

2011 CAFE GREEN FLIGHT CHALLENGE

**TEAM AGREEMENT
BETWEEN
COMPARATIVE AIRCRAFT FLIGHT EFFICIENCY FOUNDATION
AND**

(INSERT NAME OF CHALLENGE TEAM HERE.): rev.07.28.09

1 INTRODUCTION

This Agreement (“AGREEMENT”) is entered into by the Comparative Aircraft Flight Efficiency Foundation, Inc. (“CAFE) and:

(Insert name of individual and/or name of company here.) (“TEAM”) located at

(Insert address of individual or company here.). CAFE and TEAM are collectively referred to as “the Parties”.

The purpose of this AGREEMENT is to establish the rules and conditions for TEAM to qualify and participate in a technology demonstration flight competition that is called the 2011 CAFE GREEN FLIGHT CHALLENGE (“CHALLENGE” or “CGFC”) and that presents monetary awards from FUNDERS to its winners. The 2011 CHALLENGE will be conducted from July 10 to July 17, 2011 by CAFE at the CAFE Flight Test Center at Charles M. Schulz-Sonoma County Airport in Santa Rosa, California.

The CHALLENGE is intended to bring about the development and convergence of new technologies and innovations that can improve the community acceptance, efficiency, door-to-door speed, utility, environmental-friendliness, affordability and safety of future air vehicles. Such technologies and innovations include, but are not limited to, bio-fueled propulsion, breakthroughs in batteries, motors, solar cells, fuel-cells and ultra-capacitors that enable electric-powered flight, advanced high lift technologies for very short takeoff and landing distances, ultra-quiet propellers, enhanced structural efficiency by advances in material science and nano-technology and safety features such as vehicle parachutes and air-bags.

To ensure that air vehicles are safe, sustainable and practical, the CHALLENGE is comprised of a series of separate but inter-related flight attempts that measure key performance capabilities. In order to win any of its prizes, all TEAM vehicles are required to participate in all flight attempts and must demonstrate these performance capabilities to a level that satisfies all entry requirements, rules, and other provisions of this Agreement. Winners will be determined by their vehicle's demonstrated flight performance as measured by CAFE test equipment. Each of the flight performances to be measured is detailed below in **Appendix A, “Rules”**.

1.1 Execution of Agreement

To execute this agreement, TEAM must first complete and submit its NOTICE OF INTEREST LETTER (NOI, see **Appendix L**). Submitting the NOI makes the TEAM immediately eligible to submit its Design Proposal to CAFE as described below and in **Appendix G**. All TEAMS must submit a Design Proposal. Only 18 TEAMS can be accepted into the CHALLENGE. Therefore, TEAMS are encouraged to submit their NOI and Design Proposals as soon as possible in order to maximize their opportunity to be so accepted. After approval and acceptance of TEAM's Design Proposal by CAFE, TEAM will be asked to complete and submit to CAFE all of the forms below, including the EXECUTION portion, the EXHIBIT A portion, and the TEAM registration fee. See **Appendix L** for a complete list of documentation required.

EXECUTION of this AGREEMENT by TEAM LEADER as agent for the TEAM indicates the willingness and intent of TEAM to participate in the CHALLENGE and to follow and abide by all the terms of this AGREEMENT.

All interactions by TEAM regarding CHALLENGE will be directly with CAFE. TEAM MEMBERS will communicate with CAFE through a TEAM LEADER to be designated by each TEAM at the time of EXECUTION of this AGREEMENT.

1.2 Registration fees

To be accepted by CAFE, this AGREEMENT must be accompanied by a registration fee, as described below, payable from TEAM to the CAFE Foundation. This registration fee will be refunded in full if CAFE declines to accept the TEAM's AGREEMENT for official registration into the CHALLENGE. Otherwise, the registration fee is non-refundable.

Upon receipt and validation by CAFE of said registration fee, and in the absence of any conditions deemed by CAFE to be unacceptable, contrary or forbidden to this AGREEMENT, CAFE shall execute this AGREEMENT by signature, with time and date to initiate the Effective Date of this AGREEMENT and official registration of TEAM into the CHALLENGE. Any TEAM so registered and subsequently disqualified or removed from the CHALLENGE for reason of not fulfilling the terms, provisions, conditions and required performances of the CHALLENGE as defined in this Agreement will not receive any refund of its registration fee.

An "Early Bird" discounted registration fee of \$4000 will be accepted from those TEAMS whose completed AGREEMENT is delivered to CAFE at 4370 Raymonde Way, Santa Rosa, California 95404, on or before midnight December 31, 2009. From January 1, 2010 through and until midnight June 30, 2010, the registration fee will be \$6000. From July 1,

2010 to December 31, 2010, the registration fee will be \$8000. Registration closes at 11:59 PM December 31, 2010.

1.3 Insurance and Paperwork Deadline

After being officially accepted into the CHALLENGE, TEAMS must submit to CAFE all of the items listed in **Appendix L** before 11:59 PM May 30, 2011. Any TEAM that fails to complete and submit these necessary items by that deadline will be disqualified from the CHALLENGE. **A summary of the Key Dates pertaining to this CHALLENGE is given in Appendix I.**

1.4 Design Proposal

All TEAMS must submit a Design Proposal acceptable to CAFE in order to execute this Agreement. TEAM's Design Proposal must contain a detailed description of the vehicle design, its innovations and its technology advancement to be demonstrated. The Design Proposal must be accompanied by the signed Non-Disclosure Agreement (NDA, **Appendix H**) TEAM's Design Proposal must then be approved and accepted by CAFE in order for TEAM to become eligible to execute this AGREEMENT and participate in the CHALLENGE. Information required in the Design Proposal must include at minimum that found in **Appendix G**.

In the interest of the CHALLENGE goals, which are to develop and disseminate new technologies for community acceptance, environmental protection, efficiency, speed, and vehicle safety, CAFE reserves the right to evaluate and select Design Proposals that best fit these goals. In that selection process, CAFE reserves the right to decline to accept Vehicles that it deems unsafe, of poor quality construction, unlikely to obtain FAA license, of a performance level likely to be below the thresholds required, too similar to any two other entrants, not validly a U.S. team, ineligible due to having been US federally funded or staffed or incompatible with the above stated goals of the competition. CAFE will explain to TEAM LEADER its reason(s) for declining to accept any Design Proposal. TEAMS whose Design Proposal is not accepted may revise and re-submit it.

CAFE's evaluation of the acceptability of TEAM's Design Proposal may require up to 30 calendar days. Once a TEAM is accepted and officially registered into the CHALLENGE by CAFE according to this Agreement, CAFE shall not remove or "bump" that TEAM from the CHALLENGE in order to make room for any other team.

If TEAMS apply for the CHALLENGE after it has filled its maximum number of entries, then entries will be prioritized onto a wait list by CAFE based on their date of submission and the potential impact of their proposed technologies on the CHALLENGE goals.

A list of all TEAMS submitting Notice of Interest letters and those officially registered to compete in the 2011 CHALLENGE will be posted on the CAFE website at cafefoundation.org within 10 days of such submittals and registrations. Those postings will protect the proprietary information of each TEAM in accordance with the NDA.

CAFE will welcome Design Proposals submitted by Universities or Colleges, individuals, private design groups, corporations or other business entities, EAA members and teams that are combinations of these.

Once accepted by CAFE as acceptable for official registration in the CHALLENGE, TEAM Design Proposal must be implemented into a TEAM vehicle whose design does not substantially differ from that Proposal. If any substantial change to the vehicle from the submitted Proposal is subsequently necessary, such change must be approved by CAFE as compatible with the CHALLENGE or the vehicle may become ineligible to compete in the CHALLENGE.

1.5 Design Proposal Intellectual Property

CAFE agrees to protect all TEAM Design Proposals and the intellectual property therein with a Non-disclosure Agreement (NDA). The NDA is found in **Appendix H**. The NDA protection by CAFE of the intellectual property and any other proprietary information submitted by TEAM to CAFE will remain in effect even if TEAM is not accepted into the CHALLENGE or is subsequently removed or disqualified from it.

1.6 Timeline

The CHALLENGE will be conducted in 2011 from July 10-17, inclusive. Upon completion of the competition, CAFE will determine the winners of all CHALLENGE prizes as soon as possible. Cash prizes will be awarded within 60 days of their announcement. See **Appendix I** for Key Dates of the CGFC.

1.7 Purse Payment

FUNDERS have agreed to issue purse payments no later than 60 days after the announcement of the winner of the CHALLENGE. Checks will be payable to the TEAM LEADER. Each TEAM MEMBER acknowledges that FUNDERS shall only be obligated to make purse payments to the TEAM LEADER. TEAM MEMBERS hereby acknowledge that any failure of the TEAM LEADER to make payments of any kind to TEAM MEMBERS is the responsibility of the TEAM LEADER, and not the responsibility of CAFE or FUNDERS.

ABBREVIATIONS/DEFINITIONS to be used in this document

AGL: Above Ground Level, referring to altitude above local ground

BTU: British Thermal Unit, a measure of energy based upon the amount of heat required to raise the temperature of one pound of liquid water by one degree from 60° to 61° Fahrenheit at a constant pressure of one atmosphere. 1000 BTU equal 0.29307107 kWh, making the 115,000 BTU energy content of 1 gallon of 87 Octane unleaded auto gasoline be equivalent to: 33.7 kWh.

CAFE: Comparative Aircraft Flight Efficiency Foundation, Inc.

CGFC: CAFE GREEN FLIGHT CHALLENGE

CAS: Calibrated airspeed, corrected for instrument and pitot system error

CFTC: CAFE Flight Test Center (at Charles M. Schulz Sonoma County Airport)

C.G. (or c.g.): Center of Gravity (of the vehicle)

CW: Competition Weight. The vehicle weight, including fuel and payload that TEAM will use in all CHALLENGE flight attempts (includes payload of 200 lb per seat and 30 minute fuel reserve for 200 mile flight).

dB: decibels, used in noise measurement

dBa slow: Equivalent noise power in dB weighted on the "A" slow scale

EAA: Experimental Aircraft Association

ERs: Entry Requirements, the capabilities that must be demonstrated in order to qualify to compete or win in the CHALLENGE. See Appendices B, C, D.

FAA: Federal Aviation Administration

FAR: Federal Air Regulations (as maintained by FAA)

Flight Attempts: The flights made during the CHALLENGE by TEAM vehicle to demonstrate performance applicable to the ERs or the CGFC.

FUNDERS: CAFE-approved businesses, agencies or individuals that provide CHALLENGE prizes.

g: The amount of acceleration due to gravity at the earth's surface

H₂: Hydrogen, typically used for fuel cells

KW-h: Kilowatt-hour, a unit of electric energy-use measured in the CHALLENGE

MPG: Miles Per Gallon referring to energy consumption

MPGe: Miles Per Gallon equivalent, for referencing MPG relative to the energy content of 87 Octane unleaded auto gasoline, 115,000 BTU per gallon. See Appendix F

mph: Speed in statute miles per hour

MSL: Mean sea level, referring to altitude above sea level, on a standard day

NASA: National Aeronautics and Space Administration

NDA: Non-disclosure Agreement, to protect intellectual property

Passenger-MPGe: Vehicle's MPGe multiplied by the number of seats

PIC: Pilot in command, the licensed, qualified pilot operating the aircraft

V: Velocity in statute miles per hour

V_a: Velocity for maneuvering speed

V_{so}: Velocity for stall in landing configuration

V_x: Velocity for best angle of climb, best endurance or minimum power required

V_y: Velocity for best rate of climb

W_p: Cabin payload in pounds

OTHER DEFINITIONS; naming

There are two main prize flight attempts in the CHALLENGE, each of which is a timed 200 statute mile flight. These main prize flight attempts are named as follows:

- 1) the Passenger-MPGe flight attempt will be named the “MPG Flight”; and,
- 2) the mph flight attempt will be named the “Speed Flight”.

The MPG Flight will be flown 2 days prior to the Speed Flight.

2 ELIGIBILITY

2.1 Team Eligibility

A TEAM is an individual or private entity, or a group of individuals or private entities that register to participate in CHALLENGE. A TEAM is comprised of a TEAM LEADER and TEAM MEMBERS. A TEAM LEADER is, by definition, also a TEAM MEMBER.

The TEAM LEADER is a single private entity or individual which is the sole agent representing TEAM regarding its participation in CHALLENGE. In the case of the TEAM LEADER that is a private entity, it must appoint an individual who is an officer of the private entity to represent the TEAM LEADER.

To be eligible to win any CHALLENGE prize, an individual or entity, a) in the case of a private entity, shall be incorporated in and maintain a primary place of business in the United States, and b) in the case of an individual, whether participating individually or as a member of a group, shall be a citizen or permanent resident of the United States and shall have served as TEAM leader for no less than 6 months prior to the start of the 2011 CGFC.

TEAM MEMBERS are participants on the TEAM who are not the TEAM LEADER. All TEAM MEMBERS will apply to CAFE to register for the CHALLENGE through TEAM LEADER and must receive written acceptance by CAFE in order to participate with their TEAM.

All TEAM MEMBERS must execute an “Adoption of Agreement”, as set forth in Exhibit A, committing to all terms of this AGREEMENT. By signing below, TEAM LEADER represents that all TEAM MEMBERS have executed the Adoption of Agreement and that no one else will become a member of the TEAM or participate in the CHALLENGE until such new TEAM MEMBER has signed this Agreement. CAFE may disqualify any TEAM if it discovers that a person is acting as a TEAM MEMBER who has not signed

an "Adoption of Agreement". TEAM LEADER will provide CAFE with a copy of the "Adoption of Agreement" signed by each TEAM MEMBER.

TEAM MEMBERS may NOT participate in the CHALLENGE on more than one TEAM.

Any U.S. Government entity is ineligible for the prize competition. Any organization principally or substantially funded by the Federal Government, including Federally Funded Research and Development Centers, Government-owned, contractor operated (GOCO) facilities, and University Affiliated Research Centers, must have their eligibility to compete in the CHALLENGE pre-determined by CAFE. The principle to be used in such determination is to assure no unfair advantage to any TEAM.

U.S. Government employees (including employees of Federally Funded Research and Development Centers, Government-owned, contractor-operated facilities, and University Affiliated Research Centers) must have their eligibility to compete in the CHALLENGE pre-determined by CAFE. U.S. government employees may not be acting within the scope of their employment. The principle to be used in such determination is to assure no unfair advantage to any TEAM.

Board members of CAFE are not eligible to participate in the CHALLENGE.

2.2 Aircraft and Hardware Eligibility

Aircraft and aircraft parts that were manufactured and assembled in foreign countries can be used to win any CGFC prize by TEAM(s) that has valid eligibility as defined herein.

Any aircraft or Vehicle whose design or construction is deemed by CAFE to have been principally or substantially funded by any Government may be ineligible to participate in the CHALLENGE, other than as a possible exhibition. Determination of such eligibility will be made by CAFE. The principle to be used in such determination is to assure no unfair advantage to any TEAM.

2.3 Financing

TEAM shall not obtain any government (federal, state, local or foreign) funding for purposes of participation in the CHALLENGE.

2.4 Uses of Federal Resources

TEAM is permitted to use or pay for the use of U.S. Government facilities, personnel, hardware, or information previously developed by the U.S. Government if access to such is available on an open, cooperative, nonexclusive, or reimbursable basis.

2.5 Government Regulations and Licensing

TEAM will comply with all U.S. laws, regulations and policies, including those relating to export control and nonproliferation, and the laws of relevant state and local jurisdictions that pertain to or govern any activities conducted by TEAM in connection with the CHALLENGE. This includes all FARs. See **Appendix A and L**.

3 SAFETY

CAFE reserves the right to deem any TEAM, TEAM LEADER or individual TEAM MEMBER “unsafe” at any time and eliminate that TEAM or individual from the competition. CAFE is willing to provide a non-binding safety audit to TEAM, subject to time and availability constraints. CAFE will answer any safety related questions promptly, and will dispense safety related advice when it sees fit.

The CAFE Flight Test Facility and its ramp, surroundings and grounds are no-smoking areas. All fueling and de-fueling of aircraft shall be conducted outdoors.

4 RIGHTS

4.1 Use of Names, Trademarks and Insignias

TEAM may not use the name, trademark or insignia of CAFE, its contractors, collaborators, or FUNDERS on its hardware and printed materials related to the participation of TEAM in the CHALLENGE without CAFE's or its contractor's, collaborator's or FUNDER's prior written consent, whichever party is applicable.

TEAM agrees that unauthorized use of such names, trademarks and insignias shall result in removal from participation in the CHALLENGE if TEAM continues unauthorized use after being notified to cease and desist.

4.2 Media Rights

TEAM retains all Media Rights related to the story of its participation in the CHALLENGE.

TEAM agrees that CAFE will retain all Media Rights related to the story and conduct of the CHALLENGE.

Each TEAM MEMBER agrees to let CAFE (and FUNDERS) use the name and likeness of such TEAM MEMBER (without charge) as may be reasonably required in connection with the media material prepared and distributed by CAFE relating in any way to the CHALLENGE.

Subject to the terms of **Appendix H (Non-Disclosure Agreement)**, TEAM agrees to provide CAFE reasonable amounts of video footage or access for recording activities related to participation of TEAM in the CHALLENGE and the right to use said footage for public affairs and/or educational purposes. CAFE is granted the right to furnish said footage and the right to use said footage to FUNDERS.

TEAM agrees that its failure to furnish video footage or access for recording purposes based on CAFE's reasonable requests may result in TEAM's removal from participation in the CHALLENGE.

4.3 Purchase and Sales Rights

a. TEAM agrees that CAFE and FUNDERS retain the non-exclusive right to purchase from TEAM the resultant or derived product, innovation or service used to win the CHALLENGE.

b. This Section does not guarantee a purchase of the resultant or derived product, innovation or service and is subject at all times to the parties reaching mutual agreement after the CHALLENGE.

c. TEAM otherwise retains all rights to sell the resultant or derived product, innovation or service used to win the CHALLENGE to whomever they wish, provided they abide by all local, state, and federal laws and regulations regarding the sale and export of technology.

d. TEAM agrees that failure to meet this purchasing requirement may result in its removal from participation in the CHALLENGE.

4.4 Intellectual Property Rights

To the extent TEAM owns intellectual property resulting from its participation in CHALLENGE, TEAM agrees to negotiate in good faith with FUNDERS the grant of a nonexclusive, nontransferable, irrevocable, license to practice or have practiced the intellectual property throughout the world, at reasonable compensation, if FUNDERS choose to pursue such a license.

5 GENERAL PROVISIONS

5.1 Governing Law

The Parties hereby designate United States Federal Law to govern this AGREEMENT for all purposes, including, but not limited to, determining the validity of the AGREEMENT, the meaning of its provisions, and the rights, obligations, and remedies of the Parties.

5.2 Acceptance and Removal

By executing this AGREEMENT, CAFE accepts TEAM for CHALLENGE.

CAFE has the right to eliminate TEAM from the CHALLENGE at any time if TEAM fails to meet any term of this AGREEMENT. Disqualified TEAM(s) may be required to remove their vehicle and TEAM from the CFTC grounds and leave the CFTC premises. In select cases and at its sole discretion, CAFE may allow a disqualified TEAM and its Vehicle to continue participation in CHALLENGE Flight Attempts for Exhibition purposes.

Removal of the TEAM from participating in the CHALLENGE eliminates the possibility of TEAM winning the CHALLENGE.

TEAM agrees to abide by a decision for removal made by CAFE, without contest, legal recourse, or any other action of protest of the decision.

5.3 Reporting of Aggregate Investment

For the purposes of measuring the CHALLENGE's effectiveness in leveraging investment in general aviation technologies, on a quarterly basis, TEAM agrees to provide CAFE with a written total (a single amount) of the following: TEAM's incremental and cumulative financial, property (capital), personnel, and any other investments, and/or expenditures (direct or in-kind) made to conduct any and all activities related to or required by participation of TEAM in the CHALLENGE. CAFE will not make this information public except in aggregate form for all TEAMS competing in the CHALLENGE.

TEAM agrees that failure to meet this reporting requirement within 30 days of a request from CAFE may result in its removal from participation in the CHALLENGE.

5.4 Effective Date of Agreement

The Effective Date of this AGREEMENT is the later date on which the Parties execute this AGREEMENT.

5.5 Responsible Officers

The following are Responsible Officers (or their designee) for each party for purposes of providing periodic TEAM updated information, to coordinate planning of the CHALLENGE, and to perform other interfacing functions between TEAM and CAFE as necessary. When questions arise about CHALLENGE rules, the Responsible Officer may contact CAFE for a case-by-case interpretation and ruling. All such interpretations and rulings will be posted by CAFE on its website as FAQs.

Comparative Aircraft Flight Efficiency Foundation
Brien A. Seeley, President
4370 Raymonde Way
Santa Rosa, CA 95404-6231
Tel: 707-544-0141
Fax: 707-544-2734
Email: cafe400@sonic.net

Insert TEAM name here.

Insert TEAM Responsible Officer Name here.

Insert TEAM Responsible Officer Title here.

Insert TEAM Responsible Officer Telephone Number here.

Insert TEAM Responsible Officer Fax Number here.

Insert TEAM Responsible Officer Email here.

Insert TEAM Mailing Address here.

5.6 Complete Agreement

This AGREEMENT represents the full and complete understanding and agreement between the parties regarding their relationship and the CHALLENGE. It merges and supersedes all previous AGREEMENT or agreements, oral or written, express or implied

including related communications and representations. Any modifications to this AGREEMENT must be in writing and signed by the Parties to be effective.

5.7 Invalidity

The invalidity, in whole or in part, of any part of this AGREEMENT herein shall not affect the validity or enforceability of any other part of this AGREEMENT.

5.8 Assignment

This AGREEMENT may not be assigned by TEAM to any party without the prior approval of CAFE. CAFE may assign this AGREEMENT to a FUNDER or its designated agent.

5.9 Insurance

TEAM agrees to investigate and obtain any and all insurance policies or coverage required by its local, state, or federal governments to conduct any and all activities related to or required by participation of TEAM in the CHALLENGE. In addition, CAFE shall, in its sole and absolute discretion, require that each TEAM procure customary and reasonable levels and terms of liability insurance to include coverage for claims by (a) a third party for death, bodily injury, or property damages, or loss resulting from an activity carried out in connection with participation in the competition with the U.S. Government named as an additional insured under the insurance policy and (b) the U.S. Government for damage or loss to Government property resulting from such activity. CAFE will require proof of such insurance as a requirement to participate in the CHALLENGE. Such insurance limits TBA. TEAM will be required to obtain documentation that their insurance includes the CAFE Foundation, the County of Sonoma, EAA Chapter 124, the U.S. Government and any other affiliated entity that may be required by CAFE, as named insured.

TEAM agrees that failure to meet this insurance requirement may result in TEAM's removal from participation in the CHALLENGE.

5.10 Waiver and Acknowledgement

In return for the opportunity to participate in this CHALLENGE, TEAM agrees to waive any and all claims against CAFE, its officers and its contractors and related entities, including FUNDERS (who may be named later), NASA, County of Sonoma, EAA Chapter 124, and the U.S. Government and its related entities, including but not limited to claims in contract and tort, related or arising from participation of TEAM in the CHALLENGE. TEAM further agrees to hold CAFE its officers, board members,

volunteers and contractors and FUNDERS harmless for any and all such claims of its TEAM MEMBERS, contractors, agents and related parties.

Commitments by the federal government to provide purses for this CHALLENGE are subject to the availability of appropriated funds, and no provision in this AGREEMENT shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C 1341.

5.11 Liability

By competing in the CHALLENGE, TEAM agrees to assume any and all risks and waive claims, whether in contract or tort, against CAFE and its contractors and related entities, including FUNDERS (who may be named later), NASA, County of Sonoma, EAA Chapter 124, and the U.S. Government and its related entities, for any injury, death, damage, loss of property or revenue or profits, whether direct, indirect, or consequential, arising from its participation in a competition, whether such injury, death, damage or loss arises through negligence or otherwise, except in the case of willful misconduct. TEAM further agrees to add as additional named insured to its liability insurance policy the CAFE Foundation, the County of Sonoma, EAA Chapter 124, the U.S. Government and any other entities named by CAFE as requested. TEAM further agrees to indemnify the U.S. Government against third party claims for damages arising from or related to competition activities. Related entity means a contractor or subcontractor at any tier, and a supplier, user, customer, cooperating party, grantee, investigator, or detailee.

TEAM also acknowledges that CAFE has entered into agreement with FUNDERS to pay the purse and agrees that the obligation for payment of the purse to declared winners belongs to FUNDERS and not to CAFE. FUNDERS have committed to pay TEAM LEADER of winning TEAM within 60 days of winning the CHALLENGE. TEAM will not hold CAFE responsible for any failure of FUNDERS to disburse funds.

6 DELAYS, CANCELLATION OR TERMINATION

TEAM acknowledges that although CAFE has organized the CHALLENGE so as to minimize the chance of weather delays, circumstances may arise that require the CHALLENGE to be delayed indefinitely or cancelled. Such delay or cancellation, and/or the termination of this AGREEMENT, shall be within the full discretion of CAFE or its assignee, and TEAM accepts any risk of damage or loss due to such delay, cancellation, and/or termination.

7 DISPUTES

The Responsible Officers will attempt to resolve all issues and disputes arising under this Agreement. If the Parties are unable to resolve any dispute after having made good faith

efforts, the dispute will be referred to higher-level officials of CAFE and TEAM, as appropriate. If the Parties are unable to resolve the disputes after exhausting the above procedures, either Party may pursue any appropriate remedies. Pending resolution of any disputes pursuant to this article, the Parties agree that performance of all other obligations shall be pursued diligently in accordance with the Agreement unless the Agreement is terminated pursuant to this Section 7.

8 EXECUTION

The undersigned agree to all terms of this AGREEMENT, all Appendices and of Exhibit A, below.

_____ Date: _____
Brien Seeley, President
Comparative Aircraft Flight Efficiency Foundation

_____ Date: _____
(Signature TEAM Leader)

Print TEAM Leader Name here.

Print TEAM Name here.

Print TEAM Leader Title and email here.

Print TEAM Pilot Name and email here (if other than TEAM Leader).

**EXHIBIT A: APPLICATION FOR APPROVAL OF TEAM MEMEBERSHIP
AND ADOPTION OF AGREEMENT**

The undersigned applies to register for the 2011 CAFE GREEN FLIGHT CHALLENGE as a TEAM MEMBER and agrees to be bound by all the provisions of the attached 2011 CGFC CHALLENGE TEAM Agreement which TEAM MEMBER acknowledges having read. In particular, but without limitation of other responsibilities under the Agreement, applicant TEAM MEMBER agrees:

- In return for the opportunity to participate in this CHALLENGE, to waive any and all claims against CAFE its officers, board members, volunteers and contractors and FUNDERS, and the U.S. Government, including but not limited to claims in contract and tort, related to or resulting from any and all activities under or arising from participation as a TEAM MEMBER.

- Abide by all TEAM Agreement provisions, including but not limited to 2.5 “Financing”, 2.7, “Government Regulations,” 4.2 “Media Rights”, 5.3 “Reporting”, 5.10 “Waiver and Acknowledgement”, and to submit all questions and issues to CAFE through the TEAM LEADER.

- That member has read and understood all provisions of the TEAM Agreement.

TEAM Member Name: _____

TEAM Member Citizenship: _____

TEAM Member Signature: _____

(For Companies, an authorized corporate officer must sign)

Date: _____

Application endorsed by:

TEAM Leader Signature _____

Date _____

Application Approved by CAFE:

CAFE Signature _____

Date _____

Appendix A:

2011 CAFE Green Flight Challenge Rules

1 RULES SUMMARY

The CGFC will be a NASA-funded prize flight competition to be held from July 10 to 17 of 2011. All flight attempts are to be flown at Competition Weight.

Main Prize: \$1,500,000.00 US for the one vehicle with ≥ 100 mph AND ≥ 200 Passenger-MPGe that achieves the best combination of mph and Passenger-MPGe by the following formula:

$$\text{Score} = 1 / ((1/\text{mph}) + (2/\text{Passenger-MPGe})) *$$

Other Prizes: Bio-Fuel Prize and Honorary Achievement Prize

Performance Required:

Range: 200 statute miles, with 30 min. reserve, day VFR at $\geq 4000'$ MSL over non-mountainous, sparsely-populated coastal terrain
Efficiency: ≥ 200 Passenger-MPGe energy equivalency
Speed: ≥ 100 mph average on each of two 200 mile flights
Minimum Speed: ≤ 52 mph in level flight without stall, power and flaps allowed
Takeoff Distance: ≤ 2000 feet from brake release to clear a 50 foot obstacle
Community Noise: ≤ 78 dBA at full power takeoff, measured 250 feet sideways to takeoff brake release
Handling Qualities: Acceptable on all 7 basic handling qualities. See **Appendix C.**

Features Required:

Passengers: Upright seats with adequate volume for a 6-foot tall, 200 lb adult. See **Appendices D and J.**
Wingspan: Must fit inside 44-foot wide hangar for weighing (wingfold is acceptable). Height, length and landing gear footprint limits are defined in **Appendix B.**
Vehicle Weights: ≤ 6500 lb. with ≤ 4500 lb. on main gear and ≤ 2000 lb. on nose-wheel or tail-wheel
Field of View: Acceptable to FAA licensing authorities and FAA AC25.773-1
Control System: Must provide dual controls if two or more seats
Payload Carried: 200 lbs per seat. Dual pilots if two or more seats. 200 lbs per seat sandbag ballast in all seats not occupied by pilot/co-pilot

- Seating Configuration: Tandem seating is allowed, but vehicles with 3 or more seats must place at least 2 seats directly side-by-side. Rapid exit required for all seats. **Appendix D**
- Fuel/Energy Use: Energy consumed: 1 gallon of 87 octane unleaded auto gasoline = 115,000 BTU. See table of energy equivalents for all allowable fuels/energy sources in **Appendices E & F**.
- Fuels/Energy Allowed: Avgas 100 LL, Jet-A, diesel, unleaded auto gasoline, bio-fuels, H2, synthetics, electricity. **See Appendix F**.
- ePower Measurement: Electric-powered aircraft will use a CAFE-provided power meter to accurately determine energy used during the competition
- Flightworthiness: Valid US FAA Airworthiness Certificate for unrestricted day VFR flight in the Continental United States, proof of structural limits (**Appendix K**), ASTM 2316 compliant vehicle ballistic parachute and all applicable inspections. **Appendix L**.
- Pilot Qualifications: FAA qualified for operating experimental aircraft, with current medical, BFR, 500 flight hours total and 10 flight hours in make & model
- Eligibility: Team leader must be a U.S. Citizen or permanent resident
- Early Bird Entry Fee: \$4000 if submitted before December 31, 2009
- Design Proposal: Required before acceptance by CAFE into the event
- Design Freeze: After official registration and weigh-in no modifications to the vehicle are allowed.

Additional Relevant Documents:

Team Agreement and all of its Appendices, FAA AC25.773-1 (field of view regulations)

Updates and FAQs: Visit cafefoundation.org

Additional Requirements:

Nothing except water ballast may be jettisoned from the vehicle during flight; weight of discarded water ballast will be scored as fuel consumed

* Passenger-MPGe = number of passengers (pilots, passengers or seats with equivalent ballast) multiplied by the calculated vehicle miles per gallon equivalent for the fuel and/or electricity referenced to the average energy content of 1 gallon of 87 octane unleaded auto gasoline (115,000 BTU) (for example: 200 passenger MPGe = 2 seats x 100 MPGe for a 2-passenger aircraft.)

2 RULES IN DETAIL

The 2011 CHALLENGE will demonstrate new technologies for small aircraft that are potentially applicable to a wide range of future aviation missions including Unmanned Aerial Vehicles, Air-Taxi operations, homeland security surveillance, personal

transportation, etc. For 2011, **a maximum of 18 competitors will be accepted** into the CHALLENGE.

To ensure that air vehicles are safe, sustainable and practical, the CHALLENGE is comprised of a series of separate but inter-related flight attempts that measure key performance capabilities. In order to win the prize, all TEAM vehicles are required to participate in all flight attempts and must demonstrate these performance capabilities to a level that satisfies all requirements, rules, and other provisions of this Agreement. The winner of the CHALLENGE will be determined by vehicle's demonstrated flight performance as measured by CAFE test equipment. Each of the flight performances to be measured is detailed below.

TEAMS that have fulfilled the pre-qualifying requirements described herein will begin their official flight attempts for the 2011 CHALLENGE at the CAFE Flight Test Center (CFTC) at Charles M. Schulz Sonoma County Airport on Sunday July 10, 2011. A series of rehearsal, qualifying and prize flight attempts will take place on the succeeding days. Team pilot(s) will fly all flight attempts required at the CHALLENGE event. All flight attempts will be flown at Competition Weight.

The CHALLENGE Prize flight attempts for the 2011 CAFE GREEN FLIGHT CHALLENGE shall be made at the CFTC and are planned for Wednesday, July 13, 2011 (for MPG Flight) and Friday, July 15, 2011 (for Speed Flight). Thursday, July 14 is a day reserved for re-fueling, re-weighing and recharging electric powered aircraft. In the event of unsuitable weather, this schedule of events may be postponed one day. The Awards Banquet is planned for the evening of Saturday July 16, 2011, where the final official scores and winner of the CHALLENGE prize will be announced. Sunday July 17, 2011, from 9:00 AM to 1:00 PM will be "Public Exposition Day" at the airport, consisting of a static display of all of the competing teams and their Vehicles.

2.1 Prizes

CAFE has arranged for the following prizes to be funded by a collection of one or more private or government organizations ("FUNDERS"). FUNDERS have stipulated that the CHALLENGE prizes described herein can be awarded only to U.S. Citizens or permanent residents or U.S. entities. The prizes are as follows:

- \$1,500,000.00 for the main 2011 CHALLENGE flight competition
- \$150,000.00 for the 2011 Bio-Fuel Prize
- If warranted, \$153,000.00 for the Honorary Achievement Prize

Details on the awarding of these prizes are given below.

The 2011 CAFE GREEN FLIGHT CHALLENGE that pertains to this AGREEMENT shall award US \$1,500,000.00 (one million five hundred thousand U.S. dollars) to the

winner. If a TEAM scores within 1% of the high score of that winner, such a second-place TEAM will receive a share of the prize in accordance with Section 2.2, below.

The entire Bio-Fuel Prize of US \$150,000.00 (one hundred fifty thousand U.S. dollars) will be awarded to the one TEAM that fulfills its requirements with the highest score.

The entire Honorary Achievement Prize of US \$153,000.00 (one hundred fifty three thousand U.S. dollars), if warranted as described below, will be awarded to the one TEAM that fulfills its requirements with the highest score.

2.2_CGFC Prizes and Scoring Formula

To qualify to win any prize, teams and their vehicles must satisfy all requirements, rules and provisions delineated in this Agreement.

a. Main Prize

The main prize for the 2011 CAFE GREEN FLIGHT CHALLENGE will be one million, five hundred thousand U.S. dollars (US \$1,500,000.00). This main prize will be awarded to the one TEAM whose vehicle demonstrates the highest score during its two successive CGFC flight attempts, while also demonstrating ≥ 100 mph *and* ≥ 200 Passenger-MPGe on each of those flight attempts. The formula for scoring is:

$$\text{Score} = 1/((1/\text{mph}) + (2/\text{Passenger-MPGe})) \quad (\text{Equation 1})$$

Weather permitting day VFR, each TEAM vehicle's official Passenger-MPGe score will be measured by its 200 statute mile CGFC MPG Flight on Wednesday, July 13, 2011. Each TEAM vehicle's official mph score will be measured by its 200 statute mile CGFC Speed Flight on Friday, July 15, 2011. The Passenger-MPGe and mph scores so achieved will be combined into the above formula for scoring (Equation 1). Note that this formula provides diminishing gains in score as either mph or Passenger-MPGe become much higher than the thresholds required. This fact demands that TEAMS carefully calculate the relative benefits of designing for either increased mph or increased Passenger-MPGe. See **Appendices E and F** for details about computing Passenger-MPGe.

b. Bio-Fuel Prize

In addition to the main prize, the CGFC will award a Bio-Fuel Prize of one hundred fifty thousand U.S. dollars (US \$150,000.00) to the one TEAM whose vehicle demonstrates the highest score while fulfilling all of the following requirements:

1. Operates on a fuel that is $\geq 99\%$ bio-fuel, such as B99 or B100 bio-diesel
2. Derives $\geq 90\%$ of its BTU energy consumption from that fuel
3. Achieves ≥ 100 mph *and* ≥ 200 Passenger-MPGe on both its CGFC MPG Flight and its Speed Flight
4. Fulfills all other Entry Requirements and terms of this Agreement

The Bio-Fuel Prize may be won by a hybrid aircraft that fulfills the requirements 1 through 4 above.

c. Honorary Achievement Prize

In the event that no TEAM vehicle among at least 3 teams competing achieves the requisite ≥ 100 mph with ≥ 200 Passenger MPGe, then an Honorary Achievement Prize will be awarded to the one TEAM that:

- Meets or surpasses all pertinent requirements of this Agreement, and;
- Achieves ≥ 80 mph, and;
- Achieves ≥ 160 Passenger-MPGe and;
- Achieves a score that surpasses that of all other competitors.

The prize amount for the Honorary Achievement Prize will be one hundred, fifty-three thousand U.S. dollars (US \$153,000.00).

d. Near-tie score(s)

In the event that two or more teams achieve ≥ 200 Passenger MPGe and ≥ 100 mph with scores that are within 1% of each other, then the team(s) with the lower score(s) will share a portion of the \$1,500,000.00 Prize. The formula for the cash amount to be rewarded in that case is:

$$\$1,500,000 \times (S1 - (S1 \times 0.99)) / ((S1 - (S1 \times 0.99)) + (S2 - (S1 \times 0.99))) = \$ \text{ prize for team S1}$$

$$\$1,500,000 \times (S2 - (S1 \times 0.99)) / ((S1 - (S1 \times 0.99)) + (S2 - (S1 \times 0.99))) = \$ \text{ prize for team S2}$$

where S1 = score of highest scoring team

S2 = score of 2nd place team that achieves within 1% of S1 score

In the unlikely event that 3 or more teams achieve scores within 1% of the winner, values for S3, S4, etc. can also be computed by adding their terms to the above formula.

The following example illustrates use of the above formula:

Team S1 achieves a score of 52.0, representing 100%

Team S2 achieves a score of 51.6, achieving 99.2% of S1's score

Team S3 achieves a score of 50.7, achieving 97.5% of S1's score

$$\begin{aligned} \text{Team S1 prize} &= \$1,500,000 \times (52 - (52 \times 0.99)) / ((52 - (52 \times 0.99)) + (51.6 - (52 \times 0.99))) \\ &= \$1,218,750 \text{ prize} \end{aligned}$$

$$\begin{aligned} \text{Team S2 prize} &= \$1,500,000 \times (51.6 - (52 \times 0.99)) / ((52 - (52 \times 0.99)) + (51.6 - (52 \times 0.99))) \\ &= \$281,250 \text{ prize} \end{aligned}$$

Team S3 prize = \$0.00 since S3 is not within 1% of the winning score of S1.

e. Timing, Course and Logistics

The timing for speed in the Speed Flight begins at takeoff brake release. After takeoff, the 200 statute mile competition course will require an initial climb to reach 4000 feet MSL about 15 miles from the airport. The course will fly over relatively unpopulated areas of coastal Northern California. The elevations and latitude-longitude coordinates of the competition course pylons are expected to be at or below 4000 feet MSL and these will be published by CAFE before April 15, 2011.

Both the MPG Flight and the Speed Flight will finish with a 500-foot AGL flyover above the CAFE Flight Test Center (CFTC). The energy consumption measurement will be completed after each aircraft has landed and taxied at a normal speed UNDER ITS OWN POWER to a designated engine/motor shutdown location immediately outside the CFTC. From that point, the aircraft will be pulled by hand inside the CFTC and weighed and its fuel and/or energy consumption will be determined. Wings will be folded if necessary to fit inside the CFTC. Assurance that the 30 minute VFR reserve fuel/energy required by FAR 91.151 is on-board will be the responsibility of each team pilot and will be monitored by CAFE as described in **Appendix E** and section s, below.

Anticipated exclusive use of Runway 19 at STS combined with coordination by STS FAA Tower controllers will provide expedited takeoff, departure, landing pattern and taxiing operations for each aircraft in the competition.

2.3 Pre-qualifying, Inspections and Entry Requirements

Entry requirements (ERs) are those performance, feature and other requirements necessary to participate in the CHALLENGE prize competition. These are described below and in the other **Appendices**. Some ERs will be met by prequalifying and others will be tested at CFTC during the CHALLENGE. Vehicles that fail to meet any one of the ERs will be disqualified from any further participation in CHALLENGE flight attempts and will be ineligible for any CHALLENGE prizes.

a. Pre-qualifying and documentation

Before May 30, 2011, all TEAMS must submit documentation and **prequalifying** test results of the pertinent ERs as defined in **Appendix L**.

b. Entry Requirements and Inspections at the CGFC

Vehicle inspections during the CGFC will be made by CAFE officials and will include:

- 1) Seating layout, dimensions and field of view (**Appendix D**)
- 2) Basic pre-flight, airworthiness, control and mechanical integrity
- 3) Aircraft dimensions, wingspan, footprint, height, etc. (**Appendix B**)

- 4) With all seats occupied, pilot(s) and all passengers must be able to exit the aircraft from their seated position, unassisted by another person, in ≤ 60 seconds (2 crew exit attempts are allowed)
- 5) Measurement of empty weight and c.g.
- 6) Time stamped photo documentation of Design Freeze (Section 2.4 b.)

c. Community Noise Requirement

The Community Noise Requirement is that all vehicles must demonstrate ≤ 78 dBA, slow scale, maximum takeoff noise emission when measured from two separate microphones located 250 feet on each side of the runway centerline and near the aircraft brake release point during its two full power takeoff distance flight attempts. This dBA level is approximately twice as stringent as the current FAA standard for GA. Vehicle may be required to carry a CAFE Flight Examiner on its takeoff Community Noise Flight.

d. Minimum Level Flight Speed Requirement: MLFS

This requirement is considered essential to the safety and utility of the aircraft competing in the CGFC. The Minimum Level Flight Speed flight attempts will be measured while flying at Competition Weight. To be valid, MLFS must be sustained for 10 seconds. The MLFS flight attempt will allow use of power and must demonstrate ≤ 52 mph CAS in order to qualify for the CHALLENGE. The MLFS measurement will be made during the same flight attempt as the Takeoff Distance Requirement and Community Noise Requirement.

e. Takeoff Distance Requirement

A takeoff distance requirement of ≤ 2000 feet over a 50-foot obstacle is required in order to be eligible for the CHALLENGE. The takeoff distance flight attempt will be measured from the point of brake release. This may require that a CAFE Board member be on-board the vehicle. The Community Noise measurement and MLFS measurement will also be made during the takeoff distance flight attempt.

f. Speed Requirement

All vehicles must achieve ≥ 100 mph average speed from takeoff brake release to finishing flyover at the CFTC during both their MPG Flight and their Speed Flight in the CGFC.

g. Passenger-MPGe Requirement: Fuels and Electricity Use

All vehicles must achieve ≥ 200 Passenger-MPGe during both their MPG Flight and their Speed Flight in the CGFC. Passenger-MPGe will be measured relative to the energy content of 87-octane regular unleaded auto gasoline, defined as 115,000 BTU per gallon (US EPA). The energy content of other fuels or forms of energy will be scaled relative to this value, as shown in the examples in **Appendix E and F**:

Any teams planning to use special fuels not listed in the **Appendix F** must inquire and obtain from CAFE before April 15, 2011, a special assigned energy content for such fuel for the purposes of this CHALLENGE. Any such additional assignments shall be published by CAFE on its website. **See the Appendix F table on “Energy Sources” for a list of known fuel/energy contents.**

Each Vehicle's MPGe will be determined by weighing on the CAFE Scales before and after each of its 2011 CGFC 200 mile competition flight attempts or, for electric powered aircraft, by an on-board kWh totalizer. (See **Appendix E**) The gallons used will be computed using the fuel energy densities listed in **Appendix F**.

On the ground or in-air re-fueling (or re-charging) during the 2011 CGFC 200 mile competition flight attempts will not be allowed, with the exception of in-the-air recharging of vehicles that fly with their own photo-voltaic solar cell panels, which is allowed, and the solar energy so obtained is not included in that vehicle's energy consumption for scoring purposes. In the case of hybrid-electric and Hydrogen powered vehicles, please see the examples given in **Appendix E**.

The fuels allowed in the competition must be those sold commercially from retail dealers and must be unaltered with user additives. See **Appendix F**.

All TEAMS will pay for their own fuel and/or electricity consumed during the CGFC. CAFE will provide the sole source of electricity as 240 Volts and 40 amps for charging electric-powered aircraft. It is anticipated that the charger plug will be the J1772 standard.

h. Flight Attempts Requirements

Flight attempts are those conducted at the CFTC and its attendant venues. In some cases, a rehearsal flight attempt may be allowed to precede the actual flight attempt. In so far as possible, CAFE officials will communicate via aircraft communications radio on the CAFE flight test frequency of 123.75 MHz to advise TEAM PILOT of any need to repeat a flight attempt. As time permits and at its sole discretion, CAFE will limit the number of repeat flight attempts on an equitable basis for all teams. Any team that fails to perform a valid, qualifying flight attempt within that limited number of flight attempts will be disqualified.

j. Vehicle Cabin Exit Requirements

All aircraft must demonstrate that each seat's pilot or passenger is able to exit the closed and latched cabin without assistance from another person. Starting with a closed and latched cabin and all vehicle seats occupied by adults, exit from the aircraft of all those adults must be accomplished within 60 seconds. Two attempts are allowed to demonstrate this requirement.

k. Handling Qualities

Before arrival at the CGFC, all aircraft must demonstrate acceptable basic handling qualities on each of 7 Cooper-Harper handling tasks as explained in **Appendix C**.

l. Wingspan

All vehicles must have a wingspan that can fit inside a 44-foot wide hangar for weighing (wingfold is acceptable). Wingspan (as projected onto a level surface), if ≥ 44 feet, must be capable of being shortened to ≤ 44 feet by wing-folding or tip removal that can be easily accomplished in 20 minutes or less by no more than 4 adult persons of average size and strength. This is necessary to fit typical tie-downs, hangar rows and the width of the CAFE Flight Test Center's hangar. Any small additional projected span of winglets, tip tanks or other wing tip device, as vertically projected onto a level surface, will be included as wingspan.

m. Vehicle Height and Length

All vehicles must be less than 13 feet tall must have a length that measures ≤ 23 feet from main landing gear to tip of tail or nose. Landing gear footprint must fit the diagram given in **Appendix B**.

n. Vehicle Weights

All vehicles must have a gross weight ≤ 6500 lb. including ≤ 4500 lb maximum on main gear and ≤ 2000 lb. on nose-wheel or tail-wheel

o. Field of View

Pilot's field of view must be acceptable to FAA licensing authorities and comply with FAA AC25.773-1, which can be downloaded as a .pdf at cafeoundation.org

p. Dual Pilots and Control System

All vehicles equipped with two or more seats must provide dual controls and make their flight attempts with two qualified pilots aboard.

q. Seating Requirements

Tandem seating is allowed, but any vehicles with 3 or more seats must place at least 2 seats directly side-by-side in accordance with **Appendix D**. Rapid exit is required for all seats. See **Appendix D**

r. TEAM Pilot Requirements

Each TEAM LEADER shall designate a TEAM PILOT, who will be authorized to fly the vehicle in the flight attempts of the CHALLENGE and who must have the minimum qualifications of 10 hours in type and 500 hours total time as pilot in command. TEAMS whose vehicle has 2 or more seats shall designate 2 TEAM PILOTS with such qualifications. A SUBSTITUTE PILOT may also be designated if pre-registered with CAFE and fulfilling the same qualifications. If the SUBSTITUTE PILOT replaces the TEAM PILOT, then the TEAM PILOT can no longer fly in the CHALLENGE or serve as TEAM PILOT unless the SUBSTITUTE PILOT is incapacitated or too ill to fly. Vehicles with 2 or more seats must supply and fly with 2 qualified pilots on all flight attempts in the CGFC.

s. Fuel Reserves

At the conclusion of the Speed Flight, all aircraft will be impounded. CAFE will compute the tentative scores of each aircraft. CAFE will then verify by measurement the presence of a 30 minute fuel/energy reserve for each of the four (4) TEAMS that have achieved the highest scores or whose scores position them to win any prize. Any of these TEAMS that prove to have less than the requisite 30-minute fuel/energy reserve on board **WILL BE DISQUALIFIED**. For the purposes of this reserve verification, a reserve equal to 1/2 of the average BTU/hour consumed by the aircraft during its Speed Flight will be required.

t. Design Freeze

Vehicle may not be modified in any significant way after its first successful qualifying Flight Attempt at the CFTC. CAFE officials will monitor this and provide overnight security/surveillance to assure that no tampering or modifications occur. Minor repairs including failed part replacement with identical part may be allowed if pre-approved by CAFE (e.g., a flat tire). Internal or external taping over cabin door seams, vents, windows, baggage outlets, etc. is expressly forbidden. The same propeller must be used for all flight attempts including noise, takeoff distance, minimum flight speed, MPG and mph attempts. The same fuel type/specification and/or battery pack must be used for all flight attempts including noise, takeoff distance, minimum flight speed, MPG Flight and Speed Flight attempts. No battery cell or battery pack may be replaced once the competition begins. No engine-bay changes/adjustments such as turbocharger boost, prop governor setting, valve timing or ignition timing are allowed once the competition begins.

u. Aircraft Structural Requirement

See **Appendix K**, which provides 3 options for TEAMS to prequalify their vehicle's structural load testing. Structural load testing documentation must be completed by May 15, 2011.

v. Payload Considerations

See **Appendix J**. Teams must supply ballast to assure that a payload of 200 lb per seat is carried on each flight.

w. Team Representative

TEAMS must provide a representative to be present at the official CHALLENGE Award Banquet Ceremony, scheduled for Saturday July 16, 2011. In addition, at least one TEAM member from each team shall be present for the 9:00 AM to 1:00 PM Sunday July 17, 2011 "Public Exposition Day" at the CFTC, consisting of a static display of all of the competing TEAM vehicles.

x. Additional Rules

These CHALLENGE rules are subject to change at the discretion of the CAFE Foundation. CAFE may, in its sole and absolute discretion, implement such additional rules or requirements as it deems appropriate to administer the CHALLENGE. Failure to adopt or follow such additional rules or requirements shall be grounds to terminate a TEAM and all TEAM MEMBERS from the CHALLENGE.

Additional technical specifications, rules and other details not already covered in this Agreement may be provided by CAFE to TEAM at the time of registration and/or published as FAQs on the CAFE website at cafefoundation.org.

CAFE, its judges and test pilots are authorized and empowered to disqualify any team and/or its vehicle found to be "incompatible with the stated goals of the competition". This includes infractions not limited to the following:

- Cheating of any kind including tampering with CAFE flight test equipment
- Disturbing the event by unruly behavior
- Presenting a vehicle deemed unsafe or un-airworthy
- Unsafe flying
- Tampering with another team's vehicle, fuel, crew or possessions
- Failure to attend required briefings or to comply with their instructions
- Failure to comply with any additional rules

Appendix B:

Required Aircraft Dimensions

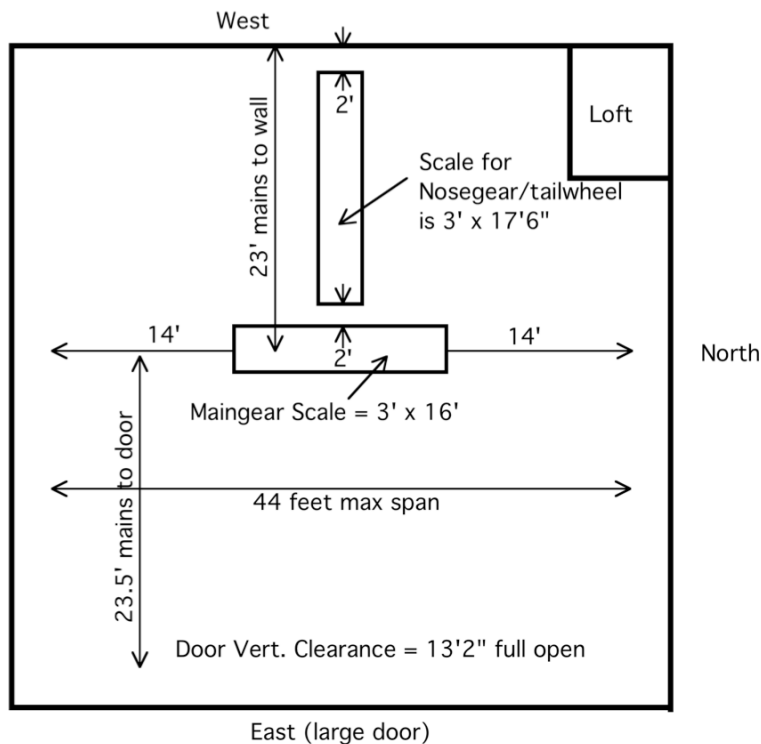
Vehicle height: ≤ 13 feet

Vehicle length: ≤ 23 feet from main landing gear to tip of tail

Wingspan (as projected onto a level surface), if ≥ 44 feet, must be capable of being shortened to ≤ 44 feet by wing-folding or tip removal that can be easily accomplished in 20 minutes or less **by no more than 4 adult persons of average size and strength**. This is necessary to fit typical tie-downs, hangar rows and the width of the CAFE Flight Test Center's hangar. Any small additional projected span of winglets, tip tanks or other wing tip device, as vertically projected onto a level surface, will be included as wingspan.

Vehicle landing gear footprint length, height and span dimensions must fit inside CFTC and onto scales, per CFTC floor plan shown below.

Gross weight: ≤ 6500 pounds on main landing gear and ≤ 2000 lb on nose or tail wheel



CAFE Foundation Flight Test Center
Floor Plan

Appendix C:

Required Basic Handling Qualities Evaluation

derived from MIL-STD-1797A and FAA AC 90-89A

The following evaluation must be completed and its documentation submitted to CAFE prior to May 30, 2011 or TEAM will be disqualified from the CGFC. These basic aircraft handling qualities criteria were chosen by the CAFE Foundation because of their crucial role in helping ensure that an aircraft is safe. They comprise the core items of interest on new prototype experimental aircraft. Since loss of control is the major factor in small aircraft fatalities, these criteria are focused on controllability and stability.

These basic handling qualities tasks must be performed at Competition Weight and documented to video by the TEAM's designated pilots, who must be either credentialed professional test pilots or test pilots whose experience and qualifications are acceptable to CAFE in accordance with the information below.

The 7 Basic Handling Qualities tasks to be evaluated in the CGFC are:

1. Takeoff and landing characteristics, including glide-path control during flight at speeds both above V_x and below V_x .
2. Pre-stall characteristics at $V_{so} + 5$ kts
3. Aerial agility (pitch, roll and yaw) at V_a and $1.3 V_{so}$
4. Directional stability at V_a and $1.3 V_{so}$
5. Static longitudinal stability at V_a , stick-fixed
6. Maneuvering stability (lb/g) at V_a
7. Braking effectiveness/adequacy

Each of the 7 tasks listed above will be assigned the following criteria:

- a. an *aggressiveness* and technique with which it should be executed
- b. a *goal* or *goals* to be accomplished/demonstrated, including an *acceptable* workload and level of performance to accomplish the goal.
 - o *transient* (lag/oversteer) and *steady-state* responses to the test pilot's commanded tasks must also provide acceptable control power without PIO tendency.
- c. Failure to demonstrate acceptable performance in any three or more sub-component goals from the total of those found under the 7 listed tasks will constitute disqualification from the CGFC.

Each goal will be evaluated, recorded and commented upon by at least two test pilots for each vehicle. All Handling Qualities Flights should be flown at near mid-c.g. Documentation of Handling Qualities Evaluation of CHALLENGE vehicle will be by time-stamped photographs of the aircraft's external features and test-pilot

narration on in-flight, date-stamped video showing the performance of the 7 Basic Handling Qualities tasks according to the following methods:

DETAILS OF EVALUATION:

- 1) Takeoff and Landing Characteristics:
 - a. Aggressiveness: Make a full power takeoff and power-off landing, speeds and flaps per POH, while keeping aircraft's centerline within 20 feet of runway centerline.
 - b. Goals: Using the Cooper-Harper Scale, level 4 or better acceptable pitch, directional and lateral control, acceptable view of runway at all speeds, minimal PIO tendency, acceptable (and predictable) glide-path control by combined use of power and angle of attack, landing gear cycling time of ≤ 10 seconds, acceptable trim effects of gear and flap deployments
- 2) Pre-stall characteristics at $V_{so} + 5$ kts: Performed at ≥ 5000 feet AGL over unpopulated areas
 - a. Aggressiveness: In the landing configuration, decelerate to and maintain $V_{so} + 5$ kts by decelerating approximately 1 kt./second in level flight with necessary power. Do not stall. Observe controllability in all 3 axes by making gentle control inputs while observing for any pre-stall warnings or un-commanded attitudes.
 - b. Goals: Using the Cooper-Harper Scale, level 4 or better acceptable pitch, directional and lateral control with some evidence of pre-stall warnings (buffet, stick-shake, horn or other) and with no un-commanded attitudes.
- 3) Aerial agility (pitch, roll and yaw) at V_a and $1.3 V_{so}$:
 - a. Aggressiveness: After initial, gradual familiarization with the aircraft's controls, assess 3 axis aerial agility in terms of the following sub-component goals, as follows:
 - o From level flight at fixed power at V_a , apply moderately abrupt but less than 2 G control inputs in pitch, and maintain the input long enough to observe its effects. Observe for acceptable break-out force, lag, stick force, PIO and sensitivity in terms of pitch attitude change per inch of stick movement. Restore un-accelerated level flight at V_a . 2) Then apply similarly abrupt control inputs in both left and right roll, rolling from 60° right to 60° left and back. Again observe for acceptable break-out force, lag, stick force, PIO and sensitivity. Restore un-accelerated flight at V_a . 3) Then apply similarly abrupt control inputs in yaw (using rudder, both left and right). Again observe for acceptable break-out force, lag, rudder force, PIO, rudder lock and sensitivity. Repeat these 3 maneuvers while flying at fixed power at $1.3 V_{so}$ in the landing configuration.
 - b. Goals: In all sub-component goals listed in (a) above, acceptable control performance, according to the guidelines below, and without excessive PIO tendency at both V_a and $1.3 V_{so}$. No rudder lock allowed.

GUIDELINES for maximum acceptable lag or latencies (from 1797A) are:

Pitch: 0.2 seconds p. 190

Roll:	1.2 seconds	p. 377
Yaw:	1.0 seconds	

GUIDELINES for acceptable maximum breakout force, derived from MIL-STD 1797A paragraph 4.2.8.5, are:

Center Stick:	3 pounds
Wheel or Yoke:	4 pounds
Sidestick:	1 pound

GUIDELINES for control power in roll:

The control power of roll rate is evaluated by timing, with a stop watch, the time to change from a 60 degree bank in one direction to a 60 degree bank in the other direction while using maximum deflection of the aileron and coordinating rudder. The resulting time includes the time to accelerate the roll and therefore reflects a slightly slower roll rate than the steady state rolling rate that the airplane is capable of sustaining. The roll rates in both directions at V_a must be $\geq 40^\circ / \text{second}$ in order to be acceptable. The roll rates in both directions at $1.3 V_{so}$ must be $\geq 30^\circ / \text{second}$

GUIDELINES for PIO tendency: (1797A, p. 152) Rating 3, 2, or 1 required in order to be acceptable.

PIO Ratings 1, 2 and 3 are acceptable.

RATING:

No tendency for pilot to induce undesirable motions.	1
Undesirable motions tend to occur when pilot initiates abrupt maneuvers or attempts tight control. These motions can be prevented or eliminated by pilot technique.	2
Undesirable motions easily induced when pilot initiates abrupt maneuvers or attempts tight control. These motions can be prevented or eliminated but only at sacrifice to task performance or through considerable pilot attention and effort.	3

PIO Ratings 4, 5 and 6 are unacceptable.

Oscillations tend to develop when pilot initiates abrupt maneuvers or attempts tight control. Pilot must reduce gain or abandon task to recover.	4
Divergent oscillations tend to develop when pilot initiates abrupt maneuvers or attempts tight control. Pilot must open loop by releasing or freezing the stick.	5
Disturbance or normal pilot control may cause divergent oscillation.	6

Pilot must open control loop by releasing or freezing the stick.

4) Directional stability at V_a and $1.3 V_{so}$: Performed at ≥ 5000 feet AGL over unpopulated areas

- a. Aggressiveness: After initial, gradual familiarization with the aircraft's controls, assess directional stability in terms of the following sub-component goals, as follows:

From level flight trimmed at fixed power at V_a , slowly enter a sideslip by maintaining heading with rudder and ailerons until a 10° bank is reached. Note steady increase of rudder and aileron forces without force reversal as the sideslip is increased. Then, slowly release the aileron input while still holding full rudder, and observe whether the low wing returns to the level position. (Do not assist the ailerons during this evaluation, maintaining only a very light grip on the stick).

Next, check static directional stability from level flight at V_a by slowly yawing the aircraft left and right using rudder. Simultaneously, the wings should be kept level by using the ailerons. When the rudder is released, the aircraft should tend to return to straight ahead flight.

Repeat these maneuvers while flying trimmed at fixed power at $1.3 V_{so}$ in the landing configuration.

- b. Goals: In all sub-component goals listed in (a) above, acceptable control performance at both V_a and $1.3 V_{so}$. This means:

Positive C_n stability with rudder force increasing in proportion to sideslip angle no significant rudder force reversals (though lightening of force is allowed)

No rudder lock

Low wing returns to near level when aileron input is released during steady heading sideslips

Nose returns to near straight when rudder force is released in level yaw tests

Damping upon such release gives no more than 3 left-right yaw oscillation cycles

5) Static longitudinal stability at V_a , stick-fixed: Performed at ≥ 5000 feet AGL over unpopulated areas.

- Aggressiveness: After initial, gradual familiarization with the aircraft's controls, assess static longitudinal stability as follows:

Trim the aircraft for level flight at V_a at fixed power. Using a stick force gauge, apply pitch input force (push) necessary to increase and then maintain airspeed by first 5 mph, then 10, then 15 and then 20 mph.

Repeat using pitch input force (pull) necessary to decrease airspeed by 5, then 10, then 15 and then 20 mph. Note the force in pounds necessary to hold each of those off-trim airspeeds.

- Goals: To be acceptable, the aircraft must demonstrate progressively increasing stick forces as airspeed deviates further from V_a trim speed. The slope of an x-y

plot of stick force in pounds versus airspeed deviation in mph must be positive (i.e., slope upward and to the right on the graph) throughout the tested range of airspeeds. This slope must be at least 1 pound of force for every 10 mph off trim speed.

6) Maneuvering stability (lb/g) at V_a : Performed at ≥ 5000 feet AGL over unpopulated areas.

a. Aggressiveness: After initial, gradual familiarization with the aircraft's controls, assess maneuvering stability as follows:

Trim the aircraft for level flight at V_a at fixed power. Using a stick force gauge, apply pitch force input to increase G and note the number of pounds necessary to generate 1.5, 2.0 and 2.5 G.

b. Goal: Acceptable minimum "Stick force per G" depends upon the type of control, as follows:

GUIDELINES: From 1797A, page 303, 307:

Minimum Stick Force per G

Center Stick	3.0
Yoke or Wheel	6.0
Side Stick	4.0

7) Braking effectiveness:

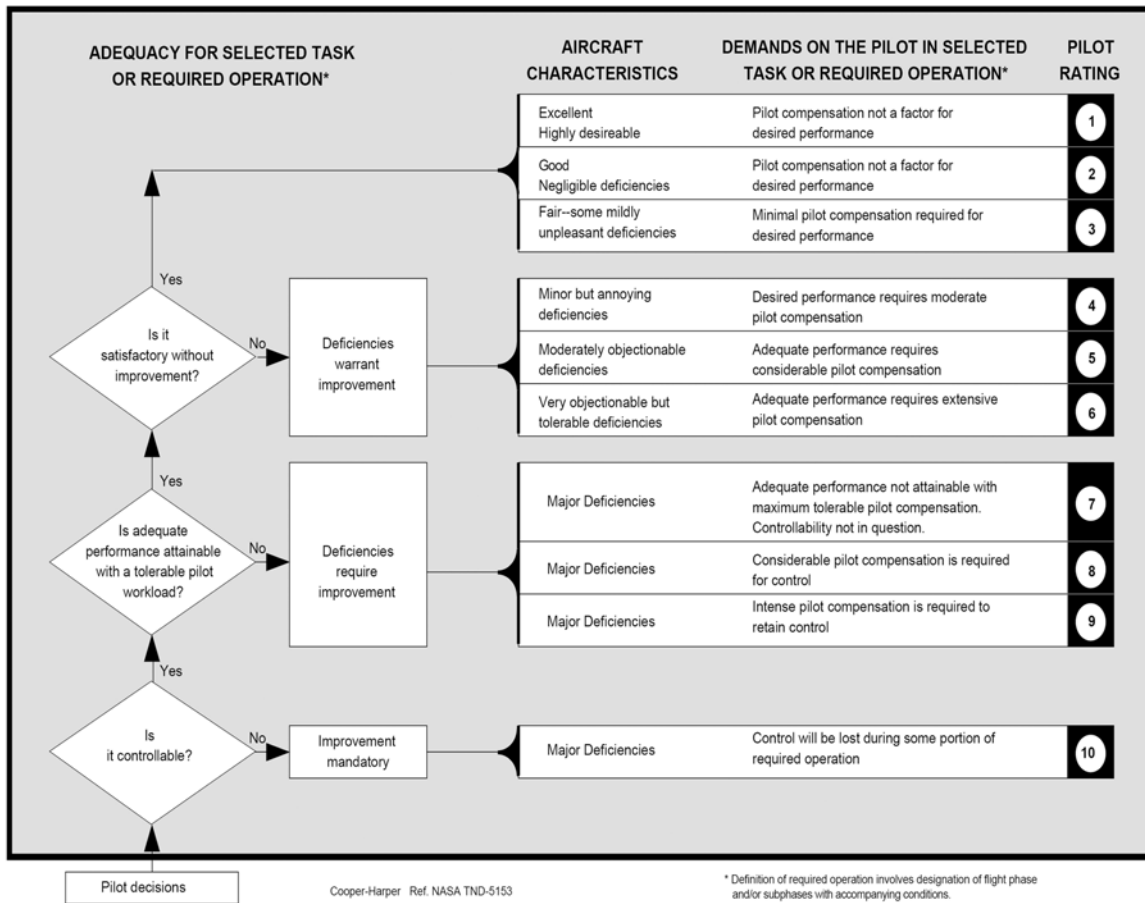
a) Aggressiveness: After initial, gradual familiarization with the aircraft's landing characteristics, upon touchdown, apply firm braking while maintaining straight ahead direction. Note G force generated and adequacy of directional control.

b) Goal: Acceptable braking is a deceleration rate of 0.2 G with ability to maintain straight ahead direction.

TEAMS are encouraged to eliminate test pilot bias and foreknowledge of an aircraft's *bad habits* by having no mutual test pilot conferencing prior to each pilot writing their evaluation. Test pilots must also be wary of having to be timid or decrease aggressiveness to obtain better or satisfactory results.

The Cooper-Harper Rating Scale for Handling Qualities is shown below:

HANDLING QUALITIES RATING SCALE



ADDENDA: The following represents additional background information helpful but not mandatory for pilots performing the Handling Qualities Evaluations.

From 1797A: Additional guidance information for test pilots:

Method for determining stick force gradient:

There are several methods for obtaining the required control force data. The best method to use depends primarily on the speed range under consideration. A major factor in determining the appropriate method for a given speed range is that load-factor control gradients are defined for constant speed. The method selected must therefore result in zero or small speed changes with n , or at least include a means for eliminating the effects of any speed changes.

One method is to use a series of alternating symmetric pullups and pushovers, sequenced so as to minimize the airspeed and altitude changes. The control is held fixed after each input until the short-term motion becomes steady state, and measurements are taken at a near-level attitude.

Another method is to perform a series of stabilized turns after trimming the aircraft in level flight. The load factor can be changed by changing the bank angle, and the airspeed held constant by using a different rate of descent for each load factor. The throttle and trim controller should be left at their trim settings throughout the maneuver to minimize the possibility of introducing extraneous pitching moments. The gradients obtained in this manner will not be quite as linear as with the symmetric pullup method because of the difference in pitch rate between pullups and turns (see, e.g., Airplane Performance Stability and Control). But, with the possible exception of a more stable slope near 1 g in the turns, the differences are generally small and can easily be accounted for, if necessary, knowing pitch rate. Of course load factors between 1 g cannot be obtained in near-level turns. A progressively tightened turn of this sort, at constant airspeed, is a wind-up turn, Navy style (USNTPS-FTM-103).

A third method that is sometimes used is a windup turn, Air Force style (FTC-TIH-79-2). After trimming in level flight, a turn of a certain number of g's is initiated, and the speed is allowed to decrease slowly as the g-level and altitude are held constant. The test is then repeated at several other g-levels until the complete range is covered. In this way, control gradient data can be obtained rapidly for several speeds. Again, the trimmer and throttle should be left at the trim settings and the rate of change of airspeed controlled by changing the rate of descent. The major disadvantage of this method is that it is less accurate because more careful pilot technique is required.

In general, the symmetric pullup method will work well at high speeds, but the airspeed changes will be excessive if the method is used at low speeds. On the other hand, the turn methods work well at low speeds, but can cause excessive altitude changes at high speeds.

4.8.3 Control harmony. The following control forces are considered to be limiting values compatible with the pilot's capability to apply simultaneous forces: _____. Larger simultaneous control forces shall not be required to perform any customary and expected maneuvers.

REQUIREMENT RATIONALE (4.8.3)

Normal maneuvering involving two or three controllers can be taxing, and precise maneuvering difficult, if any one controller requires large force inputs, even if each of the forces meets its single-axis requirement.

REQUIREMENT GUIDANCE

The related MIL-F-8785C requirement is paragraph 3.4.4.1.

Recommended limits:

CONTROL TYPE	PITCH	ROLL	YAW
Sidestick	20 lb	15 lb	
Centerstick	50 lb	25 lb	
Wheel	75 lb		
(two-handed tasks)	40 lb		
(one-handed tasks)	25 lb		
Pedal	50 lb		175 lb

The cockpit control forces required to perform maneuvers which are normal for the aircraft should have magnitudes which are related to the pilot's capability to produce such forces in combination. The pilot cannot apply forces simultaneously to all three controls that are as large as those forces that can be applied to one control at a time. The 40 pounds allowed for wheel forces is a carryover from MIL-F-8785C. It is based on the use of two hands, a rare occurrence in most flying tasks since one hand is on the throttle(s) during maneuvering. The sidestick forces are based upon both the maximum forces on the F-16 movable stick (AFFTC-TR-79-40) and results of the USAF Test Pilot School evaluations (AFFDL-TR-79-3126). The forces chosen are 75-90 percent of the maximum forces used.

HIGH AOA FLIGHT:

Prior to flight-test evaluation of departure and spin characteristics, installation of a recovery system on the flight test aircraft is recommended. In particular the recovery system should be installed such that it does not snag on the control surfaces, regardless of control surface deflection during or after deployment jettison. A flight test plan similar to the one used for simulation will be submitted before initiation of flight test.

Lack of adequate high-AOA maneuvering/stall non-visual (e.g., tactile) cues ranked very high on the pilots' problem list. Such cues are a primary source of information when attention is directed away from the instruments — as is generally the situation surrounding stall encounter. Cues are equally important in air combat to establish maximum and/or optimum maneuver conditions. It appears that very few aircraft have adequate non-visual cues. In particular, single-crew aircraft require a separation of information channels which might be compared with the need for frequency separation in highly augmented aircraft with uncoupled modes of control. That is, artificial devices such as stick or rudder pedal shakers can be (and are) masked by buffet; aural tones can be (and are) masked by radio communications or missile arming and lock-on tones. The preferred cues are buffet itself and possibly the most consistent and desirable tactile cues — stick force and position. These were stressed over and over by the operational pilots. The key cues which provide positive indication of changing aircraft AOA or energy state are:

Stick force (per knot or g)

Stick position
Buffet level
Uncommanded aircraft motion
Artificial warning devices

Stall approach. The aircraft shall exhibit the following characteristics in the stall approach:

- a. The onset of warning of stall approach shall occur within the following speed range for 1-g stalls.
- b. An increase in intensity of the warning with further increase in angle of attack shall be sufficiently marked to be noted by the pilot. The warning shall continue until the angle of attack is reduced to a value less than that for warning onset.
- c. At all angles of attack up to the stall, the cockpit controls shall remain effective in their normal sense, and small control inputs shall not result in departure from controlled flight.
- d. Stall warning shall be easily perceptible.

Recommended warning ranges:

1-g Stalls:

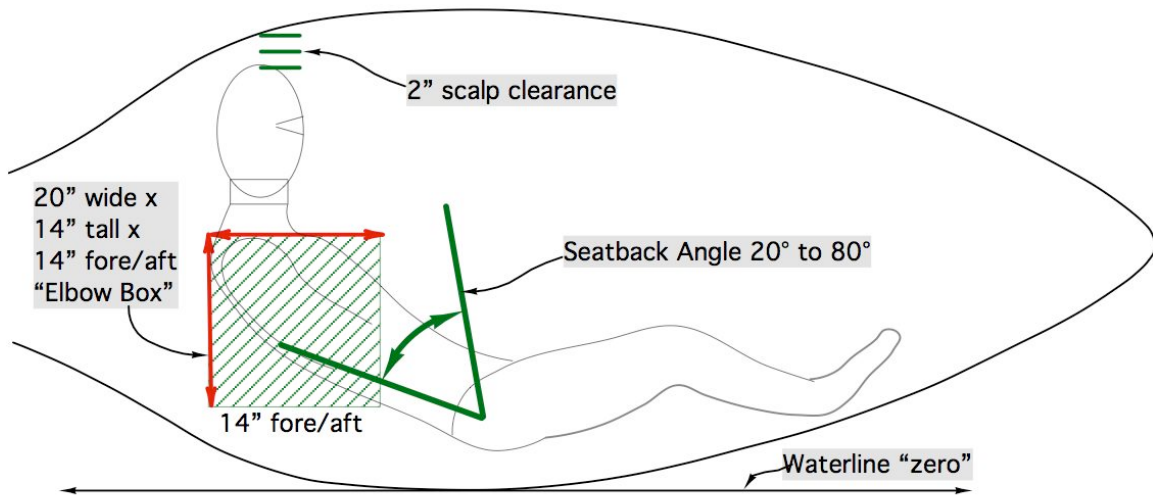
FLIGHT PHASE	MINIMUM SPEED FOR ONSET	MAXIMUM SPEED FOR ONSET
Approach	Higher of 1.05VS or VS + 5 knots	Higher of 1.10VS or VS + 10 knots

Appendix D:

SEAT REQUIREMENTS

CAFE GREEN FLIGHT CHALLENGE

Minimum Seat Dimensions and Volume



Minimum Dimensions For Each Seat:

General: Seat must accommodate a 6 foot tall, 200 lb. person with no more than 90° flexion of knees or hips and with headroom clearance (from scalp) of ≥ 2 inches when a line from the surface of the forehead to the anterior sternal notch is perpendicular to the Waterline.

The cross-hatched green "Elbow Box" is 20" wide (spanwise) x 14" tall x 14" fore/aft and represents the minimum contiguous space required for the torso. The space occupied by the Elbow boxes of any 2 seats cannot overlap.

The seatback angle must be between 20° and 80° measured from the Waterline. Prone seating is not allowed.

The Elbow box space requirement must be met with the box oriented with its bottom surface parallel to the Waterline.

Field of view for both pilot and co-pilot seats must fulfill FAA Advisory Circular requirements of AC 25.773-1.

Appendix E:

DETERMINING MPGe and FUEL RESERVES

SPECIFIC EXAMPLES

According to the relevant part of FAR 91.151, the VFR reserve fuel requirement is that *“No person may begin a flight under VFR conditions unless (considering wind and weather conditions) there is enough fuel to fly to the first point of intended landing and, assuming normal cruising speed –*

- 1) During the day, to fly after that for a least 30 minutes;*

30 Minute Fuel Reserve: required for CGFC

The above FAR 91.151 responsibility to assure the aircraft’s 30-minute fuel/energy reserve will be the responsibility of the TEAM Pilot. Any aircraft that is unable due to inadequate fuel or energy on-board to complete the 200-mile competition, land and continuously taxi at a normal speed UNDER ITS OWN POWER to a signaled engine/motor shutdown point immediately outside the CAFE Flight Test Center, **WILL BE DISQUALIFIED**.

At the conclusion of all of the CGFC Flight Attempts for mph measurement, all aircraft will be impounded. CAFE will compute the tentative scores of each aircraft. CAFE will then verify by measurement the presence of a 30 minute fuel/energy reserve for each of the four (4) TEAMS that have achieved the highest scores or whose scores position them to win any prize. Any of these TEAMS that prove to have less than the requisite 30-minute fuel/energy reserve on board **WILL BE DISQUALIFIED**. For the purposes of this reserve verification, a reserve equal to 1/2 of the average BTU/hour consumed by the aircraft during its Speed Flight will be required.

MPGe Determinations:

Liquid fueled aircraft will have their MPGe determined by weighing the fueled, competition-ready aircraft inside the closed (no wind), 44-foot span, CAFE Flight Test Center hangar both before and after their 200 statute mile competition flight. From the weight change due to fuel burn during the flight and the specified density of the fuel consumed, the number of gallons of fuel for the 200-mile flight will be determined. That number of gallons figure will be converted to MPGe by first multiplying it by that fuel’s energy content per gallon given in the table below in **Appendix F**. This produces the “BTU consumed”. To obtain “equivalent gallons used”, one then divides the “BTU consumed” by 115,000 BTU. Next, the 200 mile course length is divided by the “equivalent gallons used” to obtain vehicle MPGe. For example, if the aircraft has 3

seats, then the Passenger-MPG_e is computed as 3 times the Vehicle MPG_e. If it had 4 seats, then the Passenger-MPG_e is computed as 4 times the Vehicle MPG_e, etc.

Example #1: If a 2 seat aircraft consumes 200,000 BTU of bio-diesel fuel during its 200 mile flight attempt, that will represent $200,000 \div 115,000$ BTU or 1.739 gallons used. This then calculates as $200 \text{ miles} \div 1.739 \text{ gallons}$ giving 115 Vehicle MPG_e. Since there are two seats in the vehicle, this makes 2×115 or 230 Passenger-MPG_e.

Example #2: If according to the on-board totalizer a 4 seat aircraft consumes 100 kWh of electricity during its 200 mile flight attempt, that represents $100 \text{ kWh} \div 33.7 \text{ kWh per gallon} = 2.967$ gallons of fuel used, since each gallon of 87 octane regular unleaded auto gasoline represents 33.7 kWh. This then calculates as $200 \text{ miles} \div 2.967 \text{ gallons} = 67.4$ vehicle MPG_e and, since there are four seats in the vehicle, this makes 4×67.4 or 269.63 Passenger-MPG_e.

Example #3: Hybrid aircraft of two main types are expected; Type A is the hybrid in which either motor or engine can drive the propeller in some proportion, with the engine being the main propulsor in cruise and the motor helping during takeoff and climb. Type B is the hybrid that is mainly an electric powered aircraft. It is propelled by its electric motor and uses its internal combustion engine only to drive a generator to charge its batteries. Either type of hybrid will be scored based on the total energy used. This is the energy contained in any fuel burned plus the net energy used from the batteries. The net energy used from the batteries is the total energy used from the batteries minus the energy put back into the batteries. This means that both a weighing of fuel burn and an on-board electric power meter totalizer will be used to determine the total energy used.

If a 2 seat Type A hybrid aircraft burned the 87 octane equivalent of 1.80 gallons of B100 bio-diesel and also consumed from its batteries a net energy of 3.37 kWh of electricity, its score would be calculated by converting that 3.37 kWh to “electrical equivalent gallons used” by dividing 3.37 kWh by the ratio of 33.7 kWh per gallon to obtain 0.10 gallons. The total equivalent fuel used for scoring purposes is therefore $1.80 \text{ gal.} + 0.10 \text{ gal.} = 1.9$ gallons.

The MPG_e in this case would then be: $200 \text{ miles on } 1.90 \text{ gallons} = 105.26$ Vehicle MPG_e

and the Passenger-MPG_e would be $2 \text{ seats} \times 105.26 = 210.52$ Passenger-MPG_e

Because the Type A example hybrid above consumed the **equivalent** of 1.80 gallons of 100% bio-fuel out of its total energy use of 1.90 gallons, its bio-fuel use comprised $1.80/1.90 = 94.7\%$ of its total energy use, therefore qualifying it for the Bio-Fuel Prize.

Example #4: Some vehicles may have solar photovoltaic cells on their surfaces to augment their energy. In such cases the electric power meter will only record the net energy used from batteries in computing the score. The energy obtained from the solar photovoltaic cells will be free and not included in the score.

Appendix F:

Approved Energy Sources for 2011

Fuel type	BTU per gallon.	Density lb/gal	Energy ratio to 87 octane
87, 89, 91 unleaded auto gasoline	115,000	6.09	1.0
Bio-diesel B100	118,300	7.27	1.0287
Bio-diesel B20	127,250	pending	1.1065
Bio-jet 100%	pending	NA	pending
Hydrogen, liquid	34,644 (51,532/lb.) (113,571 BTU (LHV per kg.).	0.567	0.3013
Electricity: mi/KWh	na	na	33.7 kWh per gallon
Avgas 100 LL	120,000	6.02	1.0435
Jet-A	135,000	6.76	1.1739
Petro-diesel	129,500	7.09	1.1261

All fuels used in the competition are subject to tracing, testing and inspection by CAFE and require documentation of their source of purchase. Teams requiring fuels not listed must pre-apply to CAFE to obtain an energy density determination.

References:

http://en.wikipedia.org/wiki/Gasoline-equivalent_gallon

http://www.bts.gov/publications/national_transportation_statistics/2002/html/table_04_06.html

http://www1.eere.energy.gov/hydrogenandfuelcells/presidents_initiative.html

<http://www-formal.stanford.edu/jmc/progress/hydrogen.html>

http://www.eere.energy.gov/biomass/biofuels_data.html

http://www.eere.energy.gov/afdc/price_report.html

MPGe = Miles per gallon equivalent, based upon the energy content of 87 octane. unleaded auto gasoline.

Appendix G:

DESIGN PROPOSAL REQUIREMENTS (See NDA in Appendix H)

Please supply all applicable information below:

TEAM name and address

Vehicle name

University affiliation, if applicable

TEAM Leader name (must be a U.S. citizen or permanent resident) and email

TEAM members

Short Bio/resume of TEAM members

A one-page summary detailing the innovations used and how they advance the state of the art (without disclosing proprietary information)

3-view dimensioned drawings of vehicle, including 3-views of seating area

Photos of vehicle, cabin seating with and without occupants, propulsion system, landing gear, if available,

Aerodynamic parameters, known or estimated, in English units:

Gross Weight

Empty Weight

Principal material used to construct (composite, aluminum, etc.)

Wingspan and wing area

Wing aspect ratio

Cabin seating area dimensions: See **Appendix D**

Landing gear type (retractable, nose or tailwheel)

Engine or motor BHP or KW

Motor voltage and amperage at peak power

Propeller diameter and RPM at cruise

Fuel type and fuel capacity, gallons

If Fuel Cell, specify capacity, tank psi, flowmeter/totalizer make/model/specs

Batteries, if electric-powered: cell capacity (wh), total capacity (kWh) density (wh/kg), cost per kWh, manufacturer, model # and charging voltage/amperage (See Appendix F)

Solar cell type and capture ratio (efficiency)

Solar cell array area, sq meters

Maximum Rate of Climb, MSL, feet per minute

V_{max}, mph, MSL

V_{ne}

V_{gear}, if applicable

V_{so}, stall speed with flaps, mph

V_x, minimum power speed, mph

V_y, speed for max L/D, mph

Means of certifying that + 3.8 / - 1.5 G structural limit capability is met. **Appendix K**

Date of first flight, if available

Appendix H:

NON-DISCLOSURE AGREEMENT

THIS AGREEMENT (Agreement), effective as of _____, 20__, is by and between _____ (hereinafter referred to as TEAM) and The CAFE Foundation (hereinafter referred to as CAFE).

RECITALS

- A. TEAM wishes to provide, to CAFE, certain materials and information for the purpose of participating in the CAFE GREEN FLIGHT CHALLENGE (CGFC).
- B. TEAM considers some of its materials and information to be proprietary and wishes to establish certain requirements with regard to CAFE's treatment thereof.

AGREEMENTS

Accordingly, CAFE and TEAM agree as follows:

1. For purposes of this Agreement, the term Proprietary Information is defined to mean all proprietary, confidential, and/or trade secret information disclosed by TEAM to CAFE and pertaining to TEAM's aircraft, CGFC team vehicle and/or any technologies or systems used in or applied to said vehicle(s); provided that:
 - a. Proprietary Information includes only information that is disclosed by TEAM to CAFE in written, image or digital form and **is clearly marked with appropriate proprietary legends**,
 - b. Proprietary Information does not include information already in the public domain or known to CAFE when first received from TEAM, and
 - c. Proprietary Information will lose its status as Proprietary Information if, and as of the date when, it becomes part of the public domain through no wrongful act of CAFE, is received by CAFE without restriction from a third party who had the right to disclose it, or is developed by CAFE independently of any disclosure hereunder.
2. For a period of five (5) years from the effective date of this Agreement, CAFE will use reasonable care to (i) preserve Proprietary Information in confidence and not disclose it to others without the prior permission of TEAM and (ii) not use Proprietary Information, without TEAM'S permission, for any purpose other than the purpose set

forth in paragraph A. of this Agreement. Except as specifically set forth in this Agreement, CAFE will have no obligation relative to any materials or information (including but not limited to Proprietary Information) provided or otherwise disclosed by TEAM to CAFE.

3. No disclosure or physical transfer, by TEAM to CAFE, of any materials or information pursuant to this Agreement will be construed as granting (a) a license under any patent, patent application, or copyright or (b) any right of ownership in such materials or information.

4. This Agreement will automatically expire five (5) years from its effective date unless sooner terminated in accordance with this paragraph 4. TEAM may terminate this Agreement upon written notice to CAFE specifying the effective date of such termination. Any such expiration or termination, however, will have no effect upon rights or obligations relative to Proprietary Information disclosed to CAFE under this Agreement prior to the effective date of such expiration or termination. TEAM participation, acceptance, removal or disqualification from the CGFC will have no effect upon the expiration or termination date of this Agreement.

5. TEAM will not refer to this Agreement, or to any related activity or relationship with CAFE, for any promotional purpose or in any news release or public announcement without the prior written approval of CAFE.

6. Proprietary Information disclosed under this Agreement is made without any representation, guarantee, or warranty of any kind.

7. This Agreement will be governed by the laws of the state of California, U.S.A., except that the conflict of laws provisions under California law will not be applied for the purpose of making other law applicable.

8. a. In performing their respective obligations under this Agreement, the Parties will comply with United States export control and asset control laws, regulations, and orders, as they may be amended from time to time, applicable to the export or re-export of goods or services, including software, processes, or technical data ("Items"). Such regulations include without limitation the Export Administration Regulations ("EAR"), International Traffic in Arms Regulations ("ITAR"), and regulations and orders administered by the Treasury Department's Office of Foreign Assets Control (collectively, "Export Control Laws").

b. The Party conducting an export or re-export, as defined in such laws and regulations, shall be responsible for obtaining the required authorizations. Each Party shall reasonably cooperate with, and exercise reasonable efforts to support, the Party making the export or re-export in obtaining any necessary licenses or authorizations required to perform its obligations under this Agreement.

c. The Party providing any Items in conjunction with this Agreement shall, upon written request of the other Party, provide the Export Control Classification Numbers (“ECCNs”) for each Item as well as the ECCNs for any components or parts of each Item, if such component ECCN's are different from the ECCN of the Item at issue.

d. Each Party represents that (i) any Items, and the parts and components thereof, it is providing in conjunction with this Agreement are not currently “defense articles” as that term is defined in 22 C.F.R. § 120.6 of the ITAR and (ii) the services it is providing in conjunction with this Agreement are not currently “defense services” as that term is defined in 22 C.F.R. § 120.9 of the ITAR. The Parties acknowledge that this representation means that an official capable of binding the Party providing such Items knows or has otherwise determined that such Items, and the parts and components thereof, are not currently on the United States Munitions List at 22 C.F.R. § 121.1. Each Party agrees to reasonably cooperate with the other in providing, upon written request of the other Party, documentation or other information that supports or confirms this representation, including, for example, Commodity Jurisdiction Determinations.

e. To the extent that such Items, or any parts or components thereof, were specifically designed or modified for a military end use or end user, the Party providing such Items shall notify the other Party of this fact and shall also provide the other Party with written confirmation from the United States Department of State that such Items, and all such parts or components thereof, are dual-use Items subject to the jurisdiction of the Department of Commerce.

9. This Agreement contains the entire understanding between CAFE and TEAM regarding any materials and information covered by this Agreement and disclosed to CAFE on or after the effective date and supersedes, merges, and replaces any and all prior and contemporaneous communications and understandings with respect thereto. No modification of, or exception to, this Agreement will be binding on a Party unless first agreed to in writing by such Party. This Agreement will apply in lieu of and notwithstanding any specific legend or statement associated with any particular materials or information disclosed or transferred by TEAM to CAFE.

TEAM

The CAFE Foundation

By: _____
(Signature)

By: _____
(Signature)

Title:

Brien A. Seeley
Title: President

Date: _____

Date: _____

Appendix I:

KEY DATES:

Official Dates Begin at 12:01 AM and End at 11:59 PM:

July 10, 2009	Begin accepting team NOI's and Design Proposals
July 17, 2009	Begin accepting signed TEAM AGREEMENTS
December 31, 2009:	End of \$4000 Early Bird Discount Registration Fee
January 1, 2010:	Begin \$6000 Registration Fee
July 1, 2010	Begin \$8000 Registration Fee
December 31, 2011	Registration closed
April 15, 2011	Begin CAFE website posts of lat-lon competition course coordinates
April 15, 2011	End Special fuels acceptance period
May 30, 2011	Pre-qualifying and team documentation deadline
July 10 through 17, 2011	Dates of the CHALLENGE CGFC event at cafe
July 10:	Registration, tie-down assignment, weigh-in, inspections
July 11:	Begin Noise, Takeoff and Minimum Speed flight testing
July 12:	Complete Noise, Takeoff and Minimum Speed flight testing
July 13:	All aircraft fly 200 miles MPGe flight competition
July 14:	Recharge day
July 15:	All aircraft fly 200 miles Speed flight competition
July 16:	Reserve day in case of adverse weather
July 16:	Evening Awards Banquet
July 17:	Sunday morning: Public Day: exposition of all aircraft and scores

Appendix J:

PAYLOAD AND SEATING CONSIDERATIONS

The Payload/seat carried in the CHALLENGE CGFC Flight Attempts will be 200 pounds per seat. For each seat in Vehicle there must be a comfortable space, load and CG range adequate for a 6' tall, 200 lb person. See **Appendices B, D and J**.

Competition Weight is the Vehicle weight, including fuel and payload that TEAM will use in all CHALLENGE flight attempts. It requires a payload of 200 lb per seat and 30-minute fuel reserve for a 200-mile flight.

Aside from pilot and co-pilot seats that are occupied by actual people, teams with 3 or more seat vehicles must provide an airworthy sand ballast of 200 pounds per seat in the form of a closeable dummy (canvas bag or other sturdy containment device) that can be securely strapped into each seat and filled with 10 each of 20 pound sand bags provided by team to simulate a 200 pound person." For example, a 4 seat aircraft would carry 2 pilots plus 2 sandbagged canvas dummies each weighing 200 pounds such that the total payload carried is 800 pounds.

For fairness and safety, aircraft with 3 or more seats must place at least 2 of those seats directly side-by-side with no stagger. Each seat must have a seatbelt and shoulder harness and must fulfill the requirements given in **Appendix D**.

Payload may include additional sand ballast in those situations where crew weight is below 200 pounds per seat. Placement of such sand ballast will be limited to the seat(s) and approved baggage areas. Baggage area sand ballast may not exceed 40 pounds per seat. Fuel is not counted as payload, nor is equipment essential to the flight such as headsets, portable GPS receivers or Communication transceivers, etc.

Appendix K

Structural Requirements

There are 3 options for TEAMS to fulfill the CHALLENGE structural load-testing requirement for their vehicle:

1. Video document a shot bag static load test of the aircraft's wing and tail to limits of +3.8 and -1.5 G using an appropriate fixture.
2. In-flight video recording of bank angle and G meter to demonstrate 2.0 G capability by maintaining level flight in a 60° bank for 20 seconds at V_a . This tests both wing and tail. Must be performed at both forward and aft c.g. over non-populated area, with parachute(s).
3. A detailed design review signed-off by a credentialed structures expert.

Structural load testing documentation must be completed by May 15, 2011. (Section 1.3)

Appendix L

Documentation and FAA Requirements

Necessary to become officially registered in the CHALLENGE:

Adoption of Agreement by all TEAM MEMBERS
Execution of Agreement by TEAM LEADER
Registration fee

Before May 30, 2011, all VEHICLES must **pre-qualify** for the CHALLENGE by submitting documentation of:

Structural load adequacy (**Appendix K**)
Ballistic parachute compliance (ASTM 2316 guidelines)
Acceptable Basic Handling Qualities (**Appendix C**)
Proof of insurance including additional named insured's (See Sections 2.9, 5.9)
Aircraft Liability Insurance Policy (face sheet) – coverage required is \$1M liability
Copy of FAA Registration and Airworthiness Certificate
FAA approval of vehicle modifications, if any
Logbook documentation of any A-D compliance
Copy of FAA Operating Limitations
Pilot's Operating Handbook documentation:

- Center of gravity envelope, datum and sample calculations
- Copy of weight and balance

TEAM LEADER documentation:

- Proof of U.S.A. Citizenship or permanent residence by Copy of Birth Certificate, Passport and/or proof of permanent residence

TEAM pilot documentation:

- Copy of current biennial flight review for TEAM pilot(s)
- Copy of current Medical Certificate(s) for TEAM pilot(s)
- Logbook records of pilot's hours flown: 500 hr. total and 40 hr. in type

Copy of current annual inspection or conditional inspection from aircraft logbook
Copy of logbook documentation of any required equipment list changes
Current pitot static and transponder encoder certification
Other documentation necessary to show compliance with these rules, as described below in 2.3 a. and as may subsequently be required by CAFE.

Appendix M

NOTICE OF INTEREST LETTER

By signature below, Responsible Party of TEAM indicates interest and intent to participate in the 2011 CHALLENGE according to the rules described in the attached preceding Agreement. This letter is non-binding and does not constitute an Agreement to participate nor confer a right to participate. In accepting TEAMS to participate in the 2011 CHALLENGE, CAFE will give priority to TEAMS submitting this signed NOTICE OF INTEREST LETTER, according to the date of receipt of signed said letter at the following address:

CAFE Foundation
4370 Raymonde Way, Santa Rosa, CA. 95404. ph: 707-544-014 FAX: 707-544-2734

Please neatly print all of the following information:

TEAM name:

TEAM LEADER name, phone, address and email (must be a U.S. citizen or permanent resident):

Vehicle name:

Vehicle description: (engine and fuel/energy type, # of seats, approx. Competition Weight, wingspan, etc.)

IMPORTANT: Include a short description of the technology advancement to be demonstrated on a separate sheet.

TEAM address: _____

Signature of Responsible Party: _____ Date: _____