

Post-Fire Drone Reforestation

CIFQ 2024





We're the world's largest forestry automation company, on a mission to plant 1 billion trees.

We leverage drone technology, GIS & forestry science, and automated manufacturing to accelerate large-scale reforestation.

Our experienced team has 5 years of results and 4 years planting in the boreal forest. We work with governments, corporations and NGOs to fulfill their tree planting targets.





High severity burns struggle to regenerate naturally. This land base can't be restored without innovation.



Limited planter availability



Limited nursery availability



Limited scalability



High costs



Flash Forest's proprietary solution addresses safety, labour availability, speed, and scalability issues in reforestation projects.



Dry pod
tech



Automated & modular
production



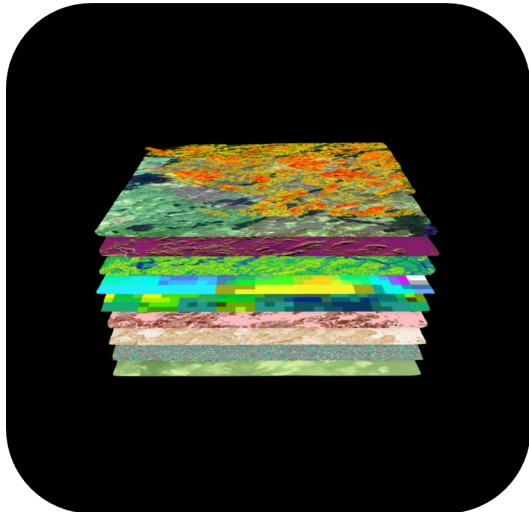
Rapid planting
tech



Lower
costs



Our advanced technology merges UAV, AI, GIS, and plant science to scale reforestation at the rate the climate crisis demands.



An aerial photograph of a forest with a large, irregularly shaped cleared area in the center. The cleared area is dark brown and black, indicating a recent fire or heavy logging. The surrounding forest is a mix of green and brown, suggesting a transition in vegetation. The image is framed with rounded corners.

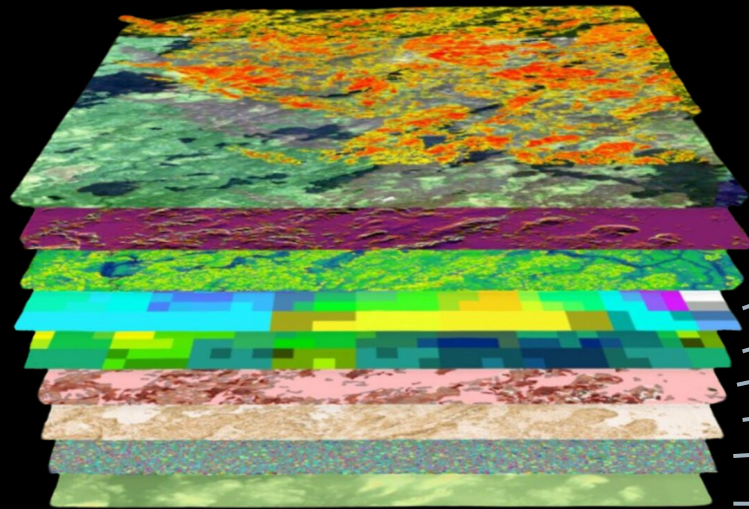
Precision Site Screening

Our GIS software leverages AI to conduct suitability analysis for potential planting sites.

It factors in solar radiation, summer precipitation, soil moisture, slope, elevation and other indexes based on satellite imagery, enabling us to select projects that are ideal for drone reforestation.



ML-driven climate data



- Burn severity
- Multispectral satellite imagery
- Insolation
- Soil Moisture
- Average temperature
- Precipitation
- Pre-burn forest attributes
- Slope
- Aspect
- Elevation



Machine Learning Macrosite Selection



We use machine learning models to select optimal site boundaries based on post-burn conditions and for pixel-level species suitability mapping.

Example criteria we scan for includes precipitation, solar exposure, slope degree, soil type which is combined with our survival data to create a suitability score.



We create highly specialized planting prescriptions with optimized species-mix based on analysis of microsites, climate predictions and tree survival data.

Our Process: Indigenous Engagement



Chief and Council Consultations

We consult with our Indigenous partners to incorporate intergenerational knowledge of the local environment into our reforestation plan.

Indigenous Traditional Knowledge

We incorporate local traditional knowledge and land uses to preserve native biodiversity and enhance cultural significance.

Employment Opportunities

We create jobs for the Indigenous communities we partner with. From cone collection to planting crew opportunities, these positions are vital to our team.



Custom Seedpods



Our self-sustaining seedpod technology gives trees a jump start to life. It is customizable to seed type and environment.

Our seedpods are comprised of:

- tree seed
- water retention additives
- beneficial fungi & bacteria
- minerals and nutrients
- healthy growth medium conditioner.

The seedpods' water retention capabilities enable them to grow 4x in size to hold extra moisture.





Automated Production



Our pod production and seeding equipment are scalable and modular, manufacturing over 500k seedpods per day.

Our production process omits the energy-intensive nursery phase required in traditional tree planting, and reduces waste and energy in transportation due to their compact size.

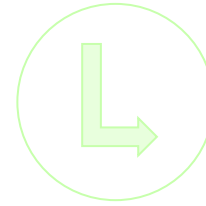


High-tech Field Unit Kits



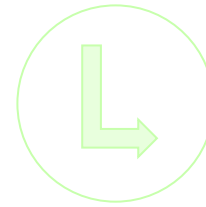
Our field unit kits are safer, faster, and more scalable than traditional planting.

Our custom drones are able to embed our pods beneath the soil surface, with limited to no site prep. One drone can plant up to 50,000 trees per day.



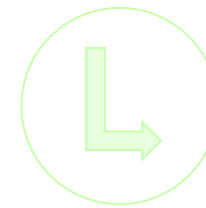
Seed Acquisition

Seed is supplied from client's seed, seed banks, and our collections. We use (on average) 1/10th of aerial seeding volumes



Testing and Stratification

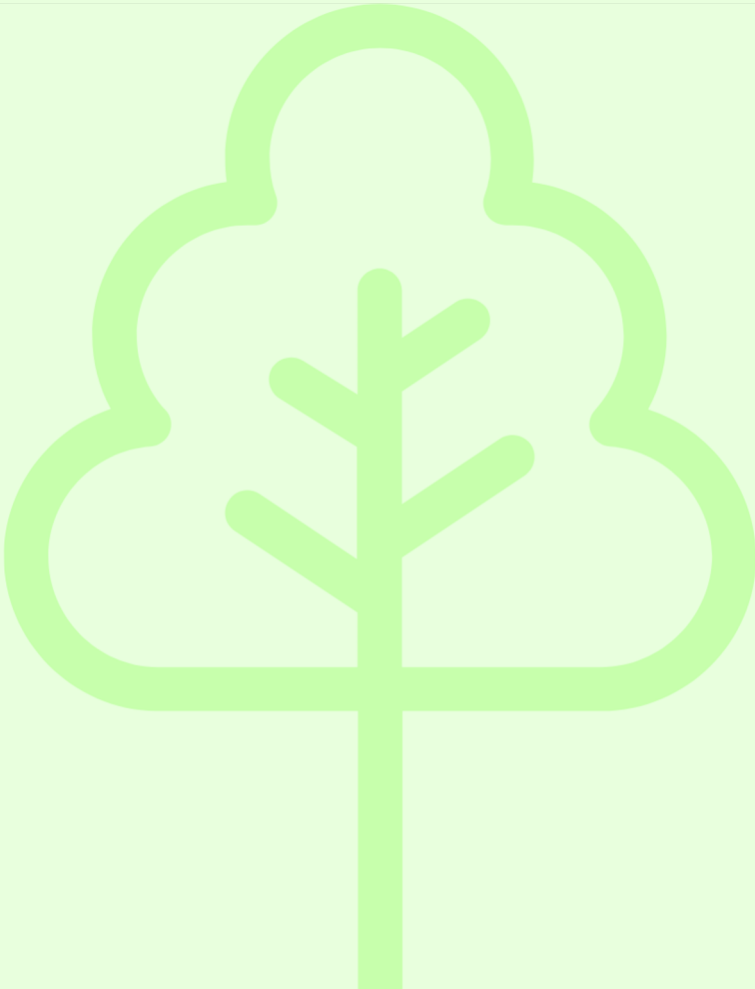
All seed is handled at our main facility for testing and stratification prior to seeding.



Seed Pod Manufacturing

Pods are manufactured based on site requirements.

2024 Projects: Canada

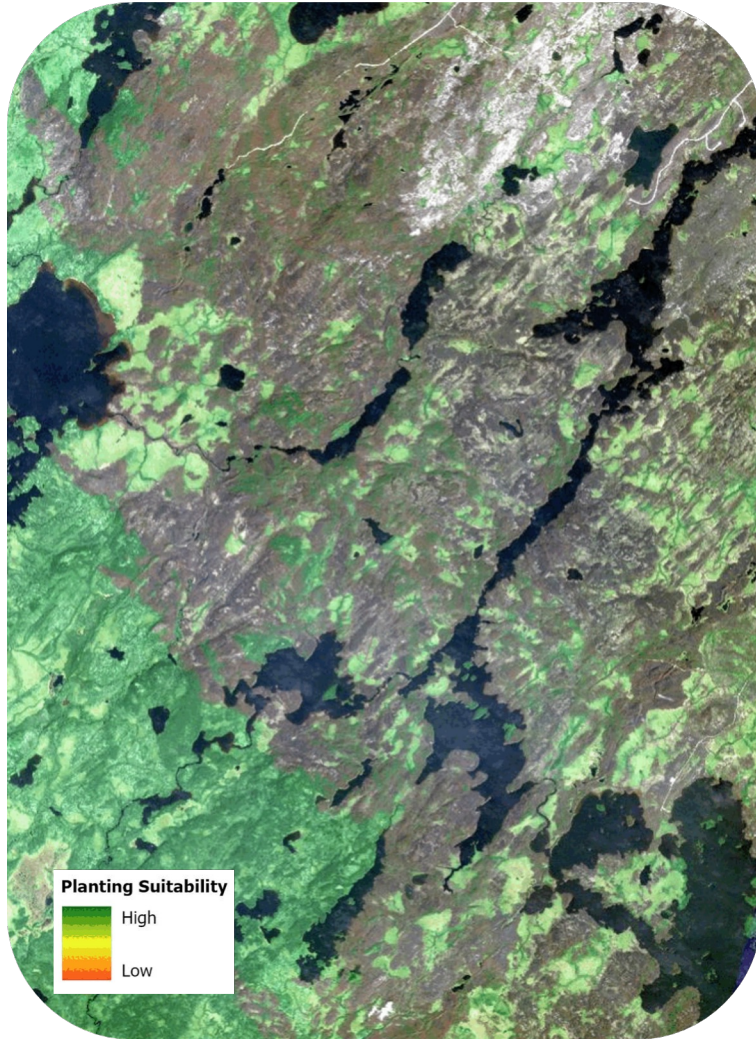




4.5M hectares of forest burned in 2023, with the vast majority of high severity burns not likely to be replanted, risking long-term ecosystem conversion.

There isn't sufficient seed reserves to replant the worst wildfires and a lot of surplus old seed stock is difficult to get released. Drone reforestation requires more seed than traditional nurseries. Additionally, increasing the availability of tree planters and capacity of nurseries is becoming a greater problem.

\$200 million is being allocated to plant 40 million trees (Quebec - MNRF)

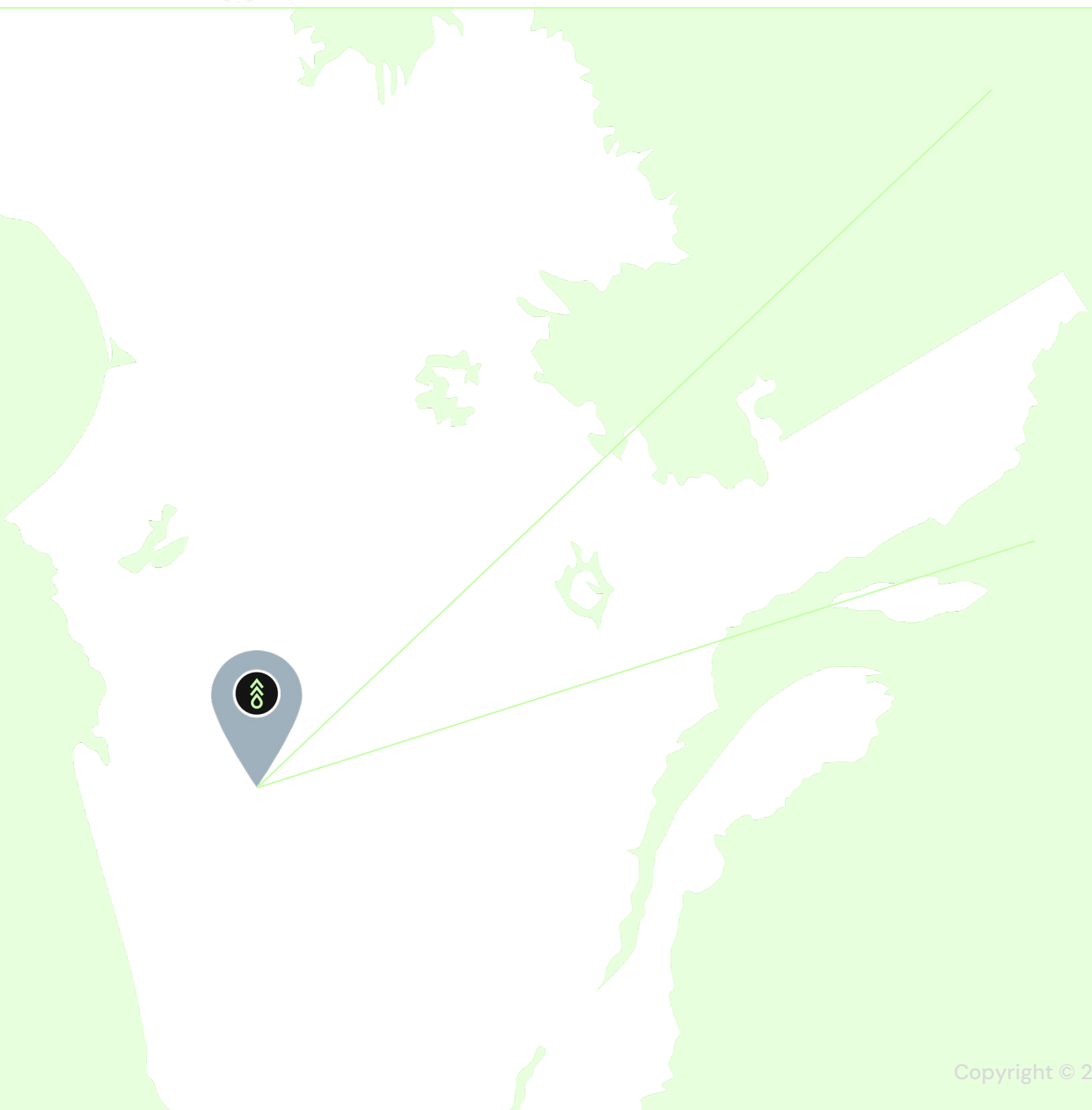


Flash Forest's technology is uniquely suited to address these problems.

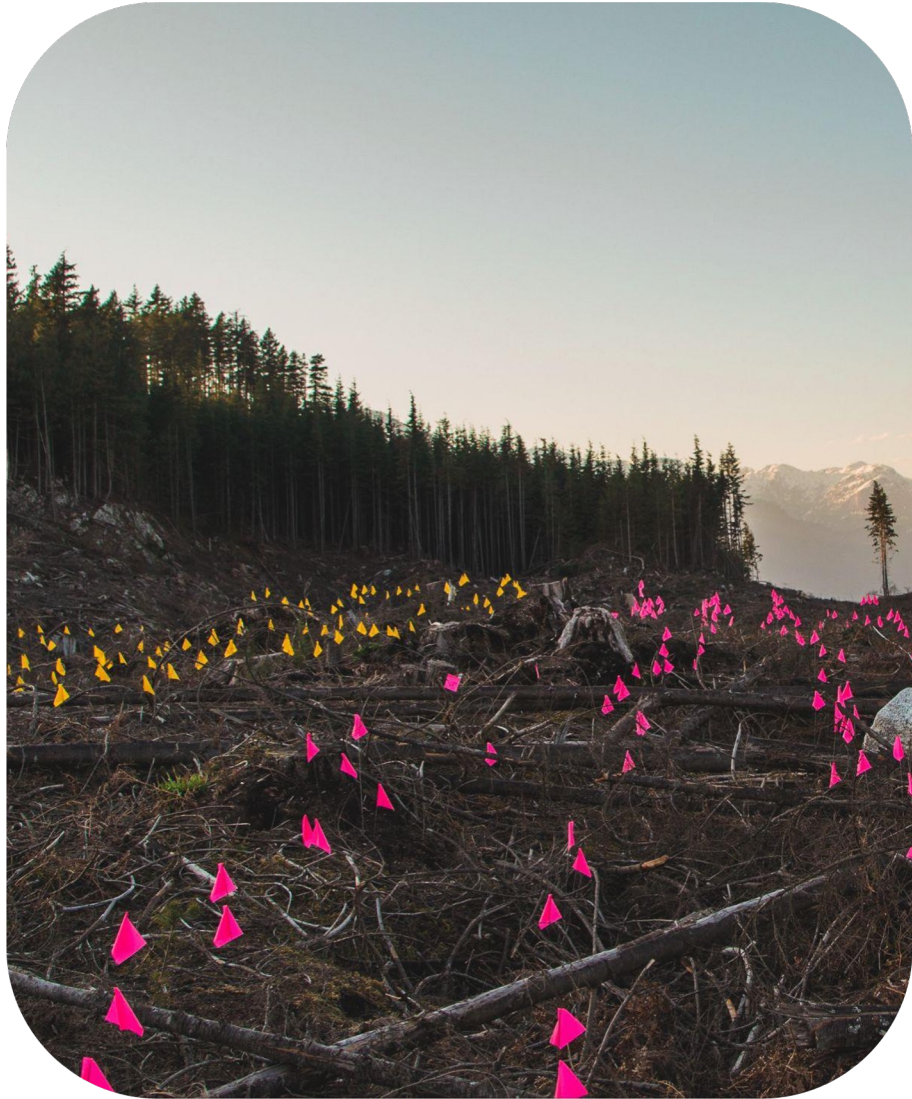
Our Machine Learning program can immediately identify the priority subset of burns that won't regenerate naturally. Our operations require no nurseries or tree planters, and we can use B-class seed and have Qc-partners available to collect and sort cones. Ground truthing helps ensure that no trees are planted where naturals exist.

We can plant for roughly 1/3rd current Qc budget on a per tree basis.

Assinica Project: Our Partners



Monitoring Protocol: Flag Transect



Method

Refers to data collected from hand planted/dropped and flagged pods. It is used to help us predict an average of total seedlings that could be expected. We do this through flagged transects (a flag is placed at each pod) which are distributed in rows of 20 across the site.



Assumptions

We predict seedling numbers by trying to average survival rates from both dropped pods and embedded pods. Embedded pods perform best but we reduce these numbers in our predictions because we assume not all pods embed.



Limitations

- a) flagged sites may be randomly assigned to bad microsites with low germination
- b) they don't account for naturals (but we account for this in pre-planting ground assessments)
- c) we have to make assumptions on embedding rates and density.
- d) we only had one transect per 5 hectares in some sites

Monitoring Protocol: Circular Plots



Method

Refers to pseudostratified random sampling plots that are placed across the site to count how many seedlings are actually there. A circle (area 55m^2) is plotted and seedlings are counted within the circle area.



Assumptions

We assume based on distribution we can approximate differences between naturals and planted pods.



Limitations

It is the primary standard in forestry but we didn't use it originally because we couldn't tie performance back to certain species or pod types.

Executive Summary: Summary of Flag Transect Data



2 Year Survival



Target SPH



Achieved SPH
(Conservative Estimate)

Trees Targeted 2022



Across 5 Sites



Seed to Tree Ratio



Aerial Seeding



Flash Forest

Trees Surviving 2023



Across 5 Sites
(Conservative Estimate)







Reforestation, reimagined.



ARR for Credit Generation at Scale

500
hectares

Trial
Size

1M
hectares

Total Project
Size

750K
trees

Trees Planted
by 4 FTEs

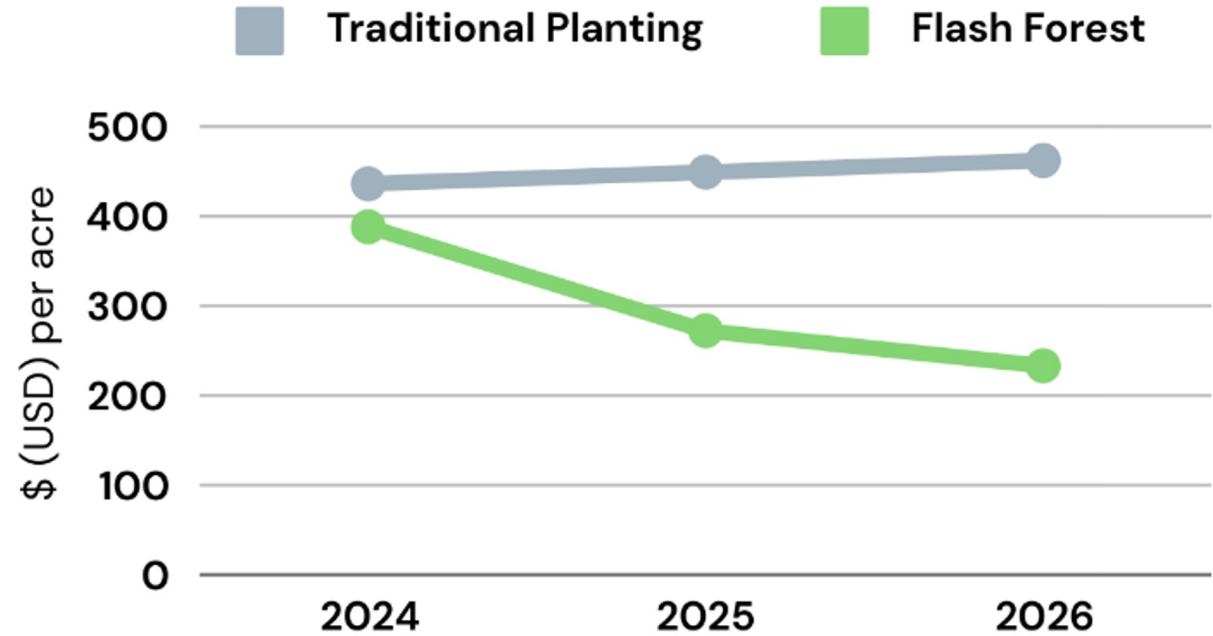
8
days

Project
Timeline

VCM
eligible

Grassland
Conversion

Asia Project – How our method has unlocked value



All-in cost of traditional planting versus Flash Forest.
Assumes 500 trees per acre.