

Feasibility of Generation IV Nuclear Reactors

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Abstract

Generation IV nuclear power plants are almost ready for primetime, but there are several things that need to happen first. Test reactors need to be built to test mechanical, fuel, and safety features, the public needs to decide whether to support building of new reactors, and nuclear policy needs to stabilize for the length of time required to really invest in nuclear power.

Project Goals/Objectives

- Determine whether it is feasible to start deploying Generation IV nuclear reactors within 5 years, or whether it will have to wait for a longer period of time
- If it is necessary to wait, what should be done in the meantime to improve the feasibility of new reactors?

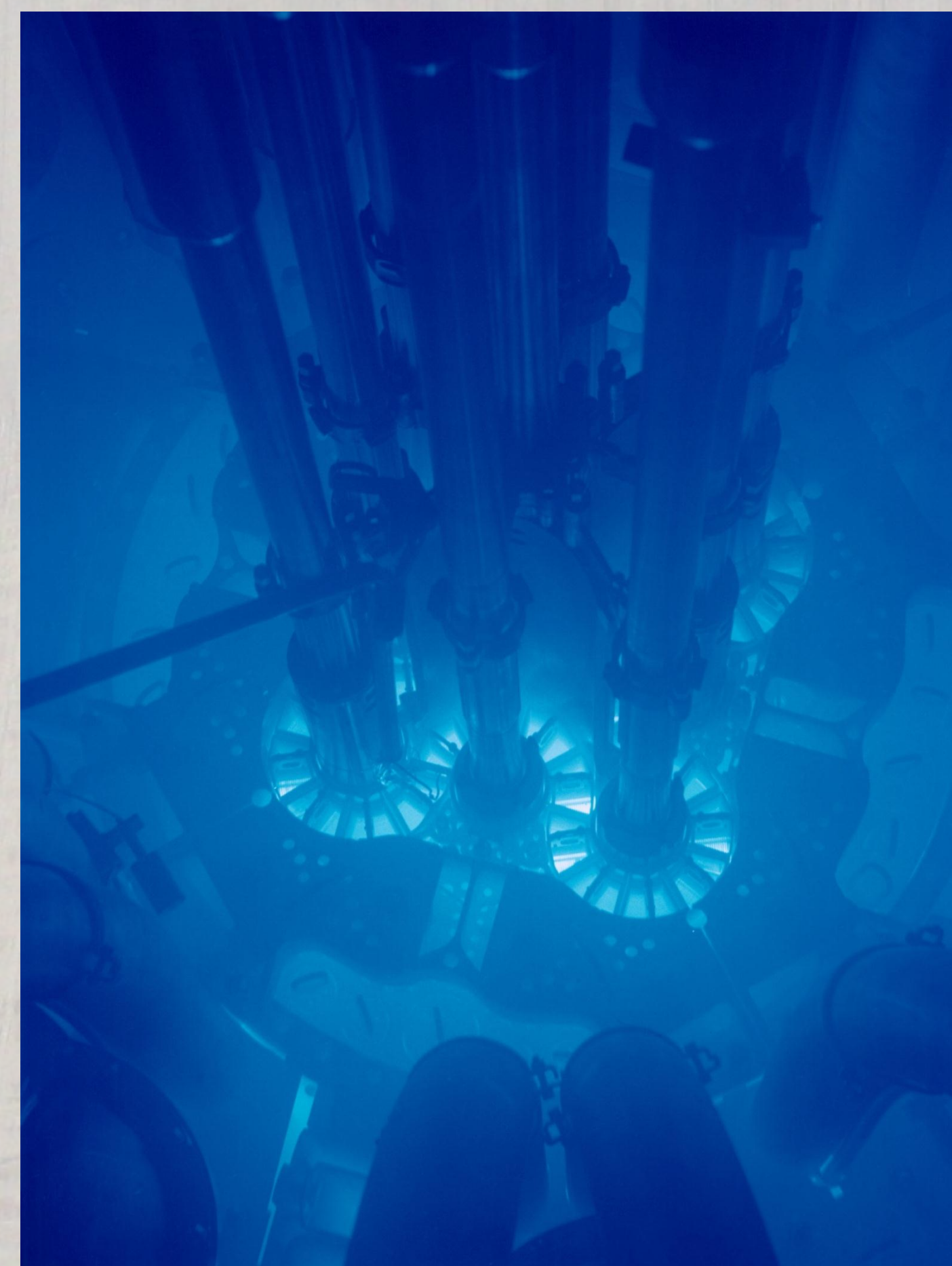
Background

- Advances in nuclear plant design have increased efficiency
- New designs will be more cost effective
- Some new reactors use Thorium as a fuel
- Thorium is a more balanced and stable fuel
- New reactors are safer due to new active and passive safety features
- Can sustain plants for extended periods of time without humans or electricity
- People have always been ambivalent of nuclear power
- People are more likely to be negatively affected by events rather than positively affected
- Government is hesitant to increase funding to fund nuclear projects

Methods/Process

- For resources, we used journals, reports, Case Studies/Test Cases, Surveys, Newspaper Articles, Webpages from the World Nuclear Association, Generation IV International Forum, and the Department of Energy
- For research tools, we used a combination of Google Scholar, WPI Summon, and manually searching websites for articles related to nuclear power
- Additionally, we collaborated with Nuclear Policy Group to create a survey of our own, which we distributed to WPI students

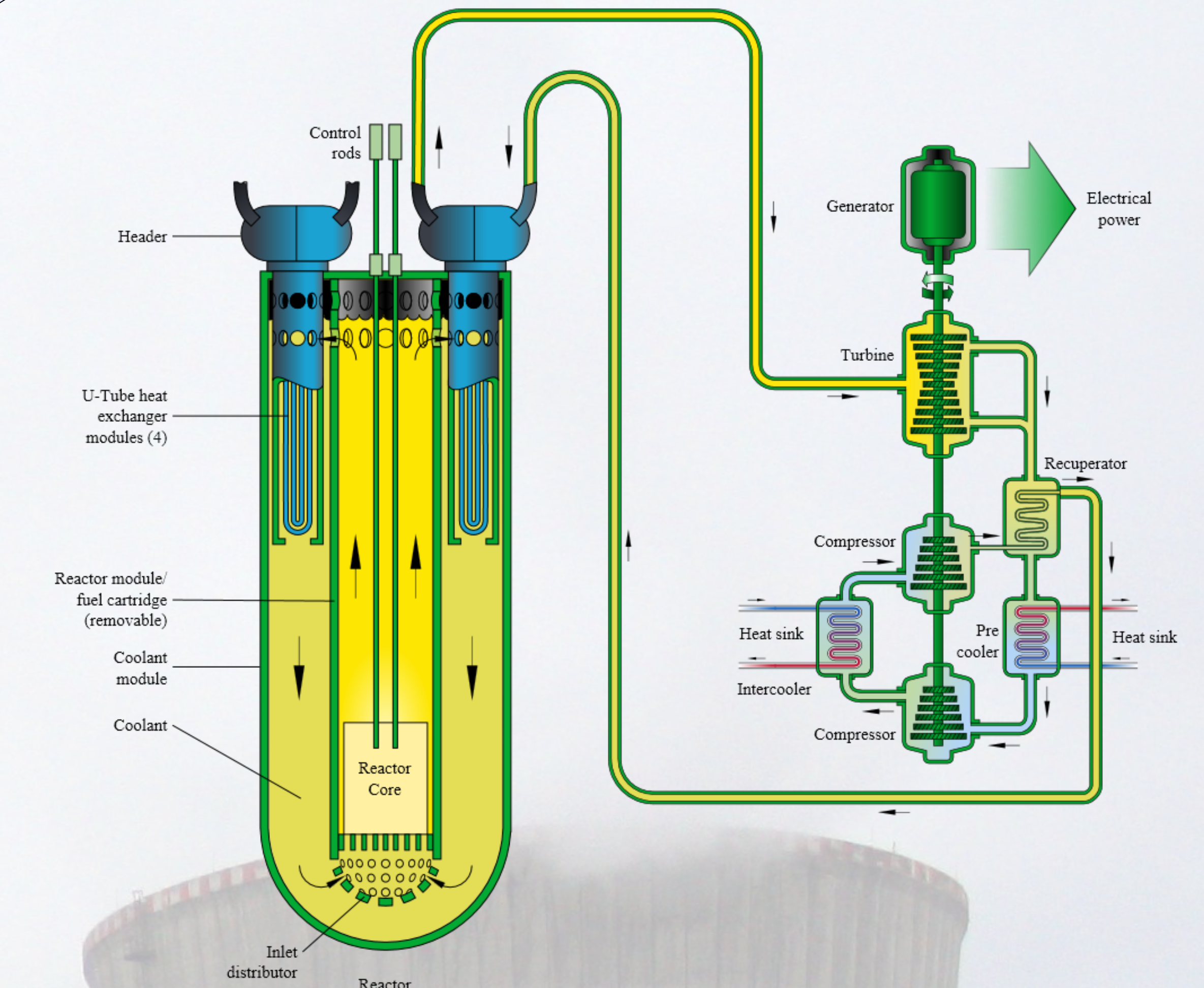
- This generated 530+ responses, which we integrated into our paper



Water-cooled nuclear reactor[1]

Results/Outcomes

- From a Technology, Safety, and Fuel standpoint, Generation IV plants are possible in anywhere from 5-15 years depending on the progress of research during this time
- From a sociopolitical standpoint, the future is a lot more unclear. While the technology is there, there is not a lot support for it.



Design Theory of a Generation IV Lead Cooled Reactor[2]

Conclusions/Recommendations

Our research has led us to draw the conclusion that commercial Generation IV Nuclear Power Plants are possible in 5-15 years. This can happen if the technology is cheaper, more reactors are built, officials more willing to push for increased nuclear power are elected, and public awareness of the safety and benefits of nuclear power increases.

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References

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