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Nuclear power : a false solution to climate change

In the face of declining nuclear power generation worldwide, nuclear industry leaders and their political and media allies are suggesting that this technology is an appropriate and indispensable solution to fight climate change. But how realistic is this?

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PROTECTING THE CLIMATE? NUCLEAR POWER WON'T HELP

At best, nuclear power's contribution to energy supply is minor...

Even in France, which produces 75% of its electricity needs from nuclear power, greenhouse gas (GHG) emissions are still four times too high to reach the climatic objectives. In 2014, fossil fuels (petrol, diesel, gas, coal) still accounted for more than half of the country's primary energy consumption.

75% of GHG emissions worldwide occur in sectors that have no link whatsoever to producing electricity (agriculture, deforestation), that are so far weakly electrified (transportation), or that use

electricity wastefully (home heating, certain industrial processes).

… and definitely too late

The fight against climate change is a race against time. Emissions worldwide should reach their peak by 2020 before declining drastically. According to the International Energy Agency (IEA), even if one nuclear reactor was built and got online every week for 15 years, GHG emissions would only be reduced by 9%! The industrial and financial capacities necessary for such nuclear growth are plainly lacking, rendering it impossible.

A marginal form of energy in decline

Worldwide, nuclear provides barely 2% of total energy consumption (approximately 16% in France). This amounts to only 10.8% of world electricity production, in sharp decline since the historical peak of 17.6% had been reached in 1996 [1]. Nuclear energy will continue to decline, as the reactors currently under construction are too few to replace the many aging reactors that will close within the next decades.

Even China, which has the largest number of reactors under construction, produces more electricity from wind turbines than from nuclear power since 2012 [2]. Nuclear energy amounts to less than 3% of the energy consumed in the country.

Nuclear energy also produces greenhouse gas

The mining and enrichment of uranium; the manufacturing, transport and reprocessing of nuclear fuel rods and waste; the building and dismantling of the reactors. At every step, nuclear energy produces greenhouse gas. Like wind, solar and hydroelectricity, however, nuclear produces far less GHG than coal or petrol.

Nuclear energy is too expensive

Investors are turning their backs on nuclear power. According to the IEA, from 2000 to 2013, 57% of investments in new electricity generation capacities have been in renewables, and only 3% in nuclear [3]. Furthermore, many proposed new reactors have been dropped over the past few years.

This is because the cost of nuclear energy continues to increase. In France, the EPR nuclear reactor is now bound to cost three times more than initially announced. Furthermore, some 250 billion euros would have to be squandered to patch up the ageing reactors to prolong their operations to a security standard comparable with the EPR [4]. This is a waste of money: the whole fleet will in any case have to be replaced within the next 10 or 20 years!

Unlike nuclear energy, the cost of renewables keeps falling. Electricity from on-shore wind is already much (30 to 50%) cheaper to produce than that of the future EPR [5] or the current French reactors once they will be revamped. The same may happen for solar electricity as soon as 2018 [6].

Nuclear energy is not adapted to a deteriorating climate

If we take into account the full life cycle, the kWh from nuclear uses much more water than a kWh from wind or photovoltaic [7]; now, droughts and heat waves are becoming ever more frequent! Moreover, such climatic events can disrupt the operation of nuclear power plants: one quarter of France’s nuclear reactors had to be shut down or operated at reduced capacity in the hot summer of 2003.

Fires caused by drought can also threaten nuclear installations, as happened at Mayak in Russia (2010) and at Los Alamos in the US (2011). In France, during the storm of 1999, the Blayais nuclear

plant near Bordeaux was flooded and came very close to an accident. The electric grid can also be severely damaged. Even when shut down, a constant supply of electricity is required to cool down the reactors, so they will not undergo a nuclear meltdown.

MORE NUCLEAR DANGERS TO AVOID DANGEROUS CLIMATE CHANGE ?

Radioactivity and nuclear waste: more and more pollution

From uranium mines to nuclear waste, including radioactive and chemical pollution from nuclear reactors, every phase of the nuclear cycle brings about pollution.

300,000 tons of spent nuclear fuel have already been accumulated worldwide. These highly radioactive nuclear wastes will remain dangerous for over hundreds of thousands of years. This highly radioactive nuclear waste will remain dangerous for over hundreds of thousands of years. Nuclear countries plan on burying the waste, but the only existing nuclear waste disposal sites (Asse in Germany and WIPP in the United States) have turned into incredible fiascos that already contaminate the environment, although they store waste that are less radioactive.

Major accidents: a disaster is possible

The French Institute of Radioprotection and Nuclear Security (IRSN) now states that “elected officials must be prepared for a nuclear accident” [8], and that a major accident would be an “unmanageable European catastrophy” that would cost up to 760 billion euros [9].

Numerous factors can cause an accident. After Chernobyl and Fukushima, building new reactors would increase the risk of another catastrophe, which could contaminate vast territories for centuries and have a huge impact on the health or living conditions of millions of people.

Proliferation: radiological terrorism, nuclear war

More nuclear power means more radioactive materials that may be diverted. By dispersing them with conventional explosives, a terrorist attack can contaminate a city.

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Furthermore, no tight barrier exists between the civilian and military uses of nuclear materials: any nation possessing nuclear reactors can develop an atomic bomb…and use it. It is estimated that a limited nuclear conflict between Pakistan and India, whose vital supplies of drinking water from the Himalayan glaciers are threatened by global warming [10], would expose 2 billion people to famine [11].

THE TRUE SOLUTIONS FOR THE CLIMATE

Saving energy : the most efficient, the least expensive

Enormous potential for saving energy exists in every sector: construction, industry, transport, information technology, household appliances, etc.. The IEA asserts that 50% of reductions in GHG emissions to be achieved by 2020 should come from efficiency measures [12]. This could avoid the equivalent of the current emissions from Russia, the fifth largest GHG emitter in the world.

Being efficient with the energy we use, which is less expensive than producing it, brings about numerous advantages: reduced energy expenses, job creation, etc. Thus, meeting its objective of saving 20% of energy by 2020, the European Union would save 200 billion euros net per year [13]!

100% renewables : yes we can !

According to the ADEME (the French Environment and Energy Management Agency), achieving 100% renewable electricity by 2050 would have a cost similar to maintaining nuclear energy. The country has the potential to produce three times as much renewable electricity as the current demand for power [14]. The “négaWatt” scenario has demonstrated that by 2050 France could meet nearly all its energy needs, and not only those in electricity, with renewables [15].

These recent studies converge with the results of numerous others carried out elsewhere in the world. Researchers from Stanford have published in 2015 a detailed prospective scenario enabling the US to achieve the goal of 100% renewable energy by 2050, while reducing their total energy consumption by 39% [16].

Break out of the nuclear and fossil fuel stranglehold

Nuclear power and fossil fuels are the backbone of a centralized, rigid energy system which inherently encourages wastefulness and hinders the rapid expansion of renewable energies. We must urgently break out of the stranglehold of these energies from the past.

Energy transition: Germany shows the way

Thanks to sustained institutional support, the energy transition will enable Germany to close all its nuclear plants by 2022, while almost consistently reducing its GHG emissions for the past 25 years. The country aims to reduce its emissions by 55% by 2030 compared to 1990.

In only ten years’ time, the share of electricity from renewables has increased from 9% to 26% on a yearly average [17], sometimes exceeding 50% on sunny or windy days [18].

Contrary to a widespread belief, Germany has not used coal to phase out nuclear power [19]. Granted, some coal-fired plants that went under construction between 2005 and 2009 did go on line between 2012 and 2015. But the sustained development of renewables has far more than offset the reduction of nuclear electricity generation. But the sustained development of renewables has far more than offset the reduction of nuclear electricity generation [20]. And since 2011, when 8 nuclear reactors were closed permanently, no new coal-fired plant construction has started and no less than 6 projects have been cancelled! [21]. Moreover, several coal-fired plants totalling 2.7 GW will be mothballed by 2020, inactive except in case of emergency [22].

In 2014, electricity produced in Germany from coal dropped by 6% compared to 2013 [23], and the country’s GHG emissions by 4.3%, while total fossil fuel consumption reached its lowest level in 35 years [24]. After scrapping nuclear power, Germany intends to scrap coal.

Job creation: far greater potential than nuclear!

With some 1.1 million jobs in the European Union (7.7 million in the world), renewable energy creates 5 times as many jobs as nuclear power [25]. While in France Areva is currently planning thousands of redundancies, in Germany there were 1.2 million jobs related to renewables and energy efficiency [26].

Footnotes

[1] Mycle Schneider, Anthony Froggatt, "The world nuclear industry status report 2015", July 2015, p.13

[2] Bernard Chabot, Développement Durable Magazine, "Analyse des marchés et des productions

d'électricité nucléaire jusqu'en 2014 et 2040 avec des comparaisons stratégiques avec les énergies renouvelables", April 2015, p.58

[3] International Energy Agency, "World Energy Investment Outlook 2014 Special Report", June 2014, p.162

[4] WISE-Paris / Greenpeace, "L'échéance des 40 ans pour le parc nucléaire français", February 2014

[5] While the estimated cost of the EPR at the time was still estimated at six billion, the french Court of Auditors estimated in 2010 that the EPR would produce electricity at a cost of € 70 to € 90 / MWh. With a cost of 8.5 billion, the cost of EPR MWh can be estimated at around € 110 / MWh. This valuation is accredited by the contract signed by EDF with Great Britain for the construction of two EPR reactors at Hinkley Point. While benefiting of a financial guarantee of £ 10 billion granted by the British state, EDF claimed a guaranteed sales price and indexed to inflation for 35 years. Set at £ 92.5 per MWh (approximately € 111 / MWh) to contract signature, almost twice more than the current market price per MWh, with the guaranteed price, inflation will reach about £ 120 / MWh (about € 144 / MWh) in 2023 - very hypothetical year for the start-up of the reactors planned by EDF. source : Liberum Capital, "Flabbergasted – The Hinkley Point Contract", October 30, 2013). In comparison, in November 2013 , ADEME estimated that " the average purchase price of electricity over the lifetime of a wind turbine is around € 70 / MWh " (source : ADEME, "Les avis de l'ADEME - La production éolienne d'électricité", November 2013, p.3).

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[7] J Meldrum, S Nettles-Anderson, G Heath, J Macknick, "Life cycle water use for electricity generation : a review and harmonization of literature estimates", Environ. Res. Lett. 8 (2013), ; The IRENA (International Renewable Energy Agency) uses this study to compare the water needs of different energies in its report : "Renewable energy in the water, energy and food nexus ", January 2015, p.69

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[9] Patrick Momal, Ludivine Pascucci-Cahen, "Les rejets radiologiques massifs diffèrent profondément des rejets contrôlés" IRSN, November 2012

[10] Gwynne Dyer, "Alerte : changement climatique, la menace de guerre", Ed. Robert Laffont, 2009, p.151-163

[11] IPPNW, "Nuclear famine – Two billion people at risk ? - Global Impacts of Limited Nuclear War on Agriculture, Food Supplies, and Human Nutrition", 2nd edition, November 2013

[12] International Energy Agency, "Redrawing the energy-climate map - World Energy Outlook Special Report", 2013

[13] Ecofys / Friends of the Earth / Climate Action Network, "Saving energy : bringing down Europe's energy prices for 2020 and beyond", February 2013, p.4

[14] ADEME,"Vers un mix électrique 100 % renouvelable en 2050 – Rapport final", 2015

[15] Scénario NégaWatt 2011, Dossier de synthèse updated in July 2013

[16] https://stanford.edu/group/efmh/jacobson/Articles/I/WWS-50-USState-plans.html and https://thesolutionsproject.org/

[17] Specifically, 9.2% in 2004 to 26.2% in 2014.AG Energiebilanzen, "Bruttostromerzeugung in Deutschland ab 1990 nach Energieträgern", 27 février 2015

[18] According to data recorded in February 2015 , the historical record has raised 80% of German electricity consumption provided by renewable energies at 12:00 AM May 11, 2014 . Agora Energiewende, "Report on the German power system", February 2015, p.14

[19] See also : Conrad Kunze, Paul Lehmann, Energy Post, "The myth of the dark side of the Energiewende", February 17, 2015 ; french translation by Réseau "Sortir du nucléaire"

[20] From 2010 to 2014 , the nuclear power generation decreased by 43.5 TWh / year , while the production of renewable electricity increased to 55.8 TWh / year. Agora Energiewende, "Zuwachs bei Erneuerbaren Energien macht Grafenrheinfeld-Aus spielend wett", July 2, 2015

[21] Craig Morris, "Germany builds minus six coal plants after nuclear phaseout", April 29, 2013 ; Craig Morris, "Zero German coal plants as a reaction to Fukushima", May 27, 2015 ; Deutsche Umwelthilfe (DUH), "Kohlekraftwerksprojekte in Deutschland" , October 2013 ; Bundesverband der Energie- und Wasserwirtschaft (BDEW) , "BDEW-Kraftwerksliste", April 13 , 2015 and english version translated by Reuters

[22] See for example : Denis Cosnard, "L'Allemagne va arrêter plusieurs vieilles centrales au charbon", Le Monde, July 2, 2015

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[24] Thomas Gerke, "Plummeting demand, renewables slightly up and fossil power generation at a 35 year low", Renewables International, December 22, 2014

[25] Sources and detailed methodology of this calculation : https://www.sortirdunucleaire.org/Image4-emplois-UE

[26] 363,100 jobs in the renewable energy sector in Germany in 2013 , according to Observer, 14th EurObserver report, "État des lieux des énergies renouvelables en Europe", 2014, p.131 ; 850,000 jobs in the sector of energy efficiency in 2014, according to DENNEF, "Branchenmonitor Energieeffizienz 2015", April 2015, p.31