XPRIZE WILDFIRE | PG&E | GORDON AND BETTY MOORE FOUNDATION

Competition Guidelines

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Version 1.0 | Open for comment through May 17, 2023

COMPETITION GUIDELINES

XPRIZE Wildfire is governed by these Competition Guidelines. The Competition Guidelines summarize the high-level requirements and procedures of the competition. These guidelines are based upon extensive research and consultation with dozens of experts and hundreds in our online community, including fire incident chiefs, wildland smokejumpers, fire investigators, forest specialists, testing specialists, and researchers across a wide array of relevant fields.

This version of the guidelines is open to **public comment** through May 17, 2023. Questions, comments, or communications about the guidelines may be sent to wildfire@xprize.org. Comments will be taken into consideration and as deemed appropriate, revisions may be incorporated to reflect input.

XPRIZE may revise these Guidelines at any time during the course of the competition to provide additional information or to improve the quality of the competition. Unanticipated issues that arise may require modifications to these Guidelines. XPRIZE reserves the right to revise these Guidelines as it, in its sole discretion, deems necessary. All **registered teams** will be notified of revisions in a timely manner. Official updates will be communicated to team leaders by email.

For the most updated version of the Guidelines, check xprize.org/wildfire.

Further details concerning the operation of the competition, such as exact dates and locations of events, specific technical thresholds for performance testing, and operational information will be released in the **Rules & Regulations**, and other documents that are forthcoming throughout the competition.

NOTE: **Bolded** items are defined in the Glossary.

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1. COMPETITION OVERVIEW

The $11 Million XPRIZE Wildfire is a 4-year competition to innovate wildfire detection and rapid response technologies that will put an end to destructive wildfires.

Extreme Wildfire Events (EWEs) are on the rise. Globally, we see more fires that burn bigger, at a higher intensity, and spread out of control faster. These large and destructive wildfires are unleashing catastrophic consequences—from a growing economic burden and the loss of life and assets to the destruction of ecosystems. While only around 3% of all wildfires are extreme, they drive over 80% of total associated fire damages, and account for an increasing percentage of global greenhouse gas emissions.

Although wildfire can be tremendously destructive, it is also an important part of the global ecosystem. Wildfire is integral to the health and sustainability of forests as it clears dead vegetation and encourages new growth, and it is essential for the survival of certain plants, including the giant sequoia and Eucalyptus.

For over a century, the primary fire management approach in many places was to suppress any fire, in turn allowing more vegetation to accumulate on the ground, feeding extreme fires. This practice has begun to shift in recent years, but in light of global trends including a changing climate and the expanding **Wildland-Urban Interface** (WUI), the risk of extreme wildfires will continue to heighten, increasingly outpacing present-day wildfire management capacity. Technical innovations combined with a renewed understanding of ecologically beneficial fire could give this field a crucial boost to its century-old practices.

Imagine a world where humanity and fire can sustainably and safely co-exist. Where wildfires are **detected rapidly**, **accurately**, and **precisely**; allowing for the safe management of environmentally beneficial fires and the swift suppression of destructive fires. Where firefighting has transformed, ensuring the safety of firefighters, society, and ecosystems alike.

XPRIZE Wildfire will incentivize innovators to design and develop a wide range of novel firefighting technologies, in order to combat one of the most devastating global challenges of our time. The following **core problems** currently inhibit progress, and are the areas XPRIZE Wildfire is set to target.

> Time
Wildfire detection, response, and suppression can be too slow when it comes to destructive fires. Against a shrinking time window due to the changing climate and shifting population patterns, calls from local citizens remain the prime detection method when flames are visible. The present-day best-case average time from detection to suppression is 60 minutes, while in extreme conditions, fires take mere moments to sprawl out of control.

> Detection Accuracy & Precision
Early detection is a game changer for firefighting, but current capabilities are inaccurate or not precise enough, driving delays in strategy and response. From space, a hot pixel represents $1km^2$ and the **false positive** rate can reach 40%, inhibiting the reliability of observations and delaying action. Closer to the ground, planes cannot roam the sky 24/7 and ground detection is limited in coverage area. All detection methods are challenged by certain environmental conditions, while live fire behavior intelligence is unavailable to global fire managers at large.

> Accessibility
Wildfires can start in hard-to-reach areas, while current ground vehicles are limited to 40% slopes and aerial vehicles are limited by weather conditions, time of day, and environmental and fire conditions. In terms of the fire behavior, for a flame of 1.2m (4ft.) in height, direct ground attack (control and suppression activities) cannot continue with hand tools alone, and at 2.4m (8ft.) in height, flames are too high and intense for an aerial attack.

> Siloed, Fragmented Field
Firefighting's building blocks—detection, response, and suppression—are split across many actors and are insufficiently coordinated and integrated. Innovators tend to work on one piece of the puzzle, and often, due to investment concerns, capabilities are developed to serve many, at times competing, priorities. All while fire managers are slow to see innovation incorporated.

> Operability in Extreme Weather
Climate-change-induced weather leads to more extreme fires that spread faster, making the current way of detecting, responding to fires, and delivering suppression materials or other fire attack maneuvers more challenging and increasingly obsolete.

> Global Availability
Even when the technology exists, it can be costly and out of reach of many countries and communities, as is the case with supertanker planes, satellite-based remote sensing, and even having a local firefighting unit.

2. HEALTH, SAFETY, AND ENVIRONMENT

Developing and testing novel wildfire management technology is inherently dangerous. Safety is our top priority. XPRIZE works with an array of best-in-class professionals to design testing scenarios that achieve the appropriate balance of challenging and safe. Working closely with certified Fire Managers, we will take every precaution to ensure the safety of all participants, judges, and the public during testing. Safety controls stand as the most critical aspect of all testing rounds of this competition.

XPRIZE acknowledges that there is a possibility that something does not go according to plan, and we develop comprehensive risk mitigation plans in partnership with the relevant testing partners and landowners. Although we believe solutions can come from anywhere, prior to advancing to later stages in the competition, teams will be assessed on their safety planning and understanding of fire management and the inherent risks. Due to the nature of XPRIZE Wildfire testing, Teams may be required to obtain Commercial General Liability insurance coverage. Official details on insurance will be provided in the **Competitor Agreement**, to be released in May 2023.

To minimize the impact of the competition on the environment, competition entries must minimize environmental harm and ensure safety of participants and surrounding communities. All teams must comply with the following requirements:

- Teams will comply with all relevant environmental, health, and safety regulations.
- Teams must ensure compliance with NFPA Wildfire Codes and Standards.
- Teams may not employ, influence, or harm any form of life in their approaches to the challenge, and should make every effort to avoid detrimental effects on all conservation values.
- Teams must recover equipment and supplies that are deployed within the **Competition Area**. Any disposable portions of the system must be declared and accepted by Judges as causing no harm prior to deployment in the Competition Area.
- Teams must research and obtain any necessary permits for operation in the Competition Area as it pertains to their tested solution. XPRIZE will collaborate with teams in this activity.
- Teams must ensure that solutions are fully functional and will not pose a risk to other competitors, judges, safety personnel, or observers.

Additional details will be provided in the Rules & Regulations. XPRIZE reserves the right to adjust the Competition Guidelines and Rules & Regulations based on the latest scientific and legal information available at the time to ensure personal and environmental safety. XPRIZE will make

all final determinations on safe and acceptable operating conditions for competition operations. XPRIZE reserves the right to disqualify teams who are found to be operating in an unsafe or unethical manner, whether at official testing sites or at their own facilities.

3. COMPETITION STRUCTURE

3.1 COMPETITION TRACKS

Across **two competition tracks**, designed to support near and long-term impact goals and address the core problems, competing teams will innovate across all aspects of firefighting—from detection and characterization of the fire to autonomous wildfire response solutions and suppression materials. The competition tracks will individually and jointly transform how wildfires are managed and fought.

Track A: Space-Based Wildfire Detection and Intelligence
> In the Space-Based Wildfire Detection & Intelligence track, teams will have one minute to accurately detect all fires across a landscape larger than entire states or countries, and 10 minutes to precisely characterize and report data with the least false positives to two **ground stations**.

Track B: Autonomous Wildfire Response
> In the Autonomous Wildfire Response track, teams have 10 minutes to autonomously detect and suppress a **high-risk fire** in a 1,000 km^2, **environmentally challenging** area, leaving any **decoy fires** untouched.

Teams may register to compete in one or both tracks. Teams may also compete for a **Bonus Prize,** which will complement the goals of the main competition by incentivizing breakthroughs in rapid, precise, and accurate detection of wildfires. Refer to section 3.3, Prizes, for details about all **prize purses**.

3.2 COMPETITION MILESTONES

Competition Milestone dates may be subject to change. The following tables are intended to provide an overview of major competition milestones. All teams are reminded to closely monitor competition timelines, especially those that choose to compete in both tracks.

The competition tracks will run in parallel, with the timeline of the Space-Based Wildfire Detection & Intelligence Track occurring at a faster pace than that of the Autonomous Wildfire Response Track. Space-Based Wildfire Detection & Intelligence will consist of three (3) rounds

over 22 months. Autonomous Wildfire Response will consist of four (4) rounds over 36-42 months.

Following deliberation with the **Judging Panel**, XPRIZE will directly notify all teams who are selected to advance to each subsequent stage of the competition.

An additional 12 months will be devoted to amplifying the impacts of XPRIZE Wildfire and ensuring that successful solutions are adopted by the stakeholders most in need of the resulting technologies.

Milestone Summary Table	
Space-Based Wildfire Detection & Intelligence	**Autonomous Wildfire Response**
- Team Registration - Round 1: Qualifying Technical Submission - Round 2: Semifinals Testing - Round 3: Finals Testing - Award Ceremony - Scaling & Impact	- Team Registration - Round 1: Qualifying Technical Submission - Round 2: Extreme Conditions Testing - Round 3: Semifinals Testing - Round 4: Finals Testing - Award Ceremony - Scaling & Impact

Track A: Space-Based Wildfire Detection & Intelligence
(April 2023 – January 2025)

Date	Milestone	Details & Requirements
April 21, 2023	Official Competition Launch	Team Registration Opens, Competition Guidelines Released
April 21 - May 17, 2023	Competition Guidelines Public Comment Period	Comments may be sent to wildfire@xprize.org
April 21 - August 31, 2023	Registration Period	Early Registration Deadline: June 30, USD $500 Standard Registration Deadline: August 31, USD $1,000 Signed Competitor Agreement required with payment (see section 3.4 Team Registration)
November 1, 2023	Discretionary Late Registration Closes	Late Registration Fee, USD $1,000 (See section 3.4 Team Registration for details)
November 1, 2023	Qualifying Technical Submission Deadline	Detailed technical submission; instructions provided June 2023 (see section 3.5 Competition Rounds)

Track A: Space-Based Wildfire Detection & Intelligence
(April 2023 – January 2025)

Date	Milestone	Details & Requirements
November 2, 2023 - January 10, 2024	Qualifying Technical Submission Judging	Independent Judging Panel will review materials
January 2024	Advancing Teams Announced	Advancing teams will share a milestone prize purse (see section 3.3 Prize Purses)
February 2024	Team Summit	In-person and/or virtual meetings to introduce teams to each other and foster collaboration opportunities
August 2024	Semifinals Testing and Judging	Outdoor environment, independent Judging Panel (see section 3.5 Competition Rounds)
September 2024	Finalist Teams Announced	Advancing teams will share a milestone prize purse (see section 3.3 Prize Purses)
January 2025	Finals Testing and Judging	Outdoor environment, independent Judging Panel (see section 3.5 Competition Rounds)
January 2025	Final Award Ceremony and Winners Announced	
2025 - 2026	Post-Competition Scaling and Impact	

Track B: Autonomous Wildfire Response
(April 2023 – April 2026)

Date	Milestone	Details
April 21, 2023	Official Competition Launch	Team Registration Opens, Competition Guidelines Released
April 21 - May 17, 2023	Competition Guidelines Public Comment Period	Comments may be sent to wildfire@xprize.org
April 21 - October 31, 2023	Registration Period	Early Registration Deadline: August 31, USD $500 Standard Registration Deadline October 31, USD $1,000; Signed Competitor Agreement required with payment (see section 3.4 Team Registration)
April 1, 2024	Discretionary Late Registration Closes	See section 3.4 Team Registration for details

Track B: Autonomous Wildfire Response (April 2023 – April 2026)		
Date	**Milestone**	**Details**
April 1, 2024	Qualifying Technical Submission Deadline	Details provided June 2023
April - May 2024	Qualifying Technical Submission Judging	Independent Judging Panel will review materials
May 2024	Qualified Teams Announced	
July 2024	Team Summit	In-person and/or virtual meetings to introduce teams to each other and foster collaboration opportunities
November 1, 2024	Technical Validation Submission Deadline	
November 2, 2024 - January 10, 2025	Submission Judging	Independent Judging Panel will review materials
January 2025	Advancing Teams Announced	
March 2025	Extreme Conditions Testing and Judging	Indoor controlled environments, independent Judging Panel (see section 3.5 Competition Rounds)
March 2025	Semifinalist Teams Announced	advancing teams will share a milestone prize purse (see section 3.4 Team Registration)
August 2025	Semifinals Testing and Judging	Outdoor testing environment, independent Judging Panel (see section 3.5 Competition Rounds)
September 2025	Finalist Teams Announced	Advancing teams will share a milestone prize purse (see section 3.3 Prize Purses)
March 2026	Finals Testing and Judging	Outdoor testing environment, independent Judging Panel (see section 3.5 Competition Rounds)
April 2026	Final Award Ceremony and Winners Announced	
2026 - 2027	Post-Competition Scaling and Impact	

3.3 PRIZE PURSES

The XPRIZE Wildfire Prize Purse totals USD $11,000,000 and is divided as follows. All prize monies are listed in US Dollars.

Grand Prize

A grand prize purse totaling USD $7,000,000 will be awarded across the two competition tracks. The First Place Team in each track will receive USD $3,500,000.

Milestone Prizes

A milestone prize purse totaling $3,000,000 will be awarded incrementally across the two competition tracks, with $1,500,000 allocated to each track. Milestone prizes will be awarded to teams that reach key competition milestones, according to the Judging Criteria.

In the Space Based Wildfire Detection & Intelligence Track, there are two milestone prizes. Teams that advance to the Semifinal Round will share a milestone prize purse of $750,000. Teams that advance to the Final Round will share a milestone prize purse of $750,000.

In the Autonomous Wildfire Response track, there are two milestone prizes. Teams that advance to **Semifinals Testing** will share a milestone prize purse of $750,000. Teams that advance to the Final Round will share a milestone prize purse of $750,000.

Lockheed Martin Accurate Detection & Intelligence Bonus Prize

A Bonus Prize totaling USD $1,000,000 will be awarded to one or more eligible teams across both tracks whose competition entries successfully demonstrate **Accurate, Precise, and Rapid Detection**.

Further details will be provided in the Rules and Regulations.

3.4 TEAM REGISTRATION

Taking part in an XPRIZE competition is an exciting and challenging journey that requires a significant commitment of time, expertise, and resources. XPRIZE will organize the testing environments; however, each team will be responsible for the total costs of their participation in the competition, including R&D, general operations, and travel among other costs.

XPRIZE competitions are driven by teams of innovative groups and individuals, comprising subject matter experts, enthusiasts, start-ups, student teams, amateurs, and all problem-solvers in between; a winning idea can come from anywhere.

Teams and individuals are encouraged to collaborate and combine skills during the competition. Teams may recruit additional experts and are permitted to add new members to

their team at any time throughout the competition. Teams competing in XPRIZE Wildfire may include individuals with expertise in the fields listed in

the sidebar, among others. Teams may also merge with other teams at any time during the competition, especially to add technical and subject matter expertise to their roster. Teams must notify XPRIZE 10 days before a merger. In the case of mergers, teams must determine which legal entity will remain in the competition and assign one team leader. Additional details regarding team mergers are provided in the Competitor Agreement.

To support team collaboration, XPRIZE will host informational sessions and facilitate team meetings, and may suggest that teams merge to form a more robust or interdisciplinary team. These sessions will allow teams to get to know each other and receive important competition updates. All **Interested Teams** are encouraged to join, but participation in these sessions is not mandatory.

- Automation, UAVs (drones)
- Artificial Intelligence
- Chemical Engineering
- Climate Science
- Data Analytics
- Emergency & Disaster Management
- Fire Ecology
- Fire Science
- Fire Detection/Response
- Fire Equipment & Technology
- Forest Management
- Forest Health
- Forestry and Wildlife
- Machine Learning
- Material Science
- Mechanical Engineering
- Product Design
- Product Engineering
- Project Management
- Remote Sensing
- Research
- Robotics
- Risk Management
- Satellite Imagery
- Sensors
- Systems Integration Engineering
- Wildland Firefighting
- Wildfire Management and Prevention
- Wildland-Urban Interface
- *and many others*

How to Register a Team

To participate, all teams must first create an account and log in to the **Prize Operations Platform (POP)**. POP is an online platform through which teams will register for the competition and complete all required activities. All teams must appoint a Team Leader, who will be responsible for maintaining communications with XPRIZE. Teams are expected to maintain their POP profiles throughout the competition, ensuring their profile shows the most recent team information, including an active email address.

Teams may register to compete in either or both Tracks. Progress and success in one Track do not imply commensurate progress or success in the other, and vice versa, however, there may be synergy between tracks. To remain eligible to compete, teams must complete the registration form, submit a Competitor Agreement, and pay a registration fee by the appropriate Registration Deadlines. Teams must complete all required activities within each respective track throughout the duration of the competition.

Teams may decide that they possess more than one idea and wish to submit multiple entries. Multiple competition entries per track are permissible, provided that each entry represents a distinct technology approach, and is registered under a distinct Team, complete with its own team profile, description, and entry fee in the Prize Operations Platform. The capacity of multiple entries may NOT be added together for the purposes of wildfire detection and/or suppression. Please refer to the Competitor Agreement for more details.

As of the date of submission, each Team must own, or hold appropriate license rights to, all technologies, methods, resources, and Intellectual Property included in the Team's submission. Please refer to the Competitor Agreement for more details.

Any person or entity can participate in the Competition, no matter their citizenship or nationality, unless prohibited by US law—see [Sanctions Programs and Country Information | US Department of the Treasury](#). If a Team has a Team Member who is ordinarily resident in such destinations, it will be up to the team to obtain a license of authorization issued under U.S. Law.

Registration Submission

Each team will complete a Registration Submission. The Registration Submission activity will be assigned to teams in POP automatically upon creating a team profile. This submission will be used to obtain an initial landscape of competitors, and to support the facilitation of collaboration opportunities between teams. The aggregate information from these submissions may be shared to support team collaboration opportunities. The XPRIZE Wildfire Operations Team will not distribute specific details about any team without permission.

The Registration Submission will ask about the following:
- Team composition, i.e. number of expected team members
- Proposed solution focus areas, i.e. detection, intelligence, response, suppression delivery, suppression materials, etc.
- In what areas of technical or subject matter expertise is your team seeking support?
- Is your team open to collaboration opportunities?

Registration Submissions are due by the standard registration deadline of each competition track but it is recommended to complete the submission sooner.

XPRIZE encourages teams to begin designing their technologies at the earliest opportunity in preparation for the Qualifying Rounds of their respective track(s).

Registration Fees

Registration fees are required as a simple qualifier to ensure competitors can obtain the appropriate resources to fully compete in the prize. All fees collected go toward supporting

post-prize efforts, including **Alumni Network** development and prize impact work (see section 3.7). Team Registration must take place by the registration deadlines below.

Early Registration: USD $500
- Space-Based Wildfire Detection & Intelligence: June 30, 2023
- Autonomous Wildfire Response: August 31, 2023

Standard Registration: USD $1,000
- Space-Based Wildfire Detection & Intelligence: August 31, 2023
- Autonomous Wildfire Response: October 31, 2023

XPRIZE has sole discretion to register and qualify additional teams across both Tracks from the close of their respective registrations until the **Discretionary Late Registration** deadline (see section 3.2). Teams that register during this period must meet all preceding registration and submission requirements and pay a late registration fee of USD $2,000. *XPRIZE strongly encourages teams to register before the regular registration deadline. There is no guarantee late registration will be granted to a team.* Potential teams should contact XPRIZE directly for more details.

Competitor Agreement

To be considered to advance to subsequent stages of the competition, all registered teams are required to sign the Competitor Agreement to acknowledge the terms expected of teams upon entering the competition. This document contains vital information detailing the requirements teams must meet to remain eligible for the competition. Competitor Agreements will be signed when a team makes their registration fee payment. The Competitor Agreement will be available in May 2023 for teams to peruse before signing.

3.5 COMPETITION ROUNDS

XPRIZE Wildfire runs across two tracks, each with its own timeline and milestones. The tracks will both entail multiple rounds of technical submissions, testing, and judging, which inform the selection of teams that will ultimately compete for the Finals Prize Purses at **Finals Testing**.

- **Space-Based Wildfire Detection & Intelligence** Finals Testing is scheduled for January 2025.
- **Autonomous Wildfire Response** Finals Testing is scheduled for March 2026.

Throughout the competition, teams will be asked to submit technical submissions, video footage (where applicable), supplemental documentation, and technology prototypes that

demonstrate teams' solutions in accordance with the competition criteria. Team submissions will be reviewed by an independent Judging Panel, which is responsible for making the final decisions on advancing teams from one round of the competition to the next. Team submissions will be assessed and scored in a way that upholds confidentiality as well as fair and equal consideration of all competition criteria, without favoring one criterion over another unless explicitly specified.

Scoring methodologies for each track beyond any general terms in these Guidelines will be detailed in the forthcoming Rules & Regulations.

The following sections outline the structure of each competition track by milestone. Refer to the Competition Milestone Reference Table for side-by-side comparison. Full details pertaining to all submission and testing rounds will be published in the forthcoming Rules & Regulations.

XPRIZE Wildfire will refer to competing teams that progress through the competition using the following **team definitions**:

- **Interested Team**: A team or individual that is interested in participating in the competition and has created a profile in the XPRIZE POP system.
- **Registration in Progress**: A team that has completed registration but has not yet paid the fee and signed the Competitor Agreement.
- **Registered Team:** A team that has paid the required registration fee, signed the Competitor Agreement, and is eligible to submit a Qualifying Submission for the Judging Panel's review.
- **Qualified Team:** A team that has been selected by the Judging Panel from the pool of Registered Teams based on the strength of their Qualifying Submission.
- **Semifinalist Team:** A team that has successfully completed the necessary technical submission and is approved by the Judging Panel to advance to in the competition.
- **Finalist Team:** A team that has successfully completed Semifinals Testing and is approved by the Judging Panel to attend Finals Testing.

Further details regarding testing procedures and requirements for both tracks will be released in the Rules & Regulations.

Track A: SPACE-BASED DETECTION & INTELLIGENCE

SPACE-BASED WILDFIRE DETECTION & INTELLIGENCE

Registration Deadline **Aug 31, 2023**	Qualifying Technical Submission Deadline **Nov 1, 2023**	Qualified Teams Announced **Jan 2024**	Semifinals Technical Submission Deadline **April 2024**	Semifinals Testing **Aug 2024**	Finals Testing **Jan 2025**

Dates are tentative and subject to change

Judging Criteria

For this track, the most important judging criteria, based on which the Grand Prize will be awarded, are the accuracy and precision of wildfire detection and intelligence across vast and remote areas in various conditions and challenging terrain. This will encompass speed, accuracy, quality, complexity/comprehensiveness, and actionability of observations.

Additionally, other criteria that will be tested throughout the competition include:

- **High-Resolution Detection:** Current fires visible from space are too large for effective response. Teams will demonstrate the ability to detect fires $10m^2$ in size and smaller, toward $1m^2$, while drastically cutting the false positives rate to 5%.
- **Live Fire Behavior Intelligence:** While critical to informing action, fire behavior cannot be measured accurately in real-time and is estimated on-site by wildland firefighters. Teams will generate a comprehensive characterization of fire behavior including perimeter, direction and rate of spread, and intensity in different parts of the fire.
- **Global and Continuous Coverage:** Teams' solutions will be able to detect and pinpoint a fire in a wide range of environmental conditions, including different biomes, through smoke and cloud, and in both day and night.
- **Fast and Universal Access to Data:** From detection, teams will have 10 minutes to analyze and securely transmit data to personnel at multiple ground stations.
- **Integrable with Systems and Users:** Teams' solutions ought to be used by those who need them most - firefighters, but the field is slow to incorporate innovation. Thus, solutions will be tested for technical compatibility with the target deployment satellite and emergency services data system, as well as for the users' satisfaction.
- **Scalability:** An aerial or High-Altitude Platform simulating a Low-Earth Orbit (LEO) Satellite was chosen as the target deployment destination for the opportunity it holds in high resolution and sharing the technology globally. With a goal for global service using a satellite constellation, teams will detail and demonstrate their space preparedness and will be evaluated for the cost-effectiveness of their solutions. Nonetheless, the evaluated capabilities support other solution deployment (aerial) pathways.

Round 1: QUALIFYING TECHNICAL SUBMISSION

This round will call for written Technical Submissions that provide detailed information by which the capabilities and potential for success of teams will be evaluated.

Qualifying Technical Submissions will include details on team composition, technology design concepts and objectives, feasibility and safety assessments, and a work plan to implement the proposed technology, among other information. Detailed instructions and an outline of information required in the submission will be provided to Registered Teams in June 2023.

An independent Judging Panel will be assembled to evaluate team submissions and select Qualified Teams. Following Judging, XPRIZE will notify all teams of their status. Advancing teams will share a milestone prize purse of $750,000.

Round 2: SEMIFINALS TESTING

In the Semifinal Round, teams will demonstrate the performance of the components of their integrated solutions, namely observation instruments and analytical capabilities. Team solutions will be evaluated and tested in an outdoor environment. Analytics will process a satellite training dataset and present their analysis of observations using their submitted API. Instruments will observe from above a landscape featuring a contained live fire (showing flames) and simulated cloud and smoke barriers, in both day and night conditions.

Complete testing criteria and procedures will be released in the forthcoming Competition Rules & Regulations, and the official testing location(s) (**Competition Area**) for Semifinals Testing will be disclosed to teams by XPRIZE at a date prior to testing.

Following Judging, XPRIZE will notify all teams of their status. Teams that advance to the Final Round will share a milestone prize purse of $750,000.

Round 3: FINALS TESTING

Prior to participating in Final Testing, teams will be required to submit materials to verify they are prepared to proceed to the final round of the competition. The **Finalist Verification** will include written entries and video materials where applicable. This submission will not be judged, but technical readiness, safety, and other pre-testing measures will be considered.

In the Final Round, it is currently anticipated that all teams will be evaluated simultaneously, observing a designated landscape from a provided aerial or high-altitude platform, simulating a Low Earth Orbit (LEO) Satellite.

The Winning Team will accurately detect and precisely characterize all fires 10m^2 and bigger, and the most smaller fires within a vast and remote area, and report with the least false positives to

two ground stations within 10 minutes.

Complete testing criteria and procedures will be released in the forthcoming Competition Rules & Regulations, and the official testing location(s) (**Competition Area**) for Finals Testing will be disclosed to teams by XPRIZE at a date prior to testing.

Track B: AUTONOMOUS WILDFIRE RESPONSE

AUTONOMOUS WILDFIRE RESPONSE

| Registration Deadline **Oct 31, 2023** | Qualifying Technical Submission Deadline **April 1, 2024** | Qualified Teams Announced **July 2024** | Extreme Conditions Testing **March 2025** | Semifinals Testing **Aug 2025** | Finals Testing **March 2026** |

Dates are tentative and subject to change

Judging Criteria

For this track, the most important judging criteria, based on which the Grand Prize will be awarded, are <u>**accuracy and time elapsed**</u> from ignition to **full suppression** of the high-risk wildfire and any subsequent spot fires, leaving any decoy fires untouched. This will encompass quick, accurate and precise detection as well as rapid response and full suppression.

Additional criteria that will be tested throughout the competition include:

- **Fully Autonomous Integrated Solutions**: From detection to response and suppression, solutions' ability to operate autonomously will be tested. These autonomous systems must feature a safety requirement known as "Human-On-the-loop" autonomy. This means the solutions must be capable of operating successfully without human input during the test (participants may provide input when training their systems), although humans will be supervising the testing and can abort or override if problems arise.
- **Smart Detection:** The ability of solutions to autonomously recognize and not respond to False Positives such as water vapor, clouds, or low-intensity, non-moving fires.
- **Safety**: Teams' solutions must not introduce harm in their operation or delivery (i.e., by striking anyone with a drone or a dangerous suppression material delivery mechanism). Additionally, the teams' solutions (particularly if they innovate with a new chemical retardant), must be non-toxic, based on current globally-recognized NFPA standards (NFPA 1143 and NFPA 1145).
- **Functionality in High Winds**: Teams' solutions will be tested to assure ability to function in 30km/h (20mph) and evaluated for the ability to withstand even 100km/h (60 mph) winds, both in terms of ability to fly or operate in this environment, as well as ability to deliver suppression materials in these difficult wind conditions.

- **Functionality in Complex Terrain**: Teams' solutions will have to demonstrate the ability to function effectively in steep or otherwise difficult terrain, via the final testing.
- **Connectivity**: Firefighting operations comprise many moving pieces, making communications essential to success. Experience has shown that at times, connectivity is lost to the extent of paralyzing operations. Thus, teams must exhibit 2 types of connectivity in their systems for back-up.

Round 1: QUALIFYING TECHNICAL SUBMISSION

Qualifying Technical Submissions will be required of all teams that wish to advance in the competition. Submissions will provide detailed information by which the capabilities and potential for success of teams will be evaluated, and will include details on team composition, technology design concepts and objectives, feasibility and safety assessments, and a work plan to implement the proposed technology, among other information.

An independent Judging Panel will be assembled to evaluate team submissions and select Qualified Teams. Detailed instructions and an outline of information required in the submission will be provided to Registered Teams in June 2023. Following Judging, XPRIZE will notify all teams of their status.

Round 2: EXTREME CONDITIONS TESTING

In this round, teams will demonstrate components of their integrated solution in indoor controlled-environment extreme conditions, focusing on the safety of suppression materials and solutions' ability to withstand and operate in high winds over challenging terrain.

Technical Validation Submission

Prior to undergoing Extreme Conditions Testing, all Teams will be required to demonstrate they have made sufficient progress on their proposed technology to advance to testing. A **Technical Validation Submission** will be required of all teams and will include written entries and video materials where applicable. Complete instructions and requirements will be shared with Qualified Teams before the deadline, allowing sufficient preparation time for Semifinals Testing.

Submissions will be evaluated by the Judging Panel, accounting for the criteria outlined above, as well as technical maturity, feasibility and safety, and the ability of the Team to meet the Competition timeline.

Following Judging, XPRIZE will notify all teams of their status. Teams that pass the Technical Validation will advance to the Extreme Conditions Testing Round.

Extreme Conditions Testing

Teams will demonstrate the functionality of the relevant parts of the integrated solution. Specifically, teams will be tested for capabilities that can be affected by high-wind and steep

terrain, such as response and suppression delivery, as well as the safety of suppression material (retardant). The test will take place in a supervised facility using a lab and a wind simulator. Exact testing requirements, along with details and regional locations for the Semifinal Testing will be released in the Rules & Regulations before testing.

Following Extreme Conditions Testing, the Judging Panel will select teams to advance to Semifinals Testing and XPRIZE will notify all teams of their status. Teams that advance to this round will share a milestone prize purse of USD $750,000.

Round 3: SEMIFINALS TESTING

In this round, teams will demonstrate their integrated solutions' capabilities in an outdoor environment, focusing on evaluating detection, response, and automation capabilities. The test will be performed outdoors using false positives and a contained live fire.

Complete testing criteria and procedures will be released in the forthcoming Competition Rules & Regulations, and the official testing location(s) (Competition Area) for Semifinals Testing will be disclosed to teams by XPRIZE at a date prior to testing.

Following Judging, XPRIZE will notify all teams of their status. Teams that advance to this round will share a milestone prize purse of USD $750,000.

Round 4: FINALS TESTING

Prior to participating in Final Testing, teams will be required to submit materials to verify they are prepared to proceed to the final round of the competition. The Finalist Verification will include written entries, video materials where applicable, and a business plan requirement for teams to demonstrate the scalability and implementation of their solution. This submission will not be judged, but technical readiness, safety, scalability, and other pre-testing measures will be considered.

In the Final Round, each team will have 10 minutes to rapidly, precisely, and accurately **fully suppress** a **high-risk fire** at a designated 1,000km^2 area.

Teams will deploy their entries from a single location (**Base Station**) close to the designated Competition Area.

Complete testing criteria and procedures will be released in the forthcoming Competition Rules & Regulations, and the official testing location(s) (**Competition Area**) for Finals Testing will be disclosed to teams by XPRIZE at a date prior to testing, allowing sufficient time for teams to arrange travel.

3.6 WINNERS ANNOUNCEMENTS

Following Finals Testing in each track, the Judging Panel will convene to review and discuss the results and determine the winners of the Grand Prize and the Bonus Prize. The winning team(s) will be announced in a Final Award Ceremony.

3.7 POST-PRIZE IMPACT

The awarding of this XPRIZE marks the recognition of an audacious breakthrough with the potential to put humanity on a course to realize the vision where humanity and fire safely and sustainably co-exist. To realize this potential, XPRIZE will work with partners to address some of the most pressing innovation barriers - from regulatory hurdles, through access to investment, to deployment opportunities. Scaling impact activities will be offered to competing teams throughout the competition, while Finalists teams will receive additional support following the awarding of the XPRIZE Wildfire.

By registering to compete in an XPRIZE competition, teams will automatically be enrolled into the XPRIZE alumni network. This alumni network will allow XPRIZE to communicate with and support competitors well after a prize is completed. The objectives of the alumni network are to monitor post-prize impact; to support and scale team solutions; to create opportunities for networking among alumni and with XPRIZE's partnership ecosystem; to provide continuing education for competitors; to invite and engage alumni in various conferences and events. At any point in time, where a competitor no longer wishes to be an alumnus of XPRIZE, they may opt out of the alumni network.

4. COMPETITION ECOSYSTEM

4.1 COMPETING TEAMS

A. **GOOD STANDING.** Teams must register their intent to compete on the XPRIZE Prize Operations Portal (POP), sign the Competitor Agreement, and pay the registration fee ahead of the deadline in order to be eligible for an award. Each team must specify a legal entity (ie individual or corporation). At milestones where prize money is awarded, XPRIZE will pay the award to the specified legal entity.

B. **FUNDRAISING.** All costs of competing in XPRIZE Wildfire are the responsibility of the competing team.

C. **SAFE AND ETHICAL BEHAVIOR.** Teams are responsible for maintaining the health and safety of their teams and the environment over the course of their participation in the prize. Teams must comply with all laws and regulations which apply to their participation in the prize. XPRIZE reserves the right to expel teams who do not uphold reasonable standards of safety and ethics.

4.2 ADVISORY BOARD

A. **SELECTION OF ADVISORS.** XPRIZE will appoint a panel of topical experts and big-picture thought leaders to serve as the "**Advisory Board**" (AB) for the Competition. The AB will remain in place throughout the Competition to advise XPRIZE regarding the scientific and other elements of the Competition.

B. **INDEPENDENT ADVISORY BOARD.** The AB will be independent of XPRIZE and all teams and team members. No Advisor, nor any member of the Advisor's immediate family, shall participate, nor have any financial or other material interest, in XPRIZE, the Sponsor(s), and/or any team or team member. All members of the AB shall promptly disclose to XPRIZE any such current, former, or expected future conflict of interest with XPRIZE, the Sponsor, or any team or team member.

C. **ROLE OF ADVISORY BOARD.** The duties and responsibilities of the AB may include, but not be limited to: (i) assisting with the establishment of qualifications for prospective Judges; (ii) recommending members of the Judging Panel; (iii) assisting with development of testing protocols and judging criteria; (iv) and providing input toward the development of these Competition Guidelines.

4.3 JUDGING PANEL

A. **SELECTION OF JUDGES.** The "Judging Panel" (as defined in the Competitor Agreement) will comprise highly qualified and impartial Judges with subject matter and technical expertise. XPRIZE will propose Judging Panel candidates to the AB for its review and consideration. The AB will recommend the candidates it believes are best suited to serve on the Judging Panel. XPRIZE will secure the judging panel based on the AB recommendations.

B. **INDEPENDENT JUDGING PANEL.** The Judging Panel will be independent of XPRIZE, the Title Sponsor, any other Sponsors, and all teams and team members. No Judge, nor any member of Judge's immediate family, shall participate, nor have any financial or other material interest, in XPRIZE, the Sponsor(s), and/or any team or team member. All members of the Judging Panel shall promptly disclose to XPRIZE any such current, former, or expected future conflict of interest with XPRIZE, the Sponsor, and/or any team

or team member.

C. **ROLE OF JUDGING PANEL.** The duties and responsibilities of the Judging Panel will include, but not be limited to: (i) evaluating teams' compliance with the Competitor Agreement as they relate to prize operations, these Competition Guidelines, and the Rules & Regulations for the purposes of the Competition; and (ii) the awarding of points and selection of teams that will proceed to each subsequent round of the competition.

D. **GROUNDS FOR JUDGING PANEL DECISIONS.** Official decisions made by the Judging Panel will be approved by a majority of the Judges that vote on each such decision after careful consideration of the testing protocols, procedures, guidelines, rules, regulations, criteria, results, and scores set forth in the Competitor Agreement, these Competition Guidelines, Rules and Regulations, and all other applicable Exhibits to the Competitor Agreement. If any vote of the Judges results in a tie, then the Judging Panel shall determine, in its sole and absolute discretion, the mechanism to settle the tie. Similarly, if one or more teams are tied at any stage during the competition, the Judging Panel shall have the sole and absolute discretion to settle the tie.

E. **DECISIONS OF JUDGING PANEL ARE FINAL.** The Judging Panel shall have sole and absolute discretion: (i) to allocate duties among the Judges; (ii) to determine the degree of accuracy and error rate that is acceptable to the Judging Panel for all competition calculations, measurements, and results, where not specified in the Rules & Regulations; (iii) to determine the methodology used by the Judging Panel to render its decisions; (iv) to declare the winners of the competition; and (v) to award the prize purses and other awards. Decisions of the Judging Panel shall be binding on XPRIZE, teams, and each team member. XPRIZE and teams agree not to dispute any decision or ruling of the Judging Panel, including decisions regarding the degree of accuracy or error rate of any competition calculations, measurements, and results. Teams shall have no right to observe other teams' testing or evaluation, or to be informed of other teams' calculations, measurements, and results, unless such information is made publicly available by XPRIZE.

4.4 COMPETITION PARTNERS

Achieving global impact requires global action. XPRIZE strives to cultivate networks of partners to support the competition from design conception through the awarding of the prize and beyond. Partners may include individuals, government entities, businesses, non-profit organizations, coalitions, or other groups. Partners may provide industry and technology knowledge as well as in-kind or discounted services and products to directly support XPRIZE and teams throughout the competition. As applicable, XPRIZE will connect teams with partner-provided resources. Collaboration with competition partners is encouraged, but optional.

5. INTELLECTUAL PROPERTY

As of the date of submission, each Team must own, or hold appropriate license rights to, all technologies, methods, resources, and Intellectual Property included in its submission.

Teams will retain ownership of their Intellectual Property on any technology or data integration techniques and processes they bring to the competition, and which they develop as part of their competition entry. All details relating to team technology, innovations, or methods submitted to XPRIZE at the submission deadlines will remain strictly confidential unless clearly and specifically noted. Please refer to the Competitor Agreement for more details.

XPRIZE will adhere to national or international regulations regarding ownership of the data and insights produced as part of the competition. If none such regulations pertain to the data collected during the course of the competition, XPRIZE will retain ownership of such data and insights. These data and insights will only be released following the conclusion of the competition to interested stakeholders who have demonstrated a commitment to managing wildland fires, and who will be incentivized to sustain their commitment. Please see the Competitor Agreement for additional details on Intellectual Property.

APPENDIX

GLOSSARY

Accurate (*Accuracy, Accurately*)
The correctness (closeness to true value) and quality of the wildfire observation and intelligence (includes fire behavior characterization and false positives).

Advisory Board
A select group of prominent advisors who contribute their wisdom, knowledge and guidance to various aspects of the prize

Alumni Network
A community of former and current XPRIZE competitors and teams through which XPRIZE and such teams can continue to communicate and collaborate with one another. The objectives of the alumni network are to monitor post-prize impact; to support and scale team solutions; to create opportunities for networking among alumni and with XPRIZE's partnership ecosystem; to provide continuing education for competitors; to invite and engage alumni in various conferences and events. Registered teams are automatically enrolled but may opt out at any time.

Autonomous Wildfire Response
One of two competition tracks in the XPRIZE Wildfire, focused on the rapid and intelligent detection, response, and full suppression of high-risk fires.

Base Station
A camp that teams will use to manage their operations and launch their Solution into the Competition Area during testing

Competition Area
The location selected and/or approved by XPRIZE to conduct testing.

Competitor Agreement
A legal and binding document that details the responsibilities of competitors for the prize.

Core Problems
Challenges that currently inhibit fire management practices that innovations in technology could help solve

Decoy fires
Safely contained fires and other false positives (e.g., solar panels, water vapor).

Discretionary Late Registration
A limited opportunity to enable select teams to join the competition after the standard registration deadline. Interested teams should contact XPRIZE for more details about entering at wildfire@xprize.org.

Environmentally Challenging
In this competition the definition is inclusive of vegetation, terrain, and weather conditions. Specifically, **fuel** type (mixed fuel), terrain (steep, ≥45% slopes) and (near) **Red Flag Weather**.

Extreme Wildfire Event (EWE)
The concept of EWEs has emerged in recent years to describe the growing phenomenon of devastating wildfires, which are often described as "fast-moving," "high-intensity," or by their size (of area burned). EWE comes to describe an extreme fire behavior, demonstrating characteristics that move between "virtually impossible" to "impossible" to control and suppress.

False Positives
items and environmental features that can be mistaken for fires in detection. False positives are largely associated with hot spots - reflective and hot surfaces, such as water bodies and solar panels, and include other environmental features such as water vapor, which can be mistaken for smoke.

Finals Testing
The last set of testing events for the prize that will determine the Grand Prize winning teams.

Finalist Verification
This is a mandatory update to ensure teams are prepared to proceed to Finals Testing. This will most likely consist of written and filmed components.

Fuel
Plant material that acts as fuel for wildfires, including grass, shrubs, trees, dead leaves, and fallen pine needles.

Full suppression
Extinguish the fire ('fire out') and any spot fires.

Ground Station(s)
Emergency and firefighting services control and dispatch centers, where data, specifically from satellites in this instance, is received for confirmation.

High-Risk Fire
A fire that began moving or reached 2 meters in diameter.

Judging Panel
The subject matter and technical experts who serve as an impartial and independent evaluation team for all aspects of this prize. Judges score the team submissions and make the final award determinations in both the Semifinals and the Finals Competitions.

Public Comment Period
Feedback about the Competition Guidelines may be submitted by any readers, including prospective competitors from April 21 - May 17, 2023. XPRIZE will review the comments and take any potential revisions to the guidelines into consideration.

Precise (*Precision, Precisely*)
(Location) proximity to the target fire.

Prize Operations Platform (POP)
The standard internal XPRIZE portal for teams to complete required activities in this Competition.

Prize Purse
This refers to money offered, won, or received as a prize. It also refers to the overall amount of funds allocated to all prizes in this competition.

Qualifying Technical Submission
This submission consists of a series of questions to be answered that outline the expertise, capabilities and plans for the functional technology that each team will create. It will also require an Executive Summary of up to two pages of text, and any supporting images, diagrams, or charts.

Red Flag Weather
Weather conditions that fuel extreme wildfire events. These conditions include low fuel moisture and relative humidity, sustained high winds around 30 km/h or gusts greater than 56 km/h, unstable atmosphere, and high temperatures.

Rules & Regulations
A document detailing the testing protocols, specific rules, dates/times, and other details that will govern the competition and will be binding on teams.

Semifinals Testing
The set of testing events for the prize that will help determine which teams progress to Finals Testing.

Space-Based Wildfire Detection & Intelligence

One of two competition tracks in the XPRIZE Wildfire, focused on advancements in accuracy and precision of Earth Observing capabilities for global wildfire detection.

Team Definitions

- **Interested Team**: A team or individual that is interested in participating in the competition and has created a profile in the XPRIZE POP system.
- **Registration in Progress**: A team that has completed registration but has not yet paid the fee and signed the Competitor Agreement.
- **Registered Team:** A team that has paid the required registration fee, signed the Competitor Agreement, and is eligible to submit a Qualifying Submission for the Judging Panel's review.
- **Qualified Team:** A team that has been selected by the Judging Panel from the pool of Registered Teams based on the strength of their Qualifying Submission.
- **Semifinalist Team:** A team that has successfully completed the necessary technical submission and is approved by the Judging Panel to advance to in the competition.
- **Finalist Team:** A team that has successfully completed Semifinals Testing and is approved by the Judging Panel to attend Finals Testing.

Technical Validation Submission

The process by which Qualified Teams demonstrate they are prepared to proceed to Extreme Conditions Testing. This submission will consist of written and filmed components which the Judging Panel will review to verify each team's ability to participate in testing.

Wildland-Urban Interface (WUI)

The Wildland-Urban Interface (WUI) is where a community meets or mixes with the wildland; it is where the risk to life and assets is most heightened.