Nuclear Energy – Threat to the World – No Solution to Climate Change
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IS NUCLEAR ENERGY SUSTAINABLE?

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Is Nuclear Energy Sustainable?

Setting up and operating a nuclear reactor requires:

i. the energy costs of **building and operating** the plant itself;
ii. the energy costs of **mining and refining the uranium** in the ores;
iii. the energy costs of **enrichment of the uranium** and **fabrication of the fuel elements**;
iv. **operating and maintenance** costs (including refurbishment of the plant itself).

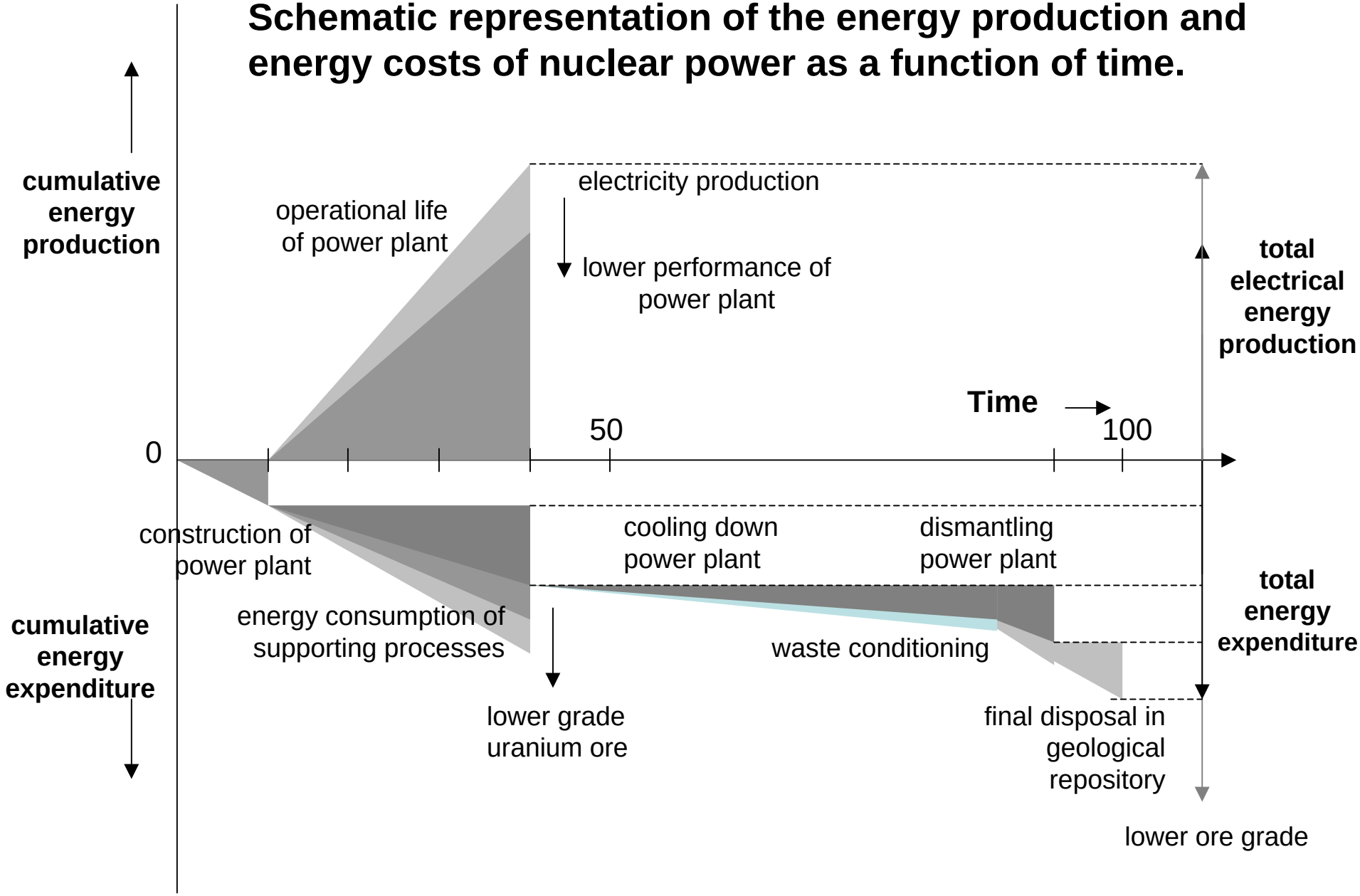
There are also :

– all **decommissioning** costs;
– **risk-associated** costs.

Is Nuclear Energy Sustainable?

- All these processes require energy, mainly fossil fuels which emit GHG's.
- As a consequence, the energy balance (output/input) is not very good, maybe 2 to 1.
- The GHG emitted by the fossil fuels used in these process lead to emissions of approximately 1/3 of a comparable natural gas plant.
- A nuclear reactor is thus not carbon free neither sustainable.
- These are intrinsic characteristics of renewables.

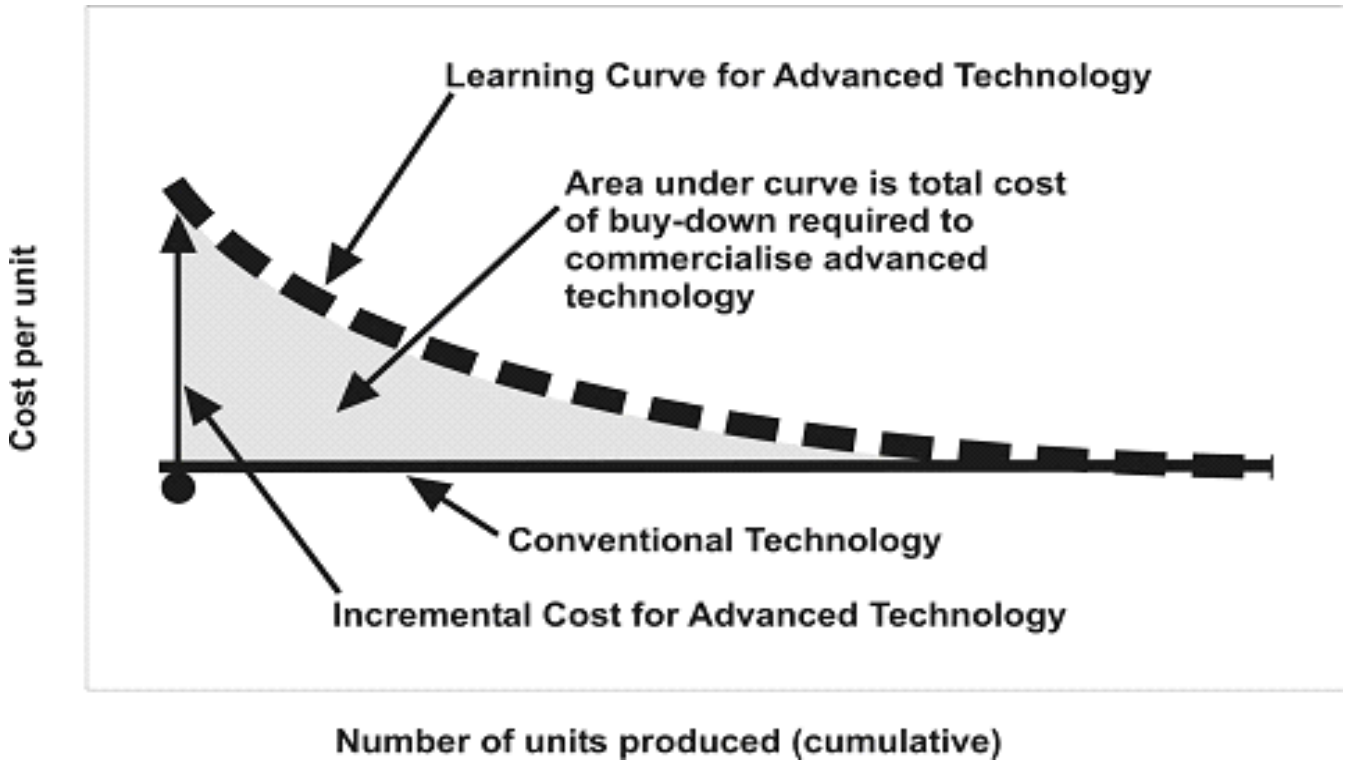
Schematic representation of the energy production and energy costs of nuclear power as a function of time.



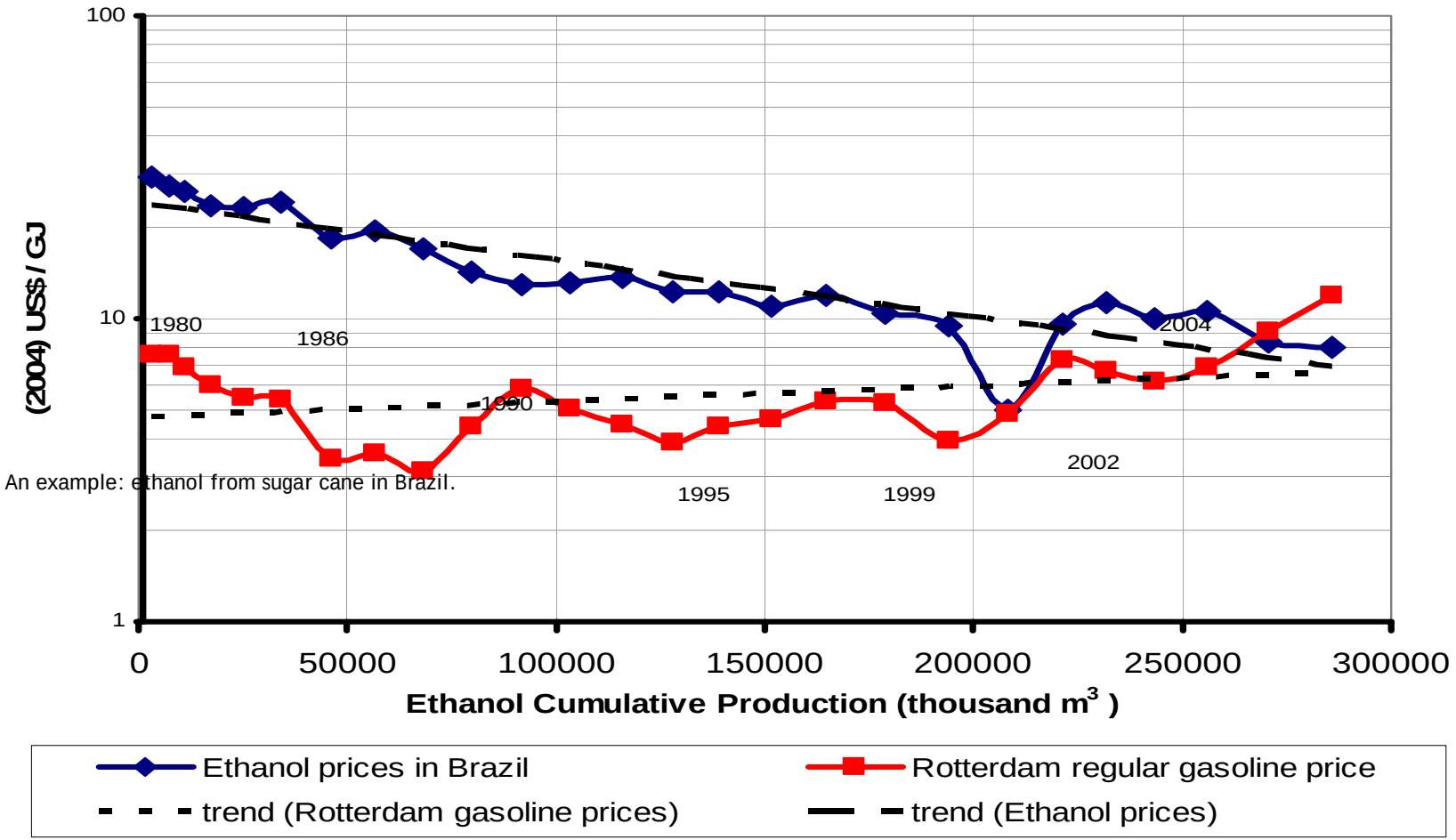
Storm van Leeuwen 2001 (www.oprit.rug.nl/deenen/Introduction,_ summary_of_costs_rev3.PDF)

Renewable Energy

Although expensive when first introduced, present significant cost reductions as a result of “learning curves”, as accumulated production of energy increases.



An example of learning curve: sugar cane ethanol in Brazil



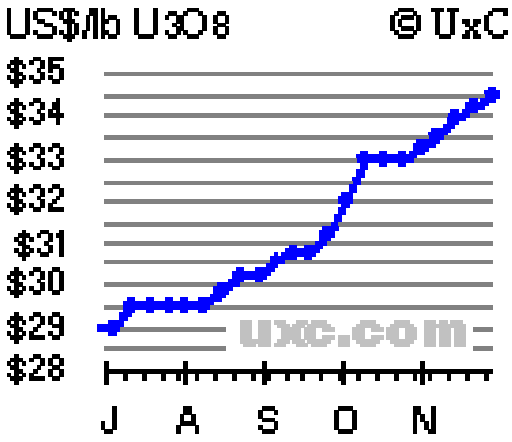
Source: Goldemberg et al (2003) updated

Nuclear Energy: arguments

AGAINST	IN FAVOUR
Nuclear reactors emits 1/3 of the GHGs of a fossil fuel plant	Nuclear does not contribute to GHG emissions (particularly CO_2)
Not competitive electricity costs (20-30% more than conventional plants); subsidies are needed, plus insurance against accidents (98%, U.S. Government) and decomissioning costs.	Electricity is competitive if carbon is valued at US$ 200/tonCeq
Risks associated with radioactive waste (80,000 tons already exist)	Risks are real but in the long term, avoiding global warming immediately
Risk of terrorism and nuclear proliferation issues	New nuclear reactor designs are safer
Risk of nuclear accidents are real	

Sources: Helen Caldicott (Nuclear Policy Research Institue) and Nicholas D. Kristot (New York Times); IAEA Bulletin vol.47, nº. 1, September 2005 (55-57). Nuclear Reactions Power for electricity generation keeps generative debate.

Is there a Nuclear Energy "Learning Curve"?



Nuclear energy does not follow this general trend, although there are few studies on the subject.

Indications are that costs have increased as more nuclear reactors have been built, due to the need of additional safety measures, storage of highly radioactive wastes and decommissioning costs.

Decreasing overall costs in nuclear energy would be more a "**forgetting curve**".