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NUCLEAR POWER

SUPPLEMENT 2

International Atomic Energy Agency

Discussing the Environmental, Economic, and Militaristic Impacts of Adopting Nuclear Energy

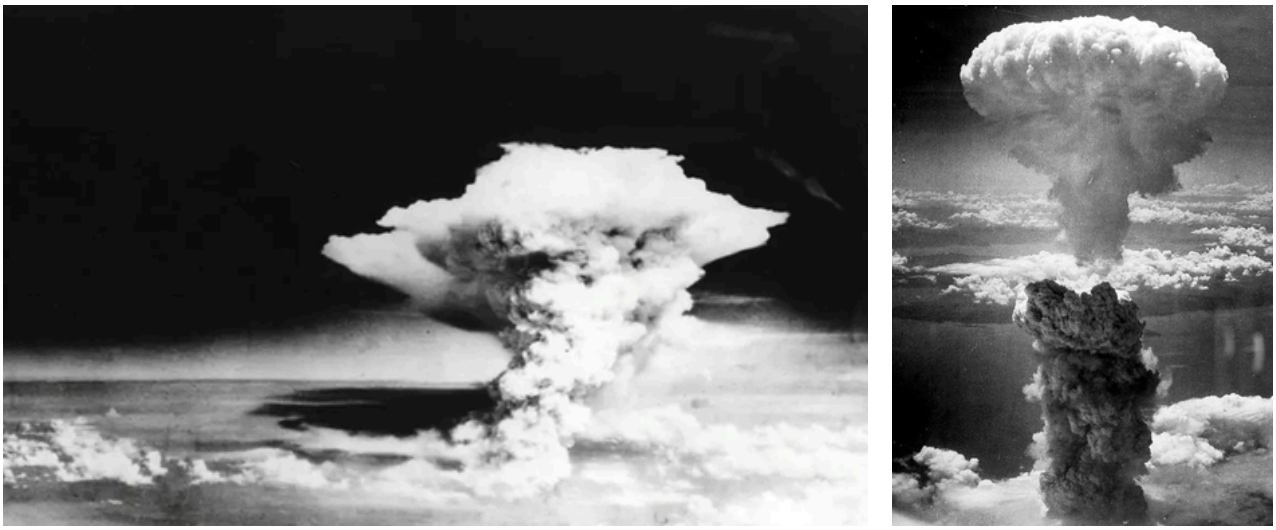
August 15-17 IISP MUN 2024

The Dangers of Nuclear Proliferation

From the initial development of the nuclear bomb during World War II, it has been acknowledged to be the single most lethal and destructive weapon ever created. This description, of course, was only reinforced by the devastating health and infrastructural crises in Hiroshima and Nagasaki, and has created a destructive reputation which has allowed the world to experience a relative reprieve from the use nuclear bombs in warfare.

However, as nuclear weapon development has experienced a sharp increase in recent years, along with the availability of nuclear weapons to unstable governments (like North Korea), the risks of nuclear proliferation are once again at the forefront of the public conscience, and an unshakable part of foreign policy and geopolitical relations worldwide. These risks, of course, have been covered in great detail in diplomatic summits and scientific journals worldwide, and ranges from a serious risk to public health due to nuclear fallout, to a threat of widespread death and destruction as a result of all-out nuclear war.

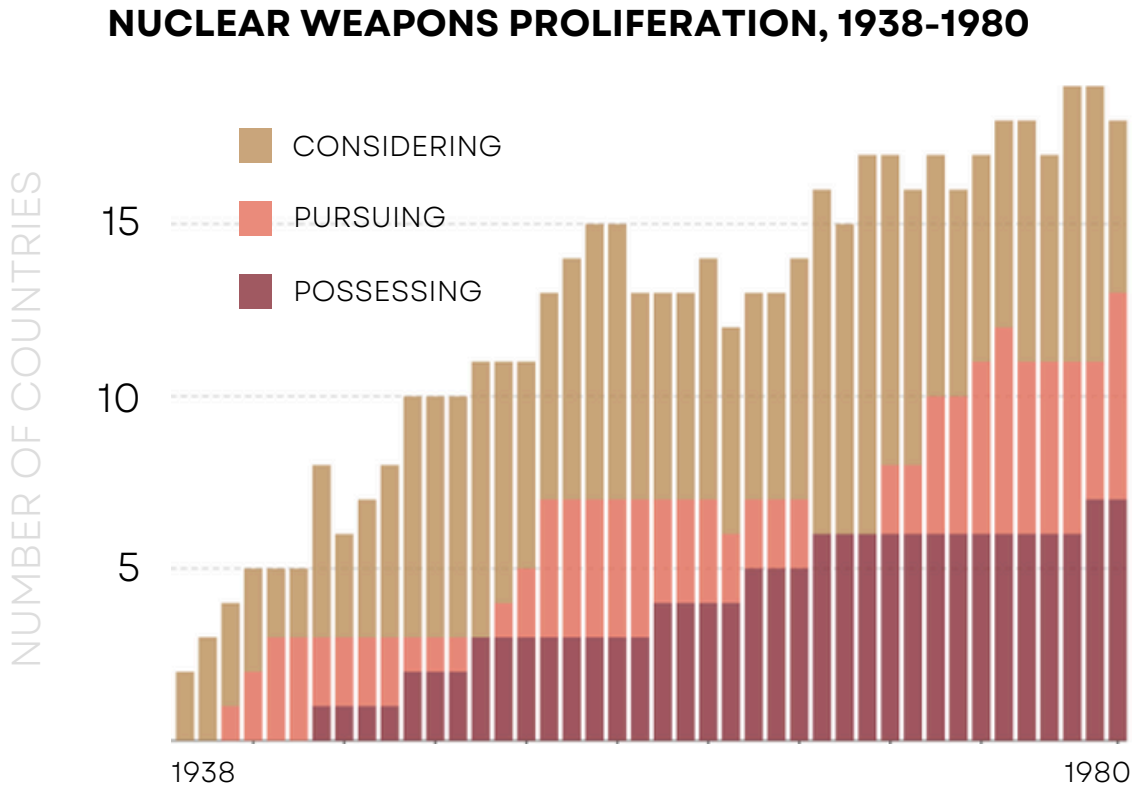
While this threat of nuclear war isn't likely at this point in time, it is worthwhile noting that political situations often change on a whim. In 2017, Kim Jong Un and Donald Trump were facing off almost constantly, and the US had credible intelligence suggesting that Kim Jong Un not only had ready access to the "nuclear button," but he was also willing to use it. Several reports during the time detailed the amount of time a missile would take to reach the West coast of the mainland US.



The aftermath of the bombs in Hiroshima (L) and Nagasaki (R) in 1945 From: US Army

When considering the issue of possible nuclear conflict, the doctrine of mutual assured destruction (MAD) is an important component. MAD is a military strategy which essentially suggests that the full use of nuclear weapons by an aggressor on a nuclear country would result in the complete and total annihilation of both countries. It is based on the theory of rational deterrence, which further posits that the threat of using strong weapons against an enemy prevents that enemy from making an attack in the first place, and therefore reduces the threat of conflict. However, this doctrine is largely only a way to justify the stockpiling of nuclear weapons, and a conceptual method of self-protection.

There is an argument to be made that nuclear non-proliferation would not solve the problem, unless it was comprehensive; meaning nuclear countries would have to dismantle their reserves as well. This seems unlikely, for several reasons – as previously noted, being a nuclear country brings with it a tremendous amount of power and influence, and to convince a country to give that up would be an extremely trying endeavour, with little chance of success. However, without convincing nuclear countries to give up their stockpiles, there is no real drive for non-nuclear countries to agree to limit their own programmes. Additionally, non-proliferation is perceived to be a solution which heavily favours nuclear countries – who are allowed to maintain their own stockpiles, but not build upon them.



A graph depicting nuclear proliferation over 4 decades

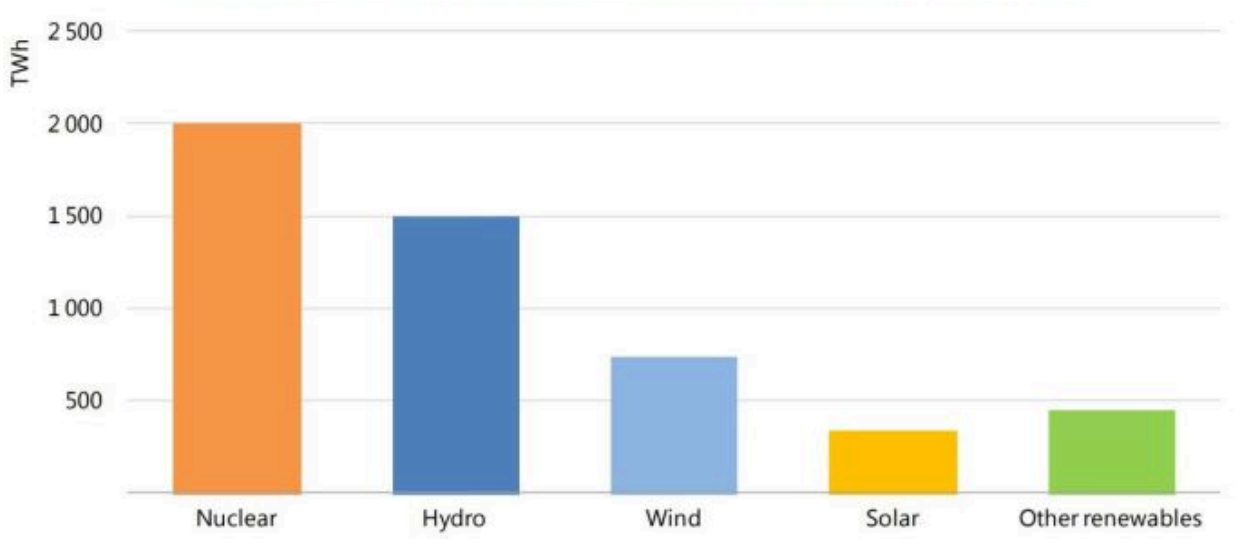
From: Our World in Data

Nuclear Energy as a Power Source

In recent years, the global reliance on nuclear energy has increased exponentially as nations seek environmentally friendly and sustainable energy options. As the demand for clean energy intensifies, nuclear power has emerged as an efficient option to meet worldwide energy needs. Views on nuclear energy as a whole are polarized – many countries and organizations have bid for the widespread use of nuclear power to reduce global reliance on fossil fuels and non-renewable resources, while others have openly disapproved of its widespread usage on a global scale.

One of the most compelling advantages of nuclear energy is its ability to generate power without emitting air pollutants. Unlike fossil fuels, which release significant amounts of carbon dioxide and other harmful gases, nuclear energy is considered a clean source of power, as the cooling towers of nuclear plants emit only water vapor, rather than pollutants. The European Commission has also labeled nuclear power as a green source of energy, highlighting its environmental benefits. In comparison to other renewable energy sources, such as solar energy or hydroelectric energy, nuclear power is more efficient, generating more energy over time in comparison. Considering the world's ever-increasing energy requirements, nuclear power provides a viable way to efficiently produce the amount of energy required to sustain global needs.

LOW-CARBON ELECTRICITY GENERATION BY SOURCE, 2018



Amount of electricity generated by various low-carbon sources

From: IEA

Nuclear power also provides high levels of reliability and efficiency, providing stable and dependent energy supplies that remain constant in spite of environmental changes. Nuclear reactors can operate continuously for years without interruption, and have an energy production factor of approximately 92.5%, making them among the most productive energy sources available. Additionally, the infrastructure required for nuclear power needs little physical space in comparison to other renewable energy installations, and a small amount of uranium can generate substantial amounts of energy. This high energy density also means that nuclear power can meet large-scale energy demands with minimal resource input – by investing in nuclear energy, countries can also achieve energy security and reduce their dependence on imported fossil fuels, enhancing their national security and stabilizing energy prices and access.

Despite boasting many benefits, nuclear power is not without its drawbacks. One of the most significant concerns is the generation of nuclear waste that accompanies the generation of energy through nuclear fission. Reactors produce radioactive and toxic byproducts that remain hazardous for tens of thousands of years. This waste includes spent fuel, containing uranium pellets as well as chemically toxic heavy metals like plutonium, which must be permanently disposed of in secure facilities. Since the 1950s, when nuclear energy was first developed, more than 250,000 tons of nuclear waste have accumulated worldwide.

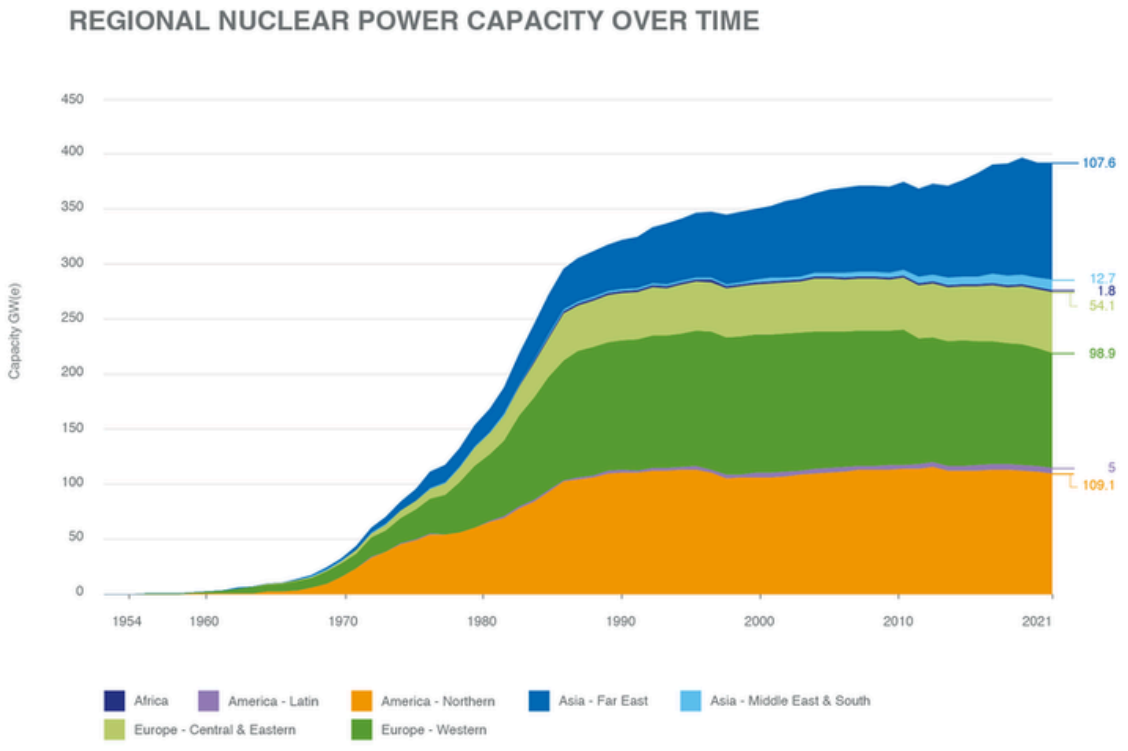
Public fear of nuclear accidents also poses a barrier to the widespread adoption of nuclear energy. High-profile incidents such as the Fukushima disaster in 2011 have heightened public apprehension, with people fearing the effects of radioactive contamination on the environment and human health. Similar disasters have underscored the risks associated with nuclear power and highlighted the need for stringent safety measures and regulations in nuclear power plants and facilities.

Aerial footage from the disaster at Fukushima, 2011 From: Getty Images

Nuclear power plants also require substantial financial investment to construct, with costs running into billions of dollars. The construction process itself is often lengthy, taking longer than the development of infrastructure for other forms of renewable energy, such as wind or solar power.

Although nuclear plants are relatively inexpensive to operate once built, the high initial costs and extended construction timelines can be prohibitive for developing countries. Additionally, as many nations have made time-bound commitments to reduce carbon emissions and fossil fuel dependency, these financial and temporal challenges to adopting nuclear energy can impede efforts to achieve net-zero emissions by a certain date, making nuclear energy a less viable option for many smaller nations.

As the world seeks to balance its energy needs with environmental sustainability, the role of nuclear power as an energy source will likely continue to evolve. At present, nuclear energy presents numerous advantages in clean energy and efficiency – however, its continued use as a primary energy source may not be optimal for all countries or conditions. Advancements in technology and safety may mitigate some of the current limitations of nuclear energy, making it a more viable option for a future source of global energy.



Nuclear power capacity over time , by region

From: IAEA

Notable Agreements & Organizations

Formation of the IAEA

The International Atomic Energy Agency (IAEA) was formed in July 1957 as an intergovernmental organization focused on encouraging the peaceful use of nuclear energy, and the limitation of nuclear weapons. The organization was formed as a more permanent successor to the United Nations Atomic Energy Commission (UNAEC) and is an independent organization within the United Nations. The IAEA was created after the International Conference on the Peaceful Uses of Atomic Energy (ICPUAC) and was formed due to rising nuclear tensions.

The agency is sometimes considered to be a result of President Eisenhower's "Atoms for Peace" speech, in which he called for an international body to monitor the international development of nuclear technology. In addition to its role regulating the field, the IAEA also serves as a platform for scientific communication and collaboration in the field. The organization also constructs and implements guidelines for the safe use of nuclear technology and conducts routine inspections of nations' nuclear facilities in order to confirm that they are abiding by the terms of the NPT, or other agreements related to the proliferation of nuclear weapons.

United Nations Resolution A/RES/1(I)

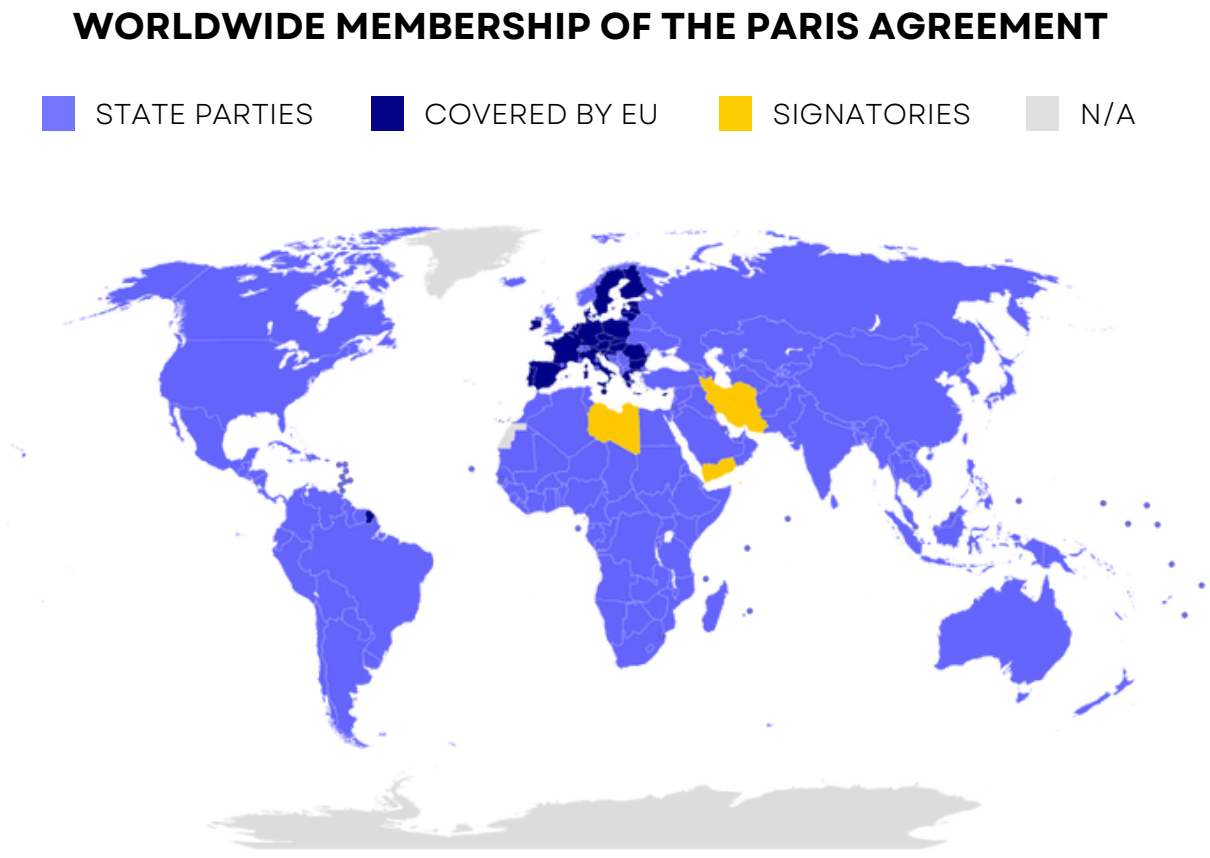
The very first resolution of the United Nations General Assembly called for the formation of a body to oversee the use of atomic energy, and to discover the problems raised by what was a fledgling innovation at the time. The resolution established the United Nations Atomic Energy Commission (UNAEC) and stipulated that the commission submit reports and recommendations to the UN Security Council, who would then convey information to other bodies of the United Nations.

The resolution also called for the commission to be under the direct control of the Security Council, and stipulated membership of the UNAEC to be composed of one representative from each member of the Security Council, and a representative from Canada in the event that Canada is not a member of the Council. The resolution made specific requests to provide nations with scientific information about atomic energy, limit control over atomic energy, and, in the event that nuclear weapons could not be eliminated, suggest and implement effective safeguards.

Paris Agreement

In 2015, at the 21st Conference of the Parties (COP21), 196 member states of the United Nations negotiated and adopted the Paris Agreement, which represented the first major international treaty to impose an explicit ceiling on the global temperature rise and made calls for measures to reduce carbon emissions to a net-zero. The Paris Agreement is also particularly notable because it is a binding agreement, and thus legally binds all signatories to follow the outlined terms in order to achieve the stated goals of the agreement in order to adequately fight climate change and adapt to its effects.

The overall goal of the agreement is to limit the global temperature rise to below 2 degrees Celsius, and ideally to 1.5 degrees Celsius over the average temperature pre-Industrial Revolution, since the 1.5-degree threshold indicates the “point of no return”. The Paris Agreement also outlined a five-year cycle of reiterative, increasingly ambitious action to combat climate change, wherein countries gradually increase the scale of their climate action. As a result, many countries have been incentivized to switch to more carbon neutral energy sources, including renewable energy and nuclear power, in an attempt to reach net-zero carbon emissions.



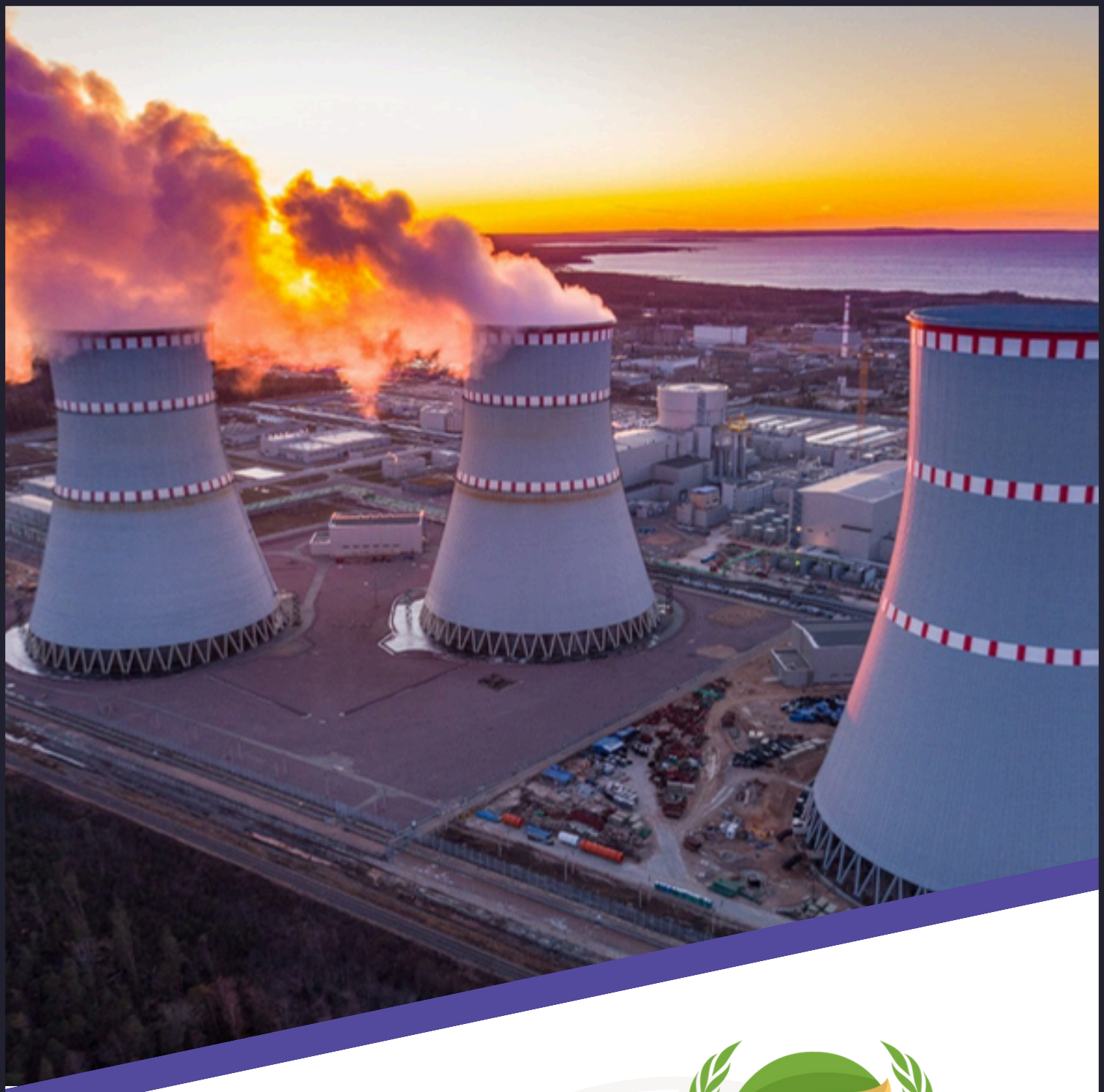
A chart depicting membership of the Paris Agreement

From: Wikimedia Commons

Convention on Nuclear Safety (CNS)

The Convention on Nuclear Safety, also known as the CNS, is one of many Nuclear Safety Conventions – the first of which was put into place after the Chernobyl accident to ensure that the development and use of nuclear energy was protected from any more of such accidents. The CNS was put into action in 1994 to govern safety rules and regulations with regards to nuclear power plants and reactors. The convention covers issues related to power plant sites, designs, constructions, operation, and emergency preparations. In order to ensure that states utilizing nuclear energy adhere to a high level of safety, the convention obliges parties to provide reports regarding their obligations to nuclear safety at annual "peer review" meetings.

Various state representatives at the Convention on Nuclear Safety From: Wikimedia Commons



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