

Alternative Sources of Energy for US Air Force Bases Abstract

The *Alternative Sources of Energy for US Air Force Bases* study was chartered to analyze Air Force installation energy needs including consumption, vulnerabilities, and risks, and to provide recommendations for solutions, including exploration of alternative energy technologies. This USAF Scientific Advisory Board study sought to identify key technology and system solutions that will allow the Air Force to meet the challenges it faces in mitigating risks of power loss due to vulnerabilities, reducing cost, and minimizing dependence on fossil sources, thus increasing the energy security of its bases.

The Study Panel received extensive briefings on numerous aspects of energy systems from various organizations within the Military Services, Government, and Industry to understand the development, installation, use, and maintenance of various energy systems. Also, visits to various bases and facilities provided information critical to the Panel's understanding of the challenges and opportunities of alternative energy systems and how they relate to base energy security. The Panel found that:

- Implementing alternative energy sources requires a more concerted systems approach. In particular the Air Force should develop better in-house competencies (e.g., energy technologies, system security, and compatibility with base operations.), develop a systems plan for each installation, provide better resources/assign an expanded role for Base Energy Managers, and pursue public/private partnerships to reduce funding requirements.
- Current policy guidance on energy security should be implemented including the development of a mission-critical priority list and accelerating the vulnerability assessments of bases and development of risk mitigation strategies. Also, AF bases should practice "fighting through" energy systems disruptions during exercises.
- Most renewable energy sources (e.g., wind and solar) require energy storage to match energy supply with demand, due to the intermittency of renewable sources. The Air Force should integrate energy storage with emergency backup power sources where feasible and exploit the high energy density of on-base stored aviation fuels (e.g., most current base power generators cannot utilize the abundant aviation fuel stored on many bases). The Air Force should partner to develop technologies that harness renewables (e.g., biofuels and synthetic fuels derived from renewable/carbon neutral sources) to generate aviation fuels. Also, implementation of a base "microgrid" would help assure both base energy security and a steady supply of energy to base facilities.
- The Air Force should evaluate making nuclear energy a part of future energy plans. The Panel noted that small nuclear power generation systems were emerging and could be a source of base power independent from, but capable of supplying power to, the local commercial grid.