COMMENTS ON THE

EIA REPORT MOCHOVCE 3,4

Environmental Impact Assessment Report, as required by Slovak act n. 24/2006 Coll., Annex 11

by

Ir. Jan Haverkamp

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My name is Jan Haverkamp. I have 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 have studied also nuclear physics and energy policy at the State University in Leiden.

I work as an independent expert in energy issues with specialisation in nuclear energy issues for the global environmental organisation Greenpeace and work since 1987 in this area. Previously to this EIA, I have participated in the Environmental Impact Assessment processes for the Temelín NPP in the Czech Republic, the Belene NPP in Bulgaria, the Cernavoda NPP in Romania and the Visaginas NPP in Lithuania.

I have been asked by Greenpeace International to write comments on the Mochovce 3,4 EIA report. I wrote these comments on personal title and my opinion – though based on my experience within Greenpeace and benefiting from input from colleagues and experts – does not necessarily coincide with the opinion of Greenpeace as organisation.

Greenpeace as organisation does, however, endorse my recommendation **that the report should be dismissed as insufficient and inadequate and that SE be required to re-do the Environmental Impact Assessment on a sufficient level of quality and that any construction activity for the EMO34 project should be halted until such an improved EIA has been completely finalised, including possible legal recourse.**

In the short term available for comment (only the legally minimum time for public comment on EIA reports – without taking into consideration that a complex project like a nuclear power station needs more time than, for instance, a small local heating installation), I have not been able to assess all materials in complete detail. This has had a negative influence on how systematic I have been able to assess the report as well as how I could order my comments. I have followed the chaotic order of the EIA report of Golder Associates.

My comments also did not undergo any English correction or editing. In spite of that, you will find it more readable and understandable than the English version of the EIA report that has been the basis for these comments.

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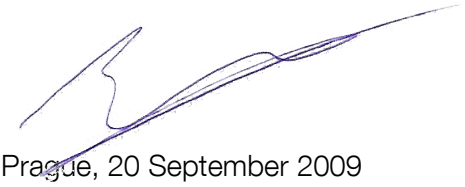
I have only been able to assess the English version of the EIA report. Due to the short assessment period of 30 days, it was not possible for me to assess the Slovak version, nor any of the summaries (Slovak, English or German), even though I am able to read and understand all three languages.



Prague, 20 September 2009
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GENERAL COMMENTS

This is from the EIA reports I have had to analyse without doubt the report of the worst quality. The report misses key issues like alternatives, the environmental impacts of the front-end (uranium mining, fuel production) and back-end (waste processing and decommissioning) of the project, the spread of radioactive materials from a large scale beyond design accident, basic epidemiological data, basic data and estimation of impacts on the natural environment and much more, and the English was worse even than that of the Cernavoda EIA.

The lack of alternatives is especially unacceptable. The Aarhus Convention and Slovak law prescribe that an EIA report has to be able to justify any impact on the environment. For that purpose, comparisons are needed with alternative developments in order to establish whether similar or possibly even more benefits can be created with less impact on the environment and human health. Without such alternatives, an EIA report is a useless exercise.

Also the lack of consideration for the impacts of front-end and back-end of the nuclear chain is unacceptable. It is impossible to compare the proposed activity with other reasonable alternatives when these linked activities are not taken into account. Especially storage of nuclear waste is an issue that should have been included here, as operation of EMO34 inevitably and irreversibly leads to radioactive waste for which there is no solution with current available technologies.

Having said that, the authors of this report have even without those alternatives or inclusion of front- and back-and not given basic data needed to assess possible impacts of the proposed construction of EMO34. There has been no attempt to predict long term influences on nature, environment and human health, most data were drawn from the relatively short term operation history of EMO12. There was no attempt made to adapt these already insufficient data from the old project to the changes that are proposed in the EMO34 project. Changes to the project have been insufficiently described so that any outside estimation is also impossible.

On top of this, recommendations made by the public in the scoping phase of the EIA have not been implemented into the final report and it is a mystery to me why the Slovak Ministry of Environment did not demand correction of that situation before it accepted this version of the EIA report for public participation.

Sources of information are almost never given in the report. An EIA report can only be convincing if it is based on publicly accessible sources that are open for peer review.

PROCESS – This EIA procedure is facing process challenges. First of all, construction of EMO34 is taking place while this EIA procedure is running. This is in breach with the Slovak EIA law as well as the Aarhus Convention, which clearly state that public participation has to happen in an early stage before irreversible acts have taken place.
Also the role of SE / ENEL in the EIA process is problematic. During the weeks before the public hearing in Bratislava on 18 September 2009, Greenpeace received a copy of a power point presentation made by the head Communication of the Mochovce NPP, mr. Robert Holy[1]. In this power point presentation, Mr. Holy clearly illustrated cooperation between the utility SE and nuclear regulator UJD (which is according to the Euratom Directive on nuclear safety supposed to be independent). The presentation furthermore showed that SE / ENEL tried to influence public participation during the hearing and to prevent a public hearing to take place in Vienna, although this is an explicit possibility and right of the Austrian government under the Espoo Convention. SE / ENEL furthermore did

1 see http://weblog.greenpeace.org/nuclear-reaction/2009/09/evil_nuclear_plan_hatched_by_enel.html
The power point presentation can be downloaded from:
http://weblog.greenpeace.org/nuclear-reaction/20090903_Public Hearing.ppt

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not inform Slovak press agency TASR of the upcoming public hearing for its 'tomorrow's events' calendar – something in line with the announcement in mr. Holy's power point that media attention should be minimised.

Concluding, I strongly recommend that the entire EIA report be dismissed by the Slovak Ministry of Environment as insufficient and inadequate and that SE be ordered to carry out a new EIA of sufficient quality. Of course, following from the Aarhus Convention, all construction work on the EMO34 project should be suspended during such a new EIA procedure.

In case this recommendation is not followed, it is very likely that I will recommend Greenpeace to take legal steps against a final approval of the EIA report, a right that is guaranteed under the Aarhus Convention, in which we will seek annulment of such a decision. According to the Aarhus Convention this should also suspend any construction work on the EMO34 project during procedures.

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DETAIL COMMENTS ON THE TEXT OF THE ENGLISH VERSION OF THE REPORT

PAGE NUMBERING ACCORDING TO THE ENGLISH VERSION

1. The EIA report is unsystematic and chaotic. Several issues are repeated and/or spread over different chapters without any clear cross reference. Many issues are not addressed at all, including a proper detail description of the human and natural environment of EMO34, possible consequences for this, alternatives for the project, the issues of environmental impacts of the front- and back-end of the nuclear fuel chain including high radioactive waste processing, security issues (e.g. protection against malevolent attack), etc. etc.

2. The EIA report is of substantially lower quality than other recent EIA reports for new nuclear projects in the region: the Belene NPP in Bulgaria (2004), the Cernavoda 3,4 NPP in Romania (ongoing), the Visaginas NPP in Lithuania (2009). Whereas in these EIAs there is a certain evolution of quality – even though none of them reach a sufficient level – the Mochovce 3,4 EIA must be seen as a sincere set-back in quality levels.

3. The EIA report does not only have to fulfil Slovak law, also the EU EIA Directive and the Aarhus Convention.

4. Page 12: The Slovak Ministry of Environment postulated that *"To evaluate the impacts of the future operation of NPP EMO 3&4 on the surrounding environment in a complex manner focusing primarily on the assessment of increase of the risk for the inhabitants living in the vicinity resulting from commissioning of MO3&4,"*. This requirement is in conflict with the Aarhus Convention, which does **not** limit the scope of effect on the environment and health to the inhabitants living in the vicinity nor does it allow for narrowing focus.

5. Page 25: The described development scenarios don't describe how they lead to the necessity of the proposed development. There is no description of different policy scenarios with their possible outcomes. Without this, it is impossible to understand the impact of EMO34 on the existing electricity network.
   This is of paramount importance, because according to our assessment, the Slovak network already suffers under a too large amount of inflexible large scale generation capacity (formerly known as 'base-load capacity') because of which the inevitable and necessary development of decentralised, flexible and variable sources, among which co-generation and renewable energy sources, is severely hampered.
   The EIA does not describe what the impact of an additional 2 x 450 MW of inflexible centralised large scale capacity would mean for the flexibility and stability of the electricity grid – and with that not what this would mean for Slovakia's role in abating climate change.

6. Page 26, 1.2.4: SE describes imports, generation capacity, demand, but it fails to describe exports. In judging the justification for the production of radioactive waste and release of radioactive substances into the environment, it is of paramount importance to know whether this is done for the need to meet national demands (energy security) or for commercial export – and if this is only partial, which part is foreseen to be for export.
   This chapter contains only an intransparent description of one possible development of generation sources, without an assessment of different policy measures and their possible impacts on the development of the electricity market in Slovakia. The minimum necessary for an EIA would be to state several policy scenarios and their impacts and the possible role of the EMO34 project in them, in order to get a proper overall picture for the above mentioned justification.

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There is no reference to the sources of used information: Where is the statement that Slovakia has become a net importer of electricity since 2007 been based upon (it is true), but more important, what is the dynamic of foreign exchange (variability over time – how much is steady capacity, how much is variable)? This is important in order to find out whether the addition of further inflexible capacity will benefit or hinder foreign exchange development.
The study says: *"Taking into account current status and viability of new potential investments, MO34 will be probably the only equivalent substitution for closed power plants. Based on current schedule of MO34 construction, Slovakia will be dependent on electricity import at least until 2013."* This illustrates the pre-occupation of the authors with the outcome of the study: EMO34 will have to be built. Taking into account the competitiveness of different generation technologies, their influence on the existing grid structure, the influence of different possible policy measures on the electricity market, EMO34 is according to our analysis by far not the only possible substitution of the closed power plants and certainly not the cheapest or most benificial.
First of all, closure of these power plants was foreseen since the 1992 G7 summit in Munich. Slovakia has had ample time to develop different ways in which to address the withdrawal of the Bohunice capacity, but completely failed to do so. To try to use such a policy failure to justify release of radioactive substances into the environment and taking nuclear risks in a new project and proposing that as only solution is a bit bland.
Secondly, Slovakia is no longer an isolated market. It is an integrated part of the UCTE (enso-e) structure and ENEL and SE consider the market as being regional (including Poland, Czech Republic, Hungary and Western Ukraine), which is also illustrated by the high amounts of electricity exchange with those countries. In order to justify the construction of nuclear capacity, it is therefore important to analyse the developments of the regional and enso-e (former UCTE) market and the possible role that EMO34 would be playing in that. Without such an analysis, no justification can be given.
Thirdly, the report misses completely any description of alternative ways to meet the needs of the region. Given the still very high energy intensity of the region, the extremely low penetration of renewable sources and the high level of centralisation and related losses, there are many ways in which future demand can be met stably and economically without the need for more nuclear reactors. <u>These different alternatives are not described nor analysed and therefore any basis for justification of emissions of radioactive substances into the environment and the creation of a radioactive waste problem is completely lacking.</u>

7. The report states: *"Figure 5 shows that the electricity supplies from completed MO34 would be sufficient to make the SR a minor exporter during the 2013-2019 period."*
As argued above, this is complete nonsense because this depends on the structure of the regional market and the demand for flexible and and steady capacity, the development of different generation sources (with different variabilities) and the development of inter-linkage and national network set-ups. Figure 5 could just as well be used to explain how much other capacity will have to be shut down in case EMO34 is brought on-line, because there is no demand for the surplus capacity nor sufficient storage capacity.
It is furthermore interesting to notice on page 27, figure 5 that with the 'other projects envisioned for mid-term', EMO34's necessity is virtually zero. This figure shows quite clearly that if the Slovak market is seen as isolated, a slight increase in development of other sources and efficiency are a good alternative to EMO34. In a wider regional perspective this is even easier.

8. Page 28 and further: The report forgets conveniently to mention one of the central requirements for an EIA, based on the Aarhus Convention: <u>An EIA has to be carried out in an early stage of the project before any irreversible steps in its implementation are set.</u> It fails to notice that the current EIA for EMO34 does not fulfil that requirement, as construction of EMO34 is continuing and the EIA is only to be completed before an operation license is to be issued. Greenpeace supports the complaint lodged by Za

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Matku Zem and Global2000 to the Aarhus Compliance Committee, which is currently investigating the issue, and we are preparing a complaint to the European Commission on the same issue. If SE / ENEL and the Slovak Ministry of Environment are taking the EIA legislation seriously, construction should be halted immediately until the EIA process is finished, including possible court appeals, so that its conclusions can influence the situation on the ground.

9. Page 31 and further: Licenses and other procedures. The proponents and Slovak authorities continue to describe EMO34 as a continuation of the project started in the early 1980s. However, it would be more according to reality to consider EMO34 as a completely new project, given the fundamental changes made to the design and the fundamental changes that took place in society since that time. Later in the EIA report, the authors indeed even go as far as to describe the project as a new design in an ill-guided PR attempt to give it a Generation III label!
   It would be logical therefore to carry out the planning, justification and licensing procedures on all levels from the start, including the adapted design and the changed socio-economic environment.

10. Page 45 and further: Neither the Vienna Convention (to which Slovakia is party), nor the Paris Convention, nor the Brussels Protocol, nor Slovak legislation covers more than a marginal part of liabilities in case of a large scale beyond design accident. Estimates of damages caused by the Chernobyl accident run in the hundreds of Billions of Euro. An accident with similar impacts in Mochovce, nearer to large European cities, could have liabilities of the same scale or more. Given the fact that the VVER440/213 reactors of EMO34 do not meet the current stand of technique in nuclear safety - which in itself still cannot fully exclude accidents of the size of Chernobyl – the described provisions for liability are completely inadequate from an environmental and health point of view.

11. Page 48: The Euratom article 41 – 43 procedure. The report mentions falsely that the European Commission issued a positive opinion about the project under Euratom article 43. The viewpoint of the European Commission was a conditional viewpoint with recommendations as made in the report.
    The report wrongly describes the outside building as a secondary containment. Whatever the thickness of the walls, this building structure does not fulfil the criteria for a secondary containment as is current state of technique and as can be found in the only new nuclear power stations under construction in Europe, in Finland and France. SE/ENEL did in no way show that increasing the thickness of the outer walls to 'up to 1,5 m thick' indeed will sufficiently protect the inside structures against a malevolent attack from outside with a passenger aircraft or charged head. In contrary, the box-form of the outer building means that the static strength of a round construction cannot be delivered and that fundamental static weakness remains, enabling a malevolent attacker from outside to penetrate the structure and the structure itself to collapse under sufficient point-pressure. SE/ENEL has in no way shown model studies that back up its claim that this would not be the case.
    The report describes that UJD furthermore only required an analysis of the results of a malevolent attack of a small aircraft. After 9/11, stand of technique requires resistance against an attack with a large passenger aircraft. Anything else means closing the eyes for today's reality. In Finland, the nuclear regulator STUK required adaptations to the EPR design after its analyses showed that even this design, with a **double** secondary containment consisting of two 1,2 meter round walls each **and** a stainless steel cladding inside, would not be able to resist an attack with a large passenger aircraft. Also the current solution in Finland is not able to give that guarantee. We therefore conclude that UJD's requirement for this analysis is fully inadequate and unacceptable.
    The report concludes: *"The successful implementation of the above measure will bring the malevolent impact of a small aircraft within the design basis of the new Units 3&4, providing an equivalent level of protection as the one being implemented at present in the ongoing and planned constructions. This guarantees Mochovce 3&4 to be in line with the future state of the art design for all new Nuclear Power Plants in EU."* As stated

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above, the level of protection cannot reach the level of that currently being implemented in the EU (e.g. the EPR design under construction in Finland and France), and it is inherently unable to meet state of the art design. It therefore has to be concluded that the EMO34 project poses an unacceptable risk for a beyond design accident and therefore for the environment and human health.
Furthermore, the adaptations to the original VVER 440/213 design do not warrant calling EMO34 a Generation III reactor. It is clear from the emphasis that SE puts on this term on page 68 and in Annex V (Thematic Boxes), that it tries to overcome justified concerns about the sturdiness of the design, especially the resistance against malevolent attack, by PR tricks and is unwilling to draw the inevitable conclusions: the 1970s VVER 440/213 design is outdated and the project should be dropped for that reason.

12. Page 58: the table mentions a rated unit power of 440 MWe. This should be adapted to the envisioned output rating increases as mentioned in the following paragraphs.

13. Page 63: Paragraph 2.4.5 Cooling system. Currently a new reservoir is being planned in the river Hron upstream of Mochovce near Slatinka with in its EIA the argumentation that this reservoir is necessary to secure sufficient cooling water for EMO. This is not mentioned in the underlying report and should be an integral part of this EIA.

14. Page 64: Paragraph 2.4.6 on Seismic issues. This paragraph only states some assumptions without indication of source. This is fundamentally intransparent. What are these assumptions based upon?

15. Page 64: *"The safety systems provide even in critical situations protection of plant personnel, and of the population around the plant, against the effects of ionizing radiation from the plant."* Another unfounded formulation. There is no evidence in the report to back up this assumption. Indeed, the safety systems should provide that kind of protection, but there is no evidence in the report to back up the claim that they actually can. All measures described are part of a to be expected safety system, but whether together they indeed will be able to protect plant personnel and population (and the environment!) remains a question, unless well founded studies are included that can show this.

16. Page 67: Design improvements – The report states repeatedly that *"improvements **will be made**"* (emphasis added, JH). Because these improvements in design obviously have not been made yet, it cannot be stated on beforehand that they will fulfil their purpose. This can only be judged after the improvements in the design **have** been made and can subsequently be analysed on their effectiveness. It is therefore important that the EIA report will not be approved until such a proof is indeed given.
There is furthermore no clear indication into which direction these improvements will go. As an example we can take the high energy pipelines. Will these be physically separated (as is, for instance, required in Germany) or not?

17. Page 68: Generation III design – ambiguous formulation that might indicate EMO34 as a Generation III design. In spite of all the rhetoric around EMO34, the VVER 440/213 is a Generation II design. All the upgrades cannot turn it into a Generation III design and at no point do the proposed improvements bring the design on the level of other generally accepted Generation III designs like the Westinghouse AP1000, the Areva EPR, the Atomstroyexport AES-2006 or the GE EBWR. The VVER 440/213 design does not know a core catcher, it misses a true secondary containment, to name only two crucial issues. When the authors put the VVER 440/213 into the category Generation III, they are misleading the public. This casts doubt on the quality of everything in the report.

18. Page 68: *"Mochovce 3-4 is a new design"*. If this is true, the project needs to go through all the procedures from the start. So far (see also 9.) the project was described

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as a finalisation of an existing project. If there is a new design, there is a fully new project. This would mean that the construction permit from 1986 would loose its validity. It also gives the unique chance to have this EIA performed before a new construction permit is issued.

19. Page 68: *"is comparable with NPPs currently under construction elsewhere today."* This is more than a hyperbole and cannot be backed up by facts. The only NPPs under construction elsewhere today in Europe are the EPR reactors in Finland and France. These already know a myriad of problems, but in comparison to EMO34, they are steps ahead. It would be good to consult with Areva, the designer of the EPR, whether it would support this claim by Golder Associates.

20. Page 68: The report furthermore uses the PR trick to call the safety level of EMO12 the *"already-high"* safety level. There is a large body of critique on the EMO12 design. An EIA report is not supposed to be an advertisement leaflet with PR talk, but a serious report on possible impacts of a project on the environment. We demand that all this kind of nuclear spin is removed from the report in its final version.

21. Page 69: Accident mitigation. None of the mentioned bullet-points are substantiated with concrete information. As they are formulated here they remain empty claims.

22. Page 70: The repeated reference to the IAEA Safety Guidelines and the WENRA safety reference levels is misleading. First of all, these are minimal requirements, which means that they do not give the level that nowadays can be expected of an NPP, but the lowest common denominator on which regulators worldwide / Europe-wide are willing to agree. As party to the CNS, Slovakia even would not be allowed to accept any NPP that would not fulfil these guidelines. Secondly, these reference levels and guidelines are designed for **existing** power stations. New power stations are supposed to adopt best available technology, and the VVER 440/213 design does not fit that label.

23. Page 70: Several analyses are mentioned here, but not given in any detail. It is not clear to what extent the claims attached to these analyses can be trusted or to what extent they are part of the general empty PR talk in this chapter. We demand that PSAs, DSAs and the mentioned severe accident scenarios will be added to the report in some detail and that the conclusions based on those in this report be re-evaluated on that basis in a transparent way.
    Furthermore, PSAs and DSAs are meant to identify weaknesses in the design. What they are not made for is to come to conclusions about the overall safety.

24. Page 71: The bubble condenser. The mentioned analysis is only valid for the case that the outward construction is in tact and not cracked or even having larger holes. That means that in case of malevolent attack from outside followed by an explosion inside leading to a LOCA, the bubble condenser is useless. This scenario is thinkable in the case of a large passenger plane attack or the use of an explosive projectile with a charged head.

25. Page 73: Containment. Because SE / ENEL and Golder Associates are aware of the fact that the missing secondary containment is one of the largest weaknesses of EMO34, they use PR tricks to obscure this fact. EMO34 has no secondary containment. It has a containment system, that is to prevent venting out of radioactive material by overpressure. As pointed out under 24, this system fails in case of holes in the building structure. We demand that reference to the containment system as "containment" are consequently changed into "containment system" in order to prevent PR induced confusion.
    Misleading formulations like *"thus practically eliminating the accident sequences which could seriously jeopardize the containment structural integrity"* should consequently throughout the text be reformulated (in this case into "reducing the risk of accident sequences…").

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26. Page 80: A MOX-containing fuel cycle is wrongly characterised as a closed fuel cycle. Even in a fuel cycle in which part of still usable uranium and plutonium is removed from spent fuel for re-use, large amounts of radioactive waste are produced. The current VVER440 fuel reprocessing installations in Russia belong to the most radioactive polluting industries in the world. A fuel chain using MOX is also an open fuel chain, in which a small amount of spent fuel is re-used. As in earlier remarks – this report is full of nuclear spin – smooth PR talk to wipe important problems under the carpet. These kind of formulations have to be removed.

27. Page 80: Interim storage. The report states that an interim dry storage will be built that will be able to contain fuel from a 10 year period. When, however, any 'final' storage is not on the horizon for another 50 years and the reactor life expectancy is 30 years (or even 60 years with PLEX), it means a gap of 20 years or more of fuel storage capacity. The EIA should also describe what is to happen with that fuel.
Furthermore, there is no description whatsoever about the nuclear safety and security aspects of this interim storage. No matter that it has already been part of a separate EIA (was that also submitted under the Espoo Convention to surrounding countries?), this interim storage is an integral part of the expansion of capacity in Mochovce and should be included in this EIA study. Interim fuel storages are large nuclear risks – especially post 9/11. In case a malevolent group is aiming to reach the largest possible emissions of radioactivity, it will not target the reactor but the storage. For instance, on page 84 it is made clear that no safety measures have been foreseen to protect the interim storage from malevolent attack.
We demand a more extensive chapter in the EIA report addressing the interim storage, including risks from malevolent attack.

28. Page 87: Final storage. The report does not concede the obvious: There is no final storage yet, there is none anywhere in the world and this is a highly speculative part of the fuel chain. Currently all running final storage programmes face technical problems and there may even be a chance that never a fully satisfactory risk reduction system will be developed. It is important that this risk is explicitly mentioned in the EIA report, as it plays a crucial role in the process of justification. Is there sufficient justification to produce waste for which there is to date no solution?

29. Page 87: *"A system of multiple engineering and natural barriers (the multi-barrier principle) in the deep underground geological disposal site ensures the isolation of wastes from the biosphere and a high degree of safety."* Given the fact that no final disposal has been created yet anywhere in the world and given the problems that current research into deep storage is facing, this sentence is highly speculative. It can maximally be stated that such a system is '**hoped to ensure** the isolation of wastes from the biosphere and a high degree of safety'. Added should be: "There is, however, currently no proven technology to do this. Slovakia is not expected to have any such facility in operation before the half of the century, if ever."

30. Page 87: Final storage. Given the fact that Slovakia has no final storage for its existing nuclear waste and given the lack of organisational clarity of who carries the responsibility for final storage up to date, it is irresponsible to prepare the production of more of such highly (radio)toxic wastes.
Furthermore: There is no adequate description how the financing of final storage is to be assured. Given the current situation in which levies for decommissioning and waste were reduced for the Mochovce 3,4 project, it is highly likely that insufficient funds will be available once a final storage has to be prepared, as well as for the centuries of oversight that such storage will need. The European Commission is currently investigating whether this capping of the decommissioning and waste levies constitutes *de facto* illegal state aid. In case insufficient funds are available, there is a chance that storage either will happen inadequately (with a larger risk for the environment) or that a

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future generation of taxpayers will have to foot the bill (this is in contradiction with the definition of sustainability and constitutes illegal state aid).

31. Page 89/90: *"Liquid radioactive wastes produced during the NPP operation can be further divided into the following: inorganic; organic; and ionizes."*
This sentence does not make sense grammatically. Inorganic wastes – clear. Organic wastes – also clear. But what are "ionizes wastes"? Waste in the form inorganic or organic ions? Waste emitting ionizing radiation? Whatever the meaning, it does not make sense.
"Ionizes waste is a group of liquid radioactive waste, because they are in solid state, but they are transported in the same way as liquids." This does not make it much clearer. Liquid cannot be in a solid state. Liquids are transported differently than solids. If the consultant is incapable of being clear on such a basic level, it casts doubts on whether he understands what nuclear power is.
In general, this chapter is clearly translated from Slovak. It would be good to have a native English speaking expert proof-read it, because there are many incomprehensibilities included. One more example (on page 91): *"The high-active in-core parts are not processed during power plant [...]"*.
For reasons of entertainment, one could read this chapter aloud with a heavy Slovak accent. Success guaranteed!
On page 93 another beautiful example: *"Airtight zones in the unit are boxes, areas and rooms in the reactor and to which the most severe accident can not spread."*

32. Page 103: LRAW – combustible wastes. Why is combustible waste sorted out? What is happening with it? Is it burned in order to reduce volume? If so in what kind of installations? What is done to prevent emissions of radioactive substances into the air (e.g. tritium and ^{14}C?) The process of combustion and compression is inadequately described to be able to judge whether this happens in a way that does not form a threat to the environment.

33. Page 108 and others: ALARA ("As Low As Reasonably Achievable") - this principle is used often. In our point of view this is an outdated approach because practice is showing that "reasonable" can be interpreted too widely. Therefore it is of paramount importance to show in the report **how** exactly certain procedures and systems are implemented and indicate where the limits of "reasonability' lie. This does not happen anywhere in the report nor in the annexes. For clarity sake, it should happen in the report.

34. Page 109: Final storage of waste at the JAVYS facility. Because JAVYS is a separate company from SE, it is important to know under which contractual arrangements storage of RAW is taking place. What are the guarantees for sufficient capacity? What are the guarantees that prevent contractual conflicts that could result in interruptions of storage? What are the exact storage circumstances in the JAVYS storage? This needs to be clearer before a judgement can be given about whether RAW is dealt with in a way that complies with the justification for this project.

35. Page 121 and further: Water. See also point 13. The reservoir near Slatinka was in its own EIA explicitly associated with the EMO34 project. Why is it not included in this EIA? Are the costs for this project included in the EMO34 project? If not, does this constitute illegal state aid?
What is further missing is an adequate description of water provision in times of longer dry periods. Which measures have been taken to provide sufficient cooling water under these circumstances? Are they all an integral part of the EMO34 project? Or are some of them carried out in the form of state run projects and for that reason constituting illegal state aid?

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36. Page 130 and further: Occupational health. There are no data included that can function as base-line for the health of workers, nor predictions of possible exposures and the results on the health of employees and contractors.
There is no information about the health situation development of current personnel of EMO12 which could function as comparative material.
There is no long-term estimation of epidemiological consequences.
General dose descriptions are inadequate to make a qualitative judgement about the health risk for personnel. Without this, no proper justification judgement can be made.

37. Page 150: *"The radioactive gas purification system removes radioactive gases."* What is completely lacking here is an overview which gases can be expected to be filtered out by this system. Tritium, for instance, will **not** be filtered out. Neither will krypton and several other noble gases. A general statement as quoted here is therefore void of information. The report should contain more details.
There is no indication of how the exposure to a maximum of 0,250 mSv/yr is received.
There is no indication whether the current debates on tritium exposure-dose relations have adequately been included. There are no data of amounts of to be expected releases.
It is interesting to read what the limits are that are set legally, but there is no information whatsoever about what is to be expected, whether there are reasons to expect that the installation will remain within the limits, under which circumstances limits could be broken, and so on. This information suddenly appears later in the report. There should be reference to that.
"Table 16 shows data obtained from measurements by instruments located in the ventilation stack and from laboratory analyses.:" It must be assumed that this is from the units EMO12, but this is not clear from the text. Do the changes in design of EMO34 also create changes for emission of radioactive isotopes? To what extend can data from EMO12 be transferred without critical analysis to EMO34?
What is the composition of the exhaust gases mentioned in table 16? Only ^{131}I is mentioned.
What are the tritium emissions to be expected?

38. Page 154 and further: liquid emissions. Sorry to say it, but amounts of water only are one part of the picture. What is dissolved in this water? Which radioactive substances? Tritium? Which amounts?
The EIA report does not contain a systematic overview of the most basic information!
Page 162 gives some information about tritium emissions. What is of great concern is, that *"In 2008, for liquid radioactive discharges, the percentage of using the yearly limit for tritium was 65.47%,"*. As it is not possible to remove tritium from liquid emissions, a doubling of capacity will most probably lead to a doubling of tritium emissions. With that, the limit would be broken after construction of EMO34.
The proposed dilution of tritium in the emission water may sound nice, but the emissions in absolute terms (in Bq) remain the same. This means that tritium exposure of the population might be higher than described here.
Table 32 describes how EMO12 tritium emissions come very near to the limits. With a doubling of capacity, this means that the fear for over-limit emissions is real. This means that tritium is a serious concern and has not been appropriately addressed in the EIA.

39. Page 168 and further: The quality of this chapter is so far below any acceptable standard that there is little reason to go into further detail. The chapter does not give information nor leads to any conclusions. The real bummer is probably: *"A calculation of dose to the critical groups of inhabitants for Mochovce NPP operation is included in the POSAR of EMO12. The following results are only reported for completeness as "design" data and they are referred to "historical" limit set by Czechoslovakian Atomic Energy Commission Decree No. 4 in 1979 that has not been in force for several years. Anyway, an updated and complete evaluation of radiological consequences during normal operational state for all the four units is reported in the chapter 6.2 of the*

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Environmental Framework." Anyway – why would we bother to take up any information in this report. There are no standards anyway. And, anyway, why would we bother to do anything at all – Fico wants this power plant, so what the heck – we don't care! ???

40. Page 168: *"Based on the results of the calculation, the critical group of inhabitants for gaseous radioactive emission to the atmosphere is constituted by adults and the maximum effective dose results in zone 161, which is the village of Nevidzany, approximately 5 - 7 km W-NW from the site."* Beg your pardon? The critical group is **adults**? It is likely that the mistake in this paragraph is introduced by the lack of consideration of airborne tritium. The critical group for radioactive exposure consists of pregnant women, children under 4 year of age, then juveniles and young women.
Table 33 does not explain what the values given under the different limits mean. Is this the amount of people expected to be exposed to higher values?
In general it is not interesting to know whether a certain population is under or above certain legally prescribed limits. What is important to know is what the possible effects on their health can be. How much cancers does this cause? How much immune deficiencies? Etc. There are insufficient epidemiological data of the population around EMO taken up in the report to function as base-line. There are no predictions made of the effects of EMO34 on the health of the people surrounding the NPP. There is basically no basis for a justification judgement.

41. Page 176 and further: Decommissioning. The description of arguments for the choice of ID instead of DD is not sufficient. There are no data showing the financial consequences of this choice, nor are there data that describe whether SE/ENEL will indeed generate sufficient funds to cover these costs. There is no description of guarantees that also in case insufficient funds are raised and costs appear to be higher than originally thought, decommissioning costs can be covered fully, there is no financial risk description and so on. Still, this is very important. When the situation arises that there is a lack of financial means available on the moment of decommissioning and waste storage, this can have severe consequences for the environment. Inadequate decommissioning and/or inadequate waste processing can lead to leakage of long lived radioactive substances into the environment in larger amounts. SE / ENEL nor the Slovak government has been able to show so far that sufficient means will be generated and sufficient guarantees will be in place. In contrary, the capping of decommissioning and waste costs in Slovak law is a guarantee for creating a gap between needed and generated funds for this work – a gap that could be even larger because current trends show that decommissioning and waste costs in the nuclear sector are structurally underestimated. From this report it is impossible to estimate whether such an underestimation also has happened in the case of EMO34.

42. Page 190: **Alternatives**: *"Based on a request from the proponent, Slovenske elektrarne NPP Mochovce, Units 3 and 4, dated the 15th of June 2008, the Ministry of Environment of Slovakia abandoned the request of alternative solutions for the proposed activity. This has been confirmed by the Ministry of Environment by the letter to Slovenske Elektrarne a.s. No. 7451/2008-3-4/hp dated July the 31st 2008."* This means that both the Ministry of Environment as well as the promoter SE have willingly broken Slovak law, the EU Directive on EIA and the Aarhus Convention, which all prescribe that alternatives need to be given for the justification of releases of radioactive and other toxic materials into the environment or creating a risk for such releases.
The argumentation that EMO34 is a 'peculiar project' is not sufficient for this. There have not been any earlier environmental analyses of the the EMO project that were conform the criteria of the Aarhus Convention, the EU EIA Directive and the currently valid Slovak law on EIA. Because this project includes a large amount of upgrades and changes, it should be treated as a new project, including a full EIA.
The Slovak Ministry of Environment and SE/ENEL have promised us on several occasions that the decision for the need of an EIA for EMO34 meant the need for a full EIA according to Slovak law, the EU EIA Directive and the Aarhus Convention. It is clear that this report does not fulfil those criteria.

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Even in case alternatives were taken up in earlier environmental studies concerning the EMO project, they should have been incorporated into this study. Even this has not happened!

43. Page 190: *"Moreover, due to the advanced stage of completion, Mochovce site represents a one off opportunity to cover in a short time the significant gap between demand and supply of electric energy on the Slovak network."* This is not true. There is no 'significant gap between demand and supply of electric energy on the Slovak network'. First of all, the Slovak network is not a stand-alone network and has to be analysed within the structure of enso-e (former UCTE). Secondly, there are a myriad of alternatives to influence demand on the grid (energy efficiency, demand side management) and alternatives for generation which will be able to fill any perceived gap faster and cheaper. Exactly those should be included as alternative to see whether releases of radioactive substances or an increase in risk of releases into the environment can be justified. Thirdly, there is currently no gap – temporary peak-shortages over the last years were easily filled with imports, temporary overproduction was easily shed with exports. Whether EMO34 can be justified needs a careful analysis of the grid structure of Slovakia and the region as well as the alternatives for demand side management and generation capacity. This has not happened and with that the criteria for a proper EIA have been broken.

44. Page 190: *"Due to the above mentioned reasons, it appears clear that the completion and operation of Mochovce Units 3 and 4 has no reasonable alternatives. A detailed justification is reported in Section C, part V."* Because of the reasons given in 42 and 43, this is a completely unacceptable statement. Careful analysis of the Slovak energy situation would show that the EMO34 project is not only not a reasonable alternative, it is a completely unreasonable alternative, exposing society to unacceptable risks in return for unnecessary capacity.

45. Page 191: Costs. It is funny to see a cost-estimate being precise to the Euro. It is a well known fact of experience that nuclear project costs in over 50% of cases grow during implementation. VVER projects are no exception – see for instance the cost increases of the Temelín NPP. We think that the total costs of the project are underestimated and do not include all costs to be made. For a better analysis, the promoter should give a more detailed breakdown of its own budget.

46. Page 193: *"16.0 STATEMENT ON ANTICIPATED CROSSBOUNDARY IMPACTS OF PROPOSED ACTIVITY - Due to the extremely low values of discharges of radionuclides from EMO12, the discharges from MO34 into atmosphere and hydrosphere are not likely to exceed the existing limits. The calculations of radiation load to the public beyond the state boundaries, as reported in chapter 1.5.3 (Section C, part III), show that there are no appreciable cross-border impacts."*
This is complete nonsense. As known, transboundary impacts of nuclear installations mainly take place after incidents and accidents – DBAs and BDAs. This study has not given any proper assessment of possible transboundary spreading of radionuclides in case of a larger accident... This has, for instance, been done in the recent EIA for the Visaginas NPP in Lithuania, although it has to be noted that the source term for those calculations was lower than reasonably can be expected.

47. Page 194: Land requirements. The report states that no additional land is needed for the Mochovce 3,4 development. This is not true. In the first place, the Mochovce 3,4 NPP needs additional measures to secure sufficient cooling water, e.g. a reservoir near Slatinka. Next to that, the development of the Mochovce 3,4 project will inevitably and irreversibly need more land for uranium mining and processing to get its fuel, more storage space for low- and middle-level radioactive waste, as well as a final storage space for high radioactive waste. Also the influx of temporary and long term workers in the area will require space for housing and services. These all need land. It is important that a proper calculation of this is made.

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48. Page 195: Water requirements. The report fails to mention the reservoir currently created in the river Hron near Slatinka. This reservoir was announced as needed for the Mochovce 3,4 project in its own EIA and therefore should have been integrated in this EIA as well.

49. Page 195 and 196: The report says nothing about what the effect of water extraction will be on water quantities in the Hron river during high and low levels of water and especially in times of extreme draught. It does not make an estimation of the effects of climate change on the water availability in the Hron river and the effects of the EMO34 project in the longer term.

50. Page 197: *"Supply of drinking water from the aqueduct was stopped in June 2005 due to a decision of the management of Mochovce NPP."* There must have been reasons for the Mochovce NPP management to decide this. The report should state the real reasons behind this decision and draw conclusions for that for the future in case EMO34 are built. Was water extraction having a negative influence on the ground water level with negative influences on the ecosystem? If so, can similar developments be expected with the source at Červený Hrádok? How come that the drinking water increase by an increase in employment of far over 25% would only increase with 25%? What is the permitted extraction from the well in Červený Hrádok, so that the reader of the report can indeed conclude that 91, 378 * 1,25 = 114,222 is below the permitted extraction? On which parameters and arguments is the calculation of the permitted extraction based? What will be the consequences of an extraction of 114,222 m^3/yr on the ecosystem?
    These are all questions that should have been answered in the report.

51. Page 198: Protective paints – these are mentioned as *"environmentally neutral materials"*. There are only a few protective paints that are environmentally neutral. To be able to judge whether only these paint materials will be used, it is important that statements like this are supported with a list of paint materials to be used, including a description of their environmental impact.

52. Page 217: *"In order to determine whether from the operation of EMO12 and MO34 an effect on the aquatic biota is likely, the concentrations of the key chemicals of concerns have been estimated for the downstream environment for river Hron and compared with reference values suggested by the Canadian Water Quality Guidelines for the Protection of Aquatic Life Canadian Guidelines have been chosen on the basis of Golder Associates experience in conducting Environmental Impact Assessment on this issue."* The choice for Canadian guidelines for a Central European ecosystem sounds a bit strange. Golder Associates should have gone through the effort to find European guidelines for this case that are related to the Central European ecosystem.

53. Page 223: 2.2 Radioactive liquid effluents discharged to the hydrosphere – tritium. The report takes a maximum limit that is based on outdated science. The Ontario Drinking Water Advisory Council concluded recently that "*an Ontario Drinking Water Quality Standard for tritium of 20 Bq/L, applied as a running annual average, would meet the requirements for an appropriate level of risk and public safety*"[2]. We advice that the limits for tritium emissions in Slovakia be re-examined in this light and limits from tritium emissions from EMO34 be lowered accordingly.

54. Page 231: *"RAW that will not meet the surface disposal acceptance criteria will have to be stored in the Integrated RAW Storage Facility situated on the JAVYS, a.s., site in*

2 Ontario Drinking Water Advisory Council, *Report and Advice on the Ontario Drinking Water Quality Standard for Tritium*, Toronto (May 2009), http://www.odwac.gov.on.ca/reports/052109_ODWAC_Tritium_Report.pdf

Dr. Ian Fairlie, *Tritium Hazard Report: Pollution and Radiation Risk from Canadian Nuclear Facilities*, Ontario (2007) Greenpeace: http://www.greenpeace.org/canada/en/documents-and-links/publications/tritium-hazard-report-pollu

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Jaslovské Bohunice and subsequently disposed in the deep underground geological disposal (once available).” This issue poses a qualitative problem. Currently nowhere in the world a deep underground geological disposal for waste from the nuclear power industry is in operation. The most promising project (Yucca Mountain in the USA) was recently halted because of technical and regulatory problems. There is no indication that Slovakia can guarantee the availability of a suitable site, nor suitable storage technology within this generation. With this, the issue of RAW has become unsustainable.

55. Page 236: I DEFINITION OF BOUNDARIES OF AREA OF CONCERN
This paragraph falsely limits the areas of concern in the definition of the Regional Study Area to a radius of 50 km. In case of a heavy accident there may be spreading of large amounts of radioactivity to a much larger area, like the Chernobyl catastrophe of 1986 has shown. This means that a far larger area needs to be taken into consideration. During a presentation at the EIA hearing in Bratislava on 18 September 2009 it furthermore became clear that the 50 km radius was only applicable to Slovak territory and excluded land on Hungarian territory. This is unacceptable.

56. Page 256: Avoided CO_2 and conventional air pollutants
This paragraph is completely inadequate. It does not give an estimation of CO_2 emissions in gCO_2eq/kWh for the EMO 3,4 nuclear reactors, which can be compared with other studies on the issue, like Sovacool (2008)[3]. For greenhouse gasses and other emissions, the report does not seem to take into account a full chain analysis for the nuclear production chain involving EMO34, so that remarks like *“As it is well known, electricity produced by NPPs leads to the avoidance of CO2 emissions into the atmosphere”* become completely meaningless. Also a comparison with only coal is misleading. Full production chain emissions of the EMO34 project should be compared to full chain emissions from a set of alternatives. Concerning greenhouse gas emissions, we argue that EMO34 is **increasing** greenhouse gas emissions as it prevents the development of energy efficiency policies and renewable energy sources like wind, geothermal, small and mini-hydro and biomass that emit less gCO_2eq/kWh output service yielded than nuclear energy (see Sovacool, 2008). Because EMO34 will occupy a large part of the available grid capacity in Slovakia, the total of this extra emissions cannot be dismissed.
The given calculation of saved greenhouse gas emissions is simply rubbish and unprofessional.

57. Page 257 and further – Surface water conditions. As already mentioned before, the role of the Slatinka reservoir has not been included in the EIA report and should be.

58. Page 257 and further – Surface water conditions. There is no adequate description of water temperature developments. Nor is there an estimation how often EMO34 will not be able to operate because of a high temperature of the Hron and other cooling water sources. The report does not study the need for extra intake of cooling water in order to prevent too high output temperatures due to increased intake water temperatures due to climate change.

59. Page 278 and further - 7.0 FAUNA AND FLORA. An interesting, be it very short and in comparison with the EIA studies for the Visaginas NPP (Lithuania) and Cernavoda 3,4 (Romania) far too summarised description of the situation... But there is **no** description whatsoever of possible impact of EMO34 on fauna and flora in the report. Ladies and gentlemen from Golder Associates and SE, this is what an EIA report is expected to do! Simple questions like which species will see bio-accumulation of radioactive substances; which species will be influenced by increases in surface water temperature – especially in times of extreme high or low temperatures; which species will suffer under the reduction of surface water flow in the Hron; which species will suffer under

3 Benjamin K. Sovacool, *Valuing the greenhouse gas emissions from nuclear power: A critical survey*, Energy Policy 36 (2008) 2940– 2953, Elsevier, http://www.elsevier.com/locate/enpol

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the construction of the Slatina reservoir, etceteras, are not even asked, let alone answered!

60. Page 285: 8.0 LANDSCAPE. This is a completely inadequate description. As model, the authors could have taken the description of impacts on the landscape of the Temelín 1,2 reactors in the Czech Republic. Baseline of the assessment should be the landscape without the construction as they are currently standing – that is, the landscape after complete removal of non-used construction. The outcome would probably be similar as the one in the Temelín EIA: EMO 34 has a fundamental impact on the local landscape. The buildings and high tension lines of **EMO 34 are simply ugly**! There is no description on how SE / ENEL tries to reduce this influence or whether indeed any attempt to that will be undertaken.

61. Page 286 and further: 9.0 PROTECTED LANDSCAPES. Same criticism as in 59 and 60. No description of impacts on these landscapes.

62. Page 288: 10.0 TERRITORIAL SYSTEM OF ECOLOGICAL STABILITY. Idem.

63. Page 289 and further: 11. POPULATION. No sufficient epidemiological data are given about the health situation of the population with the exception of very limited oncological data later. No comparison is made with the situation before EMO12 were built. No estimation is given of possible influences of EMO34 on the health situation – not on the short nor on the long term. The results from recent studies concerning childhood leukaemia near nuclear power stations have not been taken into account[4].

64. Page 291: 11.2.1 Manpower - *"This is significant for the economy of the area around the power plant and leads to a large number of local personnel being employed for the construction of the NPP".* This is incorrect. First of all, construction personnel for a nuclear reactor needs the adequate certification and it is highly unlikely that the local population will have this certification. This means that the area will be confronted with a boom of construction personnel from outside the region. Secondly, the report does not make clear that these are only temporary working places for the limited time of construction. This will lead to a short time boom in the local economy, consequently followed with a slump when the construction is over. This boom – slump effect has strongly negative consequences for a balanced development of the area.

65. Page 291: "*Due to the presence of the NPP all social and physical infrastructure already exists."* The report completely lacks an analysis of what effects the boom in outside construction personnel as well as the doubling of operation personnel will have on this infrastructure. That there is, for instance, a clinic is nice, but when the amount of personnel doubles, also the capacity of the clinic will need to increase. What are the effects of this boom, respectively doubling of operation personnel on the capacity of local infrastructure and what are the environmental consequences of this, including those on the natural environment (extra hard infrastructure, extra pressure on nature areas, etc.)?

66. Page 291 and further: No effects of the EMO34 project on the described parameters are analysed.

67. Page 295: 11.3 Infrastructure. Idem: no description of changes to be induced by the EMO34 project. What is this report written for?

4 See among others:
Fairlie, Ian (2009), '*Childhood cancers near German nuclear power stations: the ongoing debate*', Medicine, Conflict and Survival, 25:3,197 — 205;
http://www.informaworld.com/smpp/content~db=all?content=10.1080/13623690902943388

Fairlie, Ian (2009), '*Childhood cancers near German nuclear power stations: hypothesis to explain the cancer increases*', Medicine, Conflict and Survival,25:3,206 — 220;
http://dx.doi.org/10.1080/13623690902943396

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68. Page 300: "*The Mochovce NPP is an existing facility in an established and stable community. All necessary construction permits have been granted. Accordingly, a detailed socio-economic assessment is not required.*" **What kind of NONSENSE is this?** Of course a socio-economic assessment is required. Since the construction was granted in 1986, heavy socio-economic changes have taken place in Slovakia and in the region. Maybe that Golder Associates and ENEL have not been aware of this, but in 1986, Czechoslovakia was a communist country, whereas it is now a democracy with a market based economy. This has changed the baseline completely. Doubling the capacity of EMO has a fundamental influence on the socio-economic circumstances in the region and far outside!

69. Page 301: 11.4.2 Public information on nuclear power in Slovakia. Why does the author take up this analysis at all while stating that only a first step has been taken by mapping local social perception. In order to get a full overview, European perception should be investigated. It should include not only local and Slovak national perception, but also the perception of Hungarian citizens and Austrian citizens as well as a general analysis of European perception on the basis of relevant Eurobarometers and national trends.

70. Page 302: The description of PR activities that are largely oriented on promotion of nuclear power instead of fostering the critical debate cannot be used as any indication for social perception and are irrelevant for this EIA report.

71. Page 303: *"thematic study trips for mayors from ZRZM (France, Germany, Hungary, Czech Republic, Spain, Finland, etc.) organised by SE, a.s."*. This quite well illustrates the biased nature of information streams towards ZRZM. ZRZM does not receive much critical information, nor takes much initiative to do so. See point 70.

72. Page 304: *"The Mochovce NPP is an existing facility in an established and stable community. All necessary construction permits have been granted. Accordingly, at this stage of the Project, a detailed socio-economic assessment is not required."* See point 68. (The fact that this point is repeated here as well illustrates the unsystematic way in which the EIA report is written – bits and pieces all over the place).

73. Page 304: The Public Consultation and Disclosure Plan (PCDP). Greenpeace received early September a copy of a power point presentation prepared by the head of the Communication department of the Mochovce NPP, mr. Robert Holy, that was describing SE / ENEL's preparation for public hearings in the EIA process. This power point proposes on several places clear violations of the law on EIA as well as the Aarhus Convention.[5] Such flagrant manipulations of the EIA procedure should be a reason to halt the procedure.
    Another problem currently faced is that construction is continuing in spite of the fact that the EIA procedure is ongoing. This creates a situation of irreversible change on the ground, is because of that in violation of the current EIA legislation and the Aarhus Convention and makes the EIA procedure a farce.

74. Page 311: It is in general clear that Golder Associates had a small basis for creating a picture of the social perception of the Mochovce NPP. However the following quote illustrates that the analysis has been biased and therefore did not reach important conclusions: *"the rational aspects of nuclear power production have increased slightly."* With this quote, Goldener illustrates it does not perceive issues like nuclear waste or the lack of secondary containment as rational. On the other hand, unproven statements like "nuclear power is cheap" are taken as rational. Such a biased analysis

5 http://www.greenpeace.org/slovakia/press/tlacove-spravy/greenpeace-enel-se-manipuluje
A copy of the document can be found on: http://greenpeace.hu/up_files/1252659758Mochovce.pdf

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cannot lead to any sensible conclusions. It would be advisable to have a professional non-biased agency to research the perception of this project for final conclusions.

75. Page 319 and further: *"15.0 CHARACTERISTICS OF EXITING POLLUTION SOURCES AND THEIR ENVIRONMENTAL IMPACTS - The characterisation of existing source of environmental pollution, if any, was conducted within each environmental component."* Very exiting indeed. If it was conducted, **where are the results**? Obviously they are included in section C. But it would be helpful if these issues were not shattered around in the report but systematically given.

76. Page 321: *"and that the impacts are as low as reasonably achievable – ALARA."* This only makes sense for the assessment if it is clear what the authors define as "reasonable". Is this the expenditure of an extra 4 million Euro to prevent another case of leukaemia? The fact that the authors do not in any way discuss the criteria of "reasonable" makes this paragraph completely void of any meaning. It is true that international use of the ALARA principle is ill-defined and sloppy. That is not a reason to be sloppy in this case. 'Reasonable' needs to be argued in every case the ALARA principle is used.

77. Page 321: The authors describe *in extenso* the radioactivity measurements done in the period 2005 – 2008, i.e. in the period that EMO12 were already in operation. For a zero basis, however, it would be necessary to have also data on the levels of radioactive and different isotopes from before the time that EMO1 went into operation.

78. Page 321: The conclusion that *"Monitoring results demonstrate that impacts of EMO12 during standard operation are close to zero in spite of a high sensitivity of the equipment applied and it can be supposed that the contribute* (sic! JH) *from MO34 will follows* (sic! JH) *this trend."* is not backed up by analysis or data. First of all there are no extensive epidemiological data made available, comparable with the sets of data that have fed into the KiKK study and other recent studies on for instance childhood leukaemia around nuclear power stations[6]. Secondly, the EMO34 project has been subjected to major changes in the safety area. This changes the emission characteristics of the project. They might be leaning towards improvement, but without any serious analysis that is a conclusion that cannot be drawn on beforehand. We demand a clear assessment of total emissions, total exposure and total dose from the EMO34 project that can withstand the test of peer review, not a copy and paste from a basically different project.

79. Page 322: *"The assessment of primary effects of radiation on non human biota is screened form consideration for two reasons: 1) monitoring shows very low or non detectable radioactivity level in non human biota (see Annex 4.2); 2) Slovak law does not require forced standard for the exposure of non human biota."* Another example of incomprehensible translation from Slovak. I presume the author meant that it was not necessary to assess direct effects of radiation on non-human biota. If so, the reasons given are nonsense. We deal with possible cumulative effects and low detection rates currently from two reactors may very well result in high effects in case long term exposure to four reactors. This needs proper assessment and that has not been done. The second argument, that Slovak legislation has no standards, is not of any interest for an Environmental Impact Assessment. If no standards exist, it is the scientific judgement on the basis of data that can lead to an informed conclusion. Whether or not there are legal standards is in that case of no importance. But without these data, no judgement about justification of a release of radioactive substances can be made at all. From the precautionary principle one would have to conclude that without such data, no approval should be given to the project.

6 See for instance: Fairlie, Ian (2009) 'Childhood cancers near German nuclear power stations: the ongoing debate',Medicine, Conflict and Survival,25:3,197 — 205; http://dx.doi.org/10.1080/13623690902943388

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80. Page 344: *"18.0 ASSESSMENT OF ANTICIPATED AREA DEVELOPMENT IF THE PROPOSED ACTIVITY WAS NOT UNDERTAKEN"* The alternative use of the area as nature after removal of current buildings has not been taken as an alternative and that without any reasonable argument. The fact that a pre-revolution construction permit is used as reference is irrelevant. The situation of the project has been changed considerably since that time and today's decisions should be made on the basis of today's arguments – not of arguments from over 20 years ago.

81. Page 347. The assessment of effects of radiation on the public has been made without any reference to epidemiological data.

82. Page 350: *"It should be pointed out that in view of appropriate design provisions and existing design margins, not all BDBA conditions will necessarily lead to excess radioactivity releases."* This is completely irrelevant. What is relevant is that there are several BDBA conditions that do lead to large radioactivity releases. These are the ones that are important for the justification discussion. What should have been done is: a proper estimation of a source term should have been made and this should have been submitted to meteorological spreading models in order to understand the spread of radioactive isotopes after a BDBA with large radioactivity releases. Such an analysis was carried out in the EIA for the Visaginas NPP in Lithuania, be it with a too low source-term. This remark shows once more that Golder and Associates wanted to prepare a defensive PR document rather than an EIA.

83. Page 352: ALARA principle. Again – no explanation is given what the criteria are for "reasonable".

84. Page 353: *"Doses to population due to accidental conditions (DBA) will be taken conservatively from POSAR of EMO12"*. Given the fact that EMO34 underwent basic changes in its safety set-up from EMO12, a separate assessment should be made.

85. Page 363 and further. Calculations for DBA have been made on the basis of EMO12. Because of the fact that major changes were carried out at EMO34 in comparison with EMO12 these calculations cannot be taken over just like that. It has to be studied what the effect of changes within the EMO34 lay-out have for effects on these kind of accidents.

86. Page 374 and further: effects on human health. The study uses very general epidemiological data to postulate that there is no negative effect of EMO12 on the population in Levice. These data are so general that no other conclusion could be expected. Instead the study should be looking at epidemiological data related to radiation specific oncological effects on one hand (for instance childhood leukaemia and others) and on the other hand also provide more general data that go beyond a purely oncological focus. The current description does not allow for any conclusion of the effect of EMO12. Next to that, it is not acceptable that the data from EMO12 are used to draw conclusions for EMO34. First of all the life-time expectancy of the EMO34 project is between 30 and 60 years (including PLEX), and the EMO12 data only give information about effects in the first years of operation. Most oncological effects, but also other radiation induced effects, have long induction times.
The study should have compared the results of the KiKK study and others (see point 78). Also the study should have made predictions for long term exposure.

87. Page 375: "*Anyway, in order to confirm the uselessness of a specific epidemiologic study for the effects on population due to the negligible doses from the Mochovce (or others) NPP."* (Sic!) The use of this kind of language shows a basic pro-nuclear bias that endangers the objectivity of data analysis.

88. Page 390: "*According to the Slovak Decree No.296/2005, which limits the permissible temperature of non-trout rivers to 26 °C and the maximum river temperature rise to 5*

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°C, the liquid effluent released to the river is regularly monitored in order to comply with the regulatory limit." Regularly monitoring does not make effects comply with the law! This is really nonsense. Monitoring can assess whether there is compliance. What we need to know in an EIA is whether larger temperature influence can be expected or not. For that we need to see statistical / chance calculations – not laws or the description of monitoring systems.

89. Page 391: 5.1.3 Aquatic biota conditions – The use of Canadian standards by Goldener and Associates is not permissible, especially not for biotic conditions, as the ecosystems found in Slovakia are fundamentally different from those found in Canada and on which Canadian standards are based. The EIA should be reworked to reflect Slovak circumstances.

90. Page 393: Dilution factors – the 100 year minimum and 10 year maximum dilution rates cannot be taken as 'conservative'. Both rates can be heavily influenced by climate change and 100 year minima and 10 year maxima have recently been broken more frequently than before climate change started to become visible. Because the project is to operate possibly up to 60 years, calculations should be made for dilution factors based on an increase in global temperature of 2 degrees / century (minimum case) up to a possible 6 degrees for this century (realistic in case global warming cannot be halted after for instance a failure of the Copenhagen conference).

91. Page 400: 8.0 IMPACTS ON LANDSCAPE. The authors make an unacceptable step to declare the currently standing civil construction works as works of nature. The zero variant would not be letting these structures stand, but would have them removed and the area brought back into its natural state. When that is taken as zero variant, the impact of EMO34 on the landscape is considerable. What there is standing now is ugly, and finishing is not going to improve the situation one little bit. Decommissioning the standing structures will improve the landscape very much, however.

92. Page 401: *"No interactions between the Project and protected areas were identified during the operations phase and consequently no likely effect occurs."* Are the authors of this report so incompetent that they don't see that this is complete nonsense? EMO12 is operating for a time that is a lot shorter than the expected operation time of EMO34. Effects of operation of a nuclear installation – with or without major accident – is only observable over a long term. The EIA is supposed to make intelligent estimations about the total environmental impact of the project – that includes long term effects, that includes possible large (including beyond design based!) accidents. This has not happened.

93. Page 408: OTHER IMPACTS. *"creation of new employment opportunities and maintenance of existing jobs within the study areas, resulting in improved employment stability;"* See point 64. The dynamic of the social economical development is far more complex than described here, including a large temporary influx of construction related workers.
"*It is determined that the above represents a positive effect.*" This was not determined at all, but postulated. No proper socio-economic analysis was made.
There has not been made any analysis of alternative regional developments, including development of tourism, sustainable agriculture or other options. Postulating that one development is positive is not an analysis.

94. Page 414: 8.0 CONCLUSIONS
This report does **not** describe the effects of the construction and operation of EMO34 for a period of 40 years. In most places it does not go beyond the description of the influence of the current operation of EMO12, and in many not even that. The report is completely inadequate in this sense.
For non-radiological consequences no effects were found only because many activities related with the construction and operation of EMO34 were excluded. This includes

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effects of the total fuel chain, indirect activities (transport, increased population pressure, economical activity drawn to the region because of EMO34, the Slatinka reservoir) and the effects of larger incidents and accidents, including beyond design accidents due to malevolent attack.
For radiological consequences the total fuel chain was left out of consideration, as well the effects of larger incidents and accidents, including beyond design accidents due to malevolent attack.
"The EIA also considered the effects of accidental conditions that might be expected and found that existing and planned safety measures are sufficient to mitigate any adverse effect." Not all possible accidental conditions that might be expected have been investigated, especially not beyond design accidents due to malevolent attack, which are for the EMO34 project of special importance. Existing and planned safety measures have not been adequately described nor analysed, so that it is impossible to figure out whether they would be able to mitigate any adverse affect.
"Taking into account the findings of the present EIA Study, including the identified mitigation measures, it is a SE conclusion that the project is not likely to have any significant adverse effect on the environment. Indeed, the project will result in a number of positive effects through reducing greenhouse gases emissions (if compared to conventional power plant) and providing economic benefits to the immediate and surrounding communities." The findings of this EIA study are completely inadequate to be able to draw any conclusion and the study for that reason should not be accepted. It is not possible to draw the conclusion that there will not be significant effects. The claim concerning greenhouse gas emissions cannot be upheld because no analysis of alternatives took place. The economic benefits have not been compared with different alternative development options for the region and therefore no conclusion can be drawn on this issue as well.

95. Page 419 and further: Measures. Although it is of uttermost importance that sufficient environmental and radiological measurements are taken after the implementation of EMO34, the act of taking measurements does not mitigate any negative effects. It can help monitoring the situation, but the report lacks any description of what will happen if legally set or scientifically recommended limits are broken. Measurement is only step one. All other steps miss in this report.

96. Page 441 and further – PLEASE, use a spell-checker and proof-reader. The English is abominable, which impairs understanding and patience to read the already low quality of the content delivered. These are clear indications that the authors have not taken the task of the EIA seriously.

97. Page 441 – Zero variant.
It is not made sufficiently clear that the zero variant includes the removal of surplus constructions and materials from the existing areas.
"Slovak Republic will continue in status of electricity importer of" (sic!). Apart from the stupid English, this is nonsense. The study has not even attempted to look at the energy situation and energy development of the Slovak Republic, let alone give basis for such a conclusion. There are many ways in which Slovakia can improve its energy situation – both on the demand and generation side.
"Situation will cause lowering of energy safety of the Slovak Republic" (sic!) Again: nonsense. There are several alternative energy policies that will be able to increase the energy security of Slovakia. There has not been any scientifically based analysis of energy security in combination with different alternatives in this study. Even if **nothing** would be done, the energy security would minimally remain the same as it is today.
"Adverse impact on imployment in the region; Adverse impact on living standards of inhabitants in the region; Adverse impact in decreasing of stability of the comunity" (sic!) Nonsense. No alternatives have been considered in the analysis and it is likely that the zero-option would enable several alternative development paths with more positive impact for the region. All these paths will be negatively impacted by the construction of EMO34.

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98. Page 442: Proposed variant. The argumentation for the refusal of SE / Goldener and Associates to consider alternatives is illegal and illogical (no matter what legal nonsense the Ministry of Environment may have written to SE). Under the Aarhus Convention and Slovak law, any large project has to be compared to possible alternatives. We have the strong impression that no alternatives have been worked out because the EMO34 project would most probably appear to be the least preferable. Greenpeace has worked out alternative energy scenarios for non-OECD Europe and for the EU27[7] which show quite clearly that such alternatives exist also for Slovakia, with large net-benefits for present and future generations and the environment.

99. The report has been presented without the signatures of the responsible authors, It is for that reason not clear whether the published report indeed represents the latest version or not.

7 These scenario's can be found on: http://www.energyblueprint.info

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