2023 Blue Skies Competition
Q&A Session Summary Document
November 3, 2022; 3:30 – 5:00 PM ET

Technical Questions Received in Advance

1. **Does "environmentally harmful emissions" include only carbon or all potential emissions?**
   Studies show that many types of non-carbon emissions still have environmental impacts. Consider the environmental impacts of any emissions your energy source or system may produce.

2. **What level of commercial airplane should our project be geared towards? Similar question: The guidelines mention providing enough energy to support a 2-hour flight, but they don't mention the size and weight of the aircraft. Do we choose our own specs and limitations?**
   The key word is **most** for "most aviation flights longer than 2 hours." Your team will need to research, outline, and justify what these flight lengths will be, and what aircraft may be likely serve these flights in the 2050s timeframe, especially if that design needs to change to accommodate new propulsion.

3. **If we do create our own parameters, can we use NASA's blended wing as our airframe design? Similar question: Do we need to consider the wing design for the alternative source of energy?**
   While the proposal should not focus on airframe design, certain airframes can impact the viability of certain energy sources, which could be a consideration when justifying your energy source.

4. **Although 2 hours is the minimum flight target, what would be the ideal flight time that we should be aiming for?**
Teams should research and self-determine (and subsequently, outline and justify) what "most aviation flights longer than 2 hours" constitutes for the industry in the 2050s.

5. **How will 'feasibility of technological advances by 2050' be judged?**
One should be able to use their research to justify what would be feasible by 2050. Judges will be working from the outlined evaluation criteria, which values well-researched, coherent justifications for assumptions and concepts. See Technical Merit & Rationale: **Sound justification of assumptions** for the selected energy source and its source-to-flight lifecycle (Page 11, Competition Guidelines).

6. **Is there a rate on how feasible the fuel can be by 2050?**
If you mean, "will you be rated on how feasible judges think the fuel is?", the answer is no. Judges will evaluate how well thought out your case for feasibility is and how you present that in writing. Should your team be selected as a finalist, your presentation will be similarly evaluated.

7. **For a "reasonable assumption of plane redesign," could you elaborate on "reasonable"? What limitations are there on engine redesign?**
We do not expect your team to design a new airplane. Look at existing research for airplane designs that may accommodate the parameters your energy source may allow. While there are no direct limitations on the redesign of an engine, be mindful of where the technologies and research are now, and the time left to develop/implement them by the 2050s.

8. **How much emphasis should be placed on viability versus sustainability?**
That is up to the group. Neither a sustainable idea that is not shown to be viable nor a viable non-sustainable idea would be the best option to pursue for this competition.

9. **Can we assume that the landscape assessment is limited to the U.S., or would our considerations extend to global aviation? Similar question: Do we need to consider the whole world's aviation infrastructure or just the U.S. infrastructure?**
One could focus on just the U.S., but the aviation market is a global one. What happens outside of the U.S. has major impacts on the U.S. aviation industry, so judges may ask questions about the global market in their evaluations and during finalist team presentations.

10. **Should teams attempt to scale economic analysis from 2022 to 2050?**
Economics is part of the bigger picture of development, viability, and sustainability of your proposal. While many teams may not go in depth on the economics analysis, use your best judgement for any analyses to include scaling factors, such as inflation.

11. **Is hybrid considered one alternative source of energy?**
    You may consider a hybrid system but should focus on the main energy source of that system.

12. **Does the banned SAF encompass all biomass and waste-derived fuels? What exactly does SAF include?**
    This competition is not seeking analysis of SAF, as defined by the Department of Energy (DOE). Take a look at the DOE's SAF page for a better idea of what is considered SAF, for purposes of this competition. Energy sources that are bio- or waste-derived but do not fall into the DOE's definition are eligible for pursuit.

13. **Would hydrogen directly injected into an aircraft engine made of biomass conversion be considered a biofuel?**
    We need clarification before answering. Please email us directly with a rephrased question (blueskies@nianet.org).

14. **Can the energy or fuel source be extracted or powered in a new way, but come with the same result (ex. hydrogen)?**
    Yes, energy sources such as hydrogen, as well as novel ways to get those energy sources, may be considered.

15. **To what extent should we talk about the engine cycle, and how the fuel will be used in the engine itself?**
    Teams may want to discuss engine cycle and how the energy source will be consumed by the engine in the energy source justification and feasibility. However, this discussion is not a necessary piece of your proposal. The depth of discussion on energy consumption will be unique to each team and selected energy source.

16. **To what extent should we talk about the storage of fuel on the airplane?**
    Storage on the airplane is the final destination of this fuel before use. If new technologies or techniques are necessary for this storage, it may be worth mentioning them on some level.

17. **Would solid-state batteries with a focus on regenerative systems, solar, piezoelectric, thermoelectric, be acceptable for competition parameters? Similar Question: Are perovskite solar cells (an innovative, less researched, clean energy collection method) considered researching solar energy, and would this be a valid research focus?**
    If you choose electricity as your aviation energy source (which is allowed), it is up to your team and your research to decide how that will be generated, transported, and stored.

18. **Will teams be disqualified if they focus on electric (battery storage) or hydrogen fuel sources?**
Teams may use electric or hydrogen as a fuel source.

19. **Are battery swapping/takeoff assist devices (supplementary systems) allowed in this project?**
Battery swapping would be a way of getting an energy source to the aircraft, which is within the scope of the project. Vehicle takeoff is less in scope of the project, but if an assisting technology is necessary or recommended to make your energy source viable, it would be beneficial to mention it.

20. **How early in the start of the life cycle is required, meaning harvesting of raw materials to manufacturing depth up to delivery of the aircraft?**
The generation/creation of usable energy source materials should be considered as part of the lifecycle.

21. **Do the emissions involved in manufacturing need to be included in the project as far as the refinement process of our materials?**
Emissions from the generation/creation of usable energy source materials should be considered as part of the lifecycle.

22. **What resources exist, and are approved, to determine the products of various chemical combustions?**
Teams are expected to identify and use their own resources in their proposals. Peer reviewed academic and scientific resources written by subject matter experts are recommended sources in your information search.

Miscellaneous Questions Received in Advance

1. **What is the preferred method of balancing technology readiness with new concepts?**
For technology readiness, NASA's Technology Readiness Level Chart is widely utilized at both NASA and in industry. Similar scales exist in industry for manufacturing and other readiness evaluations. As far as balancing technology readiness with new concepts, it is OK to utilize ideas that have a lower TRL (because they are new), as long as teams justify assumptions and rationale for technology development and implementation.

2. **In the rubric section for landscape assessment, there are technical, social, political, financial, and environmental factors listed. How much of an emphasis should we put on each aspect of the proposal?**
   The technical aspects are the main focus of the proposal. The direction, development, and adoption of new technologies are affected by the other listed factors, which may affect feasibility and viability of selected energy sources. These should be taken into consideration and/or mentioned when appropriate.

3. **In what ways would it be preferred to measure the social and political impacts?**
   There is no specific preference. The impacts should be mentioned if/when relevant to the overall system.

4. **What are the expectations for our research sources? Is it acceptable to use research papers we find online, or are we expected to perform a lab experiment and discuss with chemists/researchers?**
   We do not expect the students to need to perform lab experiments for this proposal. Peer reviewed literature and conversations with relevant experts in the appropriate fields are acceptable resources.

5. **We are interested in attending an IEEE/AIAA symposium and they are requesting papers/reports. Are we allowed to submit our project material to this conference?**
   Yes, submitting to and presenting at industry symposia is allowed – and let us know if you do! However, we ask that teams refrain from posting research on *publicly accessible websites or servers* until after the June 1-2, 2023 Blue Skies Forum.

Programmatic Questions Received in Advance

1. **Are students graduating in December allowed to participate?**
   Yes, as long as they were students during the Fall Semester when you began working on the project. However, it is important to note that if your team is selected as a finalist, your university may not be able to support travel costs to the Forum for anyone who is no longer an active student. Eligibility for an internship depends on continued college/university enrollment.

2. **Can we have an external entity help with the video by hiring or asking someone with experience?**
   Videos should be produced by the team, and it is discouraged to hire for video production. Multi-disciplinary teams will be the most successful in this competition, so if it makes sense to add a creative member to the team, it may help position the team for success with the video and infographic. That said, just as teams may (and should)

seek subject matter experts for their research, teams may access outside resources to design and produce the video.

3. **For the video, are we expected to make 3D or 2D graphics and animations?**
   3D or 2D graphics and animations are not required nor expected, but they may help convey a concept effectively. Overall, the level of video production is up to each team to determine what's needed to convey the proposed concept. Take note of the video expectations and evaluation criteria outlined in the Competition Guidelines to determine how your team will present its concept in video form (see pages 9-11).

4. **What is the desired format of the final proposal report?**
   The proposal report should be submitted as a PDF that adheres to information laid out in the Competition Guidelines (See pages 7-8).

5. **Does the allotted page limit for the report include the references, title, etc., or is that for the body of the report?**
   The allotted page limit for the proposal does not include cover page, abstract page, or appendices such as references. PLEASE NOTE that all pertinent information to your concept should be included in the main body of the proposal. Judges are not required to read beyond seven pages, and appendices are meant for references and calculations only (see Competition Guidelines, page 8).

6. **Are additional members able to join a team after the submission of the NOI but before the submission of the proposal?**
   Yes. Team members may join up until the proposal submission, at which point the team size and membership is set, with all team members listed on the proposal itself.

7. **How technical/detailed do you want the report to be?**
   The proposal needs to reflect the total scope planned for the final paper, addressing all aspects described in the Competition Guidelines, page 4 (2023 Competition Theme Description and Details). It should be at the "convincing" level - demonstrating a strong basis of research analysis having already been conducted. Include enough detail to convince the judges that your proposed concept has been well researched and developed, that it is credible and viable with sound justification, and provide confidence that your team can further refine and develop your concept if selected as a finalist. Remember, special emphasis should be placed on analyzing innovative energy sources.

Questions Received on the Call

1. **Are we allowed to change our project concept entirely before the proposal, after we've submitted the NOI?**
   Yes, as long as it follows the [Competition Guidelines](). Any number of reasons may cause a team to shift directions between the NOI and the proposal deadlines. The NOI is primarily a program management mechanism that allows managers and sponsors to gauge competition interest to ensure enough reviewers are on board to review proposals. It is also an opportunity for us to help guide NOI submissions toward the competition theme, as necessary.

2. **As we research and prepare our proposals, what should we think about if selected as a finalist, in terms of the infographic?**
   An infographic is a more visual, less technical way to present your information from your proposal – in this case, the alternative energy and its journey from where it is to where it needs to be. Charting that outline while doing your research is a good idea, to help figure out how to structure your paper, presentation, etc. It's important to realize that not everyone is an expert in these alternative energies, or these chemistries, etc., so figuring out how to explain it in a way that anyone can understand is really important, not only for judges, but for audiences in general.

3. **For the June Forum, are all team members required to attend?**
   No. A minimum of two team members, who are U.S. Citizens, must attend the Forum in June to present on behalf of the team. However, we highly encourage attendance! The Forum is a great opportunity for professional development and a generally "cool" experience; each Forum presents an opportunity to network with other teams as well as NASA and industry experts, tour NASA facilities (typically), and often visit interesting sites in the area.

4. **For our team members, if one is not a U.S. citizen, but is part of our team, can they still attend the Forum as a spectator?**
   It depends. If the Forum is held at a NASA Center, the team member may not be able to attend, due to unique guidelines at each Center regarding foreign nationals. If the Forum is held offsite, the team member would be able to attend. Either way, if attendance is permitted, the individual may participate as an active team member. If attendance is not permitted, team members can watch virtually via Livestream. We anticipate being able to provide more clarity at the time of proposal submission and certainly by the time finalists are selected.

5. **If we graduate in May 2023, can we still access travel funds for the Forum and can we participate in an internship?**
   Stipends go directly to the university and are paid out through the university, and each university has different guidelines for funding travel for graduates who are not pursuing

additional education at the institution. Team members who graduate in May 2023 will need to check with their advisory/university officials regarding eligibility for travel funds.

Regarding NASA internships, eligibility is limited to recent graduates for 6 months following graduation, IF students can prove they are pursuing continued education. That said, sometimes NASA offers exceptions to the "intent to enroll" requirement, but any exceptions (which are extremely rare) will be determined by NASA and the entity tasked with managing internships. The contract to manage internships is in a recompete, so rules may change between now and Summer 2023.

6. **Can international students/foreign nationals participate in the internship?**
   Unfortunately, no. NASA's policy is that only internships are limited to U.S. Citizens. This is non-negotiable and something that is above the control of anyone involved with this competition.

7. **Is there a set number of finalists that will be selected.**
   A maximum of eight teams will be selected as finalists. Depending on the quality of proposals, fewer may be selected at the discretion of the judging panel.

8. **How many teams are there at this point?**
   The field is competitive. There are more participating teams than in 2022. We're excited about the NOIs received thus far, with great diversity in concepts being pursued. We hope teams are excited to put forth their best foot to participate in the competition itself, and the Forum if selected as a finalist! Remember that while the internship prize is very coveted, the experience of competing and attending the Forum is extremely worthwhile for professional development.