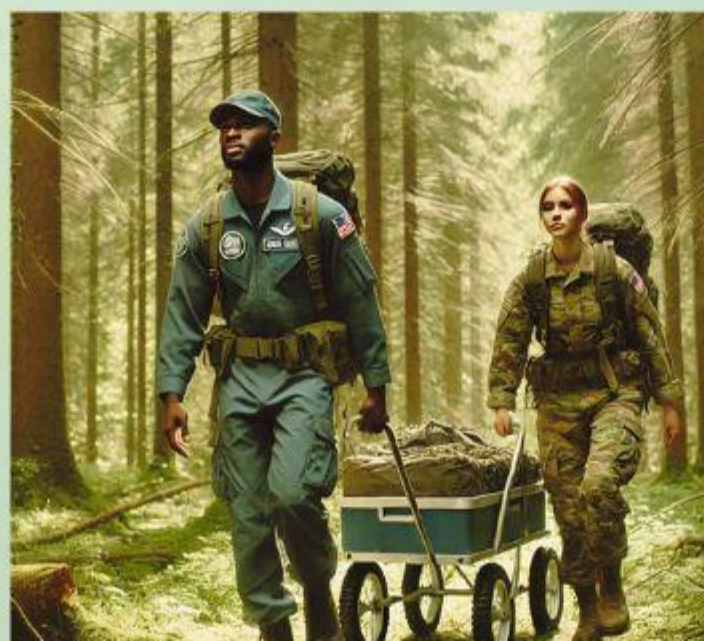


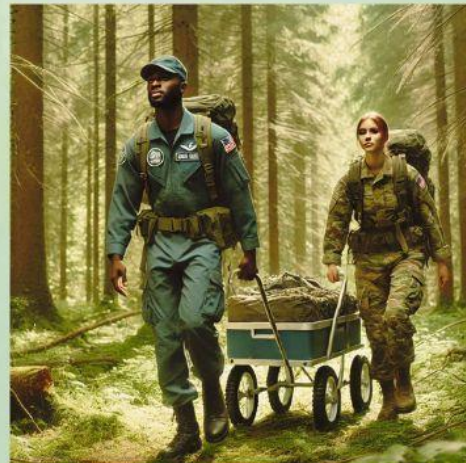


Bringing Sustainability to CAP





Bringing Sustainability to CAP



SustainableCAPability
"Bringing Sustainability to Civil Air Patrol"

CAPStone Project
by Major John H. Martin
2024



What is sustainability?

Sustainability is the practice of meeting the needs of the present without compromising the ability of future generations to meet their own needs.

It involves balancing environmental, social, and economic factors to ensure long-term health and resilience for both human societies and the planet.

This concept emphasizes the responsible use of natural resources, minimizing waste, and promoting renewable energy, while also fostering social equity and economic stability.



Sustainability Efforts and Policies



- **US Air Force**
- **Department of Defense**
- **Civil Air Patrol**





The U.S. Air Force (USAF) has a strong commitment to sustainability, reflected in its various policies and initiatives. The Air Force emphasizes sustainability as part of its mission to ensure energy security, environmental stewardship, and readiness for future operations.

Key elements of the USAF's sustainability policy include:

1. Energy Efficiency and Renewable Energy

- The Air Force seeks to reduce its reliance on fossil fuels by increasing energy efficiency and adopting renewable energy sources.**
- USAF is investing in solar, wind, and geothermal energy projects on its bases to reduce energy consumption and enhance resilience to energy disruptions.**

2. Sustainable Aviation Fuel (SAF)

- The USAF is exploring the use of sustainable aviation fuel to decrease carbon emissions from its fleet.**
- It partners with industry & research institutions to develop alternative environmentally friendly fuels.**

3. Environmental Stewardship*

- The Air Force integrates environmental protection into its operations by managing water resources, waste, and hazardous materials responsibly.**
- USAF adheres to strict environmental regulations to minimize its impact on air, water, and land.**
- The Air Force also engages in habitat and species conservation, especially on or near its installations.**

(continued on next slide)



U.S. AIR FORCE

4. Energy Resilience and Security

- To ensure operational readiness, the USAF focuses on energy resilience, ensuring that critical missions can continue in the event of power disruptions.**
- It works to secure its energy infrastructure, such as installing microgrids and on-site energy generation systems, to reduce vulnerabilities.**

5. Sustainable Infrastructure

- The Air Force is committed to constructing energy-efficient buildings and retrofitting existing structures to meet modern sustainability standards.**
- The Air Force Civil Engineer Center (AFCEC) leads efforts to ensure that new infrastructure incorporates green building standards like LEED (Leadership in Energy and Environmental Design).**

6. Climate Change Adaptation

- The USAF recognizes climate change as a threat to national security and is working to adapt its operations and infrastructure to the changing environment.**
- The Air Force's efforts align with broader Department of Defense (DoD) policies, which prioritize resilience to extreme weather and climate-related risks.**

7. Recycling and Waste Reduction

- The Air Force promotes waste reduction, recycling, and responsible disposal of hazardous materials as part of its everyday operations.**





The USAF's sustainability efforts are part of a larger Department of Defense (DoD) strategy to reduce the environmental impact of military operations while maintaining mission readiness. These initiatives are consistent with the U.S. federal government's broader goals for reducing greenhouse gas emissions and enhancing resilience to environmental changes.



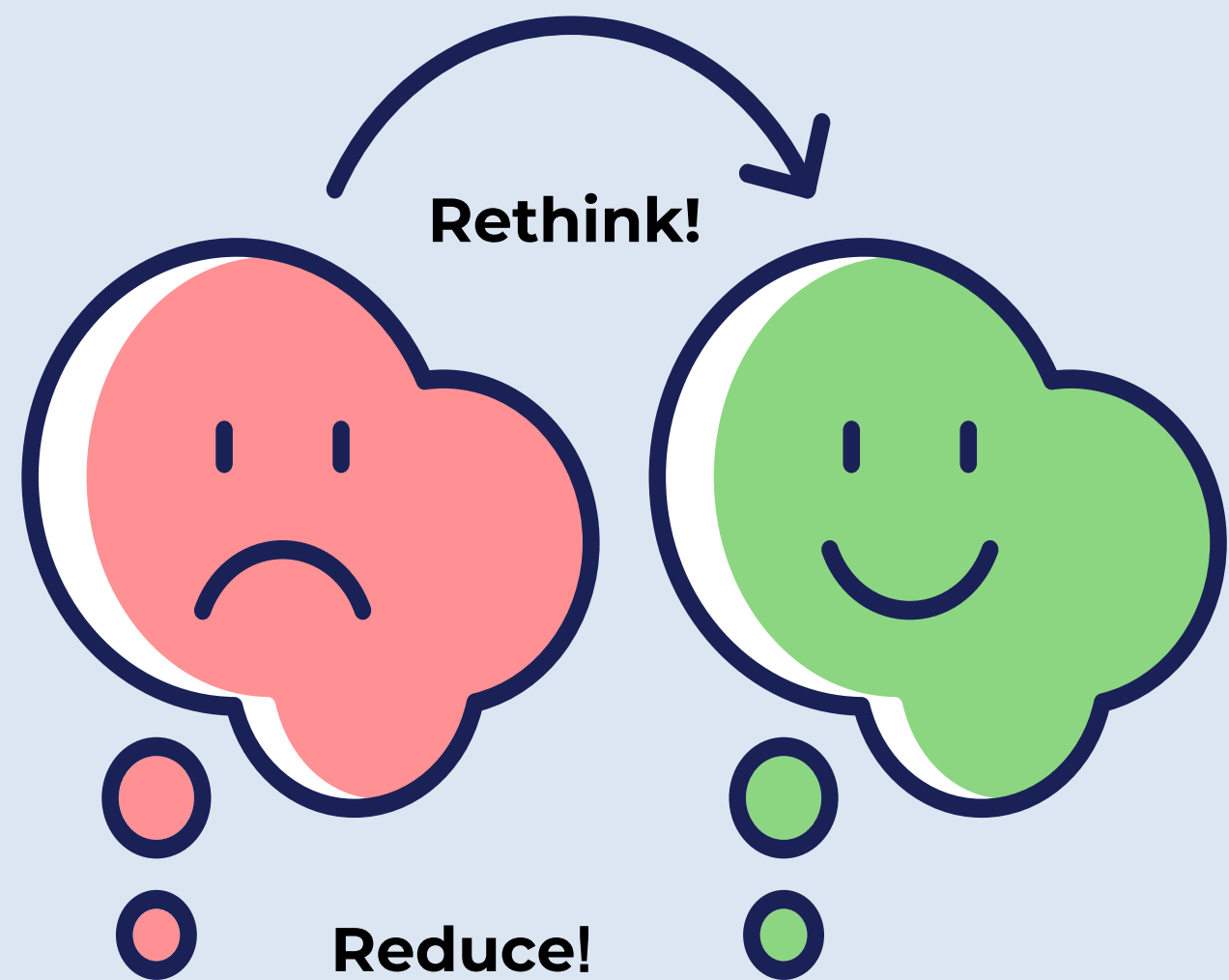


The Civil Air Patrol (CAP), as a volunteer organization focused on aviation and emergency services, does not have a widely publicized or specific sustainability policy in the same way that large corporations or governmental agencies might. However, CAP engages in activities that contribute indirectly to sustainability, such as:

- 1. Promoting Energy Efficiency in Operations: CAP could implement energy-efficient practices in aviation operations, aircraft maintenance, and vehicle use. As aviation is a major aspect of CAP's mission, fuel-efficient practices and technology adoption may be promoted in line with general aviation sustainability trends.**
- 2. Environmental Missions: CAP supports disaster response and conducts aerial surveys, which help monitor and mitigate the environmental impact of natural disasters. These missions can help preserve ecosystems by preventing further damage and guiding restoration efforts.**
- 3. Cadet and Member Education: CAP promotes leadership and education, including awareness of environmental stewardship. Through its programs for cadets, there is an opportunity to foster sustainability-conscious leadership in future generations.**



Sustainable Resource Management



DISCARD-
SOMETHING YOU DON'T WANT IN YOUR LIFE

DISPOSAL-
PUT IN THE PROPER PLACE

CATEGORY

Paper	25% of waste	Metal	5%
Plant Debris	25%	Glass	5%
Wood	10%	Ceramics	5%
Plastics	7%	Reusable Goods	5%
Putresibles	5%	Textiles	3%
Soils	3%	Chemicals	2%





**REUSE
AS IS**



**RECYCLE
INDUSTRIAL INPUTS**



**COMPOST
NATURE'S WAY**

25%

50%

80%

We can reuse, recycle, or compost our waste. There are multiple options for many of the categories, based on convenience and efficiency (thus the total exceeds 100%).





zero-waste events

A **zero waste event** is one where all materials used are either reused, recycled, composted, or minimized, reducing the amount of waste sent to landfills. CAP should aim for zero waste to align with its environmental stewardship goals, reduce operational costs, and set a leadership example for cadets and the community. Duration of zero-waste events can be half a day or several weeks.



Water/Waste Water

Collect

Treat

Use





Examples



Increasing Energy Efficiency: Weatherization Projects



Low hanging technology – lighting, caulking, door sweeps, sealing, weatherization, movable insulation, curtains





Energy-Efficient Equipment

- **heat pumps/air conditioners**
- **water pumps**
- **refrigerators**
- **ice makers and ice houses**
- **induction stoves**
- **water purifiers**
- **waste water aerators**
- **laundry washers**
- **medical equipment**





Shelters





Small Portable Power



Portable Search and Rescue Solar Backpacks



- **Communications**
- **Sensors**
- **Repowering Lights**



**Portable unit
(130 pounds)**

5kw storage

3kwh inverter





More concepts for mid-sized portable solar units





5 kw Solar Array
Measures 4 meters x 5 meters
when deployed
Fits in a pickup truck or small
trailer when configured for
travel



Disaster/Emergency Services

**Solar-powered,
off-road bike**

**Mobile medical unit
Search & Rescue**

Fast, quiet, efficient



**Trailer that can be
human or bicycle-
powered**

Can carry

- **communications**
- **first aid**
- **bivouac**
- **water**
- **food**
- **sanitation &**
- **shelter**

Can act as a litter



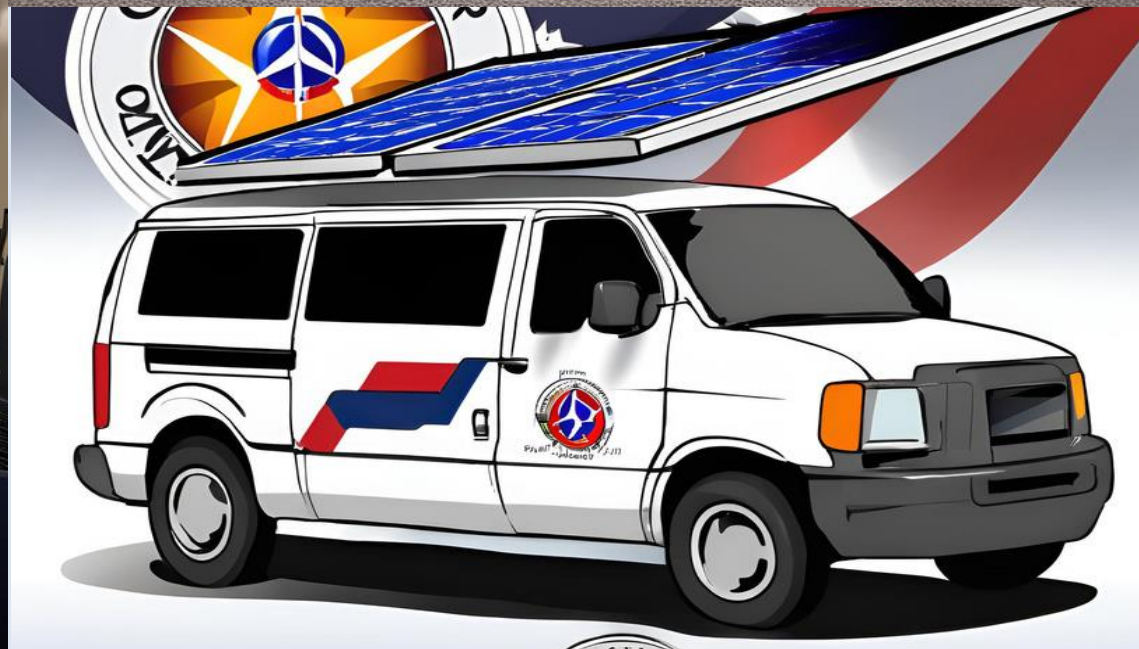
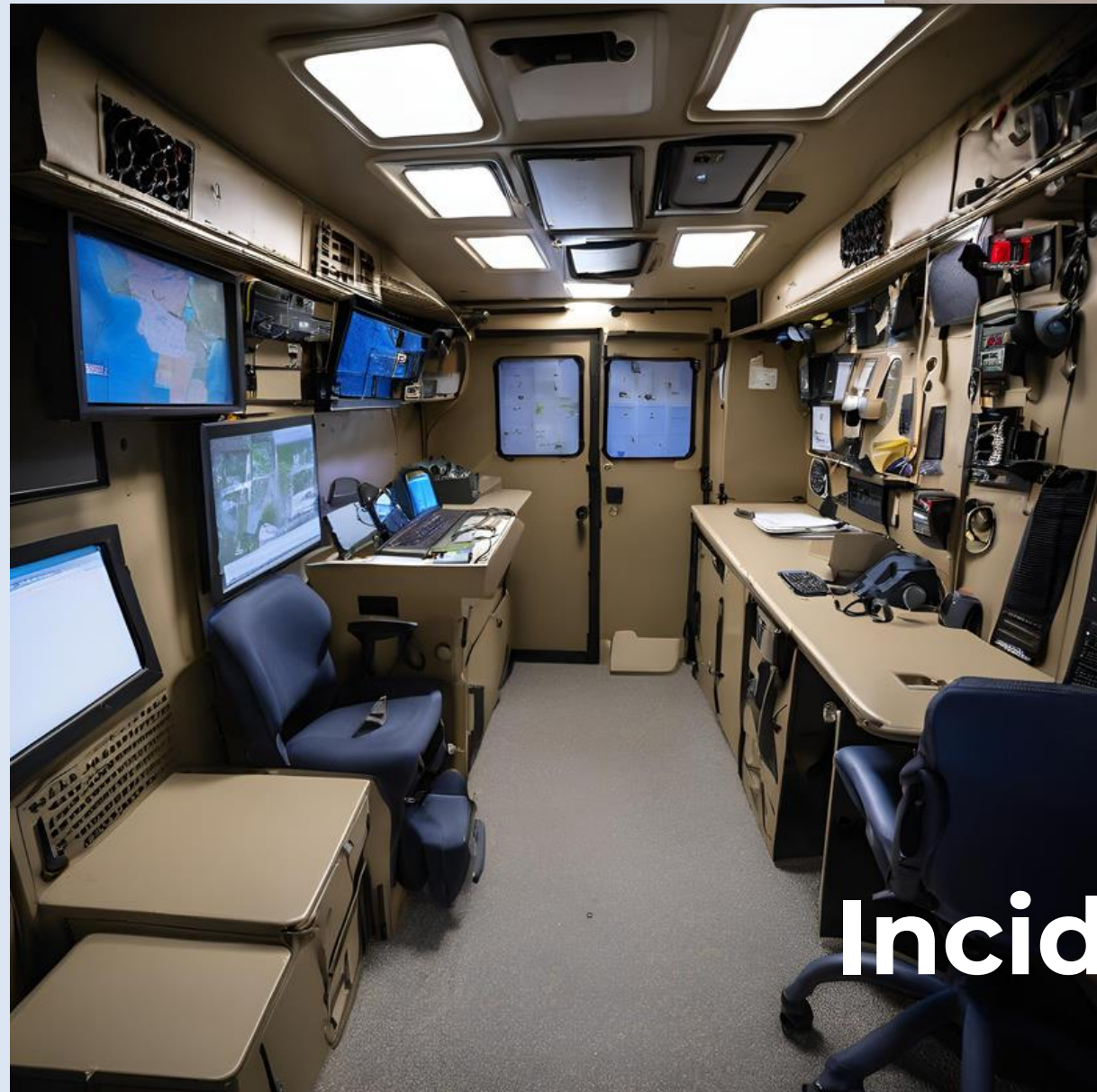
For bigger, longer lasting events....



Vans/trucks – E-85 hybrid



Electric & solar



Incident Command



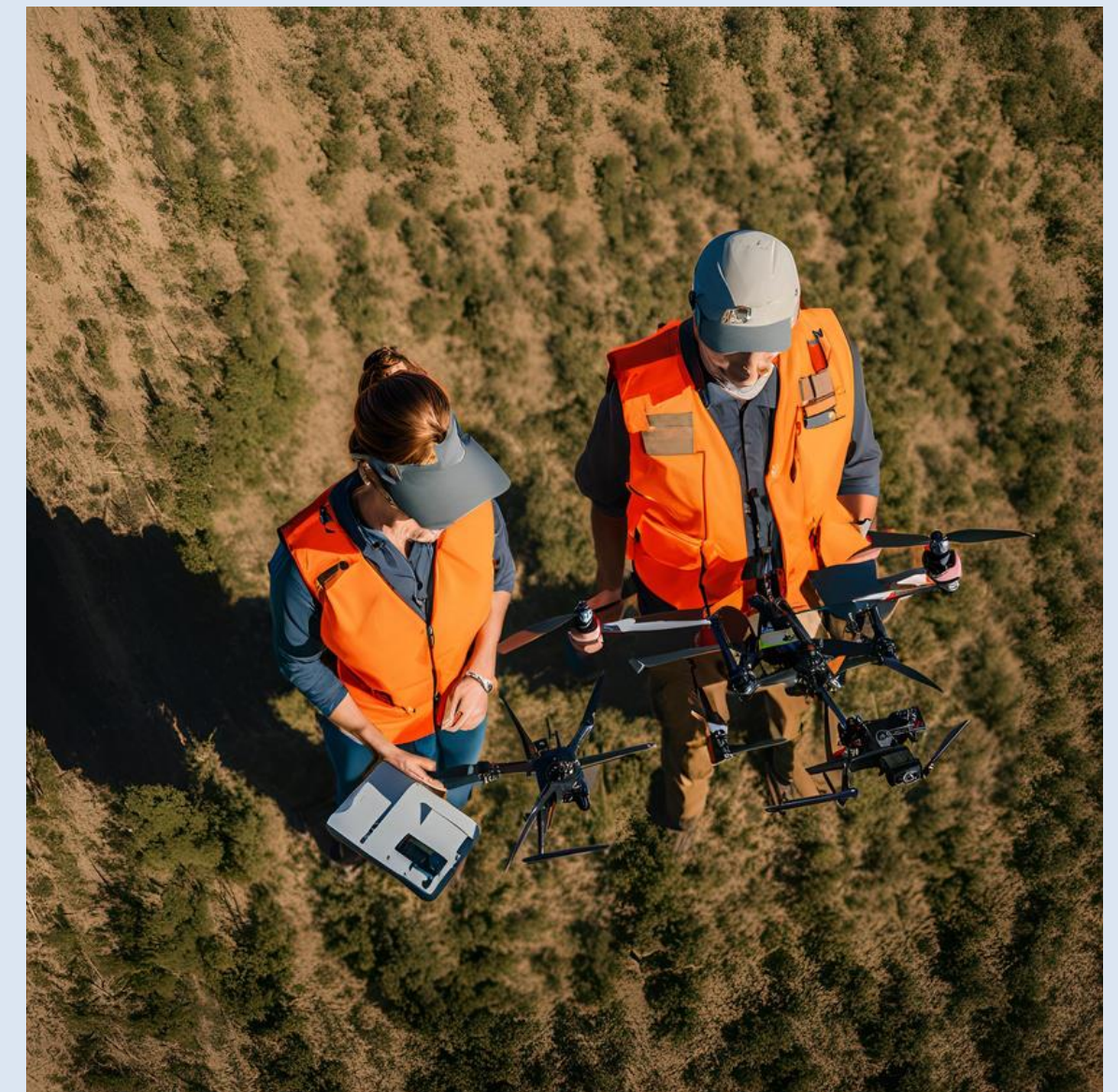
Aerospace: Communications, GPS, Weather, Imaging





Small Personal Drones for Imaging, Search & Rescue, and Delivery

In the future, they will have a sensory suite of multiple capacities of vision (infrared, etc.), pressure, enhanced auditory services, speaking, smell and taste (for chemicals).





**A long
duration
drone
with solar
panels**





Electric Airplanes





Sunseeker duo Solar Airplane



Step 3 : Education about sustainability



Step 2 : Create a task force of stakeholders.



Step 4 : Sustainability Audits



Step 1 : Create a CAP Sustainability Policy



Step 5 : Pilot Programs for Wins



Suggested Next Steps



SustainableCAPability

"Bringing Sustainability to Civil Air Patrol"



Present State- Fossil fuels

Preferred State- Renewable Energy

Timeline- Ten Years

Budget- Less than used now

Key Resources-



For More Information....

Sustainability

<https://www.sustainablejack.com>

<https://www.youtube.com/watch?v=sIoCsdXRyaY&t=9s>

Sustainable NASA “Preserving the Cosmos” 1:48 “

Electric and solar aircraft

https://www.google.com/search?client=safari&rls=en&q=Sunseeker+duo+pic&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:123f208f,vid:cbDv38aI_l8,st:0

first sunseeker duo flight. 3:49 “

<https://www.youtube.com/watch?v=GvKm6rp9tyg&t=120s>

Electric Beaver Amphibian 36:15 “

https://www.youtube.com/watch?v=0a-7FY33y_I

P 2 Xcursion Amphibian. 5:35 “

<https://www.youtube.com/watch?v=Xug8WE2qJoU>

USAF electric dreams video. 15:50 “

<https://www.youtube.com/watch?v=Ka1GpNGdjXM>

Regent Seaglider. 1:23 “



<https://www.elon.edu/u/academics/communications/elon-drone-day/2023-elon-drone-day/>
Elon University Drone day presentations 2021, 2022, 2023 webpage with videos 25,34,27 min

<https://www.youtube.com/watch?v=h-4bwyR5SvU>
6 seat Solar Aircraft concept video. 2:06 “

<https://www.youtube.com/watch?v=p5EVP7FmuSw>
These Smallest eVTOLs are the Future Ultralight Aircraft 18:59 “

<https://www.maxongroup.com/en-in/knowledge-and-support/blog/xsun-a-self-contained-solar-powered-drone-172862>
Solar Drone article

<https://www.commercialuavnews.com/international/sky-solutions-offers-an-autonomous-solar-powered-drone-in-a-box>
Drone in a Box article

<https://www.youtube.com/watch?v=4C8s6CmcJcQ>
Zipline drone video. 11:28 “



Electric Search and Rescue

<https://www.youtube.com/watch?v=8yM7rYa9zp4>

Electric Search and Rescue Light Electric Vehicles. 1:24 “

<https://www.youtube.com/watch?v=twkNoXlgskY>

Search and Rescue E-bike Team. 2:13 “

Light Solar Vehicles PowerPoint



Thank you very much!



<https://sustainablejack.com/>

jack@sustainablejack.com



Other Capstone Opportunities



- Interface for Continuing Ed tracking (all level and specialty track modules are organized by instructor or student preference and made available to be printed and placed into a notebook by third party via internet.
- A personal CAP chest wing Space Force Communicator Badge.(101 card replacement)
The CAP logo with a USB/c connection. Provides GPS, LoJack, RFID, Radio Direction finde. Recognizes Bluetooth, Siri, Alexa . Example- Pilot uses computer system to file a flight plan A-B-C-A. All info is downloaded, frequencies, emergency backups etc. Pilot puts wing on chest gets into aircraft places chip on joy stick-downloads to aircraft. It saves pilot's personal preferences, checks compatibility of pilot to craft, records, logs operations, and closes flight plan at end of trip. Mission Observer can enter incident command, present badge, get mission material and place badge on joystick with all required info for mission which is recorded and downloaded upon return. sUAS pilots and tech use their badges in a similar manner as do vehicle drivers. Personal logs. New CAP personal will use these to accomplish level and Specialty Track proficiency and help them recognize nearby mentors
- Connect US Space Academy for Educators (Huntsville Alabama) with Civil Air Patrol (Maxwell Air Force Base, Alabama). Great sharing of expertise and Aerospace. ALeX, AEX
- Sky Power for the People
- Renewable Energy, Continuing Education course, Alamance Community College