Final Outcomes Report

Submitted By: Flash Forest

EMISSIONS REDUCTION ALBERTA

1.0 Title Page

• ERA Project ID

• Title of Project

Flash Forest Commercial Pilots and Demonstrations of Rapid Drone Reforestation Technology for 2021 to 2023

• Name and information of Recipient contact

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• Name of ERA Project Advisor

Dallas Johnson

• Start date of the Project

March 5, 2021

• Completion date of the Project

March 30, 2024

• Technology Readiness Level (TRL) at Project initiation

TRL 4

• TRL at Project completion

TRL 7 - 8

• Total actual ERA funds received (as outlined in the Contribution Agreement, including holdback)

$1,816,150

• Total actual Project costs, including a breakdown of total eligible and ineligible costs.

$3,709,300

• FOR submission date

May 31, 2024

Short Project description with high-level results for the ERA website

Flash Forest™ (FF) is Canada's first and largest automated reforestation company globally. FF has worked with Emissions Reduction Alberta (ERA) through the Food, Farming and Forestry Challenge (Agreement Number E0160996), accelerating novel technologies for RPAS hardware, aerial mapping software, automation, and biological seed pod technology to reforest areas rapidly for Alberta.

Since our partnership in 2020, we have successfully (1) planted at least 2,800,000 seedpods in Alberta with over four different species (Jack Pine, Lodgepole Pine, Black Spruce, White Spruce) across 8+ different sites, (2) jointly received the World Government Summit Award in 2022 with Emissions Reduction Alberta awarded by Sheikh Maktoum in UAE, and (3) opened our Albertan office in Edmonton for Alberta amongst other milestones.

The ERA project is focused on Flash Forest's technological R&D within the province of Alberta. In 2021, technology development focused on our proprietary biological seed pods, testing at least two types of drone deployment hardware, and the development of our operator and macrosite machine learning software technology for the unique northern boreal and other forest types in Alberta. The partners Flash Forest worked with along the way include Northland Forest Products Limited (NFPL), Fort McKay Metis and other partners through the Alberta Forest Product Association (AFPA).

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5.0 Executive Summary

Our overarching goal was to develop and field test a scalable tree planting technology solution in Alberta, which is burdened by region-specific issues that limit expansion and even maintenance of the reforestation industry in the province. We set out in 2021 to reforest wildfires and cut blocks with drones. Over the three years, we have had countless learnings, failing forwards, and successes across our projects, strengthening and evolving Flash Forest. On a high level, three things needed to be considered:

- **Climate**. Northern Alberta is cold and has one of Canada's shortest planting seasons.
- **Biome**. Most tree planting occurs in Northern Alberta, Boreal Forest, with/ low annual moisture.
- **Site Access**. Many sites require helicopter access only, which significantly increases reforestation costs and carries additional risks.

Our Goal (2 parts over three years):

- Develop and test the efficacy of our technology as a silvicultural tool to support reforestation in Alberta; and,
- Create a provincial distribution facility for pods and a base for planting.

Six milestones with specific objectives are planned for 2021 to 2023. The milestones are time-based and split between Spring/Summer and Fall/Winter months (January to August for M1, M3, and M5 and September to December for M2, M4, and M6).

Particularly with the goals of this project, some observances are noted over the 3-year term:

- Develop and test the efficacy of our technology as a silvicultural tool to support reforestation in Alberta:
- Planting seasons for Spring/Summer and Fall/Winter (Planting in Spring/Summer yields higher results; continued research will be done to expand Fall/Winter planting operations to double productivity);
- Recipes for wet pods, dry pods, and seed treatments (Dry pods perform significantly better than wet pods and can be transported more efficiently);
- Application of embedding versus dropping using drones (Embedding seedpods yield better germination and survival versus dropping seedpods);
- Mulched stands, burnt stands, and cut blocks;
- Ecosystem preferences with precipitation and other factors considered.

Environmental Benefits (High-Level)

Flash Forest plants trees that naturally store carbon. Experts analyzed the novel method Flash Forest uses to plant trees to produce an environmental benefits report. Enviro-accès Inc. (Enviro-Access) offered its expertise in GHG emissions quantification and environmental technology assessment to develop an Environmental Benefits Report for the Flash Forest technology.

Enviro-Access has worked since 1993 to support innovation and improvement of sound environmental practices. Since 2005, their expertise has focused on the greenhouse gas (GHG) sector. The team is now one of the most experienced in Canada in the quantification of GHG emissions, the identification of mitigation measures, supporting projects and technologies to reduce GHG emissions, and the validation and verification of GHG projects and inventories. Enviro-Access's clients include municipalities, SMEs, large enterprises, institutions, and governments.

Enviro-Access is accredited as a verification and validation body under standard ISO 14065 by the Standards Council of Canada (accreditation number 1009-7/2).

The updated LCA conducted by Enviro-access (third-party) in 2023 shows FF methods reduce GHG emissions by at least 57.4 tCo2e per field unit (1 field unit equals approximately 10 hectares of land reforested) compared to the baseline using ISO 14064-2:2019.

Flash Forest also directly sequesters carbon through a nature-based approach, working with our partners in planting hundreds of millions of trees by 2028. Approximately 280,000 tCO2e over the entire life cycle of our trees was sequestered by Flash Forest for Emissions Reduction Alberta to date.

6.0 Project Description

Introduction

Flash Forest Inc. categorizes its intellectual property into Biological Seed Pod Technology, Drone Seed Pod Deployment Hardware, and Drone Planting Software. Each technology has significant progress but is at different stages, summarized below:

Figure 1: Seed Pod Embedded in Soil After Deployment.

Biological Seed Pod Technology

Seed Pods and Method for Manufacturing Seed Pods

Flash Forest has biological seed pod technology that contains a proprietary blend of seeds, essential nutrients, a healthy microbiome, carbon-rich growing medium, and water retention polymers specially developed for each planting operation in multiple biomes and tree species.

Seed Pod Designs

Flash Forest has several industrial designs for these seed pods. Our process for seed pod production uses a unique blend of plant growth propagators, mycorrhizae and charged media to accelerate germination and dormancy breaking in tree seeds. Our methodology differs from existing drone-reforestation methods in the chemical, climate and nutrient composition of our seed pods.

Hardware

Figure 2: Drone Deployer in Action.

Flash Forest deploys seed pods a **System and Method for Embedding Seed Pods from a Drone**, the "Pod Embedder" System attaches to a drone and embeds pods directly into the ground at a rate of at least 15 seed pods per second.

Software

Flash Forest uses sophisticated software to optimize each planting mission. The various softwares determine the **Optimal Macrosite prior to Planting Operations, Autopilot and Operator Software,** and **Post-Planting Dashboard for Reporting and Silviculture Purposes.**

Flash Forest worked with its partners, Northland Forest Products Ltd., Canfor, McKay Metis Group Ltd., and like-minded companies in the Alberta Forest Products Association, throughout 2021 - 2024, to use Flash Forest technology for Alberta, Canada, and globally as end-users.

Background of the Project

Our Product & Technological Development

Current deforestation rates worldwide are unsustainable (only about 15% of the world's original forests remain intact).

As Canada's first and largest drone reforestation company, technology is cutting-edge. Efficient and quality reforestation techniques are essential to tip the scales in this global ecological crisis. Flash Forest Inc. offers three completely unique processes and products to scale reforestation globally. All support received to-date is protected by non-disclosure agreements (ten partner organizations have signed thus far).

Flash Forest offers innovative processes and products for reforestation efforts:

Biological Seed Pod Technology: The automated process and composition for seed pod production is the first-of-its-kind, having patented a proprietary solution with the USPTO for accelerated germination and dormancy breaking in seeds across different tree species including Alberta-native White Pine and Black Pine species. Inputs include a proprietary blend of water retention polymers, and tree seeds from various species, resulting in sophisticated seed pods ideal for Albertan environments.

Each seed pod is uniform, portable, and tested for the specific biome and tree species.

Products: Dry seed pods are uniformly spherical and contain multiple tree seeds. The interior of the pod contains dry powder ingredients necessary for a growing medium, water-retention, root promotion and the exterior is a hard shell that prevents pod deformation when penetrating into the soil. The shell is biodegradable and plant friendly, allowing the outer shell to degrade once the pod is embedded into the soil.

Manufacturing Technology: Extensive research conducted in the automation of the process.

Drone Hardware: The design and production of Flash Forest's proprietary embedding device allows for aerial deployment of seed pods at an interval of six pods per second per drone.

In order to successfully plant in challenging conditions such as mangrove forests, forest beds, and dense clay-rich soils, Flash Forest's pod deployment system needs to be able to embed our seeds at high enough speeds. The system increases seed pod survival rates and allows drones to plant in conditions not typically achievable by manual tree planting. Additionally, it is important for the system to be triggered electronically, so as to minimize the amount of moving components and allow the onboard software to communicate with it directly.

Software: There are multiple software projects Flash Forest is pursuing revolving around Artificial Intelligence, GIS-mapping, Operator and Autopilot Software, and Macro-Site Identification Machine Learning SOftware.

Macro-site Selection Software: With Flash Forest's own proprietary mapping and telemetry technology, trees are planted uniformly and only where they can survive. Post-germination, this platform can be used to both monitor and nurture newly planted trees. Raw drone footage of the planting site is fed into an automated pipeline, resulting in a complete list of routes the drone must fly to plant all the necessary pods in the mission. Georeferenced files that contain an ordered list of planting locations--these are instructions fed into the drone. The path is designed to avoid obstacles and to only plant in suitable areas.

Wildfire and Post-fire Dashboard: After planting, Flash Forest aims to return to sites regularly to monitor tree survival. Drones mounted with multi-spectral imaging, along with visual sensors, allow proper tree health monitoring.

Project Objectives

2020 Overall Objective: Flash Forest focused on establishing strong partnerships for multi-year contracts with Alberta companies.

2021 Overall Objective: For 2021, the ERA project is focused on Flash Forest's technological R&D.

2022 Overall Objective: From the previous year's results, Flash Forest will adapt their technology and scale this project for the Spring and Winter 2022 seasons with larger and increased number of sites with a move.

2023 Overall Objective: By 2023, Flash Forest will have a solid product for commercialization.

Table 1: Business Environment and Project Drivers.

#	Business Environment/Project Drivers (Point of Interest)	Benefit / Difficulty
M5	**IMPORTANT**: Flash Forest completed its Series A	Flash Forest has completed an $11.4-million Series A funding round to support its plans to affordably, safely and sustainably plant one billion trees by 2028. The funding round was led by the $100-million Telus Pollinator Fund for Good and OurCrowd. The company's growth will focus on commercialization, and international business

		opportunities. Alberta will act as a hub for Western Canada and Pacific Northwest United States efforts. Wildfire has become a significant Canada-wide problem, and Alberta has been significantly impacted as highlighted in the graph below (Alberta Wildfire Dashboard). Efforts to mitigate this include investing in research towards deciduous fire-resistant species, AI software that create firebreaks, continued automated reforestation efforts in air and land, as well as the monitoring automation for our treeplanting efforts. Not only Alberta's forestry industry, but communities hugely affected by wildfire, especially remote, indigenous communities, will benefit from our technology. FF is already working with partners including Little Red River Cree Nation to reforest areas affected by the wildfires.
M5	Our latest pod recipe performs 330% better than bare seed in trials with low watering.	Our new greenhouse enables us to research new wildfire resistant deciduous species, which is a potential new ERA project for Wildfire Mitigation.
M5	We are the only company successfully able to embed pods	This approach drastically improves survival, establishment rates, and root establishment, giving longevity to our trees.
M5	Flash Forest Distribution Hub	Alberta is well-positioned as the Western Canada provincial hub for nearby provinces and states such as BC, Saskatchewan, and the Pacific Northwest.
M5	Flash Forest hires 2 World Class Registered Professional Foresters.	Strong leadership to lead Alberta and Western Canada division of Flash Forest.
M4	Flash Forest won the World Government	Global recognition for Canadian solution across government stage.

	Summit Award in the United Arab Emirates for Climate Change awarded by Sheikh Maktoum bin Mohammed bin Rashid Al Maktoum, Deputy Ruler of Dubai, Deputy Prime Minister and Minister of Finance, UAE.	Increased rapport between Flash Forest and Emissions Reduction Alberta, putting both on the world stage. https://www.prnewswire.com/ae/news-releases/as-part-of-the-world-government-summit-2022-the-uae-government-reveals-the-govtech-award-winners-824872080.html
M4	Flash Forest 2BT announcement https://www.canada.ca/en/natural-resources-canada/news/2022/10/tree-planting-drones-to-revitalize-reforestation-efforts-in-areas-affected-by-wildfires.html	Flash Forest recently announced the 2BT efforts at the University of Toronto Missisauga, Peter Fonseca, Member of Parliament for Mississauga East—Cooksville, on behalf of the Honourable Jonathan Wilkinson, Minister of Natural Resources, announced a contribution of over $1.3 million to Flash Forest, a company that uses drone technology for tree planting. A total of over one million trees are set to be planted by Flash Forest over the next two years.
M4	Flash Forest Documentary	Mini documentary series with CBC on Force of Nature series focusing on innovative clean technology hosted by Michele Romanow. Two others in line for education purposes.
M4	Co-founder Angelique Ahlström speaking on behalf of Flash Forest at COP27	Angelique Ahlstrom, CSO, participated in Tuesday's panel at COP27 in Egypt on Innovative Approaches to Accelerating Climate Adoption. Inspired by the exceptional leadership of Lisa (Elisabeth) DeMarco (Resilient LLP), Sam Ramadori (CEO, BrainBox AI), Peyvand Melati (CEO, QEA Tech), John McCalla-Leacy (KPMG) and Tyler Hamilton (MaRS Discovery District) in this important area. We discussed ways governments and enterprises can multilaterally adapt bold climate innovations to the realities of climate change, including the crucial role of risk-aversion and resiliency in that process.
M4	Flash Forest selected as one of 7 World Economic	In July 2022, UpLink launched its first challenge aimed at sourcing technology-led start-ups with

	Forum UplLink NatureTech Challenge winners!. https://www.weforum.org/videos/28460-naturetech-cohort-flash-forest-uplink-yt	solutions that enable and accelerate high-integrity Nature-based Solutions (NbS). This past December, the winners were announced. We couldn't be more grateful to be featured amongst these game-changing companies. Read the full article here: https://lnkd.in/gcxbcJuV
M4	Co-founder Cameron Jones speaking on behalf of Flash Forest at OurCrowd Global Investor Summit	The summit took place on February 15th in Jerusalem, where Cameron presented on three different occasions to large groups of investors, partners, and media. Read more: https://www.ourcrowd.com/startup-news/flash-forest-one-million-trees-in-two-months
M1 - M3		Federal Contract with Natural Resources Canada in 2 Billion Tree Campaign successful: https://www.canada.ca/en/natural-resources-canada/news/2022/10/tree-planting-drones-to-revitalize-reforestation-efforts-in-areas-affected-by-wildfires.html (Oct, 2022) Awarded by InnovateBC's Ignite Awards for BC projects: https://www.vantechjournal.com/p/innovate-bc-ignite-2022 (Oct, 2022) Finalizing Series A with major investors. (December, 2023) Flash Forest entering Growth Phase. (December, 2023) Met with the Minister of Environment and Climate Change, Steven Guilbeault to discuss environmental startups in Canada: https://www.linkedin.com/feed/update/urn:li:activity:6907491211352141824/ (February, 2022)

		Met with the Minister of Innovation, Science and Industry to discussing adopting new technologies that impact climate change and the world: https://www.linkedin.com/posts/flashforest_flashforest-canada-cleantech-activity-6861025853862674432-ZYuq?utm_source=linkedin_share&utm_medium=member_desktop_web (November, 2021) Continued global deforestation: https://www.globalforestwatch.org/map https://vimeo.com/548132999/3873a572ec (Ongoing) Awarded by SDTC for $1.7M for BC, ON and international pilots: https://www.sdtc.ca/en/government-of-canada-supporting-canadian-cleantech-companies-from-seed-to-scale-up/ (August, 2021) Featured in CNN, CBC, Now This, Washington Post. (August, 2021) Winner of the Index Project, giving us $100k of in-kind service for Boston Consulting: https://theindexproject.org/post/flash-forest-home (2021) Seed Acquisition and Post Wildfire Focus. (2021)

7.0 Project Work Scope

Experimental procedures/methodology

Hardware

For the hardware aspects of the project, our underlying technological uncertainty was devising a method where seed pods could be carried by a drone at optimal battery life and payload and embedded into the specific forest soil type without issues such as jamming, imprecise dropping, seed pod not embedding into the soil, or breaking upon impact.

How can we produce a drone-mounted mechanism that reliably withdraws a single pod and embeds that pod to the ground at a certain rate in pod/s? How can we devise electromechanical systems that move pods and require less energy than the drone's onboard battery supply?

Software

For Software, there are three major goals for Flash Forest software: (1) to maximize automation opportunities when the drones are in the process of planting trees, through the development of proprietary tools written in the QGIS environment; (2) to develop web-based dashboards that are privately hosted within the company that provides a centralized view of all of Flash Forest's past, present, and future operations. (3) to construct a cloud-based pipeline that stores large company data (orthomosaic photos, survival information, wildfire maps, etc.) and leverages machine learning algorithms available for object detection (also known as the macrosite project).

Provided a plantable area through that previous exercise, how do you generate flight paths that optimise accuracy and time for your flight operations? Similarly, how do you increase the capacity for one drone operator to operate multiple drones (drone clusters)?

How do you collect and organise data in a standard format comprehensible and accessible to the user? Can we develop an advanced programming interface that allows us to access relevant company information in real time for ourselves and our clients?

Biological

For Biological R&D, our RPAS mounted deployment mechanisms use "seed pods" which encapsulate seeds in a growing medium, protective barrier against predation, and water retention polymers that are easily manufacturable and durable enough to penetrate different soil types amongst various plant species. The pods require certain properties for optimal growth of various species, scalability and automation for mass production, and testing under simulated and natural environments of various forest types (temperate, tropical, boreal).

Technology development, installation and commissioning description

Electromechanic Systems Payload System

In 2021, our hardware engineering team prototyped the first ever electro-mechanical embedding system.

By June - July 2021, the engineering team began to conduct initial investigations where it was decided to redesign the embedder system.

2021 marks the first year where the engineering team started 3D printing in-house. A 3D printer was purchased, setup and calibrated to suit the needs and materials decided by the engineering team.

The final design was optimized (such as design of mounts) to improve assembly time while being suitable to integrate with different types of drones (interswappable).

2023 saw the work of Hylio Drones with similar experimental development as the above.

Software

For Software, **Objective 1: Work for Operator Software and Drone Swarming:** A suite consisting of three in-house plugins was built. The plugins were built to read output layers from our macrosite identification software with user inputs: planting density, payload and output "bagup" (cutblock) areas or areas within which the drone would operate (individual mission areas), and use those data points to generate flight paths based on user inputs.

Objective 2: Work for R Dashboard, Wildfire Mapping, and Cloud-based Repository: The data reporting dashboard commenced development in March 2022. This included building a local Shiny webpage utilizing existing germination data. On the main landing page, an interactive map shows all projects that were completed, and shows the overall summaries of the planting missions (e.g. site with the highest germination rate or species with the best survival rate). Once the user navigates away from the main landing page, other tabs provide more specific statistics such as germination success rates grouped by different characteristics (e.g., by species, timeseries, treatment, or location), with appropriate graphs. There's also a data download tab that allows users to download local copies of data based on the desired criteria.

Objective 3: Work for Macrosite Identification and Machine Learning for Obstacle Detection: The project began with literature review on semantic segmentation for remote sensing applications. Pretrained models were used to classify the sample orthomosaics generated by our mapping team. Specific Convolutional Neural Networks (CNNs) performed better than others tested for our classifier for trees and vegetation. Once the models were finalised, pipelines were built and tested for training, validation and inference.

Biological

Establish pod mixture suitable for mass production: This work involved continued research into and assessment of ingredients that meet and balance the requirements of

the biological, manufacturing, and deployment components of our pod technology. The biological requirements include those that maximize seed germination and early seedling establishment, such as predation deterrence and optimal water holding capacity. They also include those that maximize biodegradability and minimize harm to the environment. The manufacturing requirements include those that improve the ability of formation into desired pod shape (e.g. particle size) and maximize the speed and uniformity of automated production (e.g. mixture flowability). The deployment requirements include those that improve the portability and durability of pods, maximize pod hardness to improve embedding, and optimize pod size and mass so that they can be carried and lifted by drones in the required amounts. With these requirements in mind, between 2021 - 2023 we evaluated over 50+ iterations of pod mixture recipes to assess both addition of new ingredients as well as optimize ratios of existing ones. In addition to the pod mixture, during this time we also evaluated over 50+ iterations of pod coating recipes and 10 iterations of seed coating recipes, both of which required the testing and development of new production methods for their application. These evaluations began with tests to confirm suitability of these recipes for our automated production systems. These tests were followed by longer-term experiments that used seeds of our target planting species. Experiments at our headquarters warehouse assessed seed germination and experiments at the greenhouse assessed early seedling establishment. Based on the results of these tests, one final pod recipe was determined for large scale production and field testing.

Objective 2 - Test and establish a mechanical process for mass production.
After finalizing our processes last year and making the transition to tableted pods, our focus settled on scaling up production methods in order to hit aggressive production targets.

Objective 3 - Test mixtures in seedling germination trials to improve mixture based on results or biological study.
Results from the previous year's field trials in combination with extensive literature research prompted us to focus on environments that are most conducive to drone seeding. In FY2021/22, FF conducted field trials for existing and new seed pod compositions in a range of different environments. In August of 2021, FF assessed emergence rate for all seeding pilots we had established to date and FF repeated this assessment in October of the same year.

Commercial Evolution
Table 1 visualizes our business evolution over the last few years. It provides a high-level overview of the refinement in our approach to commercial planting.

8.0 Commercialization

Survival results. Canada suffers catastrophic wildfires annually, losing 2.5 million hectares on average, or about 3 to 4 billion trees. In 2021 alone, a peak of over 4 million hectares burned, or 4-6 billion trees, was recorded. Due to the nutrient density, exposed mineral soil and natural shade that results after a fire, Flash Forests field pilots have yielded best results in this site. Additionally, targeting wildfire allows Flash Forest to focus on permanent projects that will allow for maximum carbon sequestration and associated biodiversity projects.

9.0 Lessons Learned

We set out in 2019 to reforest wildfires and cut blocks with drones. Over three years we have had countless learnings, failures and successes across our projects. The attached summary details major learnings relative to our scope and methodology, and details the pivots we've made to ensure continuous improvement.

Flash Forest has learned several important lessons throughout its journey in ecological restoration and technology development. These lessons encompass various aspects, including business strategies, government policy, regulation, commercialization efforts, and technology development.

Here are some key lessons learned:

Importance of Stakeholder Engagement: Engaging with diverse stakeholders including government agencies, environmental organizations, local communities, and industry partners is crucial for gaining support, navigating regulatory landscapes, and fostering collaboration. Building strong relationships and fostering open communication channels with stakeholders enhance trust, credibility, and effectiveness in achieving shared goals.

Navigating Regulatory Frameworks: Understanding and navigating complex regulatory frameworks, permitting processes, and environmental regulations is essential for technology development and commercialization in the ecological restoration sector. Proactively engaging with regulatory authorities, staying abreast of evolving policies, and ensuring compliance with legal requirements mitigate regulatory risks and facilitate market access.

Iterative Technology Development: Adopting an iterative approach to technology development allows for continuous improvement, adaptation to feedback, and refinement of solutions to meet evolving market needs. Embracing agile methodologies, rapid prototyping, and user-centered design principles enable Flash Forest to innovate effectively and address real-world challenges in ecological restoration.

Strategic Partnerships and Collaborations: Forming strategic partnerships and collaborations with research institutions, industry stakeholders, and ecosystem partners enhances access to resources, expertise, and market opportunities. Collaborative efforts enable knowledge exchange, technology transfer, and scalability, accelerating the pace of innovation and amplifying impact.

Commercialization Strategies: Developing robust commercialization strategies that align with market demand, customer preferences, and competitive dynamics is critical for achieving commercial success. Tailoring go-to-market approaches, pricing models, and distribution channels to target audiences optimize market penetration and revenue generation while minimizing risks.

Focus on Scalability and Sustainability: Prioritizing scalability and sustainability in technology design, production processes, and business operations ensures long-term viability and positive environmental impact. Incorporating principles of circular economy, resource efficiency, and carbon neutrality aligns with Flash Forest's mission of ecological restoration and contributes to global sustainability goals.

Resilience and Adaptability: Building resilience and adaptability into organizational culture and business strategies enables Flash Forest to navigate uncertainties, challenges, and disruptions effectively. Embracing a growth mindset, fostering innovation, and embracing change empower the company to thrive in dynamic environments and seize emerging opportunities.

10.0 Environmental Benefits

It should be noted that Flash Forest plants trees which naturally stores carbon. The novel method Flash Forest uses to plant trees was analyzed by experts recognized by various organizations including SDTC, to produce an environmental benefits report.

Enviro-Access has worked since 1993 to support innovation and improvement of sound environmental practices. Since 2005, their expertise has focused on the greenhouse gas (GHG) sector. The team is now one of the most experienced in Canada in the quantification of GHG emissions, the identification of mitigation measures, supporting projects and technologies to reduce GHG emissions, as well as validation and verification of GHG projects and inventories. Enviro-Access' clients include municipalities, SMEs, large enterprises, institutions and governments.

Enviro-Access is accredited as a verification and validation body under standard ISO 14065 by the Standards Council of Canada (accreditation number 1009-7/2). Please request from Flash Forest our Environmental Benefits.

10.1 Emissions Reduction Impact

Life Cycle-Analysis (LCA): An updated LCA conducted by Enviro-access (third-party) in 2023 shows FF methods reduce GHG emissions.
The project aims to use automated drones to plant seed pods. Its GHG emission reductions are mainly achieved by replacing tree seedlings with seed pods. Furthermore, planting seed

pods is faster than conventional methods, which means fewer employees are needed to travel to and stay near planting sites.

Further details are provided in the Environmental Benefits Report for Flash Forest's technology.

10.2 Other Environmental Impacts

The completion of Flash Forest's project and advancement of its technology offer significant immediate and potential future environmental benefits across various dimensions, including criteria air contaminants, land use, soil health, water consumption, and biodiversity conservation. Here's a discussion of these benefits:

11.0 Economic and Social Impacts

The Flash Forest project in collaboration with Emissions Reduction Alberta (ERA) has had substantial economic impacts on the province of Alberta.

- **Job Creation**
- **Investment Attraction**
- **Cost Savings and Efficiency**
- **Economic Diversification**
- **Environmental Impact**

The Flash Forest project, in collaboration with Emissions Reduction Alberta (ERA), has not only advanced reforestation efforts but has also played a pivotal role in enhancing innovation capacity within the province of Alberta. The project's impact on innovation is evident through various initiatives and collaborations:

- **Rethinking Reforestation, Training of Highly-Skilled Personnel:** The focus on technological research and development, including the testing of drone deployment hardware, machine learning software, and proprietary biological seed pods, necessitates a skilled workforce. Flash Forest's engagement in the project has led to the training and development of a number of highly skilled professionals proficient in cutting-edge technologies related to reforestation and environmental conservation.
- **Knowledge Development:** The collaboration between Flash Forest and ERA has fostered knowledge development in several critical areas, particularly in biological and silviculture fields. The project's emphasis on technological advancements, particularly in the unique northern boreal forests of Alberta, has resulted in the

creation of specialized knowledge related to seed pod technology, drone deployment, and machine learning applications in reforestation.

- **Research Organizations:** The Flash Forest project has contributed to the growth and capabilities of research organizations within Alberta including Alberta Innovates, FRIAA, and Agroforestry Woodlot Extension Society. Collaboration with research institutions, both public and private facilitates the exchange of ideas, resources, and expertise, fostering an environment conducive to innovation.
- **Startup Companies**: The innovative nature of the project, involving automated reforestation technologies has stimulated the formation of startup companies in Alberta and Canada that are similar to solving the wildfire crisis. Entrepreneurs and researchers inspired by the success of Flash Forest initiate their ventures, further contributing to the innovation ecosystem in the province.
- **Technology Transfer:** The advancements made in drone deployment, machine learning, and biological seed pod technology through the Flash Forest project leads to technology transfer initiatives. Knowledge and technologies developed during the project could be disseminated to other sectors, promoting cross-industry innovation and application of these technologies in different contexts.
- **Skill Retention and Attraction:** The project's involvement in training and developing highly skilled personnel contributes to skill retention within the province. Additionally, the innovative and impactful nature of the project attracts talent from other regions, further bolstering Alberta's reputation as a hub for technological and environmental innovation.

The Flash Forest project, in collaboration with Emissions Reduction Alberta (ERA), has had significant impacts on local communities, underserved populations, and Indigenous groups in the province of Alberta. The project's influence extends beyond environmental considerations, encompassing various socio-economic aspects:

Employment Opportunities: The project has generated employment opportunities within local communities. The manufacturing and production of biological seed pods, drone deployment activities, and other project-related tasks would have created jobs, contributing to economic development in these areas.

Community Engagement and Collaboration: Flash Forest's collaboration with local partners, including Indigenous groups such as NFPL, Fort McKay Metis, and others through the AFPA. The project involved collaboration with these communities, fostering mutual understanding, and potentially incorporating traditional knowledge into the reforestation efforts.

Economic Impact on Underserved Communities: The economic impact of the project, including job creation and business opportunities in Northern and underserved communities. By providing economic opportunities, the project contributes to alleviating socio-economic disparities that exists in these regions.

Environmental Stewardship: The reforestation efforts undertaken by Flash Forest have direct positive implications for local ecosystems. This is especially relevant for Indigenous groups, as many are closely tied to the land and rely on it for cultural and subsistence practices. The project's commitment to sustainable practices aligns with principles of environmental stewardship important to these communities.
Long-Term Environmental and Economic Benefits: The reforestation initiative not only addresses environmental concerns but also lays the groundwork for long-term economic benefits. Healthy ecosystems can support various industries, such as forestry and tourism, which can further contribute to the economic vitality of local communities.
Education and Awareness: The Flash Forest project has included educational components aimed at raising awareness about environmental issues, reforestation, and the importance of preserving natural habitats. Such initiatives can empower communities with knowledge and promote a sense of environmental stewardship.

While the primary focus is on reforestation and technological advancements, some aspects have implications for EDI:
Inclusive Employment Practices: The project's activities, including the production of biological seed pods, drone deployment, and other technological advancements, required a diverse range of skills. Flash Forest's commitment to equity and inclusion could be reflected in their employment practices, ensuring that opportunities are accessible to individuals from diverse backgrounds, including those traditionally underrepresented in certain industries.
Community Engagement with Diverse Stakeholders: Collaborations with Indigenous groups such as NFPL, Fort McKay Metis, and other partners through the AFPA highlight a commitment to engaging with diverse stakeholders. This inclusivity in partnerships demonstrates an awareness of the importance of involving different perspectives and experiences in environmental projects.
Cultural Competence and Respect: Working with Indigenous and Metis communities necessitates cultural competence and respect. The project has incorporated practices that respect and value the cultural diversity of the communities involved. This includes acknowledging traditional knowledge and ensuring that project activities are conducted in a culturally sensitive manner.
Accessibility and Inclusivity of Training Programs: If training programs were implemented as part of the project, considerations for accessibility and inclusivity would be essential. This could involve designing training modules that accommodate different learning styles and ensuring that they are accessible to individuals with diverse abilities.
Equitable Distribution of Project Benefits: The economic and environmental benefits generated by the Flash Forest project has implications for equity. Ensuring that these benefits are distributed equitably among various communities and stakeholders, rather

than concentrating in specific areas, is an important consideration for fostering inclusive outcomes.

Capacity Building in Underserved Communities: The project's impact on underserved communities contributes to capacity building by providing skills, resources, and opportunities. This, in turn, can enhance the inclusivity of these communities in environmental and technological sectors.

12.0 Overall Conclusions

Flash Forest now has an Albertan office for operations in Edmonton, remote staff based in Calgary, and a 3rd party Albertan partner (Arch Distribution) that does its mixing and blending in Alberta. The office is essential to the expansion of Flash Forest efforts in Western Canada; as the central hub for projects in BC, AB, SK and the Pacific Northwest of the United States, the office also acts as the starting and end point for most Canada-wide efforts.

Initial tons of CO2 equivalents projected were approximately 624 field units.

14.0 Next Steps

The process to which we plant trees using drones is a success story with ERA, however, a large part of our work is externally influenced by extreme weather –

Canada's 2023 wildfire season is the most destructive ever recorded. As of October 6, 2023, 6,551 fires had burned 184,961 square kilometres or 5% of the entire forest area of Canada this year alone. In addition to this: cold and unforgiving Fall/Winter conditions, droughts and heat domes, atmospheric rivers, and predation. Although these external forces hugely impact the project, Flash Forest sees this as an opportunity.

- Wildfire season is directing Flash Forest to put research into wildfire mitigation innovations using wildfire resistant deciduous trees, and AI/GIS fire break mapping technology.
- Fall/Winter conditions still serve as an opportunity for Flash Forest to plant, not just significantly in Spring, but also in Fall/Winter. Being able to plant in both Spring and Winter will significantly speed up the process of global reforestation and rewilding.
- Droughts and heat domes have pushed us to explore post-plant monitoring innovations.

Table 2: Future Milestones.

Milestone #	Timeline	Description
1	2025-2027	Expand Canada and USA post-wildfire market, afforestation market exploration
2	2026-2028	Scale pod production 20x
3	2026-2028	Technical and R&D: 4x seedling establishment rate increase, advanced macrosite and microsite selection with AI technologies
4	2026-2028	Strengthen leadership team and capabilities: senior leadership in business development, production, engineering, and operations. Expansion of government, admin, HR, financial, M&S, VP of Product
5	2027-2029	IPO

Flash Forest is targeting post-burn land across Canada, with the majority of Operations occurring in interior British Columbia, Alberta, Manitoba and Ontario. Please request a live demo of our proprietary fire mapping GIS program to see the full scale of our market opportunity.

Market can be divided amongst four key areas:

- **Corporate ESG (Market 1)**
- **Non-Governmental Organizations (Market 2)**
- **Government (Market 3)**:
- **Carbon Credits (Market 4)**

15.0 Communications Plan

During the project, Flash Forest engaged in various knowledge-sharing and communications activities to disseminate information, raise awareness, and foster collaboration among stakeholders. More information may be found through the **Technology and Commercialization Plan**.

Flash Forest maintains an informative website that serves as a central hub for sharing project updates, research findings, and technology advancements. The website features multimedia content such as articles, blog posts, videos, and infographics to engage visitors and provide in-depth information about Flash Forest's initiatives. Flash Forest also uses LinkedIn, Twitter, Facebook, Instagram, and YouTube, to amplify its messaging and reach diverse audiences. Through regular posts, live streams, and interactive content, Flash Forest

shares project updates, highlights key achievements, and engages with followers to foster dialogue and community engagement.

For major releases, Flash Forest issues press releases to announce significant milestones, research findings, partnerships, and technology breakthroughs. These press releases are distributed to media outlets, journalists, and industry publications to garner media coverage and increase visibility for Flash Forest's initiatives.

For our investors, and similar subscribers, Flash Forest sends out regular email newsletters and updates to subscribers, stakeholders, and partners to keep them informed about project developments, upcoming events, and opportunities for collaboration. These newsletters provide a direct channel for communication and engagement with interested parties.

Flash Forest participates in industry conferences such as GLOBE Series, workshops, and trade shows to showcase its technology, present research findings, and network with key stakeholders. These events provide opportunities for face-to-face interaction, collaboration, and thought leadership within the ecological restoration and sustainability community.

Reporting is provided to Flash Forest industry partners, research institutions, and community organizations.