Promoting Sustainability and Resilience through Net Zero and Net Positive Technologies and Approaches

What is Net Zero?
Reducing our water, energy, and waste footprints can improve the environment, save money, and help communities become more sustainable and resilient. EPA researchers are helping by developing and implementing cutting-edge technologies and strategies to help communities and military installations attain Net Zero. Net Zero means consuming only as much energy as produced, achieving a sustainable balance between water availability and demand, and eliminating waste sent to landfill.

EPA has joined forces with several cross-agency partners to pool multidisciplinary expertise and resources while working towards achieving the shared goal of Net Zero energy, water, and waste.

EPA-Military Partnerships
EPA has signed Memorandums of Understanding (MOUs) with the U.S. Army and the Department of Defense (DoD) to advance the sustainability goals of Net Zero/Net Positive (NZ/NP) energy, water, and waste in military installations. Under these MOUs, EPA scientists are using cutting-edge research to develop technologies, methods, and approaches to help military installations, like Fort Riley, Kansas, and Aberdeen Proving Ground, Maryland, reduce their water, energy, and waste footprints.

Creating sustainable military bases enables the military to appropriately safeguard available resources, manage costs, and shift the focus from cleaning up hazardous areas to preventing future environmental problems. The Net Zero projects will not only help military installations achieve their Net Zero goals, but also advance the state of science. Successful strategies and technologies can be applied and adapted to other military installations and civilian communities across the country and worldwide.

EPA-Community Partnerships
As a first step in expanding Net Zero efforts to communities, EPA hosted the “Promoting Sustainable Communities through Net Zero Strategies” workshop where experienced community and government leaders gathered to discuss barriers, solutions, and lessons learned from implementing Net Zero water, waste, and energy projects at various scales.

Following suggestions from workshop participants, EPA is pursuing several projects to aid communities in their Net Zero efforts. One example is the development of a web-based search tool that connects users to EPA's green infrastructure decision-making resources, tools, and models.

A Few Net Zero Projects

Net Zero projects focus on making a positive impact on a grand scale while fostering economic growth and promoting citizen health and well-being. Some of the research projects being conducted under our cross-agency, transdisciplinary partnerships include:

- **Green Infrastructure Demonstration and Education** Increasing pressure on the nation's water supply and infrastructure have prompted new stormwater management practices referred to as green infrastructure (GI). EPA is working with the Army, U.S. Army Corps of Engineers, Kansas Unified School District, and other partners to demonstrate and assess GI technologies at an elementary school on Fort Riley, KS. EPA scientists are monitoring a newly constructed permeable pavement parking lot and the school's existing stormwater capture-and-use tanks to gain a better understanding of GI performance and how it changes with time. Students at the school will be given an opportunity to participate in the research and GI approaches will be incorporated in the school's curriculum.

- **Water Conservation and Outreach**
  While new technological advancements are necessary to attain Net Zero water, the social drivers of water demand must also be addressed for a long-term approach to water conservation. At Fort Riley, EPA scientists assessed the effectiveness of water conservation education and outreach to curb water demand and change water use behaviors of the Ft. Riley community. The interventions resulted in an 11% decrease in residential water use and the results can be used to establish water conservation interventions at other military bases and civilian communities.

- **Campus-Community Sustainability Partnerships (CCSP)**
  EPA has created a campus-community sustainability partnership (CCSP) initiative to advance sustainability by providing support with EPA models and tools to achieve the community's self-identified sustainability goals. The program enables local governments to execute their sustainability projects in an affordable manner while university students learn through hands-on experience. The long-term goal is to establish mutually beneficial partnerships that help communities become more sustainable and resilient, build capacity, and provide students real world problem-solving skills.

What's Next for Net Zero?

As the Net Zero Initiative moves forward, a research area of particular interest is Net Positive energy. While Net Zero energy means an installation or community produces *as much* energy on site over the course of a year, Net Positive means producing *more* energy on site. EPA scientists are looking into the development and implementation of innovative Net Positive technologies and approaches like co-digestion, which diverts energy-rich organic waste (food waste, oils, and grease) from landfills to wastewater treatment plants to generate energy (in the form of biogas). This approach also supports Net Zero waste goals and promotes the transition of the term "waste" to "resource".

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