Comments on the conclusions of the preliminary report of the Belgian "Energy 2030 Commission (CE2030)"

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Executive Summary

For the following reasons, I disagree with some important conclusions and recommendations[2] contained in the report of the Commission "Energy 2030":

1) A set of hypotheses and limitations underlying the simulations made with the PRIMES model by the Federal Planning Bureau in support of the Commission's work **push the costs of CO_2 emission reductions reported for the scenarios with nuclear phase-out to artificially high levels**. These hypotheses have been imposed by the CE2030 permanent members to the Federal Planning Bureau[3]. This of course biases the conclusions and recommendations in favour of nuclear energy. Six of these factors are discussed below in **section 2,** with scientific references in each case. Several of these factors are clearly presented by the Federal Planning Bureau in its report for the Commission, but most of the nuances and caveats contained in that very thorough report (Devogelaer and Gusbin, 2006) are not reflected in the Commission conclusions.

2) Another study made by the Federal Planning Bureau (Devogelaer et al., 2006) for Minister Tobback, although not entirely relevant for the nuclear phase-out case, suggests also that additional work could provide different results from those presented here. This is documented in section 3.

3) The recent **Stern review** (Stern, 2006) on the economics of climate change gives support to the analysis presented in section 2. This is documented in section 4 and appendix A.

4) There are other considerations than the purely economic ones that need to be taken into account in a discussion about energy policy. Some are relevant at the national scale, some at the international one. At the international scale, it should be clear that **nuclear energy is not the simple solution to fight climate change**, for reasons of resource allocation, limited uranium reserves, proliferation, infrastructure, and world safety (see section 5 and appendix B). At the Belgian scale, **nuclear waste, risks related to terrorism, and public acceptance of accident risks** need to be better assessed (see section 5).

5) A **view of the desirable long term evolution of the world energy system is missing in the report**. Relying on finite fossil fuel or uranium resources cannot continue indefinitely. **Solar energy exceeds 8,700 times our current world primary energy supply**. We need to prepare the **transition of our world energy system towards a solar-based system**. This will require important R&D efforts and ambitious policies (section 6). The Belgian contribution to that effort could be funded in part **by taxing the benefits made by selling electricity from amortized nuclear power plants,** and by making the nuclear electricity producers **pay an insurance premium to the Government** to compensate for the limited liability they have in case of accident. This should benefit energy efficiency and renewable energies (see section 7).

6) The **Commission probably underestimates the potential for carbon capture and geological storage**, which could offer a complementary alternative to efficiency and renewable energy sources in a transition period (see section 7).

7) The procedures used by the Commission to complete its preliminary report were far from ideal. The non-permanent members were only associated to the work late in the process. The review process of the conclusions and recommendations was not rigorous enough nor fully accessible to all members of the Commission (see section 8).

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[2] This document refers to the draft conclusions and recommendations in their version of 3 November 2006, as it is the last version received as non-permanent member of the Commission.

[3] It should be clear that the Federal Planning Bureau made the best that could be done under the constraints given.

1. Introduction

The preliminary report written by the Energy 2030 Commission Chairman, Prof. W. D'Haeseleer contains a lot of interesting information about the context in which the Belgian energy policy will need to evolve in the next 25 years. **But I disagree with many of its conclusions.**

Several of the conclusions and recommendations of the preliminary report are not founded on scientific, economic, and technical information that are broad enough, and that have been debated enough, and the following contribution[4] explains why.

2. The PRIMES economic simulations have limitations in at least six areas, and the conclusions of the Preliminary report do not reflect them adequately

The basic hypotheses and assumptions for a modelling study are extremely important to assess its results. It is true in economic modelling to the same extent that it is the case for climate modelling as my collaboration with environmental economists over the past 15 years thought me (see e.g. Chandler et al., 2002; Le Treut et al., 2004; van Ypersele, 2001). The results of any modelling exercise are only as robust as the weakest link in the information chain leading from the baseline situation to the results related to the hypothetical scenarios studied. When hypotheses that restrict the range of possible results are used, the conclusions must reflect very clearly these restrictions, and cannot have much strength until all facets of the problem have been studied, the models validated[5], and the limitations of the tools and hypotheses used fully explained.

The very thorough study made by the Belgian Federal Planning Bureau (Devogelaer and Gusbin, 2006) with the PRIMES model at the request of the permanent members of the Commission recognizes this to a very large extent, and the conclusions of the above study contain a large number of important nuances and caveats. Unfortunately, these are not reflected clearly enough in this Commission preliminary report.

The following very important limitations of the scenarios runs made with the PRIMES model affect seriously the strength of the conclusions that one can reasonably draw at this preliminary stage.

1) All scenarios consider that **all efforts** to reduce CO_2 emissions, **must be made domestically** and without usage of the Kyoto Protocol flexibility mechanisms[6] (Devogelaer and Gusbin, 2006, p. 90 and 94). This is **a very important limitation**[7], which neglects the context of the European and international climate and energy policy, and contradicts the free-market approach underlying the report.

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[4] A contribution about the climate aspects of the energy policy will complement, or possibly replace, this contribution in the final version of the report, in the spring of 2007.

[5] Climate models are validated on past climates, and through rigorous model inter-comparison exercises. The same procedures are not frequent enough in the area of economics. According to Schiermeier (2006), the economist Edenhofer said that "*economists must also routinely check their ideas against historical data, and test their predictions against those of other teams, as climate scientists do. The way natural scientists compare their models "is a totally new thing in economics. We can learn a lot from climate modellers.*" This is further discussed in Tulkens and Tulkens (2006).

[6] "…flexible mechanisms and the European Emission Trading System can bring some additional room to reduce the costs of achieving the emission reduction constraints." (Devogelaer and Gusbin, 2006, p. 90).

[7] An illustration of this is given in section 4, footnote 10, on the basis of the Stern (2006) review.

2) The PRIMES analysis **only copes with energy-related CO_2** emissions, and ignores the other greenhouse gases, which are sometimes cheaper to control[8] (Devogelaer and Gusbin, 2006, p. 90 and 94).(See also section 4).

3) The fact that **abatement costs can be** (partially) **compensated by reductions in other costs** through appropriate policy measures (e.g. reduction in labour charges) is not considered by the model[9] (Devogelaer and Gusbin, 2006, p. 90).

4) **Technology innovation is not fully represented in PRIMES**, and recent work (e.g., the Innovation Modelling Comparison Project, IMCP, Edenhofer et al., 2006) has shown how important a proper representation of this factor was for the proper assessment of climate mitigation costs. In particular, the potential in the energy efficiency area could be larger that represented in PRIMES (see the contributions of Wolfgang Eichhammer to the Commission 2030).

5) The full cost of **hidden government subsidies to the nuclear electricity sector** in the form of a limitation of the liability of the private operators in the case of a nuclear accident is not taken into consideration (there is no reason to exempt the operators of the cost of an appropriate insurance) (de Keuleneer, 2006).

6) The **benefits of taking appropriate actions** to reduce the negative impacts of climate change are **not taken into account** (Devogelaer and Gusbin, 2006, p. 90).

All these basic hypotheses and limitations contribute to push the costs of CO_2 reduction in the absence of nuclear power at extremely high values when they are compared to the values reported in the Stern Review (see below). A few of the above remarks are dispersed in the preliminary report conclusions and recommendations, but these do not highlight that the abatement costs could be substantially lower than those on which the conclusions are based, if all these other factors and hypotheses had been fully considered. And this could radically change the conclusions and recommendations.

3. The study made for Minister Tobback suggests additional work is needed.

It is worth noting that in another study made by the FPB for the Federal Minister of Environment in July 2006 (Devogelaere et al., 2006), scenarios have been developed with the inclusion of flexibility mechanism among European countries and without extending the life of nuclear power stations. The time horizon of that study (2020) for the PRIMES simulations corresponds to a time when only a quarter of the Belgian nuclear capacity would have been phased out. This reduces very significantly the challenge to reduce CO_2 emissions compared to this Commission time horizon (2030, when all nuclear plants would have been phased out). Although the scope of the PRIMES study made for Minister Tobback was limited to 2020, the PRIMES model was run up to 2030, and a limited set of results published in graphical form in that study are relevant for 2030.

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[8] "*Given that the analysis of GHG emissions other than energy related CO_2 emissions is outside the scope of the PRIMES model, the emission constraints for Belgium (…) are only indicative of the required changes in the energy system and as such, cannot be interpreted as possible post-2012 targets.*" (Devogelaer and Gusbin, 2006, p. 94).
"*Most (inter)national conventions, however (e.g., Kyoto) do specify their reduction objectives in terms of total greenhouse gases. If it is less costly to reduce the other GHG, it is recommended to first cut down these other GHG before turning to the energy CO2 emissions.*" (Devogelaer and Gusbin, 2006, p. 90).

[9] "*Compensation policies (cf. the analysis with HERMES in the study for Minister Tobback): the costly impact on society of installing a carbon value can be mitigated through the recurring effect of investing the higher state revenues in societal benefits like employment (e.g. through the lowering of labour taxes). In this way, society pays for a better environment (through the carbon value) and gains a healthier nation (through an increase in employment triggered by lower labour taxes). The enjoying of these two benefits is called a "double dividend"* " (Devogelaer and Gusbin, 2006, p. 90).

One of the scenarios considered in that study, which assumes the nuclear phase-out is fully implemented achieves a 25% reduction in greenhouse gases emissions in Belgium in 2020, with:
- a carbon value of €110 in 2020 and reaching €200 in 2030 (i.e. similar to those considered in the "-30% CO_2" scenario with nuclear energy and carbon capture and storage (Bpk30n) of the (Devogelaer and Gusbin, 2006) study) and
- a limited number of additional measures (on renewable energy, transport and building insulation) whose cost is not estimated.

It would be worth exploring such a scenario up to 2030, as graphical information in that report (figure 21 page 73, Devogelaere et al., 2006) suggests that emissions reductions stronger than -25% could be achieved without nuclear energy in 2030 at a cost comparable to that of the Bpk30n scenario (with nuclear energy) in the (Devogelaer and Gusbin, 2006) study used as a basis for this preliminary report.

4. The Stern Review on the economics of climate change explains how to bring the costs down

To set the remarks from section 2 in perspective, a few relevant key points from the recent Stern Review on "*The economics of climate change*" (Stern, 2006) are summarized below, with full quotations reproduced in Appendix A. Most of those points can be applied *mutatis mutandis*, to the modelling study made with PRIMES.

A globally rational world should be able to tackle climate change at low cost. The less global policy is, the more expensive it will be[10].

Spreading the mitigation effort widely across sectors and countries will help to ensure that emissions are reduced where is it cheapest to do so, making policy cost-effective.

Well-formulated policies with global reach and flexibility across sectors will allow strong economic growth to be sustained in both developed and developing countries, while making deep cuts in emissions.

To estimate how costs can be kept as low as possible, models should cover a broad range of sectors and gases, as mitigation can take many forms, including land-use and industrial-process emissions.

By focusing mainly on energy and mainly on CO_2, many of the model exercises overlook some low-cost abatement opportunities and are likely to over-estimate costs.

The models arriving at the higher cost estimates make assumptions about technological progress that are pessimistic by historical standards and improbable.

The inclusion in individual models of induced technology, averted non-climate-change damages (such as air pollution) and international emission-trading mechanisms can limit costs substantially.

How far costs are kept down will depend on the design and application of policy regimes in allowing for 'what', 'where' and 'when' flexibility in seeking low-cost approaches.

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[10] The Stern review gives a world average CO_2 abatement cost between $0 and $60 (average: $30) for 2030 when global emissions are reduced to 18 $GtCO_2$ by 2050, with full usage of flexibility mechanisms (Stern 2006, Figure 9.5 and accompanying text reproduced in Appendix A below) . These numbers should be compared to the carbon values reported in the FPB PRIMES simulations for 2030 Belgian cases without any flexibility mechanism: from 500 to 1500€/tCO_2 ! The difference is so large that it calls into question the hypotheses leading to the high numbers obtained by PRIMES with this Commission' scenarios.

Sir Nicholas Stern concludes: *Climate change is the greatest market failure the world has ever seen, and it interacts with other market imperfections.* ***Three elements of policy are required*** *for an effective global response. The first is the* ***pricing of carbon****, implemented through tax, trading or regulation. The second is* ***policy to support innovation and the deployment of low-carbon technologies****. And the third is action to* ***remove barriers to energy efficiency****, and to* ***inform, educate and persuade*** *individuals about what they can do to respond to climate change.* Stern (2006, p viii)

5. Money is not everything

The above Stern review conclusion ("***Climate change is the greatest market failure the world has ever seen***" (Stern, 2006)) suggests that caution is needed: costs represent one aspect of the question, and e**conomic models alone cannot answer exhaustively** the questions that are on the table of the Commission**.** Sustainable development is much more than "cheap electricity" and "low-carbon technologies" at any environmental or social cost. The FPB report itself recognizes in its conclusions that many other aspects than the cost of energy have to be taken into account by policy makers, in particular: "*(…) promoting the use of nuclear [energy] has to be carefully considered and nuanced with reflections on the functioning of the electricity market, safety, nuclear waste, decommissioning and public acceptance.* " (Devogelaer and Gusbin, 2006).

The Belgian nuclear policy needs to take into account the **international context: proliferation risk, geopolitics, limits in uranium resources, infrastructure bottlenecks, and international safety issues severely limit the role nuclear energy can play** at the international level as a technology susceptible to fight climate change (see the argumentation in Dessus et al., 2004, copied below as appendix B).

The risks from **terrorism** need to be much better assessed (a concerted crash of two fully loaded commercial jets on one plant would most likely have terrible consequences for a significant fraction of Belgium's population and territory, see the last footnote in appendix B below). Other issues, such as the collective **acceptance of the risk of a severe accident**, and the **ethical aspects of leaving waste behind us** for thousand of years should also be addressed.

Several of the aspects cited above have not been really discussed by the Commission.

6. The long term vision is absent

A **discussion of the desirable long term evolution of the world energy system is missing in the report**.

The Federal Council for sustainable development agreed unanimously in 2005 that "in the very long term, the world energy system needed to ultimately achieve all the following ultimate objectives: give an efficient answer to the climate challenge, following of the UN Framework Convention on Climate Change Article 2; allow each human being to have access to basic energy services, so that livelihood conditions can continue to be improved and to create goods and jobs; be based on usage of (almost) infinite resource; be founded on optimal energy efficiency; have a minimal impact on human health and ecosystems; have a high reliability level; and have an acceptable cost" (FCSD, 2005).

Relying on finite fossil fuel or uranium resources cannot continue indefinitely on a finite planet.

After the best efforts have been made to increase energy efficiency (see Dr W. Eichhammer contribution to CE2030), the best usage needs to be made of an existing nuclear fusion reactor. It is one which processes its waste itself, but at 150 million kilometres from us: **the Sun**. It **provides** the surface of the Earth every year with more than **8700 times our current world primary energy supply**[11]. A concerted R&D and policy effort to capture more of that flow and remove the barriers to its utilization (see, e.g., Philibert, 2006) would help us much better in the long term, at the global scale, to fight climate change and reduce fossil fuel dependency than any other technique such as fossil fuel or nuclear energy, which are based on limited mineral resources, and present so many non climate-related externalities. Renewable energies (almost entirely resulting from the solar flow of energy) would also help provide access to energy to the billions of people who don't have electricity.

We need to prepare the **transition of our world energy system towards a solar-based system**. This will require important R&D efforts and ambitious policies. It will need several decades to be implemented, but **those who will participate actively in this global transition will also reap the socio-economic rewards**.

The Stern Review mentions also that "*Action on climate change will also create significant business opportunities, as new markets are created in low-carbon energy technologies and other low-carbon goods and services. These markets could grow to be worth hundreds of billions of dollars each year, and employment in these sectors will expand accordingly.*" (Stern, 2006, p viii).

In this long-term context, the question of the phase-out of nuclear energy in Belgium is of very limited importance when one takes a global and long term view, which the climatologists are used to do.

7. Raising taxes on nuclear energy and implementing carbon capture and geological storage could help during the transition period

A temporary financial contribution to these important and ambitious policies could come, in part, from the following sources:

The limited insurance liability of electricity producers covered by the Government constitutes an important hidden subsidy to the nuclear energy producers, and it should be removed by making electricity producers **pay a reasonable insurance premium to the Government**, since the latter covers the risk.

It would also be useful to **tax the large benefits** made by producing electricity with nuclear power plants that are amortized and require limited investments (de Keuleneer, 2006).

The taxes and insurance premiums collected could be used to help prepare actively the necessary transition towards a very energy-efficient economy, making the most of renewable energy.

[11] "Mankind's total primary energy supply (TPES) was 433 Ej in 2002, including non-commercial biomass, equivalent to a continuous power consumption of 13.75 TW. This compares to the solar radiation intercepted by the Earth of 173,000 TW, of which 120,000 TW strike the Earth's surface (the difference being reflected by the atmosphere directly to the outer space). **Solar energy** is thus the primary energy source on our planet's surface – and **exceeds 8,700 times our current primary energy supply**. In other words, the Earth receives from the sun each hour as much energy as mankind consumes in a year. The IEA projects a TPES of about 688 Ej in 2030, equivalent to 21.8 TW of power (IEA 2004). Solar energy would still be 5,500 times greater." (Philibert, 2006).

Where appropriate, and as soon as possible, **carbon capture and geological storage** should be implemented to avoid emissions of the fossil fuel plants that will be inevitable in the transition period to a solar-flow based energy system. This is particularly valid for countries with large coal resources, such as China, India, or South Africa, but may play a certain role in Europe as well. The sooner these techniques will be implemented, the better. The IPCC special report on carbon capture and storage writes: "*the projected potential of CO_2 capture (…) has been estimated at an annual 2.6 to 4.9 $GtCO_2$ by **2020**. These numbers correspond to 9–12% of global CO2 emissions in 2020*" (IPCC, 2005). The European Commission estimates that carbon capture and storage will be operational in Europe before 2020 (Vergote, 2006, personal communication). This suggests that the **Commission Energy 2030 assumption that no carbon, capture and storage can really be operational before 2030 is excessively conservative**.

8. The Commission procedures were not ideal

The painstakingly slow, but very rigorous process of the IPCC (Intergovernmental Panel on Climate Change) or of the Belgian Federal Council for Sustainable Development when they produce assessment report or advices to the Government has not been used to elaborate this preliminary report and its conclusions and recommendations.

The artificial distinction between "permanent members" and "non-permanent member"[12] contained in the Royal Decree had the result that non-permanent members have not been associated with the design of the scenarios used as a basis for the modelling exercises, and have been invited to participate to some meetings of the Commission only after most of this design had been completed by the permanent members of the Commission.

The report was written by the Chairman of the Commission Energy 2030, on the basis of the inputs received from the members of the Commission. Members are only responsible for the information they provided and not for the entire content of the report. In the absence of formal rules of procedure, neither the report nor the conclusions and recommendations have been formally approved by the entire Commission.

These procedures should be improved for the preparation of the final report.

9. Conclusion

For all the reasons above (see the executive summary for a short version), I cannot subscribe to the conclusions and recommendations contained in this preliminary report, in particular the recommendation to lift the nuclear phase-out obligation

If am ready to change my mind about anything I have written or quoted above, if additional information leads me to it, or if I am demonstrated to be wrong.

[12] The Royal decree creating the Commission appoints a Chair, a Vice-chair, four "permanent expert members", and nine "non-permanent expert members" "chosen on the basis of their specific competences in the area of energy policy".

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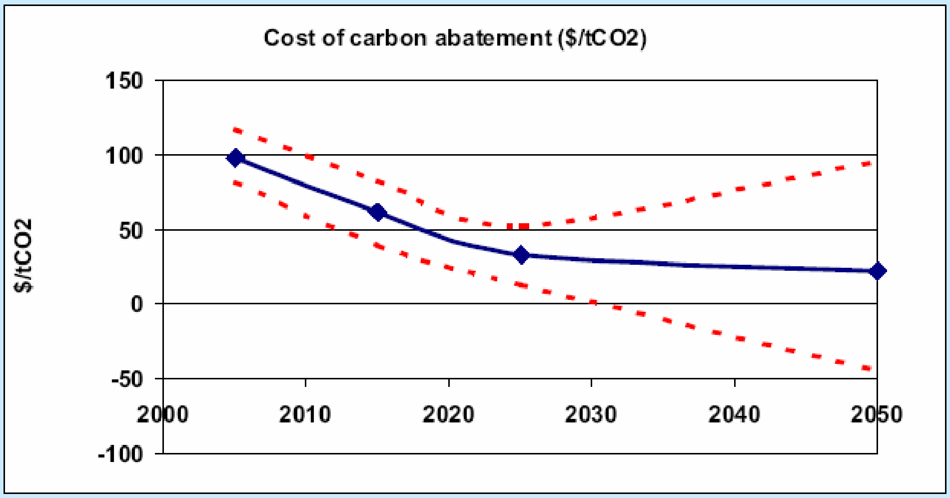
Appendix A: Relevant extracts from the Stern Review

A globally rational world should be able to tackle climate change at low cost*. However,* ***the*** *more imperfect, less rational, and* ***less global policy is, the more expensive it will be*** (Stern, 2006, p 236).

Flexibility *in the type, timing and location of emissions reduction* ***is crucial in keeping costs down*** (Stern, 2006, p 215).

Figure 9.5 Average cost of reducing fossil fuel emissions to 18 $GtCO_2$ in 2050*



*The red lines give uncertainty bounds around the central estimate. These have been calculated using Monte Carlo analysis. For each technology, the full range of possible costs (typically ± 30% for new technologies, ±20% for established ones) is specified. Similarly, future oil prices are specified as probability distributions ranging from $20 to over $80 per barrel, as are gas prices (£2-6/GJ), coal prices and future energy demands (to allow for the uncertain rate of uptake of energy efficiency). This produces a probability distribution that is the basis for the ranges given.

(Figure 9.5 from Stern, 2006, p. 231)

Anderson's central case estimate of the total cost of reducing fossil fuel emissions to around 18 $GtCO_2e$/year (compared to 24 $GtCO_2$/year in 2002) is estimated at $930bn, or less than1% of GDP in 2050. In the analysis by Anderson, this is associated with a saving of 43 $GtCO_2$ of fossil fuel emissions relative to baseline, at an average abatement cost of $22/$tCO_2$/year in 2050 (Stern, 2006, p 232).

The models arriving at the higher cost estimates for a given stabilisation path make assumptions about technological progress that are pessimistic by historical standards and improbable *given the cost reductions in low-emissions technologies likely to take place as their use is scaled up.* (Stern, 2006, p 239).

Flexibility over the sector, technology, location, timing and type of emissions reductions is important in keeping costs down. *By focusing mainly on energy and mainly on CO_2, many of the model exercises overlook some low-cost abatement opportunities and are likely to over-estimate costs. Spreading the mitigation effort widely across sectors and countries will help to ensure that emissions are reduced where is it cheapest to do so, making policy cost-effective. (…)*(Stern, 2006, p 239).

How far costs are kept down will depend on the design and application of policy regimes *in allowing for 'what', 'where' and 'when' flexibility in seeking low-cost approaches. Action will be required to bring* *forward low-GHG technologies, while giving the private sector a clear signal of the long-term policy environment.* (Stern, 2006, p 239).

Well-formulated policies with global reach and flexibility across sectors will allow strong economic growth to be sustained in both developed and developing countries, while making deep cuts in emissions. (Stern, 2006, p 239).

To estimate how costs can be kept as low as possible, models should cover a broad range of sectors and gases, as mitigation can take many forms, including land-use and industrial-process emissions. *Most models, however, are restricted to estimating the cost of altered fossil-fuel combustion applied mostly to carbon, as this reduces model complexity. Although fossil-fuel combustion accounts for more than three-quarters of developed economies' carbon emissions, this simplifying assumption will tend to over-estimate costs, as many low-cost mitigation opportunities in other sectors are left out (for example, energy efficiency, non-CO_2 emissions mitigation in general, and reduced emissions from deforestation* (Stern, 2006, p 240).

To make sense of the growing range of estimates generated, model comparison exercises have attempted to synthesise the main findings of these models. This has helped to make more transparent the differences between the assumptions in different models. A meta-analysis of leading model simulations, undertaken for the Stern Review by Terry Barker, shows that some of ***the higher cost estimates come from models*** *with limited substitution opportunities,* ***little technological learning, and limited flexibility about when and where to cut emissions*** (See Table 10.1 in Stern, 2006, p 242).

Table 10.1 Meta-analysis estimates

Average impact of model assumptions on world GDP in 2030 for stabilisation at 450ppm CO_2 (approximately 500-550ppm CO_2e)
(% point levels difference from base model run)

	Full equation
Worst case assumptions	**-3.4**
Active revenue recycling[4]	1.9
CGE model	1.5
Induced technology	1.3
Non-climate benefit	1.0
International mechanisms	0.7
'Backstop' technology	0.6
Climate benefit	0.2
Total extra assumptions	**7.3**
Best-case assumptions	**3.9**

Source: Barker et al. 2006

Source: Stern (2006, p 242)

The exercise suggests that the inclusion in individual models of induced technology, averted non-climate-change damages (such as air pollution) and international emission-trading mechanisms (such as carbon trading and CDM flows), can limit costs substantially (Stern, 2006, p 243).

The ***costs of mitigation will depend on the effectiveness of the policy tools*** *chosen to deliver a reduction in GHG emissions* (Stern, 2006, p 214).

Appendix B:

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Lovelock, climat et nucléaire : l'irréalisme au service du reniement.

Publié le 18 juin 2004 dans « *La Libre Belgique* ». Une version légèrement différente a été publiée dans « *Le Monde* » le 10 juin 2004.

Benjamin Dessus, Président de l'Association Global Chance (France), co-auteur du Rapport au Premier ministre français sur les perspectives économiques de la filière énergétique nucléaire (2000).
Gustave Massiah, Président du CRID (Centre de recherche et d'information pour le développement, France)
Jean-Pascal van Ypersele, Professeur de climatologie et de sciences de l'environnement à l'Université catholique de Louvain

En déclarant dans une tribune publiée dans la presse européenne (The Independent du 24 mai, Le Monde du 1er juin) « L'énergie nucléaire est la seule solution écologique » James Lovelock, connu dans les milieux écologistes en tant que promoteur de l'hypothèse Gaïa d'une Terre organisme autorégulé, jette évidemment un pavé dans la mare. Et cela au moment où plusieurs pays européens se demandent comment atteindre les objectifs de Kyoto et au-delà, sans réel débat parlementaire.
Cette conversion tardive d'un gourou de l'écologie pure et dure s'appuie sur la conviction que le réchauffement de la planète est le risque le plus important que devrait affronter l'humanité dans les 50 années qui viennent.
Après nous avoir décrit, pour le moins sans complaisance, les catastrophes qui nous attendent, il aborde la question cruciale du « Comment y échapper ? ». Convaincu avec raison qu'il n'y a pas d'issue sérieuse à moyen terme dans l'émergence de technologies révolutionnaires il compare les mérites respectifs des énergies renouvelables et du nucléaire, les deux sources énergétiques disponibles aujourd'hui qui ne contribuent pas aux émissions de gaz à effet de serre, pour remplacer au plus vite les énergies fossiles responsables des désordres attendus.
Et, à ses yeux, il n'y a pas photo : quoiqu'on fasse, les énergies renouvelables (le solaire, la biomasse, l'éolien, la géothermie), resteront confinées à un rôle d'appoint pour les 40 ans qui viennent. Reste alors le nucléaire, la seule solution à ses yeux qui puisse quantitativement suffire dans les décennies à venir. Alors, devant le spectre de la catastrophe, et même si c'est une solution qui n'est pas sans risques, il n'y a pas d'autre choix. Et puis, nous dit-il, « l'opposition au nucléaire s'appuie sur une peur irrationnelle nourrie par une fiction dans le style Hollywood, alors que cette énergie s'est révélée depuis son origine la plus propre de toutes… » Et notre homme de supplier ses collègues de renoncer à leur « opposition butée » au nucléaire.
Un raisonnement finalement classique pour un citoyen auquel on assène souvent qu'entre effet de serre et nucléaire il va bien falloir choisir.

Plutôt que d'argumenter sur le degré de rationalité de cette peur nucléaire, entrons un instant dans son raisonnement. Il faut alors vérifier que le développement massif d'un nucléaire supposé sans défaut est de nature à changer vraiment la donne pour les décennies qui viennent.
Car, curieusement, l'auteur n'apporte aucun argument chiffré, ni sur la consommation mondiale d'énergie, ni sur les renouvelables, ni sur le nucléaire, à l'appui de ses affirmations.
Il laisse entendre que la consommation d'énergie mondiale, tirée par la démographie des pays en développement, va continuer son irrésistible croissance et ne fait aucune allusion à une possibilité quelconque de modération de la croissance de la consommation des pays riches dans les décennies à venir. Un scénario « laisser faire », qui, comme le montrent bien les études de l'OCDE, décrit l'image d'un monde qui passerait d'une consommation d'énergie primaire de 9200 Mtep en 2000 (dont 8000 de fossiles) à 15 000 en 2030 (dont 13 000 de fossiles) et à 19 000 en 2050 dont au moins 16 000 de fossiles. L'enjeu sous jacent

au propos de l'auteur est donc la substitution d'une dizaine de milliers de Mtep en 2030 et de l'ordre de 13 000 Mtep en 2050, de façon à limiter nos émissions à la capacité d'absorption de gaz carbonique de la biosphère.
Une telle ambition est elle tant soit peu réaliste ?
Aujourd'hui le nucléaire fournit environ 21% de l'électricité mondiale. Quant à l'électricité elle-même, elle représente seulement 17% de la consommation finale d'énergie mondiale.
L'ambition décrite ci dessus implique donc à la fois :

- une augmentation massive de la proportion d'électricité dans la consommation totale d'énergie (elle même en rapide augmentation d'ici 2050) pour la faire passer de 17% actuellement à 70% en 2050
- une augmentation massive du taux de pénétration du nucléaire dans la production d'électricité de 21% aujourd'hui à plus de 90% en 2050.

Il faudrait pour cela construire chaque année l'équivalent du parc nucléaire mondial actuel, 400 centrales environ, plus d'une par jour, un investissement de 600 milliards d'euros par an au bas mot, alors que nous sommes sur un rythme de une ou deux par an actuellement.
Il faudrait aussi multiplier la production d'uranium par 15 à l'horizon 2030, alors que les réserves connues sont limitées à une petite cinquantaine d'années au rythme actuel de consommation du parc[13].
Et puis, ces centrales une fois construites, il faudrait édifier des réseaux électriques à la dimension d'une production d'électricité de 6 à 8 fois supérieure à celle d'aujourd'hui).
Et enfin il faudrait « placer » cette électricité, bien au delà de ses applications actuelles, dans des secteurs entièrement nouveaux, comme les transports routiers, alors qu'on ne dispose pas des technologies nécessaires pour atteindre les taux de pénétration très élevés que requiert ce projet.
S'il est vrai que le nucléaire peut, pour un temps et dans certains pays[14], contribuer partiellement à la réduction des émissions de gaz carbonique de la production d'électricité, il apparaît clairement que le projet proposé n'est ni vraisemblable, ni faisable. Et cela sans même tenir compte du monde à deux vitesses[15] que cela risque d'entraîner entre les pays qui pourraient s'équiper de nucléaire et les autres, ni des nouveaux risques que le terrorisme ferait courir à l'humanité avec un parc de 8000 centrales nucléaires[16].

Comment expliquer qu'un écologiste patenté comme James Lovelock n'ait même pas songé à citer, quitte à la critiquer, l'immense marge de manœuvre que représente l'efficacité et la sobriété énergétique dans les stratégies de sauvegarde de la planète ? Aurait il oublié que l'énergie la moins polluante est celle qu'on ne consomme pas ? Pourquoi faire le procès sans appel des énergies renouvelables dont on sait pourtant qu'elles rendent déjà des services nettement plus importants et peuvent rendre des services beaucoup plus diversifiés que l'électricité nucléaire, en particulier dans les transports ?
On reste confondu devant la naïveté de tels propos qui détournent des vraies questions auxquelles l'humanité va se trouver confrontée, en faisant croire que la solution à tous nos maux réside dans l'adoption d'une technologie salvatrice et universelle affublée pour l'occasion de tous les mérites. L'obscurantisme n'est pas toujours du côté que l'on croit. James Lovelock nous en apporte tristement une nouvelle preuve.

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[13] Il est possible que les réacteurs de quatrième génération, dont des réacteurs surgénérateurs, permettront de prolonger ce délai, mais ces réacteurs ne seront pas opérationnels avant 2040 ou 2050. Or Lovelock propose de mettre en œuvre massivement la technologie nucléaire d'aujourd'hui, pas celle de demain ou d'après-demain.
[14] Notre propos est centré sur la proposition de Lovelock de résoudre par la seule énergie nucléaire le problème mondial des émissions de gaz à effet de serre. Il ne s'agit pas ici de prôner la fermeture à tout prix des centrales nucléaires existantes, sans qu'un plan alternatif n'ait été mis au point.
[15] Voir « l'appel de Bellevue » publié le 4 mai 2001 par La Libre Belgique et appelant l'Europe à construire avec les pays en développement un nouveau partenariat en matière climatique et à mettre en œuvre une politique résolue d'utilisation des technologies économes en énergie et des énergies renouvelables (voir www.climate.be/bellevue).
[16] Un rapport de l'Office of Science and Technology du Parlement du Royaume uni estime qu'un seul attentat à l'aide d'un avion sur un des 19 sites nucléaires de ce pays pourrait provoquer des millions de décès (New Scientist, 29 mai 2004).