



Forever Flight WorldWide

*Prepared for U.S.
Department of
Energy*

Solar Development Tracking

Tracking solar development on IATA airports for
the FAA outside of the United States

International solar glare analysis and depository

September 2022

<https://youtu.be/mXbrCu2Mu6E>

Ryan Wilkoff

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IATA

FAA

*American-Made Solar Prize Round 6
Ready! Contest Submission*

Four Question Written Narrative

Problem - What is the problem and why is solving it important?

Solar PV is expanding on airports across the world, and solar glare analysis might not be standardized.

The aviation system is global and is rapidly adjusting to a new net-zero future. Airports such as Denver, Chattanooga, Cochin, and Antigua are installing solar PV on-site. This is a logical place for solar as airports are large flat spaces of land. Airports are also large consumers of energy who should be powered by local renewable energy.

The United States aviation system is regulated by the FAA. Beyond the borders of the United States, the aviation system is regulated by the IATA, and they believe that by partnering with governments they (the IATA) can work together to coordinate industry and government needs, regulate the industry in a harmonized way, and to facilitate the global aviation systems. The glare and glint from solar PV is distracting while entering arrival airspace. To counter this issue, the FAA developed regulations for the development of solar on-site at airports.

This issue is most problematic for pilots in poorer nations who need solar PV the most. Our software is designed for the FAA. However, because it is a worldwide depository, it will provide helpful information for pilots in all nations. Our program will be utilized by the government and airplane companies. Our software will not cost individuals so our program will pass on the cost of this necessary software to the airline companies or FAA and IATA. This is not just a software program solely for the use of the United States and its pilots, but also an opportunity for other countries around the world to start making small steps and changes for a healthier industry and planet.

Solution - What is your solution and why will it be successful?

Our solution tracks solar PV at airports US pilots depart of our specialty in aviation sustainability, our experience making other programs, and our previous experience in on-site solar aviation safety.

Our solution creates a depository that tracks solar development on airline development across the world. Our program expands on public research and the safety software programs of the FAA to create a global database. Our product will be a website that will create a functional database for every pilot who flies out of the United States airways, as well as flies into the states.

There is no current tracking system for interactions between global solar PV and the aviation system. This means that there are currently no existing solutions that account for international solar PV development and solar glare analysis. The solar glare analysis tool already exists (SGHAT) and so our software builds upon this useful tool to develop a functional depository for international solar PV development.

By the Set! Demo Day we will have a beta program that solves this issue. This software will be built in addition to our Forever Flight Thunderbird Software we are now currently developing in partnership with the NREL during their Opportunity Project Rebuilding Puerto Rico's Grid to be climate resilient.

Storage capacity is our team's primary concern, but we are dealing with it by utilizing our partners at Amazon to build a sufficient system. Amazon AWS is a partner in the NREL Opportunity Project.

The software program will be developed with the help of our team and two other young green designers. The program will start small. It will focus on a small geographic area. Italy will be our starting region. Melbourne Airport has adopted on-site solar PV. Our program will provide pilots and aviation institutions with an easy-to-use GIS database outlining solar PV development. This information will relay the dangers of certain times of day in real-time to pilots who left the US and are landing in Italy.

Our final software program will not be geographically constrained. It will cover every airport in the world. Then as pilots in the future take off from US airports, they will not have to be concerned about solar PV while landing.

Accomplishments and Team - What have you done to date and what qualities give you a competitive edge?

We have studied holistic approaches toward aviation sustainability.

Since our team was founded in 2021 our team of sustainable consultants and designers, who are all under 25 years old, have been working multiple jobs while producing the following proposals for the Federal government and other green organizations. and our team of sustainable consultants and designers, who are all und In January of 2022, we proposed a Sustainable Air Traffic Control design to the FAA utilizing hempcrete. Our design implemented hempcrete and a localized renewable energy source to limit the environmental impact.

In the spring, we completed the Department of Energy Inclusive Energy Competition outlining a process toward adjusting the country's aviation firefighting system to be electrically sourced. Our plan upgraded two airports in Colorado and the Santa Monica airport with sustainable infrastructure such as on-site solar. We also created a plan for transitioning forest fighting aircraft from jet fuel sourced to a sustainable powertrain.

The Department of Energy liked our idea, but the project was not selected so we took it upon ourselves to develop a contemporary forest fighting aircraft. We brought in a team of aerospace engineers and expert UAV designers and developed a timeline for the development of our first product. Our team has since applied for over 12 state and federal grants for the manufacturing of a fleet of hydrogen fuel cell drones capable of fighting forest fires.

Our product will be flown remotely which will save the lives of firefighters who no longer must fly over forest fires. We are still waiting to hear back from these grants and continue to submit to funds such as NASA's SBIR Ignite Program.

In the late spring, our team of recent graduates continued to provide our service and submitted projects for the NREL ETIPP Program. We met with the Office of Thom Tillis and presented to Lumberton Airport and the NC Coastal Institute with the development of sustainable upgrades that would bring jobs to the underserved Lumbee Tribe of North Carolina. For a myriad of reasons, this area did not want to grow renewable energy jobs at the time.

This project's successes and failures guided our American Solar Outreach Submission. In August, we expanded our business into direct green hydrogen planning. We submitted a proposal to plan for 1,000 US airports to develop hydrogen support infrastructure such as on-site electrolyzers to the hydrogen incubator challenge.

In August, we also started the National Renewable Energy Lab's Opportunity Project. The current NREL Opportunity Project redesigns Puerto Rico's grid to be climate resilient. This public-private partnership does not pay so we are still pre-revenue but this allows us to produce work for the Puerto Rican authorities and connect with the renewable energy system during a conference in February.

We are working with the NREL until February without pay and are providing solutions to large airports in the region right now. When our team is not producing work, we are expanding our distributed energy network by connecting with solar, tidal, microgrid, and hydrogen companies. Sadly, we have not been compensated for any of our work yet.

Our team is uniquely positioned because of our current partnerships, and our diversity. Our company is majority female with plans on expanding that majority. Since our inception last year, we have been an international organization. I have received help from team members in Karachi, Pakistan, and Leeds, England.

This gives us the ability to work on our international software more efficiently. We will produce this program because our team knows that holistic solutions are needed to rapidly reduce the emissions from the aviation system if we are to survive. The UN General notes that we need to decrease emissions within 12-24 months if we are to survive (United Nations Report, 2022).

Plan – What is your plan to achieve your goals?

We have studied holistic approaches toward aviation sustainability. We have made programs for airport energy use in the future.

Our team plans on utilizing our internal team and our partners to rapidly develop a user-friendly interface for the FAA and IATA, and for pilots who fly in and out of the United States.

Our budget will be used by our team to develop a software program for the FAA and IATA. According to our software development partners, the cost of hiring a new team member to build a new website is around we will pay a new UE/UI developer \$10,000 to help us add this feature on to our Forever Flight Thunderbird Software. We will use \$15,000 to pay our team of young green designers to reach out to airports across the world to determine if their airspace is affected by solar PV. As our plan states, we will start with Italy, and then expand to other countries after this beta program shows functionality.

The program will be created over several iterations using GIS and existing solar glare analysis. These add-ons will become a depository of solar analysis created through a widespread email campaign and then the FAA as well as the IATA will have a resource, they can track that safely maintains this vital information.

Our team knows we cannot do this by ourselves. We will utilize our distributed energy network to help us build our program. Since our inception in 2021, our team has been building a team of corporations that have the similar goal of going to net zero as quickly as possible. Forever Flight's new software will promote a holistic solution that can help rapidly decarbonize the system.

Supplementary Information

Four question narrative word count: 2,177 total word

Technical Assistance Request

Ryan Wilkoff's challenge details for challenge: [Solar Prize Round 6](#)

Generated at Fri Sep 30 2022 09:43:20 GMT-0500 (Central Daylight Time)

Explanation

Software development support

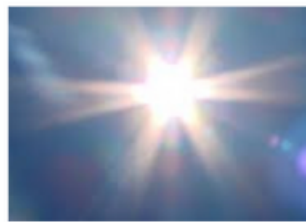
Key Needs

- * Funding & Investments (4 / 5): *No explanation*
- * Software Development (5 / 5): *No explanation*

Matches

1. [BlochSoft Technologies Inc.](#): 88.70%
2. [HomeMe Group, Inc.](#): 88.70%
3. [Mendiak Systems](#): 88.70%
4. [IoT Conduit](#): 87.25%
5. [Positive Deviancy](#): 86.74%
6. [VayuAI Corp.](#): 86.74%
7. [NAVIA ENERGY INC](#): 86.61%
8. [Zpryme](#): 84.53%
9. [Halfone Ventures](#): 83.51%
10. [North Shore InnoVentures, Inc.](#): 83.08%

PowerPoint Summary Slide



Glare from Panels at Airport in England
(Burnham Wick Solar Farm, Essex)

What's the Problem?

Solar PV is expanding in airports across the world, and solar glare analysis might not be standardized. According to pilots (or ACRP research), the glare from solar PV is distracting while entering arrival airspace.



What's the Solution?

This issue is most problematic for pilots in poorer nations who need solar PV the most. Our software will provide helpful information for pilots in all nations and pass on the cost of this necessary software to the airline companies or FAA and IATA. This is not just a software program solely for the use of the United States and its pilots, but also an opportunity for other countries around the world to start making small steps and changes for a healthier industry and planet.



Letters of Commitment



October 4, 2022

Forever Flight Worldwide
6714 Mountain Trail, Austin TX
Forever-flight.squarespace.com

RE: Letter of Support for American Made Challenges
Solar Prize Round 6

Dear Prize Team:

This letter is in support of Forever Flight Worldwide's participation in the American Made Challenges Solar Prize Round 6 and recognition of their efforts to assist the National Renewable Energy Laboratory (NREL), the U.S. Department of Energy (DOE), and the U.S. Census Bureau with efforts to rebuild Puerto Rico's energy grid in the wake of hurricanes Maria (2017) and Fiona (2022), through The Opportunity Project (TOP) to improve the resilience of the grid and to help meet the island's goal of 100% Renewable Energy by 2050.

In my capacity as Project Lead for the Open Energy Data Initiative (OEDI) and Sprint Leader for the OEDI TOP Sprint, I have had the privilege of collaborating with Forever Flight since August 2022. Forever Flight is utilizing NREL and DOE datasets made available through OEDI to develop software to provide high consumption commercial electricity users with a guide to source their businesses from renewables. As part of the TOP Sprint, Forever Flight is collaborating with industry partners both in the public and private sectors, including Amazon's AWS and local community leaders in Puerto Rico, working towards the same goal of bringing the island community to net-zero.

I acknowledge Forever Flight Worldwide's efforts to develop software towards a climate resilient Puerto Rico. Please do not hesitate to contact me if you would like to discuss my experience with them in greater detail.

Sincerely,

A handwritten signature in black ink, appearing to read "Jon Weers".

Jon Weers
OEDI PI and TOP Sprint Leader
jon.weers@nrel.gov