid justification. There are alternatives to provide for the necessary funds for decommissioning and waste management that take into account the responsibility of those behind the decisions that failed to aggregate sufficient funds so far, and that do not necessarily express themselves in an increase of electricity prices. Given the large role that the State has played in the past in the decisions at the basis of the lack of these funds, it would be logical that the State owned company Energoatom would openly face its liabilities, is declared bankrupt, that remaining assets are used to finance decommissioning and waste management as far as possible, and that the State as owner and responsible for the mismanagement at the basis of the lack of funds is covering the remaining part.

8 **Notification Page 2** – Scope of assessment: This also needs to include the following items:

8.1 Consideration and assessment of impacts due to incidents and accidents in one or more of the reactors and other installations in the NPPs, including worst case scenarios of beyond design accidents – these assessments need to include an estimate of potential damage in monetary terms, in environmental terms and in impact on the population (health, social, economic). This needs to include the impacts of scenarios created by extreme technical and human failure, extreme natural events and malevolent attack (sabotage, acts of terrorism, acts of war).

8.2 Consideration and assessment of the feasibility of protection of workers and the population in the case of a large accident with a substantive emission of radioactive substances.

8.3 Consideration and assessment of the environmental impacts of prolonged use of nuclear fuel (by uranium mining, fuel production) and prolonged production of radioactive waste (low-, middle-, but above all high-level categories of radioactive waste, including spent fuel).

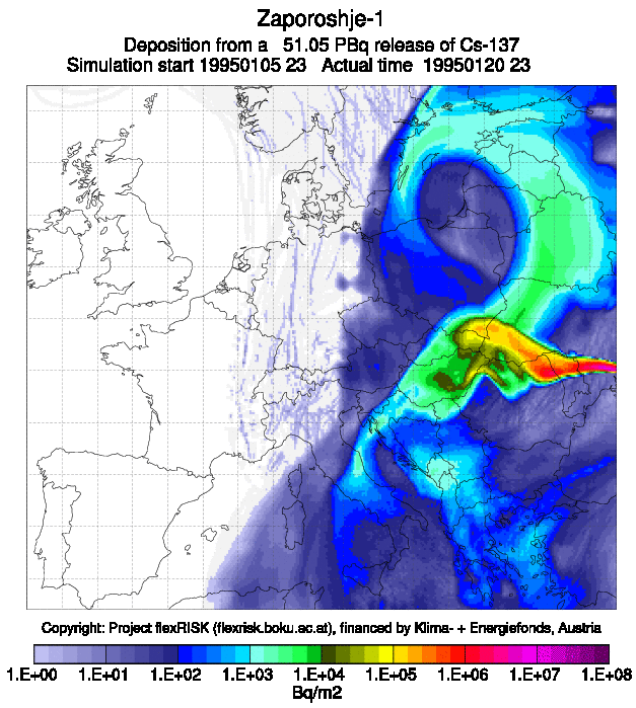
8.4 Consideration, assessment of and comparison with viable alternatives to fulfil the objectives of the project of life-time extension of ZNPP and SUNPP, including electricity generation, aggregation of funds for decommissioning and waste, social and economic development of the regions in which the NPPs are situated. The first one needs to include the introduction of energy efficiency techniques and viable and sustainable renewable

energy techniques and necessary infrastructure in order to replace the existing nuclear reactors once they have reached their current technical life-time of 30 years.

9 **Notification Page 2** – Expected environmental impacts of the proposed activity: The statement that an increase of the impact on the environment is not provided because the capacity and output of the reactors is not changing, shows that the authors of the notification do not understand nuclear technology. The severest impacts of nuclear installations are during and after a severe accident with a substantive emission of radioactive substances. The risk for such an event is growing exponentially with the age of a nuclear reactor – based on degradation of the quality of essential non-replacable parts like the reactor pressure vessel and others, the introduction of new parts and incompatibility problems, loss of knowledge and experience from the construction and other causes. The risk is furthermore depending on political and social stability, which has severely decreased in comparison with the time when the reactors were planned and constructed. For that reason, the potential impact of these nuclear power stations is not only a lot higher than when they were planned (and then they were arguably already unjustifiable), but they are also exponentially increasing.

10 **Notification Page 2** – Inputs – Further operation of ZNPP and SUNPP will require severe upgrades to reduce their risk, extending the recommendations made during the safety upgrades carried out in the last years but oriented on a longer operation time. To bring the reactors on risk levels that would be internationally acceptable for new capacity, new recommendations following from lessons learned from the Fukushima catastrophe and other developments around nuclear risk reduction on international level will need to be worked out and implemented. Next to that, 30% longer operation compared to the original technical life-time will require 30% more uranium, and – given the gradual decrease in quality of uranium ore on the world market, a much higher than 30% increase in CO2 emissions from the operation of the NPPs.

11 **Notification Page 2** – Transboundary impacts: Calculations using the FlexRISK model developed at the University of Vienna and the BOKU University in Vienna show that a severe accident with a source term of 51.05 PBq of Cs-137 (20% of the inventory – the order of magnitude of emissions from the Fukushima NPP) in one of the ZNPP reactors in weather circumstances as experienced on 05-01-1995 would be able to severely impact Romania, Slovakia and Poland.[2]
Other runs of this tool show potential severe impacts on Armenia, Austria, Belarus, Bulgaria, Georgia, Germany, Greece, Hungary, Lithuania, Moldavia, Poland, Russia and Turkey.
When, as stated in the notification, *"Calculations carried out and justified the absence of a transboundary radiation impact on the environment and the population of the consequences of discharges of radioactive substances from the SUNPP and the ZNPP under normal and*



2 Seibert, Petra, e.a., Flexrisk – *Flexible Tools for Assessment of Nuclear Risk in Europe*, Vienna (2013) BOKU; http://flexrisk.boku.ac.at/en/evaluation.phtml#form; accessed on 2 May 2017; run: Site – UA Zaporoshje; Unit – 1; Date – 1995-01-05 23 UTC; Type of result – Accumulated ground contamination with C-137; Doman – Zoomed domain (dx=10 km)

emergency event operation", this merely shows that the authors have not done sufficient research in the potential impacts of the NPPs.

12 **Notification Page 2** – Proposed mitigation measures: This part fails to notice that the maximum liability for the operator Energoatom in a case of a severe accident is 150 Million SDR (200 Million USD). For comparison, the costs for the Fukushima catastrophe are estimated to be in the order of magnitude of 100 Billion USD or more. This means that for SUNPP and ZNPP there are no economic measures in place to reduce the impact of a severe accident with substantial emission of radioactive substances.

13 **Notification Page 2** – The Complex consolidated safety upgrade programme was designed to remove urgent deficiencies in the ZNPP and SUNPP for the remainder of their technical life-time. The EBRD and EIB / Euratom have always fiercely denied that this programme was meant to prepare for life-time extension. This means that a separate programme should be developed and implemented to mitigate the potential risks attached to life-time extension.

III SUNPP – Non-technical summary (2017-04-05_SUNPP_IEA_Nontechnicalreview_en.pdf)

14 The documentation on which this non-technical summary is based is missing. There is no source indication, nor are these documents available for assessment.

15 **Page 4:** *"Therefore, the lifetime extension of power units is an accepted strategy and it is in place in the majority of countries that operate Nuclear Power Plants."* This statement is false. First of all, there are many people and institutions, including many countries, that oppose the strategy of life-time extension. These include non-nuclear countries like Austria, Luxembourg, Denmark, Ireland and many others, but also nuclear countries like Germany, Lithuania and Taiwan. That the strategy is accepted by some does not mean it is accepted in general. Next to that, only 14 out of 30 countries currently operating nuclear power stations have at the moment chosen for this strategy. That is a minority of countries that operate NPPs.

16 On **page 4**, Ukraine admits that already decisions have been taken for life-time extension of the Rivne NPP 1 and 2 units as well for the SUNPP unit 1 without EIA. This was criticised by the Espoo Convention Implementation Committee, which found Ukraine in non-compliance with the Convention for not carrying out an EIA before these decisions. In the mean time, also decisions have been taken for the ZNPP unit 1 and 2, and the SUNPP unit 2. With that, Ukraine confirmed its non-compliance with the Espoo Convention, but also is in non-compliance with the Aarhus Convention, which states in art. 6(4) that public participation has to take place when all options are open. Remedy in this case could be brought by the suspension of the validity of the above mentioned decisions pending the outcome of the this EIA procedure. Such a suspension could be sought by Ukraine in the form of injunctive relief by court – a remedy that is advised in the Aarhus Convention, art.9(4). Of course, operation of these reactors would have to be halted until a life-time extension decision can be taken informed by an EIA and its incorporated public participation procedure.

17 **Page 5.** *"Main theses that shall be communicated to the public are that extended operational life of Power Units over the period beyond their design life does not change current designs; does not provide for new construction of power units or their restructure or some components restructure for a different function, or site expansion. Thereby, any environmental factor does not change, all the parameters of environmental impacts remain on the same level, and maybe, they will go down owing to upgraded processing components and implemented supplementary environmental protection actions."* This paragraph shows that the authors do not understand the

basic premises of public participation under the Aarhus Convention. Public participation is not meant to massage a certain preoccupation of the authority into the mind of the public, as the quote here suggest. Public participation is meant to harvest the expertise and wisdom in the public to test assumptions made before a decision in order to increase the quality of the decision itself (preamble of the Aarhus Convention). Also, art. 6(4) of the Aarhus Convention clearly states that public participation has to take place when all options are still open – not when the authority already made up its mind and tries to sell that to the public.

18 Concerning the content of this paragraph: Environmental factors do change. They change in the first place due to the ageing and upgrading of the reactors. Secondly, the environment itself has changed over the 30 years of previous operation of the NPPs, and hence the risks and impacts of the project on the environment has changed. Whether these changes are relevant or not can only be decided after a proper public consultation by taking into due account the viewpoints from the public (art. 6(8) Aarhus). It may well be, and we have already brought arguments forward to that extent, that the overall risk of life-time extension is growing, that more environmentally friendly and economically and socially more viable alternatives exist, and therefore the justification for further operation of the NPPs falls away.

19 **Page 5**, Data sources of the non technical summary: where can these data sources be accessed by the public? Are they all publicly available? In an easy format?

20 **Page 6**, the Periodic Safety Review: The description shows that the PSR will lead to physical alterations to the nuclear installations with the objective to reduce risk. This is environmental information that should be available to the public in order to be able to assess whether the proposed measures indeed reduce risk, and do so to the extent claimed.

21 This statement also refutes the claim that no changes are made to the project.

22 **Page 11**: Energoatom's strategy. *"«Energoatom» neither considers decommissioning to be reasonable nor has resources required for any Power Unit decommissioning."* This basically states that the population of Ukraine and beyond will have to accept the increasing risk and related environmental impacts of an ageing NPP because Energoatom and the Ukrainian State failed to aggregate the required funds for decommissioning (and I presume waste management). That is a very big ask, which should have been submitted to the public. Who is Energoatom or even the Ukrainian State to take such a far reaching decision for the public when only this flimsy justification is given? Only the second part of that sentence is already sufficient to overrule the first part. Because Energoatom is incapable of generating and securing funds for decommissioning and waste management of an ultra-hazardous activity, it is extremely reasonable to ask it to stop operation of SUNPP and ZNPP now.

23 **Page 12**: It is described here that *"on November 28, 2013 the lifetime of South Ukraine Power Unit No. 1 was extended for 10 years by the Decision of the SNRIU Board"*. With that, Ukraine is – again! – in non-compliance with the Espoo and Aarhus Conventions, as it was in the case of Rivne 1 and 2. The current procedure is taking place after this decision has been taken, and hence this decision has not been informed by the input from an EIA and public participation and this procedure is not taking place when all options are open.
Ukraine needs to remedy this situation by suspending this decision awaiting the outcomes of the EIA procedure and public participation. Then the decision needs to be reviewed on the basis of the outcomes of the EIA and public participation so that public participation is taken into due account.

24 **Page 13**: Decommissioning costs. The report gives a sensible and realistic estimate of upcoming decommissioning costs with estimating a cost of 1 Bln€ per unit with the remark that costs are likely to be higher.
Given the fact that Energoatom does not have the means now to provide for those funds, where do the authors get the notion that sufficient funds can be generated in 10 years prolonged operation? Is there a serious perspective of a more than 100 Mln€ surplus per year from operation with electricity sales against prices that will not induce increases for the consumers? If this cannot be substantiated, the justification for the project falls away and it makes more sense to close the NPP down now and start (international?) negotiations to acquire the lacking funds for decommissioning while removing the risks and environmental impacts of the NPP.
Short, the option of direct decommissioning should be evaluated in the EIA in comparison with the situation in which necessary upgrades are made to bring the reactors on internationally accepted 2017 safety levels and realistic calculations of how much money can be generated for the decommissioning and waste management in the upcoming 10 years.

25 **Page 13** states: *"An analysis of economic impacts, social consequences and ecological effects in the event of each option implementation performed in the EIA shows that today, there is no efficient alternative to continued operation of NPP, in particular, SU NPP."*
Rather than this being a conclusion, this statement indicates a bad analysis. For that reason it is of uttermost importance that the full EIA documentation is made public.

26 **Page 16**: *"Under normal operation, design basis accidents and the most likely beyond design basis accidents it is practically excluded that these types of radioactive waste spread to the environment."* What happens in the case of a beyond design accident with a core melt-down as happened in Fukushima? The Fukushima case showed that large amounts of radioactive water were generated for which there were no clear solutions. This led to high emissions into the sea. In the case of the South Ukraine NPP, this would lead to enormous contamination of the Bug. Why has no assessment been made of that case?

27 **Page 22**: *"The total capacity of centralized storage is 16529 of spent fuel assemblies from WWER-440 and WWER-1000."* This is just sufficient for the storage of 10 years of spent fuel from the existing reactors in Ukraine, if it is assumed no extra capacity is needed because of incidents or accidents with fuel assemblies (as happened for instance in Hungary in 2003). When also currently stored spent fuel from existing reactors is supposed to be stored there, it is clear that the capacity will not be sufficient. The extra costs and effort as well as risks and (potential) environmental impacts of expansion of the central storage plans need to be taken up in this EIA.

28 **Page 24 and further**: The description of the potential impact of possible emergencies is blatantly insufficient and inadequate. There is no description how many people might be affected and in what form (evacuation, need for iodine prophylaxis, staying inside and for how long, agricultural and industrial emergency measures, etc.), what the social, environmental and economic impacts might be.
What needs to be included are assessments of impacts based on source terms that are comparable with the ones that were experienced in Chernobyl and Fukushima, e.g. the emission of several percents to several tens of percents of the gaseous content of the reactor into the environment. This assessment should include state of the art estimates of meteorological spreading of these emissions and estimates of the potential damage caused.

29 What is the argumentation for an initial buffer zone of 2,5 km? After Fukushima, a direct reaction zone of 10 km is becoming internationally accepted as a minimum. Is the choice of zone in any

way influence by the proximity of Yuzhnyukrainsk and Konstantiovka as towns next to the reactor?

30 **Page 31** – Why is the legenda of fig. 3.5 not translated? Why are there no units in the figure? What is the reason for the increase of emission of non-radioactive pollutants? What are the estimated emissions in future? Are there trends?

31 **Page 32** – Figure 3.6 does not give any sensible information. No units, no translation, there is no interpretation possible from this fat line.

32 The use of Rem and Curie instead of Bequerel and Sievert is confusing. Because of the use of old units, it is difficult to compare any of the information with other similar cases without having to make the effort of re-calculation. Why hasn't Ukraine moved to the international standard used units?

33 **Page 32 and further**: Radiation effects on the environment. The description of radiation emissions and exposure under normal circumstances is somewhat limited. Average data do not deliver sufficient information about potential risk.
As an example: the so called KiKK study in Germany (on childhood cancer around nuclear power stations) came to the conclusion that there is a significant relation between an increase of childhood leukaemia and distance from nuclear power stations for the first five kilometres.[3] Similar studies in the Great Britain, Switzerland and France confirmed these findings.[4] Although there is no causal explanation for this relationship, there is a so-far untested hypothesis that this might be related tritium exposure in the early weeks of pregnancy during fuel change and maintenance outings due to higher tritium emissions when the RPV lid is removed from the reactor.[5]
From this perspective, it would be extremely important to provide time-related emission data to investigate whether the by Fairlie identified spikes in radioactive emissions also appear in the case of the reactors from SUNPP and ZNPP and investigate whether a similar pattern of childhood leukaemia increasing with distance can be found within 5 km of the power station.

34 The FlexRISK models postulate an emission of around 50 PBq or 12% of the inventory of C-137 and C-134. None of the scenarios worked out in **page 61 and further** comes nearby such levels, the highest reaching levels in the order of magnitude of 10E+12 (a factor 10000 lower). Of course, the use of low source terms will lead to smaller areas of concern. The study should, on the basis of the findings of the Espoo Convention Implementation Committee in the case of the United Kingdom / Hinkley Point C, consider also worst case scenarios, which arguably should include scenarios with similar emissions as seen in Fukushima, e.g. the emission of several percents to tens of percents of the gaseous radioactive content of the reactors. The currently proposed investigations and scenarios are insufficient. The EIA should include larger scale beyond design based accident scenarios, including scenarios triggered by technical failure, human error, malevolent attack (sabotage, terrorist attack and acts of war), both in the reactor and in the spent fuel storage. When Energoatom is not capable of making such scenario studies, the outcomes of the FlexRISK scenario could be taken as a basis for the assessment of impact

3 Kaatsch P, Spix C, Schulze-Rath R, Schmiedel S, Blettner M. Leukaemia in young children living in the vicinity of German nuclear power plants. Int J Cancer. 2008 Feb 15;122(4):721-6. http://www.alfred-koerblein.de/cancer/downloads/Kaatsch%20P_IJC_2008.pdf

4 Fairlie, Ian, Geocap study confirms findings in Germany, Great Britain, and Switzerland, London (2012) http://www.ianfairlie.org/uncategorized/new-french-study-on-childhood-leukemias-near-nuclear-power-plants/

5 Fairlie, Ian, *Radioactive Spikes at Nuclear Power Stations*, London (2012) http://www.ianfairlie.org/uncategorized/radioactive-spikes-at-nuclear-power-stations/

of large beyond design base scenario with a substantial emission of radioactive substances. The conclusion *"The analysis performed suggests that the harmful effect associated with the life time extension of SUNPP power units during normal operation or in case of design basis accidents or beyond design basis accidents is virtually absent."* is unacceptable, simply because adequate analyses have not been carried out. We postulate that severe accidents with severe impacts also beyond the borders of Ukraine have to be taken into account in the decision to prolong life-time of SUNPP and ZNPP or not.

35 **Page 75**. The report fails to mention that there is no solution for the high-level waste returning from reprocessing from 2020. The report further fails to mention that the Krasnoyarsk, Russia installation is currently not functioning and that spent nuclear fuel is stored there awaiting reprocessing. It also fails to make an analysis of the conditions of this temporary storage and what the potential environmental impacts of accidents there could be. Furthermore, it is not mentioned that Ukraine has decided not to return spent nuclear fuel any longer to Russia for reprocessing and that there is currently neither a dedicated sufficiently protected temporary storage nor a final depository in operation for spent nuclear fuel.

36 **Page 77 conclusions: Conclusion 3** is not acceptable. The non-reversible environmental changes due to decommissioning will have to happen anyway – either now, after 10 years in case of life-time extension, or maybe even later, but in any case during the life-time of the current generation. These changes should be investigated and the benefits and drawbacks of making these changes now or later should be taken into account in the decision on life-time extension. The fact that that has so far not happened nor is proposed to happen illustrates the inadequacy of this so-called EIA procedure.

37 **Page 78 conclusions: Conclusion 5**. As argued above, assessment of radiological impacts has been inadequate and should take into account the latest findings on the relation between childhood leukaemia and distance to an NPP.

38 **Page 78 conclusions: Conclusion 7** is not acceptable because the assessment did not analyse worst case scenarios as have happened in Chernobyl and Fukushima, but was limited to scenarios with relatively low emissions of the gaseous radioactive content. We contend that scenarios with releases of percents to tens of percents of the gaseous radioactive content will result in severe contamination of large areas, including transboundary contamination, both from SUNPP and ZNPP.

39 **Page 78 conclusions: Conclusion 9** – Transparency and public participation in the decision concerning potential life-time extension of SUNPP (and ZNPP) have been fully inadequate. There is not sufficient information available for either public participation, nor for the final decisions and there are insufficient ways for the public to express its viewpoints.

40 **Page 79 conclusions: Conclusion 10** – The decision to prolong the lifetime of SUNPP (and ZNPP) is a new decision, needing large upgrades for which no EIA has been carried out, involving far-reaching changes in management and operation during the initial 30 years of operation, taking place in an environment that has changed over the 30 years of operation without this having been taken into account in any EIA nor being proposed to be taken into account in this so-called EIA procedure, and without taking into account the exponential growth of risk with age. The assessment has not taken into account the 30% increase in risk because of technical or human failure, extreme natural events, malevolent attack including sabotage and acts of terrorism and/or war, nor the 30% increase in production of radioactive waste, nor the 30% increase in environmental impacts due to uranium mining and processing. The final

conclusion that there are no adverse effects on the environment and a positive one in social and economic areas and that it is ecologically acceptable is therefore simply not true.

41 **Page 79 conclusions: Conclusion 11**. The above mentioned increases in risk also increase the risk on transboundary impacts. The claim that this analysis [in the report, JH] can currently not identify *"reasons to be concerned about possible SUNPP negative impact on the neighboring countries in case of any accident scenario, as well as assumptions for such concern in future"* shows nothing more than that the analysis has been insufficient, inadequate and unprofessional. Especially the fact that the analysis could not find "*any*" accident scenario that could cause concerns, says more about the lack of imagination of the authors than of proper risk assessment as should be carried out in the nuclear sector. This analysis lays bare the exact reasons why Chernobyl and Fukushima could happen: a lack of "thinking the unthinkable" - or short: this analysis shows that the authors have failed to learn the basic lessons from Chernobyl and Fukushima and with that increase the risk that any life-time extension of SUNPP and ZNPP could result in similar catastrophes.

42 These conclusions also hold true for the other reports put at the disposal of the public. These reports are insufficient in set-up and content, are clearly made to lead to a certain outcome, blind for any reality beyond that. There is no justification for the life-time extension of SUNPP and ZNPP, the risks are irresponsibly played down, preparation for emergencies is criminally inadequate, the lack of feeling of responsibility for the production of high-level radioactive waste to be left for management by future generations morally unacceptable. **These reports cannot in their scope and content function as the basis for a decision on the life-time extension of SUNPP and ZNPP.**