

Pathways to Net Zero Emissions for the Operational Navy

As part of Reducing Climate Threat in the future, *Climate Action 2030* lays out the Department of the Navy's role in helping the nation reach net zero emissions by 2050. NPS researchers conducted analysis of eight strategies and four pathway options to reach net zero emissions by 2050. There are no easy answers for decarbonization; while there are some promising technologies in development, they need to function in the military context and provide significant reductions to reach net zero emissions milestones. Key findings include:



A Whole-of-Government Approach: The operational Navy may not reach net zero emissions on its own; ships and aircraft are difficult to decarbonize and operational efficiency of those platforms can only go so far. However, if reaching net zero emissions is viewed as a whole-of-Navy or whole-of-DOD approach, the 2050 goal is more plausible. Installations have some advantages in reaching net zero emission and relying on community and regional partners to adjust their strategies. A whole-of-government approach changes the equation again: other departments may be able to adapt quicker to lower emission strategies and additional lands are available for sequestration.

Investing Now: While some strategies require additional research and development, addressing future investments in the acquisition process must happen now. By continuing to invest in platforms that are wholly dependent on fossil fuels without an eye to reducing emissions or reducing the reliance on transporting fuel, the Department of the Navy is unlikely to meet its goals.

Promising Strategies: Alternative fuels, batteries and electrification, and new technology including hydrogen and unmanned systems are the most promising strategies for the Department. These strategies prioritize mission readiness while addressing the need to reduce emissions and reliance on fossil fuels.

Priorities for Research: To advance these promising strategies, the following research is recommended:

- Advancement of fuel/energy in-theatre such as hydrogen technologies and seawater to fuel;
- Demand reduction including operational efficiencies, technology changes and culture and behavior shifts;
- Aircraft & shipboard decarbonization including developing roadmaps to operationalize decarbonization technology rapidly once it is proven effective such as carbon capture from ships;
- Unmanned systems studies on the impact of transitioning certain platforms to unmanned and potential emission reductions; and,
- Analysis of how these efforts align with U.S. allies' efforts on emission reductions.

Cautions: The research team recommends less emphasis on strategies that do not prioritize demand reduction such as carbon sequestration, carbon capture and storage or carbon offset programs. These tools have their own inherent vulnerabilities that would need to be addressed before relying on them for significant reductions.

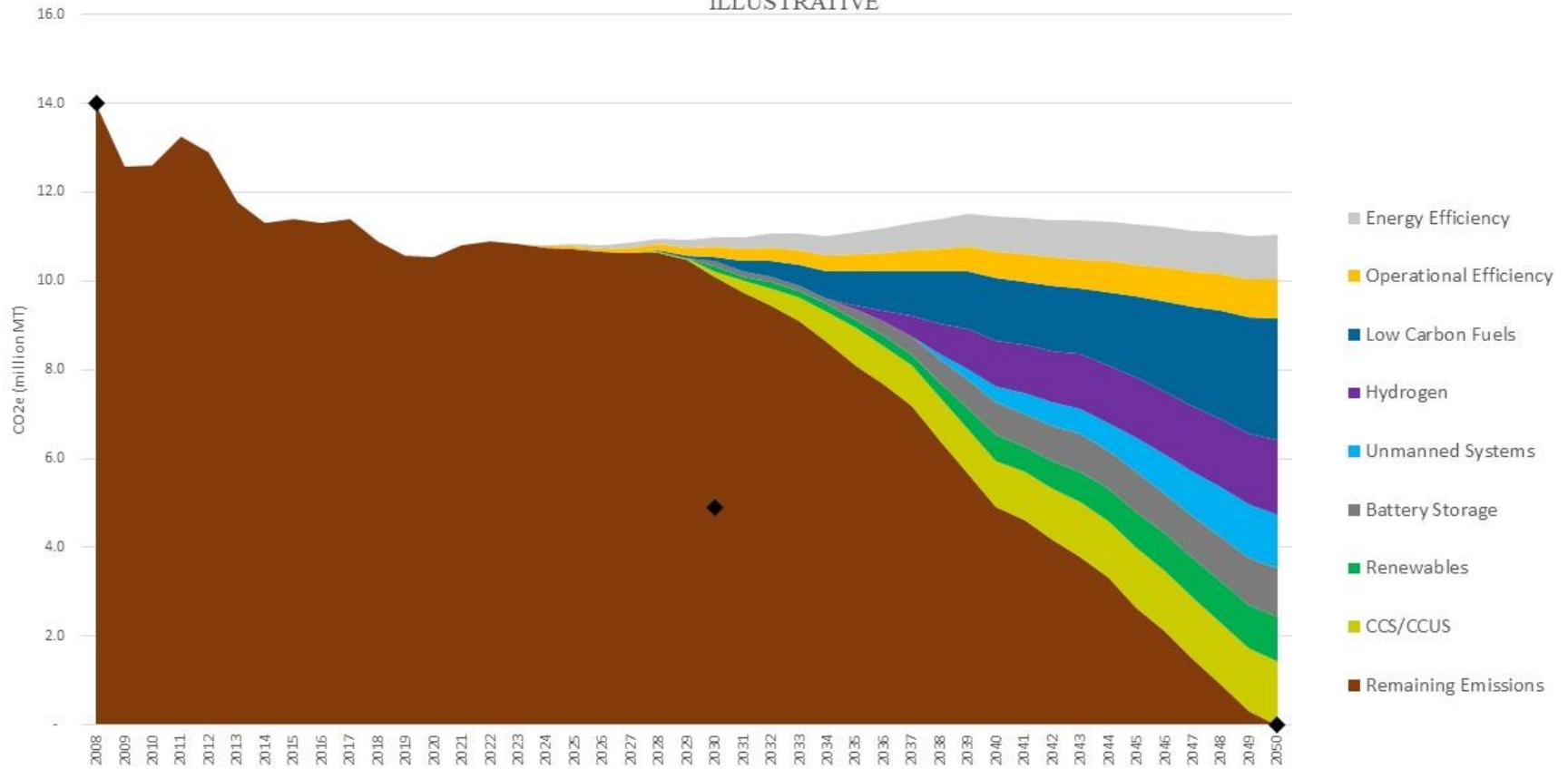
Access the report at: <https://nps.edu/web/eag/energy-climate>

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Navy OE Emissions Pathway 4: Aspirational
ILLUSTRATIVE



As shown in Pathway 4 above, with investment in diverse strategies, net zero emissions are met without heavy reliance on efficiencies or carbon sequestration. Investment in low carbon fuels is essential and Pathway 4 relies on increased investment in each strategy but particularly in hydrogen and unmanned systems.