1. **From definition, energy released in nuclear fission is harnessed to heat water and to drive a turbine. It is considered a non-renewable energy and said to be 100% carbon neutral in the energy production process itself. It is usually fueled by uranium in that energy is harnessed when uranium atoms undergo a process called fission. From this process, they release energy, heat up water and drive a turbine. Do you consider this process a viable fuel option? Why or why not. (Feel free to use outside resources for your argument and make sure to cite your resources).**

    a. Nuclear fission is a viable but complex energy option for reducing greenhouse gas emissions and meeting growing electricity demand. Once built and amortized, nuclear plants generate large amounts of reliable, carbon-free electricity, which can significantly curb fossil fuel use. The Nuclear Energy Advisory Committee (NEAC) notes that nuclear power strengthens energy security and can play an important role under carbon-pricing policies like taxes or cap-and-trade. However, major challenges include high upfront costs, long construction timelines, unresolved waste disposal, such as Yucca Mountain delays, and proliferation and safety risks.

       Despite these issues, nuclear energy complements renewables by providing stable base-load power, especially as countries transition away from fossil fuels. NEAC recommends investing in advanced reactor designs, strengthening waste management strategies, and maintaining rigorous safety and security standards. With proper oversight, international cooperation, and financial reforms, nuclear fission can be an important, but not singular part of a diversified clean energy strategy.

2. **Do you consider any negative effects of the mining of “Thorium”? How would you compare this to the mining of coal?**

    a. Thorium mining does present negative environmental and health effects, but these are generally considered less severe than those associated with coal mining. Thorium is a naturally occurring radioactive metal, and its extraction can generate radioactive waste and expose miners and nearby communities to low-level radiation if not properly managed. Additionally, thorium ores often contain other radioactive elements such as uranium, which require careful handling and secure storage to prevent contamination of soil and water. Like other forms of mining, thorium extraction can disturb ecosystems, produce dust, and create long-term site remediation needs if environmental safeguards are not enforced.

       By comparison, coal mining, especially mountaintop removal and underground mining, has far greater and more widespread environmental and health consequences. Coal extraction leads to extensive habitat destruction, air and water pollution, and releases large amounts of particulate matter and greenhouse gases throughout its life cycle. Burning coal is also one of the largest contributors to global CO2 emissions and air pollutants such as sulfur dioxide and mercury. While thorium mining carries radioactive risks, its overall carbon footprint and ecological damage are typically much lower than those of coal mining. With strict regulation and safe waste handling, thorium could offer a cleaner alternative to coal for base-load energy generation.

3. **Do you have any issues pertaining to the safety of Nuclear Power plants? Do you consider the happenings at Chernobyl and Fukushima as any warning indicators? Please explain.**

    a. Yes, there are safety concerns associated with nuclear power plants, and past accidents like Chernobyl and Fukushima serve as stark warning indicators. Nuclear power relies on maintaining stable chain reactions under tightly controlled conditions, and failures, whether due to design flaws, human error, or natural disasters, can lead to catastrophic consequences.

    The Chernobyl disaster occurred because of a flawed reactor design combined with procedural violations during a safety test, leading to a massive explosion and fire that released significant radioactive material into the environment. The long-term effects included widespread contamination, large-scale evacuations, and serious health consequences such as increased thyroid cancers. Fukushima demonstrated a different risk: even well-regulated, modern reactors can be vulnerable to external natural events. A massive earthquake and tsunami overwhelmed safety systems, causing multiple reactor meltdowns and the release of radioactive material.

    These events highlight the importance of robust safety culture, rigorous regulatory oversight, resilient plant design, including backup power and cooling systems, and comprehensive disaster planning. They also spurred significant reforms, such as stress tests for reactors worldwide, improved containment strategies, and stronger international collaboration on nuclear safety standards. While modern nuclear power plants are much safer and accidents are rare, Chernobyl and Fukushima underscore that continuous vigilance and investment in safety measures are essential for minimizing risks.

4. **Compare or Contrast the two videos "Nuclear Power as an alternative to Fossil Fuel (TEDx)"and "Why I changed my mind about nuclear power (TEDx). Are both these TED X talks leading to the same or similar conclusions?**

    a. Both talks land in a pro-nuclear place for climate. Each argues that wind/solar alone can't reliably decarbonize fast enough due to intermittency, land/material intensity, and storage limits. Both frame nuclear as the only scalable, dense, low-carbon source that can replace a large share of fossil electricity, and both treat Chernobyl/Fukushima primarily as lessons that should drive better designs and safety, rather than reasons to abandon nuclear power.

They diverge on emphasis and evidence. Matilde Leandro makes a technology-forward case for *thorium molten-salt reactors (MSRs)* as a near-term “step in the right direction”. Abundant thorium, compact fuel needs, chemically bound fission products, “walk-away safe” behavior via a freeze plug, and reduced long-lived waste. Her narrative contrasts those features with pointed critiques of PV and wind (manufacturing pollution, bird mortality, landfill end-of-life), concluding that thorium MSRs address most public fears while delivering reliable power. Michael Shellenberger, by contrast, argues for *nuclear at large*, principally today’s light-water fleet and proven pathways to expansion, grounding his case in system-level data: Germany vs. France emissions and prices, capacity factors, storage limits, IPCC lifecycle carbon figures, and UN/IAEA accident health assessments. He stresses that keeping and adding conventional nuclear would have cut emissions far more than Germany’s renewable build-out, that nuclear’s measured health risks are far smaller than feared, and that policy choices are the main blockers.

On risks and waste, Leandro leans on MSR design claims to pre-empt meltdown and waste anxiety; Shellenberger leans on empirical accident and dose-response records to show that even with legacy designs nuclear is already the safest major source, and that its solid, contained waste compares favorably to diffuse heavy-metal waste streams from other technologies. On feasibility and timing, Leandro’s thesis hinges on deploying advanced reactors; Shellenberger’s hinges on preserving/extending existing plants and building more of what we can license now, with advanced designs as a bonus.

5. **What policy do you think should be implemented for countries that are deemed 'suspect' in terms of nuclear policy and control?**

    a. A prudent policy for “suspect” countries should combine strict non-proliferation guardrails with credible access to peaceful nuclear benefits, so compliance is always more attractive than defection. Require the NPT plus the IAEA Additional Protocol and intensified, on-site safeguards; condition any civil nuclear cooperation on continuous verification and performance against a clear “design-basis threat” for security; and bar the spread of national enrichment and reprocessing in these states. In place of sensitive fuel-cycle activities, offer cradle-to-grave fuel services, assured front-end fuel supply, take-back of spent fuel, and access to multilateral fuel banks/leases, so electricity goals can be met without weapon-usable materials. These steps align with NEAC’s call to institutionalize fuel-cycle mechanisms and provide reliable fuel assurances while minimizing proliferation risks, and to strengthen the IAEA with the resources and mandate it needs to enforce safeguards effectively.

To shift incentives, pair this with graduated consequences and export controls: modernized technology controls, interdiction of illicit transfers, and automatic, reversible sanctions for violations, implemented in coordination with the UN system. Regionally, use security and transparency compacts to reduce escalation risks, and globally, keep the door open to advanced, safer reactor cooperation only when compliance is verified and durable. This integrated approach—assurance + verification + restraint + enforcement is the most practical way to reduce proliferation risk without denying legitimate, low-carbon energy development, as emphasized in NEAC's recommendations to preserve the NPT, resource the IAEA, and promote multilateral fuel-cycle arrangements over national sensitive capabilities