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Environmental Costs and Energy

Some Critical Remarks on Nuclear Renaissance and on EU Studies ExternE and Ermon

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Environmental costs

- What does it mean?
 - The economic value of a negative change in the environment.
 - The environmental damage remaining after building, operating, or decommissioning an energy resource.
 - Environmental costs are often defined by determining either the willingness to pay to avoid discharges or for admittance of claims for damage caused to the environment (including also personal injury).
 - "Since everyone has the right to a clean and thriving natural environment, and it is the polluter who must pay, the basis of admittance of claims would be the most correct means to determine environmental cost." (Bellona Working Paper **A Trading System for Greenhouse Gases** (2000))

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External costs in electricity in Europe –figures from EEA

- • Total external costs of electricity generation in the EU - 15, in 2001, amounted to (annual figure!) **Euro 42-72 billion**
- • By comparison, subsidies for all forms of energy (EU - 15, not just electricity; mostly coal) amounted to about **Euro 29 billion**
- • of which renewable energy received **Euro 5.3 billion**
- Source: European Environmental Agency (2004). Energy subsidies in the European Union. EEA Technical Report 1/2004, 14-17, Lauber - External Costs in EU Policy 22
- Financial dimension of external costs of electricity in the EU

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EREF criticism on European Environmental Agency Subsidy Report

- Shies away from internalising all external costs for Nuclear
- States, that figures on indicative estimates of total energy subsidies, EU 15, "exclude the potential cost of not having to pay for full -liability insurance cover for a critical nuclear accident or fuel incident since commercial and state liabilities are limited by international treaty. This risk would be too large to be commercially insurable."
- Mentions only in a footnote that "the calculation of externalities from nuclear power excludes mortality and morbidity associated with human exposure to high-level nuclear waste and the contribution of civilian nuclear power programmes to the risk of nuclear proliferation and d terrorism, all of which have been considered too difficult to value."
- Risk of nuclear accidents - "not fully priced"

See EEA Report , page 14. See EREF Worldwatch Report (2005)

[REFLECTIONS ON A POSSIBLE UNIFIED EU FINANCIAL SUPPORT SCHEME FOR RENEWABLE ENERGY SYSTEMS \(RES\) page 7](#)

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EU ExternE

- ExternE estimates the external costs associated with the electricity production fuel cycle in the EU-15. For the nuclear sector an estimate of 2.7 billion of external costs per year was made. This estimate was substantially lower than that for fossil fuels, and on similar level than renewable energy sources
- But: When calculation external costs associated with nuclear energy, ExternE excludes the most important factors.
- And discredits PV energy with outdated material, unclear indicators and evaluation

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Example for wrong approach

- Overall: Emerging technologies like PV are compared with established technologies without consideration to economies of scale.
- Example: PV – Extern E suggests that PV in Germany has tree times higher external costs than Nuclear. Material for calculation concerning PV in this case was just one single PV installation in North Rhine Westphalia. The technical data came from a production pilot installation from the 80ies but ExternE sold it as state of the art in 2004. On the contrary ExternE calculates with newest third Generation plants and newest coal generation plants
- The result is obvious:

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Churchill's belief in statistics revisited :

EXTERNAL COST VALUES FOR ELECTRICITY PRODUCTION IN THE EU FOR EXISTING TECHNOLOGIES
in EUR cent per kWh

Technology	Subsidies (1990)	EU	Non-EU	External	Other	EU	Non-EU
AT			1.1	0.1	0.1		
BE	0.18		0.1	0.1	0.1		
DE	0.9	0.9	1.0	0.2	0.1	0.6	0.6
FR	0.7		0.9	0.2	0.1		
ES	0.8		1.1	0.2	0.1		
IT	0.4	0.4	0.4	0.2	0.1		
UK	0.4		0.4	0.2	0.1		
GR	0.4		0.4	0.2	0.1		
PT	0.4		0.4	0.2	0.1		
PL	0.4		0.4	0.2	0.1		
RO	0.4		0.4	0.2	0.1		
SI	0.4		0.4	0.2	0.1		
SK	0.4		0.4	0.2	0.1		
TR	0.4		0.4	0.2	0.1		
EU	0.7		1.0	0.2	0.1	0.6	0.6
EU	0.7		1.0	0.2	0.1	0.6	0.6

Source: <http://www.externe.info/externe.pdf>, taken from M.de Wild Workshop LCA 2004 pp9
"the only statistics I believe are those I falsified myself"

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Further difficult approach to PV

- ExternE takes as bases that the input energy came from the German Energy mix from the 80's which was relatively highly burdened with CO₂. This leads then to a miserable Health and Global Warming effect of PV in ExternE (with PV taken into a baseload energy).
- Calculations for PV are based on values of 1990. With the clear and strong improvement of PV in efficiency during last decades, figure for PV should be much lower

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Price with nuclear risks

- When quantifying the external costs in the mid 90's ExternE had taken into account the costs associated with a potential nuclear accident (Moths, 1994). These costs were internalised by assuming that nuclear operators would have to insure their plants without liability limitation.
- Result: External costs of nuclear generated electricity would be approximately 1,80 EUR/kWh. For comparison the external costs associated with electricity generation from lignite were estimated at 0,09,7 EUR/kWh
- Source : NUCLEAR MONITOR - A Publication of World Information Service on Energy (WISE) and the Nuclear Information & Resource Service (NIRS), June 30, 2005 North American Edition

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And here comes ERMON –an attempt to noble Nuclear?

- What means ERMON?
- "Development of a General Scheme for Fuel Cycles and Life Cycles from all Energy Technologies as a Basis for the European Energy Risk Monitor (ERMON) EUR 21735 EN", commissioned by JRC of the European Commission
- Report published in May 2005 (Institute for Energy, Petten, The Netherlands,- A.Colli, A. Vetere Arellano, C.Kirchsteiger)

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ERMON's weakness

- Declares to have a general scheme for fuel cycles and life cycles for all energy technologies but in the publication fuel cycles are compared to life cycles which is inconsistent.
- ERMON favours Nuclear and discredits especially PV. It displays a long table of "Main dangerous substances and safety issues related to the PV module manufacturing stage" but does not display such a table at all for Nuclear and does not specifically point out to obvious cycle factors such as:
- Toxicity or Danger Potential of Uranium, yellow cake (U3O8) or even Uranium Hexafluoride (UF6)
- Toxicity of uranium mining and the whole mining chain until dismantling.
- There is no evaluation or mentioning of statistics on accidents at all or a relation to **Maximum allowable concentration** /working place

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Ermon's weakness consecutive

- For Solar: there is no relation between the "Dangerous" substances table and any Maximum Allowable Concentration/working place, production technologies (close cycle etc.) or accident statistics
- On the contrary, a long chapter talks about the wonders of safe Uranium mining without concrete figures, just pointing to the limitation of "nuclear energy resources" and a "solution" for this:
- This "problem can find a solution in the use of fast reactors or molten salt reactors, with a closed-fuel-cycle process. In this way it is possible to obtain a fuel availability of thousands of years and, at the same time, a rather clean fuel cycle with no mining, milling, conversion, enriching and no high level wastes." p 22

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Ermon and wind and conclusion

- Ermon shows a table (2.22) which states "wind related incidents" but neither the table nor the text give any evidence on real damage, statistics, or the like.
- No part of the reports shows a comparison of GAUs or risk potentials between the different energy sources. No statistics or data to real accidents – fatal or not – are given at all.
- But the public must think when reading Ermon that renewables carry much more risks than Nuclear
- WE urgently need a Peer Review, best asked for by DG ENV or DG TREN on ERMON

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Nuclear – Neither safe, nor clean, nor economical – but the opposite

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Nuclear would be the least efficient solution for climate change combat

- Report from 1988 by Bill Keepin "Greenhouse Warming: comparative analysis of nuclear and energy efficiency abatement strategies". - Report was based on assumption of omission of any negative things such as :
 - Nuclear waste treatment and storage,
 - decommissioning cost,
 - Safety of nuclear plants,
 - Any environmental or health consequences resulting from massive nuclear investment,
 - Possible impact on proliferation,
 - Vulnerability to terrorism, sabotage, acts of war or any additional negative impact
- (For Joint Hearing on Technologies for Remediating Global Warming, United States House of Representatives June 1988)

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Outcome of Keepin Report

- In medium high energy growth scenario massive investment in nuclear cannot prevent CO2 emission from growing
- To displace coal, one large nuclear plant (1000MW) has to be built every 2.4 days within 38 years
- Each dollar invested in electric efficiency displaces nearly seven times more carbon than a dollar invested in nuclear power.
- For every \$100 invested in new nuclear power, approximately one tonne of additional carbon is released that *could* have been avoided, had that money been invested in improved efficiency. This provides a measure of the environmental opportunity cost of nuclear power. - **And this is before Renewables entered the market!**

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Renaissance myth for Nuclear

- Nuclear electricity is covering about 16% of the world total electricity generation.
- Beginning 2005 (according to IEA) 440 nuclear power stations worldwide provide approximately 5 % of the global primary energy mix.
- According to recent Greenpeace study, if this figure is doubled, a corresponding number of new nuclear power stations would have to be built in the coming years.
- Even then nuclear energy's contribution to the primary energy mix would not be twice as high but would decrease, because, in absolute terms, world energy demand is expected to increase by at least one half in the next 25 years. To double nuclear energy's share in the "business as usual" scenario, would in fact require not a doubling, but a tripling, of the number of reactors. Not 440 but 1,320 nuclear reactors would have to be on the grid in 25 years' time.

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Money to burn?

- All nuclear orders nowadays come from centrally planned electricity systems, because despite strong official support and greatly increased subsidies, nuclear power's bad economics make it unfinanceable in the private capital market. Official studies compare new nuclear plants only with coal- or gas-fired central stations. But all three kinds of central stations are uncompetitive with windpower and other renewables, combined-heat-and-power (cogeneration), efficient use of electricity, all compared on a consistent accounting basis
- See, **Abstract of: Nuclear power: economics and climate-protection potential**, by AMORY B. LOVINS, CEO, ROCKY MOUNTAIN INSTITUTE, www.rmi.org 11 September 2005

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Finance and Investors are not going into Nuclear adventure - unless the deal is made attractive

- From: <http://www.greenpeace.org/usa/campaigns/nuclear/no-new-nukes>:
- According to the American business magazine 'Forbes', "The failure of the US nuclear power program ranks as the largest managerial disaster in business history"
- Nuclear power is not bankable - unless some nice deal can be struck with help from public authorities and public banks.
- In particular the World Bank stated already in 1992 and 1993 that „nuclear plants in the power sector would not be economic; they are large white elephants“ :
- "Bank lending for the energy sector requires a review of sector investments, institutions and policies."
- Furthermore the Asian Development Bank wrote:
- "The Bank is very much aware of this background [on nuclear power] and has not been involved in the financing of nuclear power generation projects in the Developing Member Countries due to a number of concerns. These concerns include issues related to transfer of nuclear technology, procurement limitations, proliferation risks, fuel availability and procurement constraints, and environmental and safety aspects. The Bank will maintain its policy of non involvement in the financing of nuclear power generation"

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Recent voice from within the EU Commission

- "From a pure market perspective, you have to look at what is really economic and efficient," Lars Mueller, a policy officer, DG ENV. "There are huge costs for nuclear power, if you include the costs for waste, and the waste problem is not solved in any country. Neither is the problem of decommissioning."
- Mueller was doubtful of Finnish claims that the 1,600 - MW EPR being built at Olkiluoto for Teollisuuden Voima Oy, or TVO, is the most economic way to get more baseload power. "I would be interested to hear how they justify the investment."
- (Source: Platts [Nucleonics Week](http://www.platts.com/Nuclear/Resources/News%20Features/europeannuclear/ecofficial.xml?t=EPR%20German)-
<http://www.platts.com/Nuclear/Resources/News%20Features/europeannuclear/ecofficial.xml?t=EPR%20German>)

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"Why divert further public resources from market winners to the market loser?"

AMORY B. LOVINS, CEO, ROCKY MOUNTAIN INSTITUTE

- Keeping nuclear power alive means diverting private and public investment from cheaper, more efficient market players —cogeneration, renewables, and efficiency—to the "costlier market loser". Nuclear plant vendors probably total a few billion dollars revenue; renewable power equipment vendors reached ~\$28b in 2004. (Lovins)

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Nuclear - Terrific Proliferation

- No other energy technology keeps "handy do-it-yourself-kits" and innocent disguises for making weapons of mass destruction, nor represents terrorist targets or potential for accidents that can devastate a region, nor creates wastes so hazardous, nor is unable to restart for days after an unexpected shutdown. (Lovins)

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Making the Rich richer- by loosening state control and spending state resources

- "In the full enjoyment of the gifts of Heaven and the fruits of superior industry, economy, and virtue, every man is entitled to protection by law; but when the laws undertake to add to these natural and just advantages artificial distinctions, to grant titles, gratuities, and exclusive privileges, to make the rich richer and the potent more powerful, the humble members of society—the farmers, mechanics, and laborers—who have neither the time nor the means of securing like favors to themselves, have a right to complain of the injustice of their government."
- Andrew Jackson (1767–1845), U.S. president.

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