Preliminary Feasibility Study: Carbon Offset Potential with Volt Carbon Technologies' Air Classifier Technology

December 2024

PREPARED FOR
VOLT CARBON TECHNOLOGIES INC.
590 Hanlon Creek Blvd.,
Guelph, Ontario, N1C 0A1

PREPARED BY
NATUREBLOCKS TECHNOLOGY INC. dba EMITIQ
301-852 Fort St.,
Victoria, British Columbia, V8W 1H8

NOTICE

EmitIQ has prepared this Preliminary Feasibility Report for Volt Carbon Technologies to assess the carbon offset potential associated with the implementation of advanced air classification technology. The findings, estimates, and conclusions presented in this report are based on: (i) data available at the time of preparation, (ii) third-party sources deemed credible, and (iii) the assumptions and limitations outlined herein. As this is a preliminary study, the estimates are subject to revision in subsequent design phases or through more comprehensive assessments such as a Feasibility Study (FS) or Life Cycle Assessment (LCA). Readers are advised to interpret the findings accordingly.

The information in this report is intended for general guidance only. Application of the data is the sole responsibility of the reader. EmitIQ assumes no liability for any loss or damage resulting from the use of the information contained in this document. As this report is preliminary in nature, it should not be viewed with the same level of precision as a comprehensive Feasibility Study (FS), Life Cycle Assessment (LCA), or Project Design Document (PDD).

This document does not claim to cover all products, processes, or market conditions related to the project. While efforts have been made to ensure accuracy, EmitIQ does not endorse any specific product or company mentioned. The study was conducted based on the best available data for traditional flotation processes and information provided by the client. For more thorough and detailed insights, a full Feasibility Study or LCA is recommended.

Table 1. Document Details

Document Details	
Document Title	Preliminary Feasibility Study: Carbon Offset Potential with Volt Carbon Technologies' Air Classifier Technology
Date	December 2, 2024
Version	Final
Authors	Brent Story
Reviewers	Sabrina Moolman
Prepared For	Volt Carbon Technologies Inc.

Table 2. Document Revision

Document Revision			
Version	**Revision**	**Reviewers**	**Comments**
1.0	**1**	Brent Story, Sabrina Moolman	
2.0	**2**	Volt Carbon Technologies	Report review
3.0	**3**	Brent Story, Sabrina Moolman	Updated renewable scenario
3.1	**4**	Volt Carbon Technologies	Draft review
3.2	**5**	V-Bond Lee	Draft review
3.3	**6**	Brent Story	Final Version

1. Executive Summary

Volt Carbon Technologies Inc. commissioned EmitIQ to conduct a preliminary feasibility study on carbon offset opportunities associated with integrating advanced air classification technology into graphite production. The study evaluates the potential to enhance operational efficiency and reduce environmental impact, focusing on market conditions, carbon credit valuation, and Ontario regulatory compliance. It also provides strategic recommendations and financial projections based on preliminary data for decision-making. These projections and impact estimates may be refined as more operational data becomes available during full-scale project implementation. The project uses an advanced air classification process to produce high-purity graphite from natural flake graphite ore. This process uses controlled airflow to separate graphite from impurities in a dry, environmentally friendly manner, significantly reducing water and chemical usage compared to traditional flotation methods. Air classification achieves purity levels ranging from 95% to 98.5%, offering substantial efficiency and environmental benefits.

Key Impact Categories Evaluated:

- **Global Warming Potential**: The air classification process leads to a significant reduction in greenhouse gas (GHG) emissions.
    - Compared to traditional flotation, which emits between 9.5 and 13.7 kg CO_2e per kilogram of graphite, air classification reduces emissions to 0.1644 - 0.24 kg CO_2e per kilogram when powered by the Ontario grid.
    - Powered by renewable energy sources, emissions are further reduced to 0.123 - 0.15 kg CO_2e per kilogram, representing up to a 99% reduction in GHG emissions.
- **Water Scarcity Footprint**: Traditional flotation consumes **75 litres of water per kilogram** of graphite.
    - Air classification, by contrast, uses negligible amounts of water, substantially reducing the water footprint (FBICRC, 2022).
    - This substantial reduction in water usage positions Volt Carbon Technologies as a leader in sustainable practices.
- **Land Use Transformation**: The dry air classification process has a lower environmental impact on land use compared to traditional methods, which can lead to erosion and groundwater depletion. This reduced land disturbance aligns with Volt Carbon's commitment to environmentally responsible operations.

- **Acidification Potential**: The air classification process minimizes chemical waste production, reducing the environmental risks associated with soil and water contamination from chemical reagents. Traditional flotation methods contribute significantly to acidification, whereas air classification virtually eliminates this risk.

Carbon Credit Opportunities:

The study highlights the potential for Volt Carbon Technologies to leverage carbon credits as part of its sustainability strategy. By achieving substantial emissions reductions, the company can position itself to benefit from premium carbon credit pricing in both voluntary and compliance markets, as illustrated in Figure 2 (Projected Revenue from Carbon Credits Chart). Certification under recognized standards like Verified Carbon Standard (VCS) and Gold Standard would further enhance the value of these credits, enabling Volt Carbon to maximize revenue potential while contributing to global climate action.

Using air classification powered by renewable energy, Volt Carbon Technologies can offset **93,770 to 135,500 tons of CO_2e per year**, translating into potential carbon credit revenue of **$1.4 million to $3.4 million annually**, depending on current market prices.

Strategic Recommendations:

- **Certification Pursuit**: Certification under standards like VCS or Gold Standard will optimize revenue potential. Additionally, integrating renewable energy into operations will further enhance the carbon offset potential.
    - Consider standards like Verified Carbon Standard (VCS) or Gold Standard for enhanced carbon offset potential.
- **Market Access**: Market Access: Careful consideration of market access and price fluctuations is crucial.
    - Strategic partnerships may provide long-term stability and access to premium pricing in the carbon market.
- **Scaling Production**: Scaling up production with air classification will further enhance financial projections, enabling Volt Carbon to position itself towards the upper boundary of this study's estimates.

Conclusion:

Implementing air classification and obtaining certifications such as VCS and Gold Standard positions the company to benefit from premium pricing in carbon markets. Scaling up

production and forming strategic partnerships will further increase revenue potential, establishing sustainability as a key driver of profitability.

Table of Contents

1. Executive Summary **4**
Key Impact Categories Evaluated: 4
Carbon Credit Opportunities: 5
Strategic Recommendations: 5
Conclusion: 5
2. Introduction **11**
2.1. Project Description **11**
3. Feasibility Study Overview **12**
3.1. Standards and Methods used to Evaluate the Air Classification Process 12
3.2. Methodology Development Steps for Regional Compliance Framework 13
3.3. Program Name and Offset Protocol 15
3.4 Baseline and Project Scenario 15
Project Scenario: 16
Emissions Calculation Methodology: 16
3.6. Quantification Methodology 19
4. Results **20**
5. Potential Markets for Carbon Credits **22**
5.1. Current Market Prices 22
5.3. Financial Projections 27
6. Conclusion and Next Steps for Feasibility Study **29**
7. Carbon Accounting Services **30**
7.1. Operational Boundaries 30
7.2. Description of EmitIQ.com and Its Use in Operational Emission Mapping 31
8. Conclusion **32**
Appendices **34**
References 34

List of Tables

Table	Contents of Table
1	Document Details
2	Document Revision
3	Results
4	Standard and Market Price

List of Acronyms

Acronym	Meaning
GHG	Greenhouse Gas
CO_2e	Carbon Dioxide Equivalent
VCS	Verified Carbon Standard
ISO	International Organization for Standardization
SDG	Sustainable Development Goals
FS	Feasibility Study
LCA	Life Cycle Assessment
PDD	Project Design Document
kg	Kilogram
t CO_2e	Metric Tonnes of Carbon Dioxide Equivalent
ACR	American Carbon Registry
NRCan	Natural Resources Canada
EPA	Environmental Protection Agency

CapEx	Capital Expenditure
PAX	Potassium Amyl Xanthate

List of Key Terms

Term	Meaning
Air Classification	A dry process used to separate particles based on their density, shape, and aerodynamic properties, utilized by Volt Carbon Technologies to produce high-purity graphite.
Baseline Year	The reference year against which future GHG emissions are compared to measure reductions.
Carbon Credits	Tradable certificates representing the reduction of one metric ton of CO_2e emissions, which can be used to offset emissions.
Carbon Footprint	The total amount of greenhouse gases emitted directly or indirectly by an organisation, product, or individual, expressed as carbon dioxide equivalents (CO_2e).
Emission Factor	A coefficient that quantifies the emissions produced per unit of activity, such as kilograms of CO_2 per kilowatt-hour of electricity consumed.

Greenhouse Gas (GHG)	Gases that trap heat in the atmosphere, contributing to global warming, including CO_2, methane (CH_4), and nitrous oxide (N_2O).
Baseline Emissions	The reference emissions for a project, calculated based on traditional methods, which serve as a comparison point to measure reductions achieved through new technologies.
Project Emissions	**Project Emissions:** The emissions associated with the proposed technology or new project scenario, used to compare against baseline emissions to determine reductions.

List of Measurement Conversions

Term	Meaning
kg	Kilogram, a unit of mass equivalent to 1,000 grams.
t CO_2e	Metric tonnes of Carbon Dioxide Equivalent, used to quantify GHG emissions.

2. Introduction

Volt Carbon Technologies has engaged EmitIQ to perform a **preliminary feasibility study** on the carbon offset potential associated with integrating advanced air classification technology into graphite production. The study was conducted with a focus on enhancing operational efficiency and reducing environmental impact, aligning with industry best practices in sustainability.

This report provides an in-depth evaluation of the air classification technology's role in a potential carbon offset project. It includes detailed analyses of market conditions, carbon credit valuation, and regulatory compliance within Ontario. In addition, the study offers strategic recommendations and financial projections to assist in informed decision-making.

The study specifically targets the carbon offset opportunities at Volt Carbon Technologies' pilot facility, where the most impactful emission reductions are expected. Consideration has been given to key factors such as boundaries, baseline, and leakage, with further refinement planned in subsequent design phases. Volt Carbon Technologies remains committed to ensuring the accuracy and rigour of this assessment, reflecting the company's dedication to advancing sustainable technologies.

The findings presented in this report are based on the best available data from credible sources, including pilot forecasts and testing. While the results are promising and demonstrate the potential for meaningful carbon offsets, further comprehensive studies are recommended to provide a more detailed understanding.

2.1. Project Description

Volt Carbon Technologies is advancing a pilot project in Ontario focused on the development of high-purity graphite production using innovative air classification technology. The project centres on the processing of natural flake graphite from mineral deposits located in Ontario and Quebec, employing open-pit mining techniques to extract the raw material.

The extracted graphite undergoes a dry air classification process, where the valuable graphite flakes are separated from impurities without the need for water or chemical reagents typically used in conventional flotation methods. This advanced technology produces graphite concentrate with purity levels ranging from 95% to 98.5%, offering significant advantages in both efficiency and environmental impact.

The final pilot facility is expected to produce approximately 10,000 tonnes of high-purity graphite concentrate annually. This initiative not only reduces the carbon footprint of the production process but also enhances the company's ability to meet the growing demand for high-quality graphite used in energy storage applications such as electric vehicles and renewable energy systems.

Volt Carbon Technologies operates with full mining rights in Ontario, Quebec, and British Columbia, and its process research facilities in Scarborough and Guelph provide the technical expertise to drive this project forward. The pilot project is a critical step toward full-scale production and reflects the company's commitment to innovation, sustainability, and the future of clean energy.

3. Feasibility Study Overview

3.1. Standards and Methods used to Evaluate the Air Classification Process

Air classification is a process used to separate particles based on their density, shape, and aerodynamic properties. Volt Carbon Technologies (VCT) has advanced this process by utilizing computational fluid dynamics to enhance the performance of its air classifiers. In VCTs gravitational-crossflow air classifier, material sized at 12 mesh is pushed horizontally through the system, where it is further refined by a diffuser. The particles are then sorted into bins at the bottom of the system based on their properties.

The process works by allowing denser particles to settle more quickly due to their weight, while lighter particles are carried further by the air current before settling. The airflow within the

classifiers can be adjusted, allowing the system to be tailored to purify various material properties as needed.

VCT's air classification system produces high-purity graphite, achieving 95% purity, with the potential to reach up to 98.5% purity as verified by a third-party study. This represents significant advantages over traditional flotation methods in both efficiency and environmental impact.

Traditional processes involve grinding the material dry and then using a wet process with water and flocculants to float the graphite out. This method requires substantial capital expenditure (CapEx) and is typically justified only for large ore bodies. In contrast, VCT's dry air classification technology simplifies the permitting process, especially for open-pit operations, making it feasible to develop smaller ore bodies that might otherwise be uneconomical.

Volt Carbon Technologies is dedicated to utilizing this cutting-edge air classification technology for graphite production at their pilot facility in Scarborough, Ontario. The company aims to investigate smaller ore bodies that would not be feasible with traditional methods. The ore will be sourced from their Berkwood and Tetepisca deposits in Quebec. The project's boundaries, along with baseline and leakage factors, will be carefully considered in the project's design and comprehensive development.

3.2. Methodology Development Steps for Regional Compliance Framework

Detailed Description of the Activity

To establish a methodology for the air classification process, it is crucial to provide a thorough description of the process, covering both its technical and operational aspects. Volt Carbon Technologies is dedicated to advancing sustainable energy solutions, with a particular emphasis on producing high-purity graphite for batteries and other high-tech applications. The air classifier technology exemplifies our innovative approach to graphite production.

Air Classification Process Overview:

The air classification process utilizes controlled airflow to separate graphite flakes from impurities in a dry, environmentally friendly manner. This method stands in stark contrast to traditional wet processes, such as flotation, which depend heavily on water and chemicals.

Technical and Operational Aspects:

- **Material Preparation:** The process begins with comminution, where raw graphite ore is crushed and ground to the desired particle size for air classification.
- **Air Classification:** The ground material is fed into the air classifier, where controlled airflow separates the graphite flakes from impurities based on factors such as size, shape, and density. Lighter graphite flakes are carried by the airflow through various separation stages, while heavier impurities are removed. A cyclone separator further refines the separation, and the purified graphite flakes are collected in a dust collection system.
- **Product Handling:** The high-purity graphite flakes are either stored or undergo further processing. Separated impurities are managed as waste, with the potential for additional processing to recover other valuable minerals.

Differentiation from Traditional Methods:

- **Reduced Water Usage:** Unlike traditional flotation, which consumes litres of water per kilogram of graphite, the air classification process is dry, significantly reducing water consumption and minimizing contamination risks.
- **Lower Chemical Usage:** Traditional flotation methods depend on chemical reagents, leading to chemical waste. The air classification process operates without chemicals, thereby reducing environmental impact.
- **Energy Efficiency:** The air classification process is more energy-efficient, relying primarily on airflow and mechanical separation, as opposed to the higher energy demands of traditional flotation systems.
- **Environmental Impact:** Air classification produces less waste and has a lower environmental footprint, reducing the risk of soil and water pollution compared to traditional flotation methods.

Technical Advantages:

- **High Purity Output:** The air classification process delivers high-purity graphite flakes, essential for advanced applications such as battery production.
- **Scalability and Flexibility:** The process is both scalable and flexible, accommodating variations in ore quality and production requirements.
- **Cost-Effectiveness:** By minimizing water and chemical usage, the air classification process reduces operational costs and simplifies regulatory compliance.

3.3. Program Name and Offset Protocol

To ensure compliance and eligibility for offset credits, Volt Carbon Technologies can pursue an offset program based on its air classification technology as a viable strategy.

Proposed Protocol:
Energy Efficiency and Emissions Reduction in Industrial Processes

Relevant Offset Credit Protocols:

- **Verified Carbon Standard (VCS) -** Energy Efficiency in Industry: This protocol focuses on projects that reduce energy consumption in industrial processes, applicable to the air classification process by demonstrating reduced energy use compared to traditional flotation methods**.**
- **Gold Standard - Energy Efficiency:** This protocol certifies projects that improve energy efficiency and reduce greenhouse gas emissions, emphasizing both energy savings and broader environmental and social benefits.
- **American Carbon Registry (ACR) -** Industrial Process Emission Reductions: This protocol supports projects that reduce emissions from industrial processes, including methodologies for quantifying and verifying emission reductions from process improvements and technological upgrades.

3.4 Baseline and Project Scenario

The traditional flotation process for graphite production at Volt Carbon Technologies involves several steps: crushing, grinding, froth flotation, and chemical treatment. This method results in significant energy consumption, high water and chemical usage, and substantial waste generation. Specifically, it emits **9.04 - 13.89 kg CO_2e per kilogram of graphite**, uses **75 litres of water per kilogram**, and generates considerable chemical and solid waste, posing environmental risks such as water and soil contamination. Additionally, transportation emissions from moving large volumes of water, chemicals, and waste contribute to the overall carbon footprint, adding an estimated **1.0 - 1.1 kg CO_2e per kilogram** of graphite.

Project Scenario:

The air classification process offers a more sustainable alternative. This dry method uses controlled airflow to separate graphite flakes from impurities, significantly reducing greenhouse gas emissions, water usage, and chemical waste. The process is energy-efficient, resulting in lower emissions, minimal or no water usage, and negligible chemical use, producing high-purity graphite flakes with a much lower environmental footprint.

Specifically:

- **Energy-Related Emissions**:
  The air classification process uses **2.3 - 5 kWh/kg** of electricity, which results in **0.0644 - 0.14 kg CO_2e per kilogram** of graphite when powered by the Ontario grid. When powered by renewable energy, emissions drop further to **0.023 - 0.05 kg CO_2e per kilogram**.
- **Water Usage and Water-Related Emissions**:
  Traditional flotation uses **75 litres of water per kilogram**, whereas air classification reduces water usage to negligible levels. This also significantly cuts water-related emissions, with the emission factor for water treatment at **0.0364 kg CO_2e/litre**, leading to **2.73 kg CO_2e per kg** for water-related emissions in traditional flotation.
- **Chemical and Waste Reduction**:
  The elimination of chemical reagents, common in flotation, removes the risk of soil and water contamination, reducing **2.5 - 2.8 kg CO_2e per kg** of chemical-related emissions. Solid waste, which is substantial in flotation, is minimized in air classification, with negligible waste-related emissions.
- **Transportation Emissions**:
  In the air classification process, transportation-related emissions are reduced due to lower bulk and fewer trips required. The elimination of water and chemical transport means that the emission factor for transportation is only **0.1 kg CO_2e per kilogram** of graphite. This reflects the significant reduction in fuel consumption, as fewer and lighter materials need to be transported compared to traditional methods.

Emissions Calculation Methodology:

The following formulas outline how energy, water, chemical, and transportation emissions were calculated for both traditional flotation and air classification methods.

- **Energy-Related Emissions**:
  Energy-related emissions were calculated using this formula:
  Energy-Related Emissions (kg CO_2e per kg) = Energy Consumption (kWh per kg) × Emission Factor (kg CO_2e per kWh)
  - For air classification with Ontario grid power:
    2.3 - 5 kWh per kg × 0.028 kg CO_2e per kWh = 0.0644 - 0.14 kg CO_2e per kg
  - For air classification with renewable energy:
    2.3 - 5 kWh per kg × 0.004 - 0.01 kg CO_2e per kWh = 0.0092 - 0.05 kg CO_2e per kg
- **Water-Related Emissions**:
  Water-related emissions were calculated using the following formula:
  Water-Related Emissions (kg CO_2e per kg) = Water Usage (litres per kg) × Emission Factor (kg CO_2e per litre)
  - For traditional flotation:
    75 litres per kg × 0.0364 kg CO_2e per litre = 2.73 kg CO_2e per kg
- **Chemical Usage and Waste**:
  For flotation, chemical-related emissions are calculated as:
  Chemical Emissions (kg CO_2e per kg) = Amount of Chemicals Used (kg per kg) × Emission Factor (kg CO_2e per kg of chemicals)
  - Chemical emissions are estimated to be **2.5 - 2.8 kg CO_2e per kg** based on typical flotation.
- **Transportation Emissions**:
  Transportation emissions are calculated using this formula:
  Transportation Emissions (kg CO_2e per kg) = Material Mass (kg) × Emission Factor for Transport (kg CO_2e per ton-kilometre)
  - For air classification, the transportation emissions factor is **0.1 kg CO_2e per kilogram** due to fewer trips and lighter loads.

This method not only conserves resources but also aligns with regulatory compliance and sustainability goals, making it a cleaner and more efficient approach to graphite production.

3.5. Additionality of GHG Emission Reductions

Demonstrating beyond Business-as-usual Practices:

Technological Innovation: The air classification process introduced by Volt Carbon Technologies represents a significant innovation that deviates from the traditional flotation

method, which is the industry standard. While traditional flotation relies heavily on water and chemical reagents for separation, resulting in substantial greenhouse gas (GHG) emissions, water usage, and chemical waste, the air classification process uses a dry method with controlled airflow, leading to significantly lower environmental impacts.

Energy Efficiency: The air classification process is designed to be more energy-efficient than traditional methods. Traditional flotation processes consume high levels of energy due to the extensive use of pumps, mixers, and other mechanical equipment. The air classification process optimizes energy usage through advanced airflow control and efficient mechanical separation, thereby reducing the overall carbon footprint. This improved energy efficiency contributes to lower GHG emissions per kilogram of graphite produced.

Minimal Water and Chemical Usage: Unlike the traditional flotation process, which uses 75 litres of water per kilogram of graphite and significant amounts of chemical reagents, the air classification process virtually eliminates the need for water and chemicals. This not only conserves water resources but also reduces the environmental hazards associated with chemical waste. The significant reduction in water and chemical usage demonstrates a clear departure from conventional practices and aligns with sustainable development goals.

Exceeding Current Regulatory Requirements:

Regulatory Landscape: Current regulatory requirements for graphite production primarily focus on controlling emissions, managing water usage, and ensuring proper disposal of chemical waste. These regulations aim to mitigate the environmental impact of traditional flotation methods. However, they do not mandate the adoption of advanced, more sustainable technologies like air classification.

Voluntary Adoption of Advanced Technology: Volt Carbon Technologies' implementation of the air classification process is a voluntary measure that goes beyond regulatory compliance. The decision to adopt this innovative technology is driven by the company's commitment to sustainability and environmental stewardship, rather than regulatory mandates. This proactive approach exemplifies the company's dedication to reducing its environmental impact and leading the industry towards more sustainable practices.

Evidence of Significant Improvement:

- **GHG Emission Reductions:** The air classification process achieves lower GHG emissions compared to traditional methods, with emissions expected to be below 3 kg CO2e per kilogram of graphite, compared to 9-13 kg CO2e for traditional flotation.
- **Water Conservation:** The elimination of water usage in the air classification process marks a significant improvement over the traditional method, which consumes 75 litres of water per kilogram of graphite. Additionally, the company has successfully eliminated the need for tailing ponds and the production of sludge waste, further reducing environmental hazards.
- **Reduction in Chemical Waste:** By avoiding the use of chemical reagents, the air classification process eliminates the generation of chemical waste, addressing one of the major environmental concerns associated with traditional flotation.

3.6. Quantification Methodology

A robust methodology is being developed to quantify GHG emission reductions. This methodology will ensure reliability, scientific recognition, and reproducibility. It will address local and specific conditions, apply reduction coefficients to avoid overestimation, and ensure no leakage occurs.

Potential Methodologies for the Air Classification Process:

- **Energy Efficiency Projects:** Focus on reducing energy consumption in the comminution and air classification stages compared to traditional flotation methods.
  Potential Standard: Verified Carbon Standard (VCS) - "Energy Efficiency in Industry"
- **Water Conservation Projects:** Emphasize the significant reduction or elimination of water usage in the air classification process.
  Potential Standard: Gold Standard - "Water Benefit Standard"
- **Material Substitution and Efficiency:** Highlight the reduction in chemical usage and the increased efficiency of material separation.
  Potential Standard: Verified Carbon Standard (VCS) - "Material Efficiency"
- **Waste Management and Reduction:** Focus on the reduction of chemical waste and solid waste generation.
  Potential Standard: Gold Standard - "Waste Management"
- **Renewable Energy Integration:** If renewable energy sources are used to power the air classification process, this can be included.
  Potential Standard: Verified Carbon Standard (VCS) - "Renewable Energy"

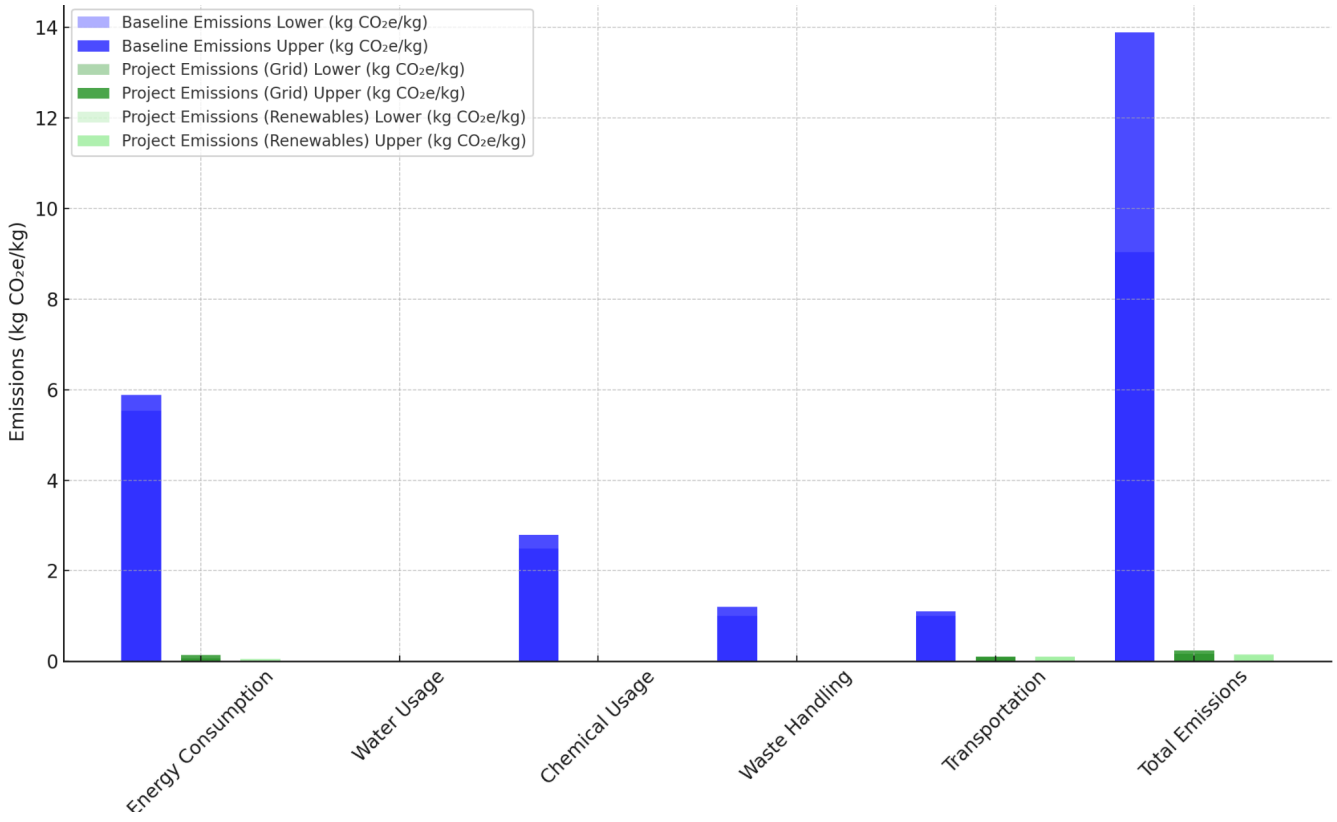
4. Results

Table 3. Comparison of Energy Consumption and GHG Emissions for Traditional Flotation and Air Classification Processes

Category	Baseline Emissions (Traditional Flotation Process)	Project Emissions (Air Classification Process) (Grid)	Project Emissions (Air Classification Process) (Renewables)	Supporting Reference
Energy Consumption	197.37 - 210.53 kWh/kg of graphite	2.3 - 5 kWh/kg	2.3 - 5 kWh/kg	FBICRC (2022); Graphite One Inc. (n.d.); Northern Graphite (n.d.)
Emission Factor (Energy)	0.028 kg CO_2e/kWh (Ontario Grid)	0.028 kg CO_2e/kWh (Ontario Grid)	0.004 - 0.01 kg CO_2e/kWh (Wind/Solar Energy)	Government of Ontario (n.d.); NREL (2012)
Energy-Related Emissions	5.53 - 5.89 kg CO_2e/kg	0.0644 - 0.14 kg CO_2e/kg	0.023 - 0.05 kg CO_2e/kg	Government of Ontario (n.d.); NREL (2012)
Water Usage	75 litres/kg*	Negligible	Negligible	Northern Graphite (n.d.); Graphite One Inc. (n.d.)
Emission Factor (Water)	0.0364 kg CO_2e/litre	0.0364 kg CO_2e/litre (if any)	0.0364 kg CO_2e/litre (if any)	Standard LCA databases
Water-Related Emissions	2.73 kg CO_2e/kg	Negligible	Negligible	Calculated using LCA data
Chemical Usage	2.5 - 2.8 kg CO_2e/kg	Negligible	Negligible	FBICRC (2022); Industry Standards
Waste Handling	1.0 - 1.2 kg CO_2e/kg	Negligible	Negligible	Minimal waste handling emissions (Graphite One Inc., n.d.)
Transportation	1.0 - 1.1 kg CO_2e/kg	0.1 kg CO_2e/kg	0.1 kg CO_2e/kg	Significant reduction in transportation emissions (Northern Graphite, n.d.)
Total Emissions	**9.04 - 13.89 kg CO_2e/kg**	**0.1644 - 0.24 kg CO_2e/kg**	**0.123 - 0.15 kg CO_2e/kg**	

***Disclaimer: Water Usage Data**

The figure of 75 litres of water per kilogram of graphite, as stated in this report, refers to the direct, unadjusted water consumption data from the Bissett Creek project prior to any scaling using the AWARE methodology. The AWARE factor, which adjusts for regional water scarcity, is not applied in this presentation of raw data.



The potential GHG emission reduction per kilogram of graphite can vary between 8.8 kg CO_2e and 13.6 kg CO_2e, averaging approximately 11.2 kg CO_2e per kilogram produced. Given the pilot project's current status, we will utilize this reduction range rather than specific values, as concrete data is not yet available.

Using conservative estimates, the air classification process at Volt Carbon Technologies can reduce GHG emissions by approximately 10.4 kg CO_2e per kilogram of graphite compared to the traditional flotation process. This reduction is primarily driven by improved energy efficiency and the elimination of water and chemical usage.

This revised statement more accurately reflects the data in **Table 4** and maintains the conservative estimate of **10.4 kg CO_2e** for reductions.

5. Potential Markets for Carbon Credits

5.1. Current Market Prices

Compliance Markets:

- **Quebec Cap-and-Trade System:** The Quebec Cap-and-Trade System, part of the Western Climate Initiative (WCI), allows companies to purchase carbon credits to meet provincial regulations. Carbon credit prices typically range from $20 to $30 CAD per metric ton of CO_2e in the Quebec Cap-and-Trade System, as noted by the Government of Quebec's environmental regulatory framework (Government of Quebec, 2023). Eligible projects for this system must adhere to recognized standards such as the Verified Carbon Standard (VCS), Gold Standard, and Clean Development Mechanism (CDM). Regulated entities in Quebec can use offset credits to cover up to 8% of their total emissions reduction obligations. Additionally, the Quebec market is linked with California's Cap-and-Trade program, offering a broader trading platform.
- **California Cap-and-Trade Program:** The California Cap-and-Trade Program also provides a significant market for carbon credits, with prices typically ranging from $15 to $20 USD per metric ton of CO2e. The linkage with Quebec's system expands the market potential, allowing credits to be traded across both regions.
- **European Union Emissions Trading System (EU ETS):** The EU ETS, another major compliance market, generally sees carbon credit prices ranging from €25 to €30 per metric ton of CO2e (approximately $30 to $35 USD). Projects must meet stringent verification and additionality criteria to be eligible in this market.

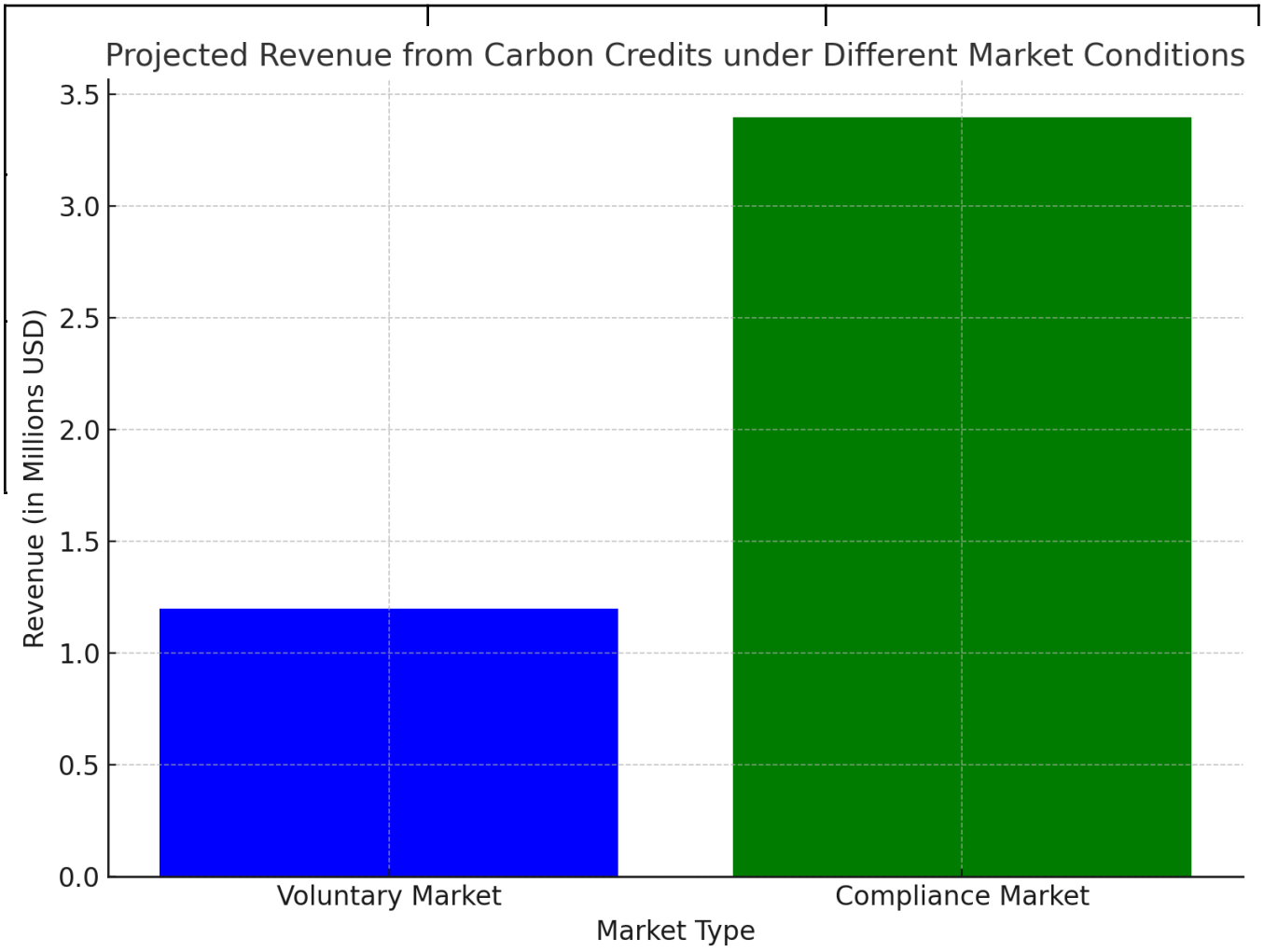
Voluntary Carbon Markets:

- **Verra (Verified Carbon Standard - VCS):** The VCS offers flexibility in the voluntary carbon market, with prices varying widely depending on the project type and location. Prices typically range from $5 to $15 USD per metric ton of CO2e.
- **Gold Standard:** Known for its additional social and environmental benefits, the Gold Standard typically commands higher prices, ranging from $10 to $20 USD per metric ton of CO2e.
- **American Carbon Registry (ACR):** The ACR provides a platform for carbon credits, with prices generally ranging from $5 to $10 USD per metric ton of CO2e.

The voluntary carbon market presents a substantial opportunity for Volt Carbon Technologies' air classification project. By significantly reducing CO2 emissions compared to traditional methods, the project can generate high-quality carbon credits. Certifying the project under standards such as VCS, Gold Standard, or ACR could lead to emission reductions of 7.2 - 13.6 kg CO2e per kilogram of graphite produced. These credits are in high demand among corporations aiming for carbon neutrality and can fetch prices ranging from $5 to $20 per metric ton of CO2e. This provides not only a lucrative revenue stream but also enhances the company's sustainability credentials and market reputation.

Table 4. Carbon Credit Pricing by Type: A Comparison of Voluntary and Compliance Markets

Methodology	**Potential Standard**	**Market Price (USD/ton CO2e)**
Energy Efficiency	VCS - Energy Efficiency in Industry	Voluntary: $5 - $15
Water Conservation	Gold Standard - Water Benefit Standard	Voluntary: $10 - $20
Material Substitution & Efficiency	VCS - Material Efficiency	Voluntary: $5 - $15
Waste Management & Reduction	Gold Standard - Waste Management	Voluntary: $10 - $20
Renewable Energy Integration	VCS - Renewable Energy	Voluntary: $5 - $15



5.2. Price Drivers

Regulatory Frameworks: Stricter government emissions regulations and the integration of carbon markets (e.g., EU ETS, California's Cap-and-Trade) drive demand and prices.

Corporate Net-Zero Commitments: Increasing corporate pledges to achieve net-zero emissions boost demand in voluntary carbon markets, especially for high-quality credits.

Quality of Credits: The certification standard and project type (e.g., renewable energy) influence credit prices, with higher-quality credits commanding premiums.

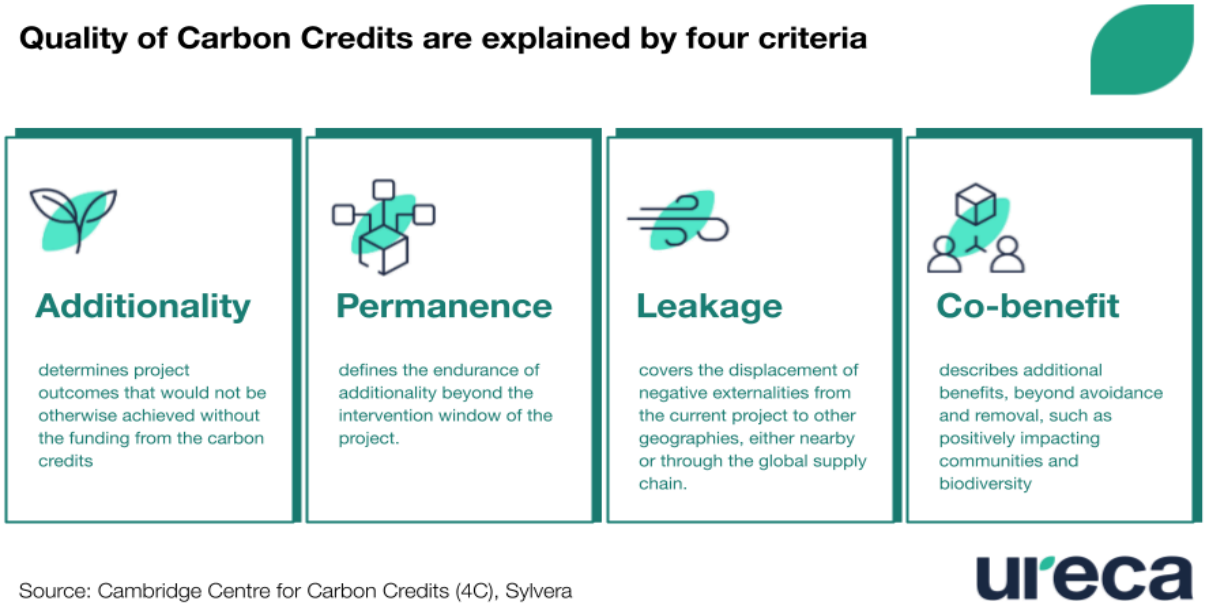
SDG Alignment: Carbon credits that contribute to multiple SDGs, such as clean energy (SDG 7), climate action (SDG 13), and life on land (SDG 15), are often more valuable. Projects that deliver broader social and environmental benefits in addition to carbon reductions can command higher prices.

Supply and Demand: Limited supply, driven by the availability of new projects and global economic conditions, impacts prices.

Technological Advances: Innovations in climate technology and improvements in verification can affect the cost and credibility of carbon credits, influencing their market value.

The integration of air classification technology in graphite production aligns closely with several of the **United Nations Sustainable Development Goals (SDGs)**. Most notably, it supports **SDG 7: Affordable and Clean Energy** by reducing the energy consumption associated with traditional flotation processes, thus promoting more sustainable industrial practices. Additionally, the significant reduction in water and chemical usage advances **SDG 6: Clean Water and Sanitation**, as air classification eliminates the need for substantial water resources, minimizing water-related environmental impacts. By lowering greenhouse gas emissions, the project also contributes to **SDG 13: Climate Action**, emphasizing the critical role that innovative technologies play in achieving long-term environmental sustainability. This initiative demonstrates a commitment to cleaner production practices, essential for advancing global sustainability goals.

The quality of carbon credits generated by the air classification process is a key factor in determining their value and credibility in carbon markets. High-quality carbon credits, certified under recognized standards such as **Verified Carbon Standard (VCS)** or **Gold Standard**, ensure that emission reductions are real, measurable, and additional to business-as-usual practices. The air classification process not only reduces greenhouse gas emissions but also meets stringent environmental and social criteria, enhancing the integrity and demand for the credits produced. By adhering to these high standards, Volt Carbon Technologies can attract buyers seeking premium carbon credits, which not only provide financial benefits but also reinforce the company's commitment to environmental and social responsibility. This ensures long-term market viability and contributes to broader sustainability objectives.

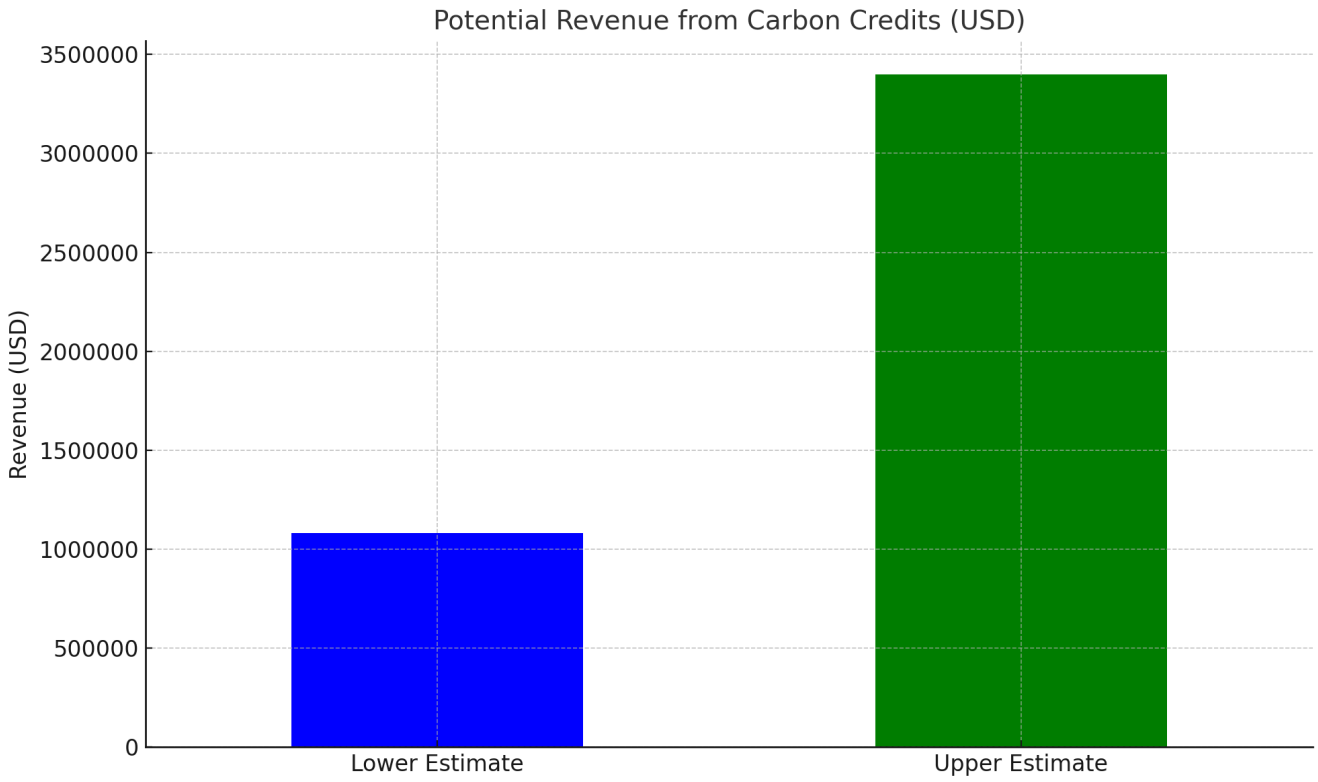


5.3. Financial Projections

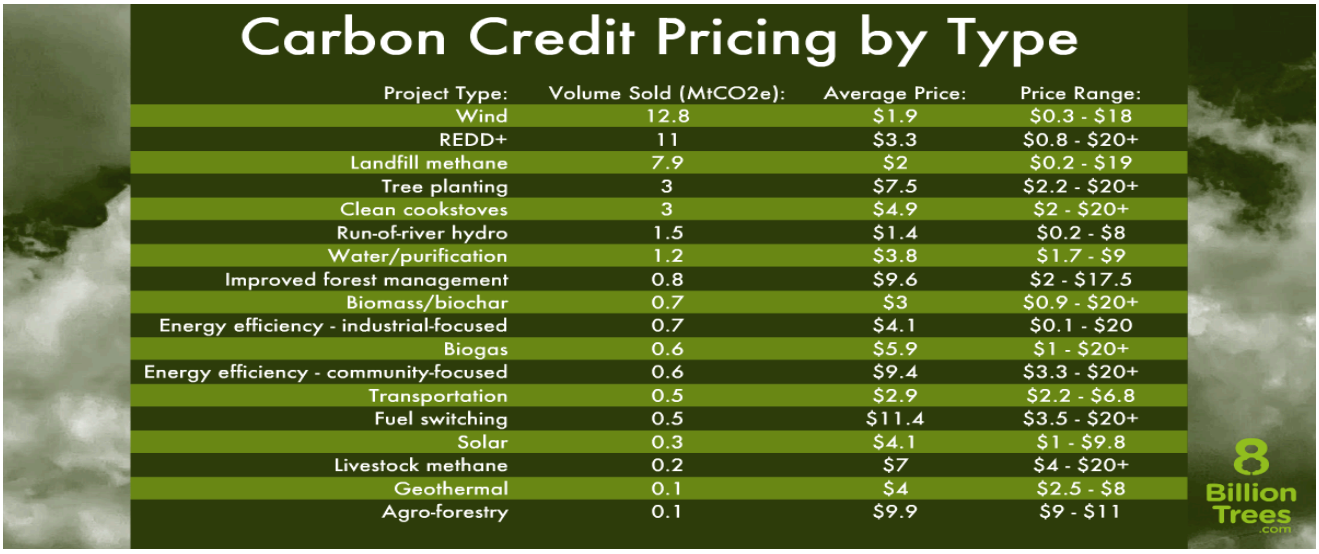
The financial benefits of implementing the air classifier are twofold:

1. **Cost Savings**: Reduced energy consumption leads to lower operational costs.
2. **Revenue from Carbon Credits**: The sale of carbon credits generated through emission reductions.

Volt Carbon Technologies has strong potential to generate significant revenue from carbon credits through its air classification process for graphite production. The process reduces GHG emissions by approximately 7.2 to 13.6 kg CO_2e per kilogram of graphite, which can be converted into carbon credits. With carbon credit prices ranging from $15 to $25 per metric ton of CO_2e, the potential revenue from producing 10,000 metric tons of graphite annually could range between $1,080,000 and $3,400,000, depending on carbon credit prices, which fluctuate based on market demand and regulatory changes (Verra, 2023).



Carbon credit pricing is influenced by several factors, including the type of certification standard, project type, and the specific market in which the credits are traded. In compliance markets like **California's Cap-and-Trade** or **Quebec's Cap-and-Trade** systems, prices tend to be more stable and higher due to regulatory obligations. In contrast, voluntary markets, such as those governed by the **Verified Carbon Standard (VCS)** or **Gold Standard**, exhibit more variability in prices, often depending on the perceived quality of the credits and additional co-benefits, such as contributions to sustainable development. Credits certified under **Gold Standard**, for instance, typically command premium prices due to their alignment with social and environmental goals, making them attractive to buyers seeking to enhance their corporate social responsibility (CSR) initiatives. This understanding of carbon credit pricing across different types and markets is critical for Volt Carbon Technologies as it seeks to maximize revenue from its carbon offset projects.



6. Conclusion and Next Steps for Feasibility Study

The air classification process for graphite production offers a substantial opportunity to reduce emissions, water usage, and chemical waste when compared to traditional flotation methods. By adhering to the outlined steps and actively engaging with regulatory bodies, Volt Carbon Technologies can establish the air classification process as a more sustainable and efficient approach to graphite production, significantly contributing to GHG emissions reductions and environmental conservation.

Next Steps:

- **Project Description and Scenarios:** Develop a detailed project description along with baseline and project scenarios.
    - Ensure all environmental and technical parameters are well defined for both the baseline and project scenarios.
- **Demonstrate Additionality:** Demonstrate Additionality: Show that the air classification process exceeds current regulatory requirements.
    - Highlight innovations in energy efficiency, water conservation, and chemical reduction.
- **Quantification Methodology:** Create and implement a robust methodology for quantifying GHG emission reductions.
    - Register under an established standard, such as the Verified Carbon Standard (VCS) or Gold Standard.

    - Alternatively, develop a new, comprehensive methodology that is tailored to the specific processes used by Volt Carbon Technologies.
- **GHG Emission Reductions and Monitoring:** Potential GHG emission reductions should be calculated, and monitoring requirements established to ensure ongoing compliance and accuracy.
    - Establish detailed monitoring requirements to ensure ongoing compliance with carbon standards.
    - Ensure the monitoring process is accurate and allows for regular updates as the project progresses.

This feasibility report offers a detailed framework for developing a new methodology for the air classification process in graphite production, ensuring it meets regional offset credit criteria while supporting broader sustainable development goals.

7. Carbon Accounting Services

7.1. Operational Boundaries

Definition: Operational boundaries require selecting the scope of emissions that will be reported. The three scopes of emissions are:

- **Scope 1**: Direct GHG emissions from assets owned or controlled by the company.
- **Scope 2**: Indirect GHG emissions from purchased electricity, heat, or steam.
- **Scope 3**: Other indirect GHG emissions resulting from the company's activities but originating from sources not owned or controlled by the company.

According to the GHG Protocol Corporate Reporting Standard, reporting Scope 1 and Scope 2 emissions is mandatory, while Scope 3 emissions are voluntary.

The GHG emission sources included in this inventory are based on the methodology outlined in the GHG Protocol and ISO14064-1:2006 standards. The emissions were classified into the following categories:

- **Direct GHG emissions (Scope 1)**: Emissions from sources that are owned or controlled by Volt Carbon Technologies.
- **Indirect GHG emissions (Scope 2)**: Emissions resulting from the generation of purchased electricity, heat, and steam consumed by the company.

- **Indirect GHG emissions (Scope 3)**: Emissions arising from the company's activities that originate from sources not owned or controlled by Volt Carbon Technologies.

Although reporting Scope 3 emissions is voluntary, this report includes key and material Scope 3 emissions to provide a comprehensive assessment of the company's environmental impact.

7.2. Description of EmitIQ.com and Its Use in Operational Emission Mapping

The 2024 Volt Carbon Technologies emissions report utilized EmitIQ's carbon accounting platform to ensure accurate and efficient emissions calculations. EmitIQ.com provided the necessary tools to create custom emission factors, manage data, and generate precise emissions reports.

- **Custom Emission Factors**: Custom emission factors were developed to address the unique aspects of the study.
    - This approach ensured the application of the most accurate and relevant factors to all activities and emission sources.
- **Data Upload**: Comprehensive data was uploaded in CSV format, capturing key metrics such as monthly utility usage, business trips, and hotel stays.
    - This organized approach enabled precise tracking of emissions at a detailed level.
- **Emission Factor Assignment**: Each data point was assigned its corresponding custom emission factor, with EmitIQ.com handling the calculations.
    - The platform converted the data into emissions values, providing results in both kilograms (kg CO_2e) and tonnes (t CO_2e) of carbon dioxide equivalent.
    - This process ensured a clear and precise quantification of emissions.
- **Data Sorting and Filtering**: EmitIQ.com enabled measurements to be sorted and filtered by category and date range.
    - This functionality supported detailed analysis and reporting, making it easy to track trends and identify areas for improvement.
- **Leveraging EmitIQ.com:** The platform enhanced the accuracy, transparency, and comprehensiveness of emissions reporting.

- This contributed significantly to the depth and quality of the Volt Carbon emission report.

8. Conclusion

The 2024 Feasibility Study for Volt Carbon Technologies provides an evaluation of the benefits and challenges associated with adopting advanced air classification technology in graphite production. By transitioning from traditional flotation methods to a more sustainable air classification process, Volt Carbon Technologies can substantially reduce greenhouse gas emissions, water consumption, and chemical waste, aligning with global clean technology trends. This approach not only aligns with the company's commitment to sustainability but also positions it as a leader in the clean technology sector. This commitment can be further demonstrated through annual carbon accounting reports, with more precise footprint calculations and effective baseline scenarios for offset projects.

A frequent issue highlighted in existing life cycle assessments (LCAs) for battery-grade graphite is the lack of high-quality data in the graphite production chain. As the market evolves, developing Product Category Rules (PCRs) for raw materials, including graphite, has become increasingly important. This is especially critical in light of new regulations proposed by the European Commission, which will require carbon footprinting, circular economy measures, and enhanced supply chain transparency (European Battery Alliance, 2020).

The study shows that the air classification process not only improves operational efficiency but also offers significant opportunities for revenue generation through carbon credits. By adopting this technology, Volt Carbon Technologies can achieve considerable cost savings, comply more effectively with environmental regulations, and support global efforts toward carbon neutrality.

As the company scales its graphite production, the context for carbon accounting will be crucial. EmitIQ, an advanced emissions management platform, will play a key role in this phase, providing accurate tracking, management, and reporting of greenhouse gas emissions. With EmitIQ’s capabilities, Volt Carbon Technologies will ensure precise measurement and transparency in its sustainability initiatives, helping the company meet its environmental goals and regulatory requirements.

Looking ahead, the company is encouraged to capitalize on these findings by engaging with regulatory bodies, pursuing relevant certifications, and exploring strategic partnerships to maximize the environmental and economic advantages of this project. With ongoing innovation and a dedication to sustainability, Volt Carbon Technologies is well-positioned to contribute to a cleaner, more energy-efficient future.

The most effective way to further reduce carbon emissions in graphite production, as identified in this study, is to shift to renewable energy sources. Energy consumption accounts for the majority of emissions in graphite production, and the newly patented air classifier technology has already made significant strides in reducing usage, as demonstrated by the delta range. The patent for this technology can be found under patent application number: **20240009707 - AIR CLASSIFIER**.

This feasibility study provides a strategic framework for implementing the air classification process, ensuring that Volt Carbon Technologies meets its sustainability objectives while strengthening its position in the growing market for environmentally responsible energy storage solutions. A more comprehensive study, such as a full Feasibility Study (FS), Life Cycle Assessment (LCA), or Project Design Document (PDD), is recommended for further refinement and detailed insights.

Appendices

Appendix 3 - Selected References

- American Carbon Registry. (n.d.). A platform for carbon credits generated through projects that reduce GHG emissions. Retrieved from https://americancarbonregistry.org
- EmitIQ. (n.d.). Advanced emissions management platform. Retrieved from https://emitiq.com
- Environmental Protection Agency. (n.d.). Environmental data and reporting standards. Retrieved from https://www.epa.gov
- Gold Standard. (n.d.). A certification standard for carbon offsets projects. Retrieved from https://www.goldstandard.org
- Greenhouse Gas Protocol. (n.d.). A comprehensive global standardized framework for measuring and managing greenhouse gas (GHG) emissions. Retrieved from https://ghgprotocol.org
- International Organization for Standardization. (2006). ISO 14064-1:2006 - Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals. Geneva, Switzerland: ISO. Retrieved from https://www.iso.org
- Natural Resources Canada. (n.d.). Energy and emissions data. Retrieved from https://www.nrcan.gc.ca
- Ontario Ministry of Energy. (2022). *Ontario's electricity system: Environmental impacts of electricity generation*. Retrieved from https://www.ontario.ca/page/ontarios-electricity-system
- Verra. (2020). Verified Carbon Standard (VCS): Energy Efficiency in Industry. Retrieved from https://verra.org

References

1. Zhu, W., Li, Y., Wang, Y., & Chen, G. (2022). Energy consumption and carbon emission analysis of natural graphite anode material for lithium batteries. *Journal of Cleaner Production, 346*. https://www.researchgate.net/publication/323324146_Energy_Consumption_and_Carbon_Emission_Analysis_of_Natural_Graphite_Anode_Material_for_Lithium_Batteries
2. Wang, J., Li, Y., & Liu, X. (2018). Energy consumption and carbon emission analysis of natural graphite anode material for lithium batteries. *ResearchGate*. Retrieved from

https://www.researchgate.net/publication/323324146_Energy_Consumption_and_Carbon_Emission_Analysis_of_Natural_Graphite_Anode_Material_for_Lithium_Batteries
3. Statista. (2023). Global graphite production emissions by type. *Statista*. Retrieved from https://www.statista.com/statistics/1351000/global-graphite-production-emissions
4. Schmid, P., & Hoffmann, S. (2021). Toward a life cycle inventory for graphite production. *Minerals Engineering*, 174. https://doi.org/10.1016/j.mineng.2021.107223
5. Graphite One Inc. (n.d.). Graphite One: High-grade critical mineral project. *Graphite One Inc.* Retrieved from https://www.graphiteoneinc.com/pfs/
6. Northern Graphite Corporation. (2022). *Life cycle assessment study for graphite concentrate production*. Minviro. https://www.northerngraphite.com/wp-content/uploads/2024/04/Bissett-Creek-PROSPECTIVELIFECYCLEASSESSMENTSTUDY_Final-Report_February2022_Updated-and-Reviewed.pdf
7. Green Battery Minerals. (2022). Independent lab results of Volt Carbon's dry-separated graphite. *Green Battery Minerals News*. Retrieved from https://greenbatteryminerals.com/green-battery-minerals-reports-independent-lab-results-of-volt-carbons-dry-separated-graphite-from-berkwood-graphite-project/
8. FBICRC. (2022). *Graphite purification report*. Future Battery Industries Cooperative Research Centre. Retrieved from https://fbicrc.com.au/wp-content/uploads/2023/11/FBICRC_Graphite-Purification-Report-VFINAL-Sept22.pdf
9. Ontario Ministry of Energy. (2022). *Ontario's electricity system: Environmental impacts of electricity generation*. Retrieved from https://www.ontario.ca/page/ontario-energy-snapshot