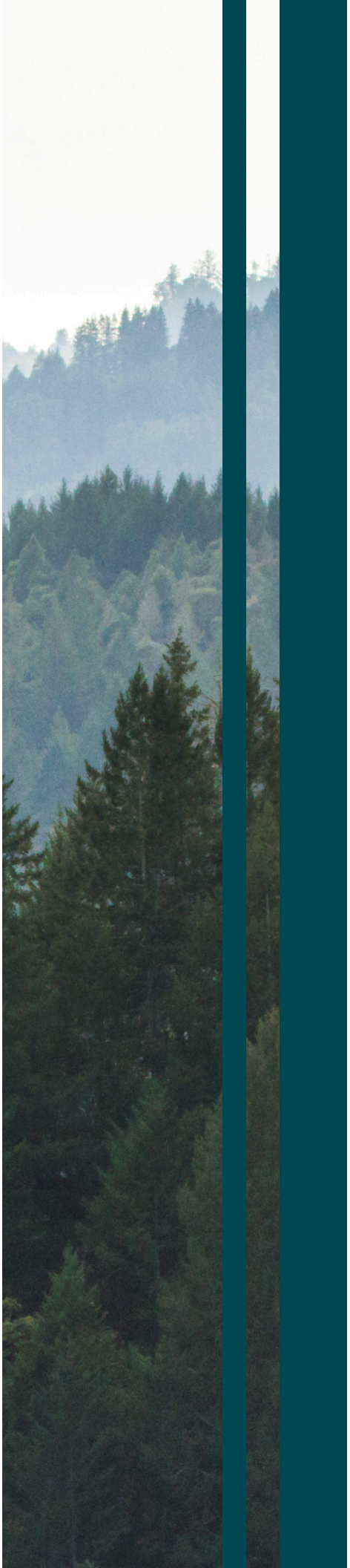


June 2026

Managing Risk at Market Scale:

A Summary Report of Preliminary Findings of the Permanence Trust Feasibility Study

A report developed by the American Forest Foundation, Kita, and Climate Resilient Solution

American Forest Foundation

Kita CRS

Executive Summary

Carbon markets face an infrastructure challenge: they lack a durable, system-level mechanism to ensure that carbon stored today remains out of the atmosphere over climate-relevant time horizons. Current approaches operate within individual projects and crediting periods but do not manage non-permanence risk across portfolios over time, limiting their effectiveness. The Permanence Trust concept is designed to solve this by actively managing long-term non-permanence risk through a centralized, financially resourced mechanism.

The American Forest Foundation, Kita, and Climate Resilient Solutions launched a feasibility study to assess bringing the Trust concept to the market. The study is supported by a robust advisory group of more than 50 organizations representing all stakeholder groups in the market, including crediting bodies, project developers, credit buyers, insurance companies, standards bodies, and more. The study focuses on the following:

- What **governance structure** best enables a trust to manage long-term carbon liabilities while maintaining credibility, transparency, and trust across market participants?
- What **financial structure** is required for a trust to remain solvent and meet long-term carbon replacement obligations under uncertain future conditions?
- How can a trust assess, diversify, and manage evolving **non-permanence risks** across projects, pathways, and time horizons to ensure contracted, durable climate outcomes?

Preliminary findings from the study indicate that the Trust concept is both feasible and credible across these three dimensions by creating a continuously managed system for durability assurance, shifting non-permanence risk away from project-level structures to an accountable entity. This report summarizes early findings from the study. A more detailed report covering modeling, pricing, and governance architecture in depth will be released later this year.

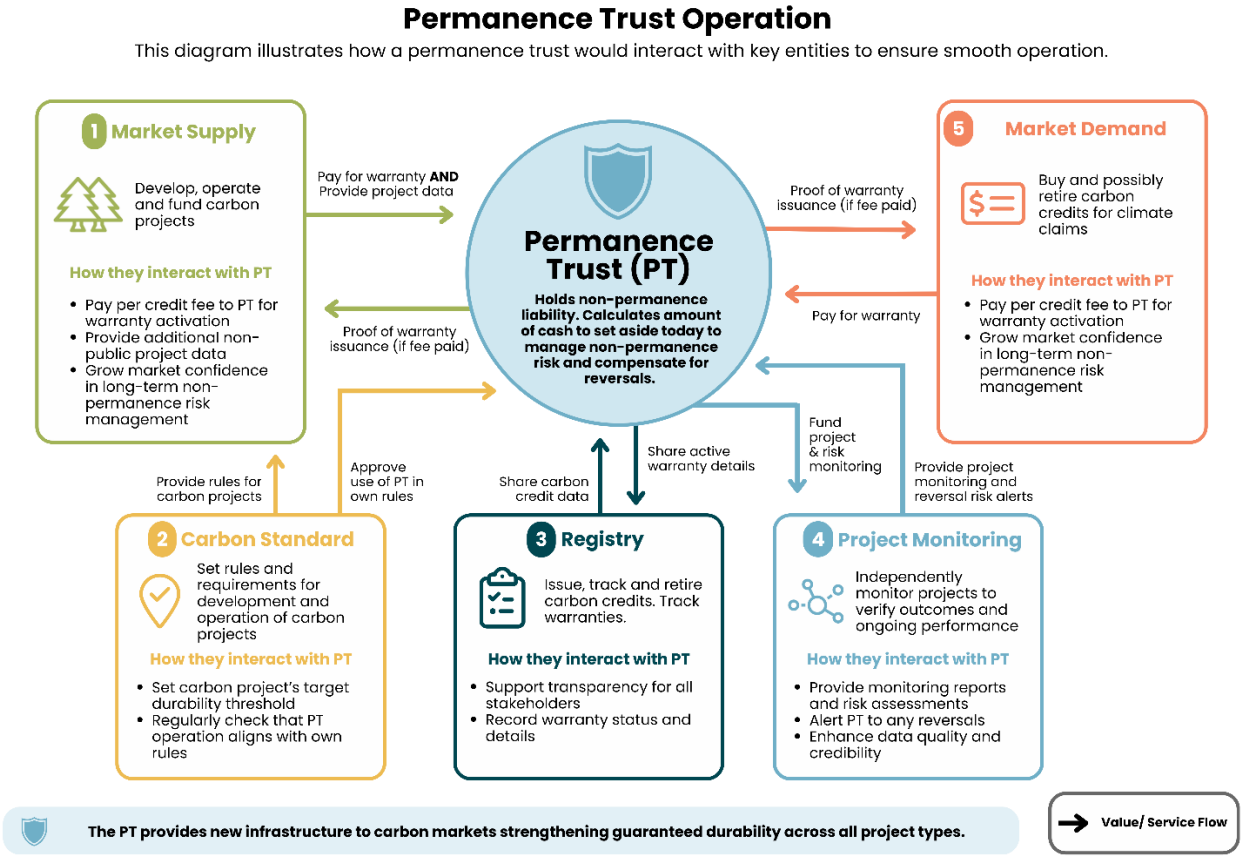
A note on terminology. *This report distinguishes between the Permanence Trust ("the Trust") as the concept developed through this feasibility study, and a permanence trust ("a trust") as a class of future implementations that could take a range of forms in different jurisdictions and ownership structures.*



How a Permanence Trust Works

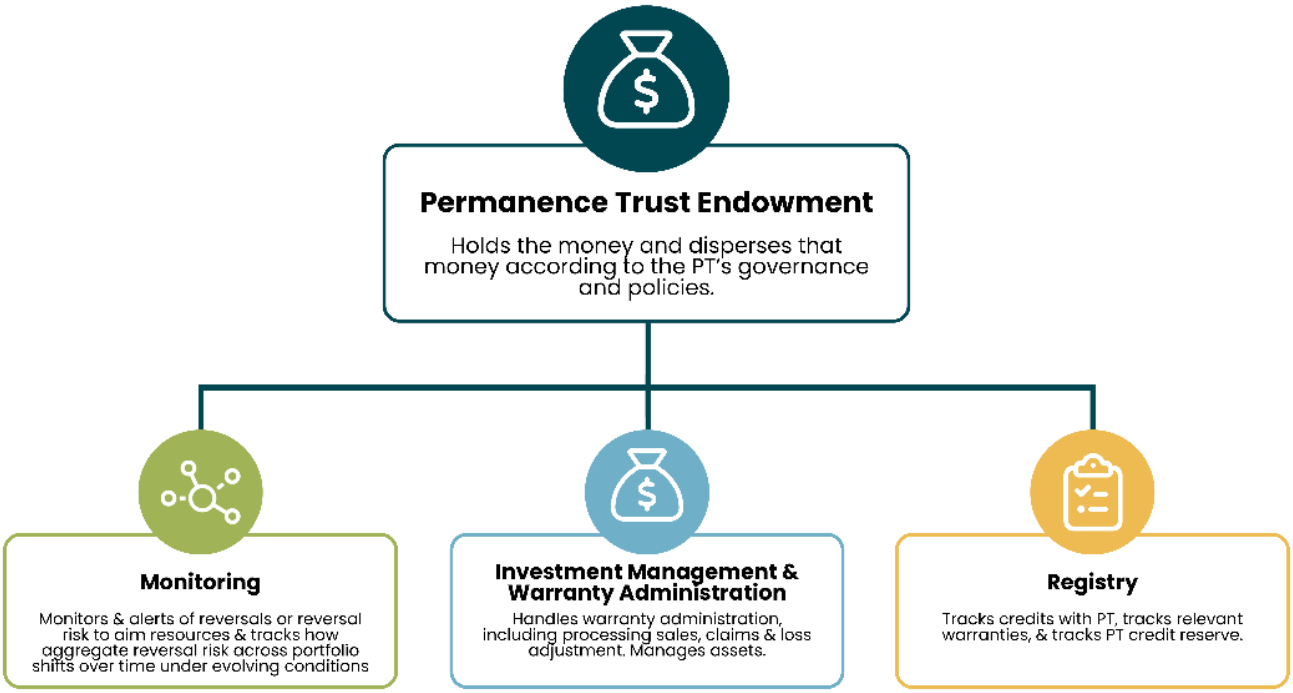
A permanence trust is **warranty-backed carbon durability**. For each carbon credit issued, a fee is assessed based on its modeled non-permanence risk and its effect on the risk profile of the overall portfolio. This fee is paid into a trust, which assumes liability for ensuring the durability of the stored carbon over a specified length of time. If a reversal occurs or is likely to occur, a trust uses its financial resources to either prevent the loss (through intervention) or replace the carbon (through new credits or mitigation actions).

Critically, a trust continues to actively manage this risk **beyond the crediting period**, addressing a major gap in current market structures. It monitors projects continuously, models evolving risks, and actively deploys capital to maintain climate outcomes. This creates a persistent, system-level assurance of durability rather than a time-limited project guarantee.



This model represents a practical implementation of **contracted durability**: rather than relying solely on the inherent characteristics of a carbon removal pathway, durability is ensured through enforceable financial, institutional, and contractual mechanisms.

Core functions of a trust include an **endowment** that pools and invests fees to fund future liabilities; **monitoring** that tracks project- and portfolio-level performance and emerging risks using remote sensing and field data; **warranty administration** that prices risk, issues warranties, and pays claims; and a **registry interface** that integrates with carbon credit systems to track obligations.



This approach bolsters the entire carbon market by providing near-term demand signals for credit types with non-permanence risk, as well as credits with negligible non-permanence risk, that would enable a trust to retire its liabilities.

Preliminary Findings

Preliminary findings from the feasibility study indicate that the Permanence Trust concept is highly feasible across financial, risk, and market dimensions.

Governance

Research supports the idea of a transferable warranty which assumes liability for the long-term permanence of stored carbon, attaches to the carbon credit itself, and persists through ownership changes, ensuring continuity of accountability indefinitely. Warranty premiums would reflect project-specific non-permanence risk, portfolio-level impacts, and operational costs. A trust

would thereafter be responsible for assessing and replacing lost carbon, creating a durable and enforceable mechanism for maintaining climate outcomes over time.

Non-profit corporations in an endowment-type structure provide the strongest foundation for long-term stewardship and credibility. This could support both voluntary and compliance market applications while maintaining clear fiduciary responsibilities and institutional accountability.

Functionally, a trust would combine independent oversight, transparent registry infrastructure, risk monitoring and modelling, warranty administration, and professional asset management. Many operational functions can be outsourced to specialized, substitutable service providers while remaining subject to oversight by a trust's governing body, enabling long-term permanence management.

Financial Modeling

Modeling indicates that long-term solvency can be achieved with affordable warranty pricing through a trust. Reversal costs can be covered by warranty fees and long-term investment returns when supported by portfolio diversification across projects, geographies, methodologies, and hazard exposures. This helps to restrict warranty fees to a small percentage of credit value while maintaining sufficient resources to cover replacement obligations.

The model integrates liability forecasting, risk-based pricing, portfolio management, and operational costs into a single system. Historical loss data, catastrophe risk models, remote sensing observations, stress testing, and the Carbon at Risk (CaR) methodology together enable the simulation of a range of loss scenarios to determine a minimum warranty premium. Losses remain manageable even over long time horizons, while investment returns compound to increasingly offset reversal liabilities.

Monte Carlo simulation results

Claims history	Median (50th percentile)	1 in 20 (95th percentile)	1 in 200 (99.5th percentile)
Average annual loss rate (Years 1-100)	1.50%	1.66%	1.75%
Annual volatility	0.10%	0.32%	0.69%
Worst single year	1.76%	3.38%	4.78%

Together, these findings suggest that long-duration durability cover can be financed sustainably through a trust using established principles from insurance, pension fund liability management, and institutional asset management.

Risk Management

Non-permanence risk is best managed as a portfolio-level liability versus a project-level obligation. Existing registry approaches typically assess non-permanence risk at the project level and size buffer pool contributions accordingly, but they often fail to adequately account for the correlated losses that could occur across projects simultaneously. A trust is designed to address this by applying a portfolio-based framework that explicitly models correlation structures and systemic drivers of loss, allowing risk to be measured, priced, and managed at the level where liabilities emerge.

Diversification is a primary determinant of solvency and affordability. Geographic diversification is not a price consideration but a risk-management requirement. Extreme weather, regulatory change, and other hazards frequently affect regions rather than individual projects, creating concentrated exposures for geographically clustered portfolios. A trust could rely on diversification across geographies, project types, methodologies, and time horizons to reduce volatility and improve resilience. By spreading risk across a large and diverse portfolio, potentially catastrophic losses for individual projects become systemically manageable, enabling durability warranties to be offered at a fraction of the cost.

Diversification must extend beyond project categories to underlying drivers of risk. As climate change intensifies, projects that appear unrelated may become increasingly correlated through common environmental drivers. The proposed framework addresses this challenge through CaR methodologies and models, catastrophe modeling, remote sensing, continuous monitoring, and Monte Carlo portfolio simulations that evaluate expected losses and extreme scenarios. By monitoring changing correlations, incorporating uncertainty and model risk into pricing, and continuously rebalancing portfolio exposure, a trust manages non-permanence risk through an adaptive system that maintains durable climate outcomes.

Policy Alignment & Application

The Permanence Trust concept aligns with the direction of emerging carbon market frameworks while remaining flexible and system-level in design. It supports the increasing emphasis on long-term integrity seen across major initiatives without embedding itself in any single policy.

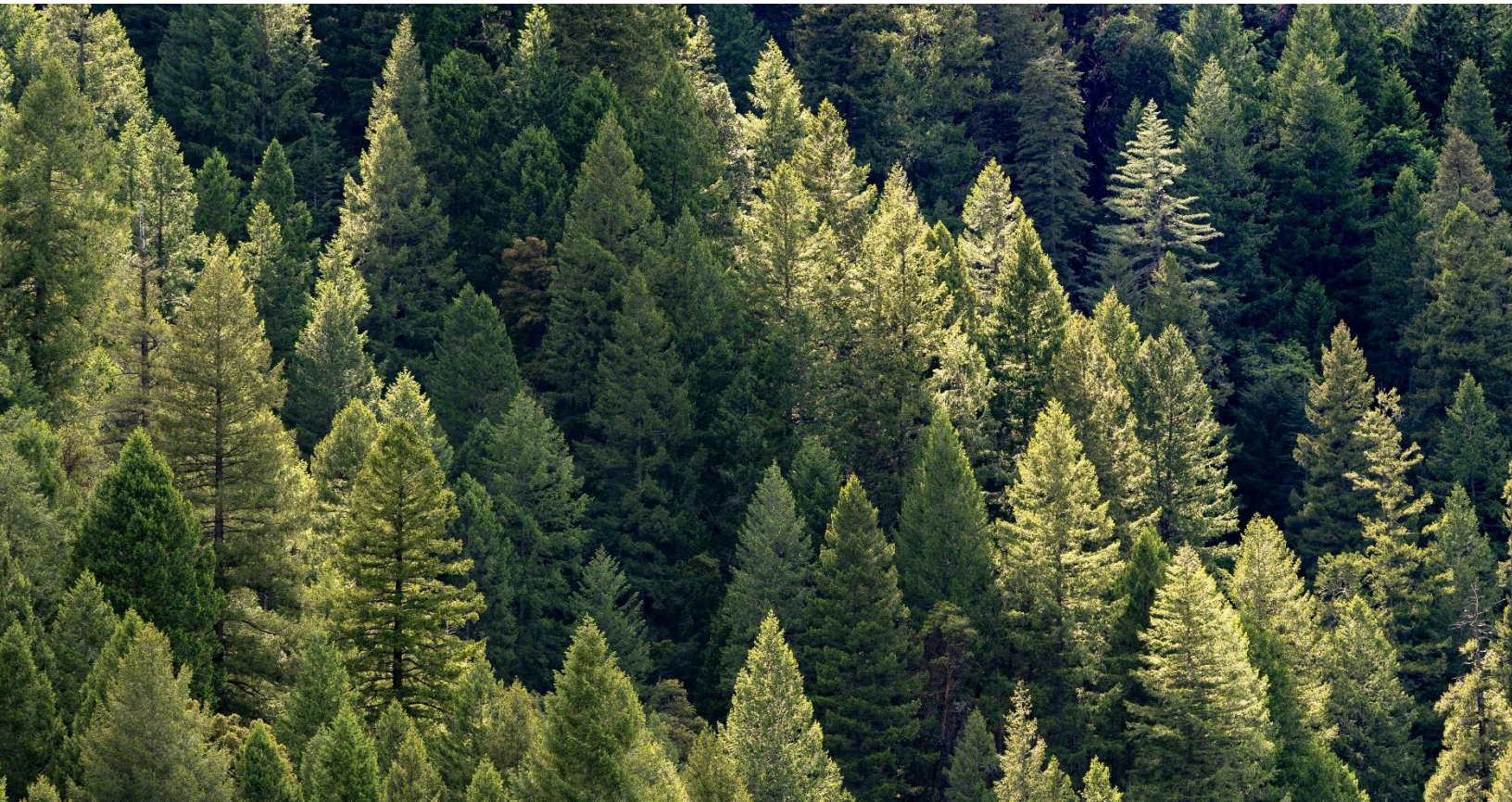
The Trust concept is compatible with evolving frameworks including **PACM and Article 6 mechanisms, the EU Emissions Trading System and Carbon Removal and Carbon Farming framework, the Integrity Council for the Voluntary Carbon Market's Core Carbon Principles, and the Science-based Targets initiative's Corporate Net-Zero Standard**. In each case, the Trust would function as an enabling infrastructure layer through enhancing integrity, reducing costs, and allowing broader participation without requiring a redesign of those systems.

By pooling and actively managing non-permanence risk, the Trust helps resolve a central policy tension: balancing **integrity and scalability across all CDR pathways**. It allows higher-risk, lower-cost carbon removal pathways to participate credibly while supporting the scaling of lower-risk solutions and maintaining consistent durability standards across all project types.

Conclusion

Preliminary findings from the feasibility study demonstrate that the Trust is **conceptually sound and practically achievable**. The next phase is a pilot to test the warranty model in real market conditions. A more comprehensive technical report covering detailed modeling, pricing structures, and governance design will be released in Q4 2026. In parallel, market stakeholders will be engaged to refine and operationalize the model.

With growing alignment across policy frameworks, standards bodies, and market participants, the Trust can move from concept to implementation. We invite engagement from across the market: **project developers and standards bodies** can participate in a pilot and shape the operational design; **buyers** can engage with the warranty model and inform pricing and integrity criteria; **policymakers and regulators** can consider how the Trust concept fits within emerging frameworks; and **insurers, researchers, and financial institutions** can refine risk, financial, and governance models that underpin the mechanism. Continued involvement from these communities is essential to refining and operationalizing a trust capable of supporting durable climate outcomes at a global scale.



Acknowledgements

About the American Forest Foundation

The American Forest Foundation is a national organization that empowers family forest owners to deliver meaningful conservation impact. The organization's programs, the Family Forest Carbon Program and the American Tree Farm System, help landowners implement forest management practices to care for the health and productivity of their woodlands. To learn more about the American Forest Foundation and the Family Forest Carbon Program, visit www.forestfoundation.org.

About Kita

Kita is the carbon and natural capital insurance specialist. Through our insurance products and risk advisory services, we help companies participate confidently in the growing market for carbon and natural capital assets, while upholding the rigorous risk management standards expected by stakeholders. By improving delivery, transparency and governance, insurance unlocks the investment needed to scale high-quality carbon removal and nature restoration solutions.

Kita is a Coverholder at Lloyd's of London – the world's leading specialist insurance and reinsurance marketplace. Kita Earth Limited is authorised and regulated by the Financial Conduct Authority. The company is entered on the FCA register (www.fca.org.uk/register). Our Firm Reference Number is 998549. Learn more at kita.earth.

About Climate Resilient Solutions

Climate Resilient Solutions brings together a network of researchers, practitioners and partners across disciplines — assembled around specific projects and challenges. Led by Dr. Bali Lee, we work at the intersection of science, business and policy to design and deliver climate solutions that are both rigorous and actionable.

From funded flagship projects like Carbon at Risk and Glacier Marriage to new collaborative work in development, projects are delivered through tailored teams with the right expertise for the challenge. Learn more at climateresilientsolutions.org.

CARBON POLICY AND MARKETS INITIATIVE

HIGHTIDE FOUNDATION

This report was made possible through support from the High Tide Foundation and its Carbon Policy & Markets Initiative.