Climate Action Network

A Sustainable Energy World Without Nuclear Power

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Climate Action Network International (CAN-I) is the world's largest network of civil society organizations working together to promote government action to address the climate crisis, with more than 900 members in over 100 countries. www.climatenetwork.org

Key points

- Nuclear power is socially, environmentally and economically unsustainable. Nuclear energy has no role to play in a fully decarbonized power sector in transition **to phasing out all fossil fuel emissions and phasing in a 100% renewable energy future with sustainable energy access for all, as early as possible, but not later than 2050.**
- Any climate agreement such as the one to be agreed in Paris in December 2015 must prioritize its efforts for climate change mitigation within the energy sector on sustainable renewable energy and energy efficiency. Governments should not incentivize or rely on nuclear power in their mitigation planning including within their INDCs.
- Nuclear power as an inherently unsustainable energy source shall not be eligible under any existing or new GHG compliance market mechanism for any carbon credits.
- Nuclear power is not fit for any climate finance and therefore shall also be barred from receiving any financial support under either international or bilateral co-operations such as IFI, the GCF or ODA.

Therefore, **CAN calls on all governments that have or are planning new nuclear power installation, to swiftly shift away from these investments toward safe, clean, appropriate and sustainable renewable energy.**

Background

Since its foundation, Climate Action Network (CAN) has held a clear position to promote a nuclear-free future. Before countries define and submit their proposed Intended Nationally Determined Contributions (INDCs) and while thinking about the elements of the Paris agreement, CAN would like to elaborate further on its long-standing position to oppose nuclear power.

Though the share of nuclear power in electricity generation has been declining both absolutely since 2006, and relatively from approximately 18% twenty years ago to 11% by end of 2013, a revival of nuclear investments is not unlikely. Currently, about 80% of nearly 400 GW nuclear are located in the OECD nations. Yet, more than three-quarters of the presently planned, commissioned and constructed 76 GW nuclear is happening in non-OECD nations[1].

Five nations, US, France, Russia, South Korea and China hold more than two thirds of all nuclear electricity generation. Globally, there are 31 nations operating nuclear power but the bulk of countries, in particular Least Developed Countries (LDCs), do not have nuclear plants. Presently, and because of the record low of reactors under construction in 2005, several nations across the world plan to maintain or even grow nuclear power in the next years and decades while several others are newcomers to this technology[2]. Despite the clear risks and also the obvious prior experiences of tragic accidents in Chernobyl and Fukushima, nuclear power displays an acceptable power source for a number of governments for several reasons, including but not limited to energy security, base load electricity supply, security and military reasons and climate change mitigation[3].

Global civil society is convinced that the fight against climate change does not justify accepting nuclear energy as a viable solution to our global climate crisis. Rather, the implications and consequences of the entire nuclear technology production and supply chain display major risks to humanity. For humanity, a globally decarbonized society must be sustainable, clean and fair without a role for nuclear energy.

The recently agreed 5th Assessment Report of the IPCC also raises several serious concerns that need to be considered when employing nuclear energy and reminds governments that scenarios to stay below 2 degree C are only slightly more expensive when nuclear is replaced by other zero-carbon technologies such as renewables[4].

Why CAN believes nuclear power is a false solution

CAN is convinced that all nuclear power technologies provide essential economic and systemic barriers to a cost-effective climate protection and zero-carbon energy future coupled with high energy and resource efficiency. Furthermore, CAN is urging that the entire nuclear fuel chain from mining uranium, producing electricity to waste disposal and

[1] International Energy Agency (IEA) (2014): Nuclear power today and decisions to come, *in:* World Energy Outlook 2014, Paris 2014.
[2] Schneider, M.; Froggart, A. et al (2014): The world nuclear industry status report, Paris/London.
[3] International Energy Agency (IEA) (2014):, Prospects for nuclear power to 2040, in: World Energy Outlook 2014, Paris, pp 383 – 410.
[4] IPCC (2014): Summary for Policy Makers WG III, pp 20 – 21 & Table (TS.13) in footnote 9.

eventual 'recycling' of used nuclear rods or/and nuclear enrichment present a long-term threat to life on earth. CAN therefore stresses that nuclear power is not needed to achieve zero carbon development. Compared to low- and zero-risk renewable energy coupled with high energy efficiency and innovative electric grid and load management in the power sector, nuclear is a strong obstacle to energy security and to a smart and affordable consumer-driven electricity demand system with strong roots in decentralised and distributed energy architecture.

In addition, nuclear energy has no role to play for providing basic power services for the approximately 1.3 billion poor people mainly in South Asia and Sub-Saharan Africa who do not have access to reliable and clean electricity. In particular, access to electricity in non-grid connected areas is most cost-effectively delivered by decentralized renewable energy sources[5].

Therefore, in order to keep the rise of global mean temperature increase well below 2 and/or 1.5 degrees Celsius compared to pre-industrial levels and to prevent catastrophic climate events, the 2015 Paris agreement should urge governments to undertake strong policies and measures to shift away from false solutions such as fossil fuels and nuclear energy.

Governments need to transition towards 100 % renewable energy as well as support ambitious energy efficiency and energy conservation in order to allow bold greenhouse gas emission reductions. To that end, CAN calls on governments to **phase out all fossil fuel emissions and phase in a 100% renewable energy future with sustainable energy access for all, as early as possible, but not later than 2050.** This vision needs to be at the heart of the 2015 Paris agreement. This will also assist to provide increasing energy service and economic growth needs, in particular for the poor and many developing countries while reducing overall energy production requirements – and associated emissions (carbon) and risks (nuclear).

Why do governments need to move away from nuclear energy? Nuclear power has several impacts on the people and communities, economics and effectiveness of the energy system as well as on the military geo-stability.

1. *Nuclear power is polluting and results in long-term risks of continued and severe contamination. Therefore nuclear power is a violation of human rights*
    a. **Nuclear power has brought large negative health impacts** such as increased cancer rates, polluted water and soils to the peoples of the world who reside in territories where uranium is mined and who had to and still have to work in the mines. The resultant mining waste, often including various grades of concentrations of remaining radionuclides, is often stored in open-air posing risks for the radioactive contamination of ground and surface water as well as agricultural produce. When accidents occur, it is particularly local and socially vulnerable groups of people that suffer most. Since radioactive contamination causes various types of cancer, children are

[5] IEA (2011): Energy for all – Financing for the poor, in: World Energy Outlook, pp. 469 – 505, particularly Fig. 13.8 & International Renewable Energy Agency (IRENA); Renewable power generation costs, in: Renewable Power Generation Costs in 2012 – An overview, Abu Dhabi, pp. 14 – 20, particularly Fig. 2.1.

particularly at risk, 1]

b. **Along its entire supply chain, nuclear power always carries a risk of radioactive contamination and generates large amounts of dangerous radioactive waste** that presently cannot be safely stored or treated anywhere because it remains toxic for centuries and millennia. Radioactivity even in low doses is a risk and might cause cancer such as leukaemia, also in regular operation of nuclear plants. [2]
c. **Nuclear accidents usually have impacts far beyond the direct surrounding environment.** The Three-Mile Island, Windscale, Mayak, Chernobyl and Fukushima accidents have shown that nuclear technology is uncontrollable and causes social and environmental damage, as well as violations of human rights, including rights to life, health, land, houses and safe water. The detailed analysis on the Fukushima accident and its implications in 2011 in Japan sheds a sad light on the dangers of this technology. Compensation alone cost the operating utility of TEPCO more than USD 40 billion and only lucky circumstances prevented a much larger disaster impacting a number of other Japanese reactors[6].

2. *Nuclear power is impeding increased uptake of renewable energy, enhanced energy efficiency and smart grids and is costly.*
    a. **Compared to other power sources, nuclear has the lowest flexibility to react to demand fluctuations by consumers**. Nuclear power technology does not allow for rapid electricity generation response, such as ramping up or ramping down capacity output within a few hours, let alone minutes or seconds which a modern power system based on variable renewables such as solar and wind might require. In fact, compared to all other power technologies, nuclear has the worst response speed and less than half or all-nuclear capacity might be able to react within six hours[7]. Therefore, nuclear is either 'on' or 'off'. As we deal with large capacities of individual nuclear plants, either mode has huge implications on grid stability. To maintain or expand large-scale inflexible nuclear power could reduce incentives on the demand side efficiency of electric appliances. The inability of nuclear power plants to deliver flexible and demand driven dispatch loads means that they only work in an electricity grid that is heavily based on large base-load power stations (primarily coal, nuclear and gas). It also means that states that invest in or rely on higher shares of nuclear energy will likely hamper a transition to decentralized renewable energy systems because they would need to maintain an electricity system suited to inflexible base load nuclear power.
    b. **Nuclear power is expensive and requires large amounts of investment** for reactors' construction and decommissioning, safety measures, and long-term radioactive waste management, among other expenses. These costs make nuclear power probably the most costly option of any energy

[6] "Schneider, M./ Froggart, A. et al. (2013): Fukushima – A status report I in The world nuclear industry status report 2013, Paris/London 2013 pp. 61 – 72. & Schneider, M./ Froggart, A. et al. (2014): Fukushima – A status report II, in: The world nuclear industry status report 2014, Paris/London.
[7] IEA (2011): Identifying the flexible resource, in Harnessing Variable Renewables, Paris 2011, pp. 43 – 50.

technology. While most renewable power utility costs (weighted averages) fluctuate between USD 1000 – 4000 per kW installed[8], recent nuclear assessments show the increase of up to USD 8000 per kW, such as in the UK (Hinkley Point)[9]. Without subsidies, nuclear power never was and still is not an economic and/or competitive solution. One key cost accelerator is the long production time of an average of 10 years per reactor across the globe with some being completed not before 20 or even 30 years[10]. Needless to say, once accidents occur, the economic burden is tremendous. For that reason no insurance company worldwide is able or willing to accept insurances that would cover catastrophic nuclear accidents[11]. Also, the costs of nuclear accidents are immeasurable and the damage caused lasts for thousands of years. Even the new generations of Nuclear Power Plants (NPP) like III+ and IV, which are not yet put in operation worldwide or exist only on paper, cannot guarantee 100%-safety, accident-caused radioactive release is still possible, and a higher risk in a world already experiencing climate change impacts.

3. *Nuclear power is a global security risk.*
    a. **Dependency on nuclear energy in states consequentially leads to a risk of nuclear proliferation** into non-holder states. This risk would increase with the spread of nuclear power: "(…) if there were rampant proliferation of nuclear energy production facilities to each and every state that has expressed interest to the IAEA in acquiring nuclear power - the world would face- grave security challenges."[3]Despite the Nuclear Non-Proliferation Treaty uranium munitions was already used too many times. "Frequent miscarriages and genetic defects in new-borns after the Kosovo war and in Iraq, are attributed to depleted uranium munitions. The gene pool of the affected population is destroyed forever."[4]
    b. **Nuclear power facilities are vulnerable to attacks, terrorism and military conflicts, as well as overall climate instability:** Over the past decades, at least two nuclear power plants (Armenian NPP and Zaporizhia NPP) were close to combat zones and at risk of being impacted by armed attacks. Moreover, widespread placement of NPPs with their spent fuel pools, storages of spent nuclear fuel and radioactive waste on the banks of ponds endangers sources of drinking water for millions of people, even if armed attacks will not destroy the reactor itself.
    c. **Climate change will further exacerbate the risks of nuclear energy**. We have already seen the need to power down some nuclear plants due to increased river water temperatures in summer that cannot deliver sufficient cooling. Nuclear energy might require, depending on cooling technologies, between 10,000 and 400,000 litres of freshwater per MW/H while wind and

[8] IRENA (2015): Renewable power generation costs in 2014, particularly Fig. ES 4, Abu Dhabi.
[9] Schneider, M./ Froggart, A. et al (2014): "The world nuclear industry status report 2014", Paris/London, pp. 8.
[10] International Atomic Energy Agency (IAEA) (2015): Database Vienna 2015: http://www.iaea.org/pris/.
[11] Versicherungsforen (2011): Calculating a risk-appropriate insurance premium to cover third-party liability risks that result from operation of nuclear power plants, Leipzig.

solar PV need less than 100 litres[12]. While this is only one example, demand on natural resources such as water for production of nuclear energy are large and are not sustainable in a world that already faces increasing scarcity of these natural resources and where climate change poses additional threats.

Therefore, each state of the nuclear energy cycle and its development escalates existing inequalities in society, impedes a sustainable, affordable and low-risk, low-waste energy system, and infringes human rights and the well-being of current populations and future generations. CAN calls on all governments, that have or are planning new nuclear power installation, to swiftly shift away from it toward safe, clean, appropriate and sustainable renewable energy.

[12] IEA (2012): "Water for energy" *in* World Energy Outlook 2012, Paris, pp 501 – 527, particularly Fig. 17.