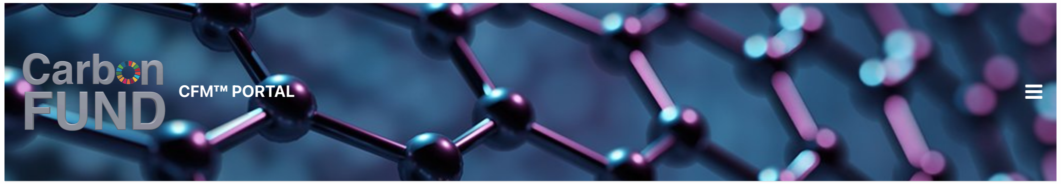

PROJECT PROVENANCE

from the earliest known history of the project

SUMMARY

NAME:	**Manufacture Graphite**
STATUS:	DEVELOPING
COMMISSIONING DATE:	01/04/2026
UID:	S10X_P_WJlicqpR3U14
CLIENT:	GROAL Holdings, Inc.
PROJECT OWNER:	Tim Collins
DEVELOPER:	Marc Tison
COUNTRY:	United States

13398 Herald Road
Coeburn, Virginia 24230
United States

ER SOURCE	Coal
ER IMPACT	Removal
ACCREDITATION STANDARD:	ISO 14064-3
METHODOLOGY:	Coal to Graphite Conversion
PROCEDURE:	Carbon Funding Mechanism℠
TCO2E LIFESPAN AVOIDANCE:	2,565,630
ANNUAL TCO2E AVOIDANCE:	2,565,630

SDG IMPACTS:	13) Climate Action
UNFFC FUND:	Yes
CONTEXT:	

1. Climate Change and Carbon Markets Climate change is a critical global issue driven significantly by industrial GHG emissions. Carbon markets provide an effective mechanism to incentivise emission reduction projects. ISO 14064-3 accredited projects are highly valued in these markets for their rigorous GHG accounting and verification processes.

2. Importance of ISO 14064-3 Accreditation ISO 14064-3 sets the standards for validating and verifying GHG assertions. Accreditation under this standard ensures that the project's emission reduction claims are independently verified, enhancing credibility and trust among stakeholders and potential buyers in the carbon market.

MEETS REQUIREMENT OF ADDITIONALITY?	Yes
MEETS REQUIREMENT OF PERMANENCE?	Yes

POTENTIAL:

The primary objective of projects underpinned by the methodology is to reduce GHG emissions from industrial processes by implementing advanced technologies and energy efficiency measures. The project seeks ISO 14064-3 accreditation to ensure transparency, accuracy, and credibility in GHG accounting and verification.

KEY REQUIREMENTS

Documents	State	Document
No data		

PROJECT DESCRIPTION

1. PROJECT OBJECTIVE

The primary objective of this project is to reduce GHG emissions from industrial processes by implementing advanced technologies and energy efficiency measures. The project seeks ISO 14064-3 accreditation to ensure transparency, accuracy, and credibility in GHG accounting and verification.

2. CONTEXT

2.1. Climate Change and Carbon Markets

Climate change is a critical global issue, driven significantly by industrial GHG emissions. Carbon markets provide an effective mechanism to incentivise emission reduction projects. ISO 14064-3 accredited projects are highly valued in these markets for their rigorous GHG accounting and verification processes.

2.2. Importance of ISO 14064-3 Accreditation

ISO 14064-3 sets the standards for validating and verifying GHG assertions. Accreditation under this standard ensures that the project's emission reduction claims are independently verified, enhancing credibility and trust among stakeholders and potential buyers in the carbon market.

3. PROJECT ACTIVITIES

3.1. Implementation of Energy Efficiency Measures

- **Technology Upgrades**: Installation of energy-efficient equipment and machinery in industrial facilities.
- **Process Optimization**: Enhancing operational processes to reduce energy consumption and GHG emissions.
- **Training and Capacity Building**: Training facility staff on energy management and efficient operational practices.

3.2. Adoption of Clean Technologies

- **Renewable Energy Integration**: Incorporating renewable energy sources such as solar, wind, and biomass into industrial operations.
- **Waste Heat Recovery**: Implementing systems to capture and reuse waste heat from industrial processes.
- **Advanced Emission Control**: Installing state-of-the-art emission control technologies to reduce pollutants and GHG emissions.

3.3. Monitoring and Maintenance

- **Continuous Monitoring Systems**: Deploying advanced monitoring systems to track real-time energy usage and emissions.
- **Regular Maintenance**: Conducting periodic maintenance to ensure optimal performance of installed technologies.
- **Data Management**: Establishing robust data management systems to record and analyse energy consumption and emission data.

4. CARBON ACCOUNTING AND VERIFICATION

4.1. GHG Inventory Development

- **Baseline Assessment**: Conducting a comprehensive baseline assessment of current GHG emissions from industrial facilities.
- **Emission Reduction Targets**: Setting clear and achievable targets based on baseline data.

4.2. Data Collection and Management

- **Automated Data Collection**: Utilizing computerised systems for accurate and consistent data collection.
- **Manual Data Verification**: Periodic manual verification of collected data to ensure accuracy.

4.3. Independent Verification

- **Third-Party Audits**: Engaging accredited third-party auditors to verify the project's GHG reduction claims.
- **Verification Reports**: Prepare detailed verification reports in accordance with ISO 14064-3 guidelines and submit them to relevant authorities.

5. PROJECT BENEFITS

5.1. Environmental Benefits

- **GHG Emission Reduction**: Significant reduction in GHG emissions from industrial processes.
- **Resource Conservation**: Enhanced resource utilisation efficiency, reducing waste and lowering environmental impact.
- **Air Quality Improvement**: Reduction in air pollutants, improving air quality and public health.

5.2. Economic Benefits

- **Cost Savings**: Reduced energy consumption leading to significant cost savings for industrial facilities.
- **Market Competitiveness**: Enhanced competitiveness of participating industries by adopting clean and efficient technologies.
- **Revenue Generation**: Potential revenue from selling verified carbon credits in the carbon market.

5.3. Social Benefits

- **Employment Opportunities**: Creation of jobs in technology installation, maintenance, and monitoring.
- **Community Development**: Improved economic conditions in surrounding communities through enhanced industrial sustainability.
- **Stakeholder Engagement**: Active stakeholder engagement fosters a culture of sustainability and environmental responsibility.

6. STAKEHOLDER ENGAGEMENT

6.1. Industry Involvement

- **Consultation Processes**: Regular consultations with industry stakeholders to ensure their needs and perspectives are integrated into project planning and implementation.
- **Training and Support**: Providing ongoing training and technical support to industrial facility staff.

6.2. Partnerships and Collaborations

- **Government Agencies**: Collaborating with government agencies for policy support, regulatory compliance, and technical assistance.
- **Non-Governmental Organizations**: Partnering with NGOs for community engagement and capacity building.
- **Private Sector**: Engaging private sector partners for funding, technology transfer, and market access.

7. MONITORING, REPORTING, AND VERIFICATION

7.1. MRV Framework

- **Monitoring Protocols**: Developing standardised protocols for regularly monitoring energy consumption and GHG emissions.
- **Reporting Mechanisms**: Establishing transparent and timely reporting mechanisms to communicate project progress and results to stakeholders.

7.2. Continuous Improvement

- **Feedback Loops**: Implementing feedback loops to continuously improve project practices based on monitoring data and stakeholder inputs.
- **Adaptive Management**: Adopting an adaptive management approach to address challenges and incorporate best practices.

8. RISK MANAGEMENT

8.1. Risk Identification

- **Technical Risks**: Identifying and mitigating risks associated with implementing and operating new technologies.
- **Operational Risks**: Addressing risks related to operational disruptions and maintenance issues.

8.2. Risk Mitigation Strategies

- **Contingency Planning**: Developing contingency plans to manage identified risks effectively.
- **Stakeholder Engagement**: Strengthening stakeholder engagement to build trust and reduce operational risks.

9. FINANCIAL PLAN

9.1. Budget Allocation

- **Project Activities**: Detailed budget allocation for technology upgrades, process optimisation, training, and monitoring activities.
- **Administrative Costs**: Budget for project management, reporting, and verification processes.

9.2. Funding Sources

- **Carbon Credits**: Revenue generation through selling verified carbon credits in the carbon market.
- **Grants and Donations**: Securing grants and donations from government agencies, NGOs, and private sector partners.
- **Industrial Contributions**: Leveraging contributions from participating industrial facilities for project implementation.

10. CONCLUSION

The Industrial Emission Reduction and Energy Efficiency Enhancement project aims to significantly impact climate change mitigation by reducing GHG emissions from industrial processes. By adhering to ISO 14064-3 standards, the project ensures transparency, credibility, and effectiveness in its emission reduction efforts. The project will contribute to a sustainable and resilient industrial sector through robust stakeholder engagement, meticulous carbon accounting, and independent verification.

METHODOLOGY

METHOD USED: Coal to Graphite Conversion

PROJECT OBJECTIVE:

The primary objective of projects underpinned by the methodology is to reduce GHG emissions from industrial processes by implementing advanced technologies and energy efficiency measures. The project seeks ISO 14064-3 accreditation to ensure transparency, accuracy, and credibility in GHG accounting and verification.

PROJECT LIFESPAN: 1

DAILY GENERATION HOURS: 0.00

CAPACITY FACTOR: 50.00%

EMISSIONS INTENSITY: 2.5000

ER SOURCE: Coal

ER IMPACT: Removal

GLOBAL STANDARD: CFM™

STANDARD: ISO 14064-3

VERIFICATION CYCLE: Monthly

PROCEDURES: Carbon Funding Mechanism℠

SITE REFERS TO: Factory

UNIT REFERS TO: Ton

AVOIDANCE FACTOR: 1.2500

GHG ER FACTOR CALCULATION

Factor	Math	Result
Project Lifespan	A	20
Sites: Factory	B	1
Units: Tons	C	1
Generation Hours Per Day	E	-
Hours Per Year	F = 365 * E	-
Capacity Factor	G	50%
Annual Production	H = F * G	0.50
Emissions Intensity	G	2.500
Avoidance Factor	I = H * G	1.250

REQUIREMENT OF PERMANENCE:

Introduction to Permanence: The principle of permanence in carbon markets ensures that GHG reductions or removals are not only achieved but are also maintained over a long period. This principle is crucial to avoid temporary solutions that could eventually reverse and release GHGs back into the atmosphere.

Context: A coal mine plans to convert coal into graphite, and subsequently graphene, using a process that does not emit harmful greenhouse gases. The project aims to secure carbon credits by demonstrating the permanence of its GHG reduction benefits.

Defending the Permanence of the Project:

1. **Stable Conversion Process:**
    - **Non-Reversible Process**: The conversion of coal into graphite and graphene must be stable and irreversible, ensuring that once coal is converted, it cannot revert to its original form and release GHGs. This chemical stability is essential for permanence.
    - **Long-Term Integrity of Graphene**: Graphene, once produced, is a highly stable material with a long lifespan, meaning it does not degrade quickly or easily release GHGs over time.
2. **Lifecycle Analysis:**
    - **Full Lifecycle Impact**: A comprehensive lifecycle analysis should demonstrate that from extraction to conversion to the final use of graphene, the process remains free of harmful GHG emissions. This analysis should include consideration of all potential GHG emission points and mitigation measures.
    - **Sustainable Practices**: Ensure that the entire process adheres to sustainable practices, minimizing the risk of indirect GHG emissions through associated activities.
3. **Regulatory and Monitoring Framework:**
    - **Robust Monitoring**: Implement a stringent monitoring and reporting framework to regularly verify the ongoing GHG benefits of the project. This includes tracking the stability and usage of graphene to ensure it remains a permanent carbon sink.
    - **Regulatory Compliance**: Adhere to local and international regulations governing carbon sequestration and emissions reductions, ensuring that the project's practices meet or exceed regulatory requirements for permanence.
4. **Risk Management and Mitigation:**
    - **Risk Assessment**: Conduct a thorough risk assessment to identify and mitigate potential risks that could compromise the permanence of GHG reductions. This includes technological failures, market changes, or policy shifts.
    - **Contingency Plans**: Develop and implement contingency plans to address any identified risks, ensuring that GHG reductions are safeguarded against unforeseen events.
5. **Long-Term Viability:**
    - **Economic Viability**: Ensure the long-term economic viability of the project, as financial stability supports the ongoing operation and maintenance of the low-emission process.
    - **Technological Advancement**: Commit to continuous improvement and technological innovation to maintain and enhance the GHG reduction capabilities of the process.
6. **Environmental and Social Co-Benefits:**
    - **Co-Benefits**: Highlight additional environmental and social benefits that enhance the project's sustainability and resilience. These might include local economic development, job creation, and reduced environmental degradation from traditional coal mining practices.

Conclusion: The coal mine's project to convert coal into graphite and subsequently graphene without emitting harmful greenhouse gases can be defended under the principle of permanence by demonstrating that the GHG reductions are stable, irreversible, and maintained over the long term. Through robust monitoring, risk management, adherence to regulatory frameworks, and ensuring the long-term economic and technological viability of the project, it can be shown that the GHG benefits are not only achieved but are also permanent. This approach supports the integrity and credibility of carbon markets, ensuring that carbon credits reflect lasting climate mitigation efforts.

REQUIREMENT OF ADDITIONALITY:

Introduction to Additionality: The principle of additionality is fundamental to carbon markets. It stipulates that carbon credits should only be awarded to projects that result in GHG reductions or removals that are additional to what would have occurred in the absence of the project. This means the project must go beyond "business as usual" scenarios and contribute to real, measurable, and long-term benefits for the climate.

Context: A coal mine plans to convert coal into graphite, and subsequently graphene, using a process that does not emit harmful greenhouse gases. This project claims to be environmentally beneficial and seeks carbon credits under the principle of additionality.

Defending the Additionality of the Project:

1. **Baseline Scenario Analysis:**
   - **Business as Usual (BAU) Scenario**: The BAU scenario would involve the continued extraction and combustion of coal, leading to significant GHG emissions.
   - **Project Scenario**: The conversion of coal to graphite and graphene without emitting harmful GHGs presents a significant departure from the BAU scenario. The project must demonstrate that, in the absence of this initiative, coal would continue to be used in a manner that results in high emissions.
2. **Barrier Analysis:**
   - **Technological Barriers**: Developing and implementing the technology to convert coal into graphene without emitting harmful gases involves significant R&D, capital investment, and technical expertise, which may not be feasible without the financial incentives provided by carbon credits.
   - **Financial Barriers**: The project might require substantial upfront investment and may not be economically viable without additional revenue from carbon credits. This financial support can help bridge the gap between traditional coal mining and environmentally friendly alternatives.
3. **Regulatory and Policy Context:**
   - **Current Regulations**: If current regulations do not mandate the conversion of coal to graphene without emissions, the project exceeds regulatory requirements, thus contributing additional benefits.
   - **Policy Drivers**: If there are no existing incentives or mandates encouraging such technological shifts, the project's efforts to mitigate GHGs are indeed additional.
4. **Environmental Integrity and Market Credibility:**
   - **Real, Measurable, and Verifiable Reductions**: The project must provide evidence that its processes result in real, quantifiable GHG reductions compared to the BAU scenario.
   - **Long-term Impact**: The project should ensure that the benefits are sustainable over the long term, maintaining its low-emission status and contributing to ongoing climate mitigation.
5. **Innovation and Knowledge Sharing:**
   - **Technological Advancement**: By pioneering a new method of coal utilization that avoids GHG emissions, the project can set a precedent for other industries and promote broader adoption of similar technologies.
   - **Knowledge Dissemination**: Sharing the technological advancements and processes can encourage replication and scaling, leading to broader GHG reduction impacts beyond the initial project.

Conclusion: The coal mine's project to convert coal into graphite and subsequently graphene without emitting harmful greenhouse gases can be defended under the principle of additionality if it clearly demonstrates that the GHG reductions are beyond what would have occurred in the BAU scenario. By overcoming technological and financial barriers, adhering to higher environmental standards than current regulations require, and providing measurable and verifiable GHG reductions, the project contributes genuinely additional climate benefits. This not only supports the environmental integrity of carbon markets but also fosters innovation and broader adoption of sustainable practices in the industry.

VERIFICATION REQUIREMENTS:

SUPPORTING RESEARCH REFERENCE(S)

Title	Publisher	Year	File
Coal Mine Methane Country Profiles Chapter 31	Global Methane Initiative	June 2015	

ISO 14064-3 provides a framework for the verification of greenhouse gas (GHG) assertions, ensuring their accuracy, completeness, and transparency. Applying this to a coal mine converting coal into graphite and subsequently graphene without emitting harmful GHGs involves a series of steps to verify the GHG reductions claimed by the project. Here are the key verification requirements:

1. Pre-Verification Activities

- **Understanding the Project**: Obtain detailed information about the project, including its scope, processes, and intended GHG reductions.
- **Defining Verification Objectives**: Clearly define the objectives, scope, and criteria of the verification process. This includes understanding the baseline scenario and the projected GHG reductions.
- **Engagement Terms**: Establish terms of engagement between the verifier and the project proponents, detailing responsibilities, timelines, and deliverables.

2. Verification Planning

- **Verification Plan**: Develop a comprehensive verification plan outlining the methodology, activities, timelines, and resources needed to perform the verification.
- **Materiality Assessment**: Determine the materiality threshold, which identifies the significance of discrepancies or errors in the GHG assertion that would affect its reliability.

3. Data Collection and Review

- **Data Sources and Collection**: Identify and review all relevant data sources, including project documents, emissions records, process descriptions, and monitoring reports.
- **Data Integrity**: Ensure the accuracy, completeness, and consistency of the data collected, verifying the reliability of the data sources.

4. Verification Process

- **Site Visits and Inspections**: Conduct site visits to observe operations, verify the physical implementation of the project, and ensure that the processes align with documented practices.
- **Interviews and Discussions**: Interview key personnel to gain insights into operational practices, data management, and GHG monitoring systems.
- **Sampling and Testing**: Perform sampling and testing of emissions data, if applicable, to verify the accuracy and reliability of the reported GHG reductions.

5. Assessment of GHG Assertions

- **Baseline Scenario Validation**: Validate the baseline scenario against which the GHG reductions are measured, ensuring it accurately represents the "business as usual" scenario without the project.
- **Quantification Methods**: Assess the methodologies used for quantifying GHG reductions, ensuring they align with recognized standards and best practices.
- **Emission Factors and Calculations**: Verify the emission factors, assumptions, and calculations used in the GHG assertion, ensuring they are scientifically sound and correctly applied.

6. Risk and Uncertainty Analysis

- **Risk Assessment**: Evaluate potential risks that could affect the accuracy and reliability of the GHG assertion, such as data gaps, measurement uncertainties, or operational inconsistencies.
- **Uncertainty Analysis**: Assess the uncertainty associated with the GHG calculations and measurements, ensuring it is within acceptable limits and appropriately documented.

7. Reporting and Documentation

- **Verification Report**: Prepare a detailed verification report documenting the verification process, findings, and conclusions. The report should include:
  - A summary of the verification activities performed.
  - The methodology and criteria used for verification.
  - The materiality threshold and any material discrepancies found.
  - An assessment of the accuracy, completeness, and reliability of the GHG assertion
- **Verification Statement**: Provide a verification statement that includes an opinion on the validity and reliability of the GHG assertion. This statement should indicate whether the GHG reductions are credible, transparent, and in accordance with the defined criteria and standards.

8. Continual Improvement and Feedback

- **Feedback Loop**: Provide feedback to the project proponents on areas for improvement in their GHG monitoring, reporting, and reduction practices.
- **Follow-Up Actions**: Recommend any necessary corrective actions or improvements based on the findings of the verification process.

Application to the Coal Mine Graphene Project

1. Understanding the Project:

- **Project Description**: The project involves converting coal into graphite and graphene without emitting harmful GHGs. Understanding the detailed process, including the technology used, the inputs and outputs, and the emissions control measures, is crucial.

2. Defining Verification Objectives:

- **Verification Objectives**: The main objective is to verify that the project achieves GHG reductions beyond the baseline scenario (traditional coal use) and that these reductions are real, measurable, and permanent.

3. Verification Planning:

- **Developing the Plan**: Outline the steps to verify the entire process from coal extraction to graphene production, ensuring no harmful GHG emissions occur at any stage.

4. Data Collection and Review:

- **Data Review**: Collect and review emissions data, process flow diagrams, and monitoring reports to ensure they accurately reflect the project's operations and GHG emissions.

5. Verification Process:

- **Site Visits**: Inspect the facilities to observe the conversion process, verify the implementation of emission control measures, and confirm the absence of harmful GHG emissions.
- **Interviews**: Conduct interviews with engineers, technicians, and management to understand operational practices and data management.

6. Assessment of GHG Assertions:

- **Baseline Validation**: Ensure that the baseline scenario (coal combustion) is accurately defined and that the project scenario (graphene production) represents a genuine improvement.
- **Quantification Methods**: Verify that the methods used to quantify GHG reductions are appropriate and scientifically sound.

7. Risk and Uncertainty Analysis:

- **Risk Evaluation**: Identify and assess risks related to data accuracy, measurement uncertainties, and operational inconsistencies that could impact the GHG assertions.
- **Uncertainty Analysis**: Ensure that any uncertainties in the data or calculations are documented and within acceptable limits.

8. Reporting and Documentation:

- **Verification Report**: Prepare a comprehensive report that details the verification process, findings, and conclusions. This report should clearly state whether the GHG reductions are credible and meet ISO 14064-3 requirements.
- **Verification Statement**: Provide a formal statement confirming the validity of the GHG assertion, highlighting the permanence and reliability of the reductions.

By adhering to the ISO 14064-3 verification requirements, the project can ensure that its GHG reductions are credible, measurable, and permanent, thus supporting its claims for carbon credits and contributing to global climate mitigation efforts.

CARBON FUNDING MECHANISM℠ OUTCOMES

REVENUE SHARE:	$5,131,260
SDG ALLOCATION:	$1,282,815

VALIDATION AUDIT

Audit Date	Audit Findings	Certificate
No data		

VERIFICATION AUDITS

Carbon Credits	Audit Findings	Certificate
No data		