A Work Project, presented as part of the requirements for the Award of a Master's degree in

Impact Entrepreneurship & Innovation from the Nova School of Business and Economics.

Implementing the Carbon Border Adjustment Mechanism in the Indian Steel Industry
A case study

Neele Müller
58649

Work project carried out under the supervision of:

Ricardo Zózimo

16/12/2024

Abstract

This thesis explores the implications of the European Union's Carbon Border Adjustment Mechanism (CBAM) on the Indian Steel Company ISC, through a detailed case study approach. ISC relies heavily on the EU for revenue and faces strategic challenges when balancing compliance costs, market access, and sustainability.

The thesis evaluates three strategies: green transition, market diversification, and a balanced approach. While aligning with global sustainability trends, the study undermines the need for ISC to navigate financial risks.

Acknowledgement is given to Ricardo Zózimo from Nova SBE for advisory support and Richard J. Albert and Lillian Udell from EY, for their expertise.

Keywords

- Sustainability
- Decision-making
- Risks
- Impact
- European Regulation
- Carbon Border Adjustment Mechanism

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209

Content

List of Figures

1. Introduction CBAM

Please follow the link and watch the video on CBAM:

https://www.youtube.com/watch?v=2mVOMxDSm5o (MAGNUS COMMODITIES, 2023)

2. Case Study: Indian Steel company ISC

2.1. Introduction

It was a quiet moment in the bustling Mumbai office of the Indian Steel Company, ISC. Ananya Sharma, who had recently been tasked with monitoring sustainability policies that may affect the company, looked over the city's skyline from the office rooftop, contemplating the challenges lying ahead. Ananya is known for a clear strategic vision and her commitment to environmental goals. Recently, she returned from an international sustainability conference in Brussels, where one key topic dominated every conversation and occupied her mind ever since: the European Union's newly implemented Carbon Border Adjustment Mechanism (CBAM).

At the conference, experts from all over the globe outlined CBAM's complex implications. The policy, designed to put a price on carbon emissions when importing, effectively levelling the playing field for EU companies that already face strict carbon regulations, could have a huge impact on ISC. With 30% of ISC's exports directed to the EU, CBAM represents a pivotal challenge for the company. ISC's high-emissions steel production puts it directly in the spotlight, making compliance critical to safeguard its profitability and ensure ISC's future in the EU market.

When Ananya returned to the ISC headquarters, she presented her findings to the executive board. She knew that ISC needed to maintain a delicate balance as they have relied on exports to Europe as a stable revenue source ever since the company was founded because that market is known for demanding high-quality, premium-priced steel. However, the carbon footprint associated with the coal-based production methods that ISC employs means that the costs of

compliance with CBAM will be considerable. Thus far, some board members have already expressed concerns over the financial impacts of “any green transition” that could take place.

To Ananya, this topic feels personal. Since she had been tasked with the monitoring of upcoming sustainable practices, she has been doing research and came around to appreciate the practices. She was hoping to push ISC toward more sustainable practices, but as CBAM introduces a new urgency, she knows that her proposal would face challenges within ISC’s executive team. There was a fine line between promoting sustainability and ensuring short-term financial stability. When stepping into the boardroom, she braced herself for a pivotal discussion. Her goal was to present a feasible path forward for ISC and to gain an understanding of where the company executives stand - acknowledging the financial realities of compliance with CBAM while preparing the company to remain competitive in the increasingly ecologically conscious global market.

It was clear that this board meeting would shape the future of ISC - would ISC embrace the bold shift toward sustainable steel production, or would they choose the path of diversifying the market, and avoiding Europe in favor of regions with fewer regulatory demands?

As the conversations unfolded, it became clear that the board was divided. For ISC, this is not only a question of compliance, but a strategic crossroad that would define ISC’s place in the ever-transforming global economy.

2.2. Company Overview

The Indian Steel Company (ISC) headquartered in Mumbai, established in 1992 is employing approximately 25000 workers globally, ca. 80% of employees in India, in the production facilities across Gujarat and Odisha. ISC is the leading player in India’s steel manufacturing sector as of 2024 and has a production capacity of 8 million tonnes and produces 5 million tonnes of steel annually for the export market. Around 30% of that are directed toward the EU market and the rest stretches over North America, Southeast Asia and the Middle East.

The EU market is crucial to ISC's revenue, providing stability, long-term contracts, and allowing premium prices for high-quality steel, but it also exposes the company to the problems of increasingly rigorous environmental regulations (Somwanshi, 2024), (Anand, 2023). ISC's reliance on coal-based blast furnaces leads to highly carbon-intensive operations, emitting 2.6 tonnes of CO2 per tonne of steel, 12% more than the global average. Such an elevated carbon footprint jeopardizes ISC's capacity to comply with the EU's Carbon Border Adjustment Mechanism (CBAM), as well as the profitability of its regional exports (Anand, 2023).

CBAM, which seeks to impose a carbon price on imported goods, significantly increases the stakes for ISC (*Carbon Border Adjustment Mechanism*, n.d.). Compliance requires significant investments in decarbonization technology such as Electric Arc Furnaces (EAFs) and Green Hydrogen Generation. However, the financial implications of such adjustments are significant. For example, constructing a Hydrogen-Based Direct Reduced Iron (H2DRI) Plant can cost $1200 per tonne of capacity, much beyond the current expenses of ISC's blast furnace technologies (*Greening the Steel Industry: A Tale of Cost and Opportunity | Morgan Stanley*, 2023), (Cgep, 2024).

The dilemma is compounded by ISC's reliance on the EU market. Since Europe accounts for approximately one-third of ISC's sales, losing access to this high-margin market might have a significant impact on the company's financial health. Yet, maintaining access will require major capital investments, which short-term competitiveness supporters warn might disrupt the company's operations and jeopardize thousands of jobs.

The conflict between short-term profitability and long-term sustainability is at the heart of ISC's strategic challenges. On one hand, the EU's push for decarbonization is consistent with larger global trends, establishing early adopters as market leaders in the green steel industry. On the other hand, ISC must balance the immediate expenses of compliance with the possibility

of losing access to a critical income stream. The current reliance on coal and limited investment in green technology underlines the importance of resolving this dilemma as CBAM phases in.

2.3. Strategic dilemma within the ISC board

Evidently, the implementation of CBAM has put ISC at a strategic crossroads, with board members divided between two opposing priorities: committing to decarbonization or transitioning to less-regulated markets. This decision is compounded by ISC's carbon-intensive production methods and the company's dependence on the EU market for 30% of its revenue. Ananya has arranged a meeting with two specialists in the field of European Trade Regulations to provide her with expertise that she could present to the board. Richard J. Albert, a Partner at EY Germany specializing in Global Trade and Compliance, and Lillian Udell, Senior Manager at EY in the Netherlands were able to give her more insight and broadened the horizon on considerations that should be made (see Appendix A). Here is what she found:

2.3.1. Current Emissions, CBAM Compliance, and Administrative Challenges

ISC's steel production emits 2.6 tonnes of CO2 per tonne of steel, exceeding the global average by 12% (Anand, 2023b). With the EU implementing CBAM to penalize carbon-intensive imports, ISC faces a steep financial burden. Richard estimates that CBAM-related compliance costs for ISC could reach €45-50 per tonne of steel based on current emission levels and export volumes (see Appendix A.1.). By 2026, with CBAM fully phased in, these costs could rise to €60 per tonne, making it more expensive for ISC to maintain its market share in Europe.

In addition to the costs, ISC must address internal challenges that are related to CBAM compliance, which includes ensuring that all departments (e.g., tax, sustainability, and procurement) understand their responsibilities. Without clear role allocation, compliance efforts can become inefficient and disorganized (see Appendix A.1.). An accurate CBAM compliance and reporting strategy requires high-quality emissions data. Lillian mentions that companies face challenges in scaling the data systems to meet the stringent requirements of the

EU, which could also happen to ISC, and needs to be considered (see Appendix A.2.). From experience, Lillian remembers that many companies, commonly among low-margin industries, pass the CBAM compliance costs to customers which could offset financial burdens for a while but could risks losing price-sensitive EU buyers (see Appendix A.2.). Lillian clarifies that ISC needs to invest in a robust data infrastructure. Leveraging digital tools to streamline emissions reporting and manage CBAM compliance could ease the administrative burdens (see Appendix A.2.).

2.3.2. Cost of Decarbonization and Funding Opportunities

A transition to green steel production presents opportunities and challenges. Technologies such as Hydrogen-Based Direct Reduced Iron (H2-DRI) and Electric Arc Furnaces (EAF) offer potential reductions in CO2 emissions by up to 95%, but the financial implications are significant (Cgep, 2024b). Richard explains that building a Hydrogen-Based DRI facility costs approximately $1200 per tonne of production capacity, which exceeds the traditional costs for blast furnaces by far (see Appendix A.1.). A transition for ISC to entirely green technologies, requires an investment surpassing $960 million, based on the company's annual export volume of 800,000 tonnes (Cost per tonne x Export volume to the EU= 1,200 x 800,000 = 960,000,000 USD). However, Lillian highlights that India's underdeveloped infrastructure for green hydrogen production adds further uncertainty to the feasibility and ROI of such investments (see Appendix A.2.). Both, Richard and Lillian mention that ISC should explore EU programs like the Carbon Contracts for Difference (CCFD) or similar programs offered in India, which can provide financial incentives to offset decarbonization costs. Such subsidies could reduce the upfront investments that are required for the technologies, such as Hydrogen-Based DRI (see Appendix A.1. & A.2.). Richard also mentions that there are ongoing discussions about redistributing CBAM revenue to support decarbonization in developing countries. No

decisions have been made yet, but ISC could potentially benefit from such initiatives in the future and reduce its net investment burden (see Appendix A.1.).

2.3.3. Risks and Limitations of Avoiding the EU Market

Short-term competitiveness advocates argue to pivot away from the EU focusing on less-regulated regions, such as Southeast Asia or Africa. However, this strategy carries its own risks.

Risks	Implications	Costs
Lower Profit Margins	• Reducing ISC's profitability compared to the high-margin EU market – limits ability to attract investors who prioritize ESG practices • Creating a dependency on price-sensitive buyers further erodes profit margins • Limiting ISC's brand perception as a high-value steel producer, reducing opportunities to negotiate favourable contracts	• Revenue reduction • Increased reliance on cost-competitiveness rather than value differentiation in emerging markets
Oversupply Risk	• Driving down the prices, eroding revenues, especially when other exporters also pivot to those regions • Reduced negotiating power – can lead to operational inefficiencies	• Lower sales margins across all product lines • Possible need for production cuts to meet lower demand
Long-Term Disadvantage, falling behind global competitors	• Not being an early adopter leads to ISC missing to gain a competitive edge and establish relationships with ESG conscious clients • Higher future transition costs • Risking non-compliance in markets that may adopt CBAM-like regulations in the future	• Increased Capital expenditure • Loss of premium clients
Long-Term Unsustainability of Market Diversification	• Falling behind competitors that have already invested in decarbonization • Unregulated markets are unlikely to stay unregulated as decarbonizations efforts and policies expand • Alienating potential investors • Vulnerability to abrupt policy changes	• Potential fines or penalties in future regulated markets • Stranded assets or tech-investments
Risk of Trade Tensions	• Complicating ISC's access to alternative markets in the future • Conflicts escalating into tariffs or import restrictions can cut off access to critical materials or alternative markets	• Legal and compliance costs • Loss of access to key suppliers or buyers

Figure 1: Risks of avoiding the EU market

Figure 1 displays the risks of avoiding the EU market as addressed by the experts. The first risk identified by Lillian is **lower profit margins** (see Appendix A.2.). According to her, emerging markets typically offer lower pricing for steel, reducing ISC's profitability compared to the high-margin EU market. Richard mentions that diversification to less-regulated markets may create dependencies on price-sensitive buyers, which further erodes the profit margins (see Appendix A.1.). ISC's brand perception of a high-value steel producer is in danger. Overall, this could lead to a revenue reduction based on the fact that no more premium pricing is possible with an increased reliance on costs-competitiveness rather than value differentiation. Richard warns that a mass pivot by global competitors in the industry to unregulated markets could lead to **oversupply**, driving the prices down, thus, eroding revenues (see Appendix A.1.). This leads to reduced negotiation powers and can then lead to operational inefficiencies when

ISC competes on volume instead of value (see Appendix A.1.). Overall, lower sales margins across all product lines can be expected, due to competitive pricing pressures. There may also be a possible need for production cuts to meet the lower demand.

In terms of **long-term disadvantages** Lillian reminds, that as more countries adopt CBAM-like policies (e.g., Canada, Australia), ISC risks falling behind global competitors who have already invested in decarbonization (see Appendix A.2.). Richard adds that delaying investments in decarbonization will lead to higher costs in future transitions because the prices for technologies will stabilize and the competition for resources intensifies (see Appendix A.1.). It can be expected that the capital expenditure (CAPEX) will be increased based on the statement of Richard, which makes it difficult to catch up with competitors that have leveraged subsidies or green investments in the meantime.

Lillian mentions the **long-term unsustainability of market diversification**. While pivoting to less-regulated markets offers a short-term relief she warns that the global expansion of carbon regulation can make this strategy risky in the long term (see Appendix A.2.). With this, ISC potentially risks falling behind competitors that have already invested in decarbonization (see Appendix A.2.). A reduced focus on decarbonization investments risks alienating the international investors that prioritize sustainable industries (see Appendix A.1.). Additionally, both mention that a market diversification without an integrated sustainability plan leaves ISC vulnerable to abrupt policy changes, such as carbon taxes in emerging markets (see Appendices A.1. & A.2.). Possible cost implications are fines or penalties for non-compliance or stranded assets or technology investments that do not align with the demand of future markets.

Finally, there is a **risk of trade tensions**. Richard adds, that trade tensions, such as those arising from CBAM-related disputes with the U.S. or China, could further complicate ISC's access to alternative markets in the future, indicating that entering and solely relying on those regions may not be a stable solution (see Appendix A.1.). Tariffs or import restrictions resulting from

regulatory conflicts can cut off access to critical materials or alternative markets that ISC relies on. This can overall lead to legal and compliance costs to navigate the new trade barriers.

2.3.4. Key Issues for ISC

It becomes clear that ISC's board must address the following critical questions:

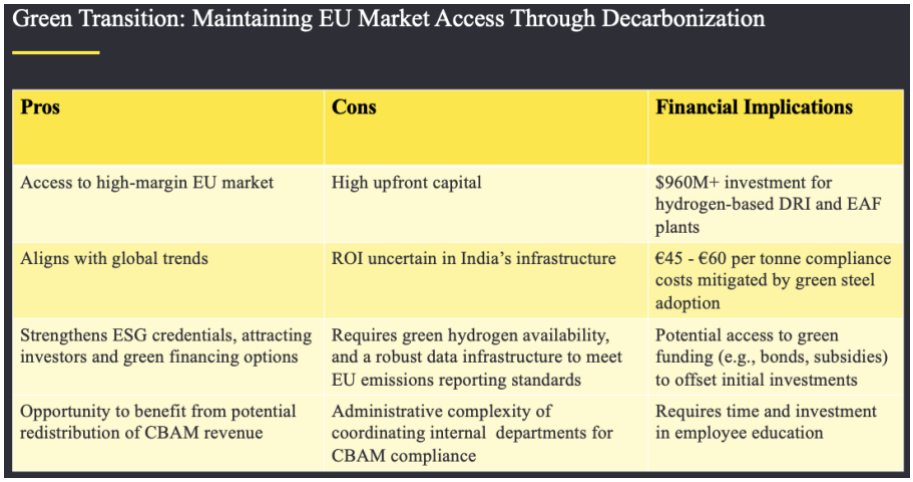
1. **Financial Sustainability**: How can ISC balance the high upfront costs of decarbonization with its need for immediate financial stability?
2. **Market Strategy**: Should ISC prioritize maintaining access to the high-margin EU market or diversify into less-regulated regions?
3. **Technological Readiness**: Is it feasible for ISC to adopt green technologies given India's current infrastructure challenges for renewable energy and hydrogen production?
4. **Stakeholder Impact**: How will each strategy affect ISC's employees, investors, and reputation as an industry leader?

2.4. Strategic Pathways for ISC: Balancing Competitiveness and Sustainability

Ananya combined her findings in a PowerPoint Presentation and presents them to the board. The objective of her presentation is to evaluate ISC's strategic options to address CBAM while balancing short-term financial stability and long-term market positioning. The following three approaches are considered:

1. Green Transition: investing in decarbonization to maintain EU market access
2. Market Diversification: Pivoting away from the EU to less-regulated markets
3. Balanced Strategy: Phased investments in decarbonization while exploring new markets

For the Green Transition (see Figure 2), Ananya emphasizes that by adopting green technologies, ISC has the opportunity to maintain access to the EU market, which allows premium pricing for high-quality steel. This is critical to ensure long-term competitiveness in an increasingly decarbonizing global economy. She highlights that transitioning to greener production methods aligns ISC with global sustainability trends (*Carbon Border Adjustment Mechanism*, n.d.-b). Not only does this position the company as a leader in green steel, but it also future-proofs its operations against similar regulations that will emerge in the future in the EU, but also in markets like Canada and Australia. However, she acknowledges the significant financial challenges, citing that the H2-DRI facility could cost approximately $1,200 per tonne of production capacity, which requires over $960 million in investments for ISC to fully transition (*Greening the Steel Industry: A Tale of Cost and Opportunity | Morgan Stanley*, 2023b).



Green Transition: Maintaining EU Market Access Through Decarbonization

Pros	Cons	Financial Implications
Access to high-margin EU market	High upfront capital	$960M+ investment for hydrogen-based DRI and EAF plants
Aligns with global trends	ROI uncertain in India's infrastructure	€45 - €60 per tonne compliance costs mitigated by green steel adoption
Strengthens ESG credentials, attracting investors and green financing options	Requires green hydrogen availability, and a robust data infrastructure to meet EU emissions reporting standards	Potential access to green funding (e.g., bonds, subsidies) to offset initial investments
Opportunity to benefit from potential redistribution of CBAM revenue	Administrative complexity of coordinating internal departments for CBAM compliance	Requires time and investment in employee education

Figure 2: Green Transition Slide

Lastly, Ananya reminds that green financing options such as government subsidies and green bonds could help offset some of these costs and make the transition more feasible over time (see Appendix A.1.) (*Iron and Steel Technology Roadmap – Analysis - IEA*, 2020). Ananya also highlights the operational challenges that ISC may face, particularly in ensuring departmental alignment to ensure CBAM compliance as suggested by Richard, and the investments needed in a robust data infrastructure to meet the stringent EU emissions reporting requirements as stressed by Lillian (see Appendices A.1. & A.2.). Overall, Ananya stresses that the Green Transition is resource-intensive, but it may secure ISC's foothold in the high-margin

EU market and aligns with global regulatory shifts. In terms of Market Diversification (see Figure 3) Ananya explains that pivoting to less-regulated markets allows ISC to avoid the high upfront costs of decarbonization, ensuring immediate financial stability, by simply continuing to use the existing production processes without the burden of CBAM compliance costs. However, she warns that emerging markets usually offer lower profit margins compared to the EU (Bekaert et al., 2021). Thus, ISC would have to accept reduced revenue per tonne of steel, which could potentially impact its overall profitability in the long run. She warns about the weakened ESG reputation that ISC may experience when diversifying markets and moving away from the EU (Bekaert et al., 2021).

Market Diversification: Pivoting to Less-Regulated Markets

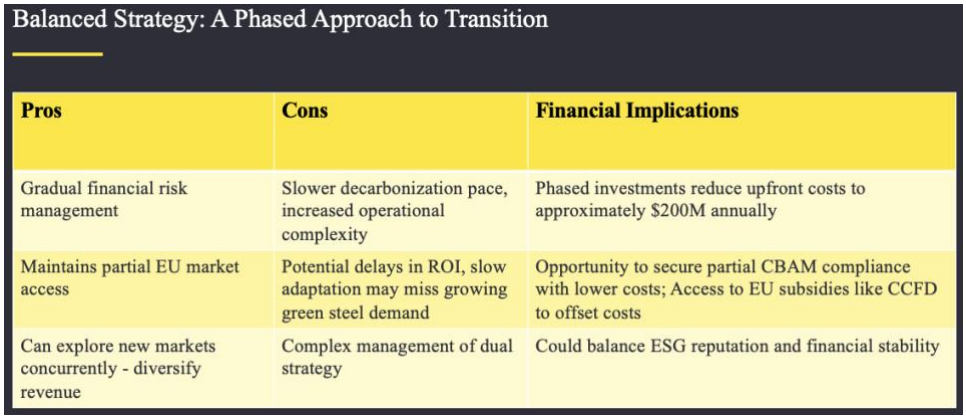
Pros	Cons	Financial Implications
Short-term financial stability by avoiding CBAM compliance costs	Reduced profit margins in emerging markets compared to EU	Lower immediate costs as no major investment is needed (avoids $960M)
Avoids high decarbonization costs	Oversupply risk in less-regulated markets	Potential revenue loss of $200M annually due to lower pricing in new markets
Taps into growing demand in emerging regions, leveraging growth opportunities in emerging markets with rising infrastructure and industrial development needs	Weakens ESG reputation, reducing competitiveness in long-term	Risk of losing premium contracts with EU-based buyers
	Risk of trade tensions in alternative markets like the U.S. and China	
	Long-term unsustainability of diversification as global regulations expand.	

Figure 3: Market Diversification Slide

Ananya informs the board that these markets are experiencing rapid industrial and infrastructural growth, creating opportunities for ISC to establish a strong presence and take advantage of the rising demand for steel. However, as she has been informed by Richard, she warns that a global shift toward less-regulated markets could lead to oversupply, driving down prices and making it harder for ISC to maintain revenue levels (see Appendix A.1.), (Boullenois & Jordan, 2024). Ananya warns that ISC's potential reliance on less-regulated markets might be short-lived with the global carbon regulations expanding, making this a semi-stable strategy (see Appendix A.2.). She adds that trade tensions arising from such policies could further complicate market access (see Appendix A.1.). Overall, she stresses that while market

diversification offers short-term relief, it also carries long-term risks, including reduced profitability and oversupply in those less-regulated markets (Chalabyan et al., 2018).

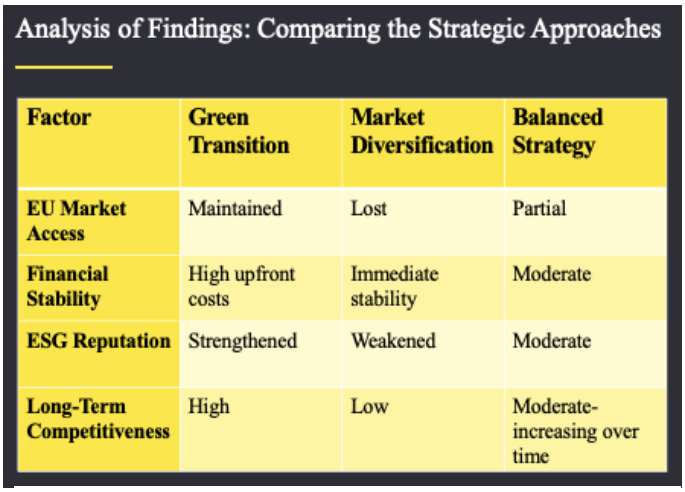
Regarding the balanced strategy (see Figure 4), Ananya explains that a phased approach to decarbonizing allows ISC to spread the high financial investments over several years (Cgep, 2024c). They may start with smaller pilot projects like Hydrogen-Based DRI and EAF technologies.


Balanced Strategy: A Phased Approach to Transition

Pros	Cons	Financial Implications
Gradual financial risk management	Slower decarbonization pace, increased operational complexity	Phased investments reduce upfront costs to approximately $200M annually
Maintains partial EU market access	Potential delays in ROI, slow adaptation may miss growing green steel demand	Opportunity to secure partial CBAM compliance with lower costs; Access to EU subsidies like CCFD to offset costs
Can explore new markets concurrently - diversify revenue	Complex management of dual strategy	Could balance ESG reputation and financial stability

Figure 4: Balanced Strategy Slide

Thus, ISC can manage costs while gradually working toward CBAM compliance. She highlights the benefits of retaining partial access to the high-margin EU market. This can be achieved by prioritizing decarbonization for specific production lines, to ensure compliance for the key exports whilst maintaining flexibility. It would allow ISC to diversify into emerging markets concurrently. Splitting the focus between compliance and expansion allows ISC to mitigate risks and ensure stable revenue streams. However, Ananya acknowledges and stresses that managing two distinct market strategies as such can increase operational complexity and require careful coordination (see Appendix A.1.). Ananya concludes that the Balanced Strategy offers a middle ground reducing the stress of financial risks while maintaining market diversity. She stresses that success will depend on an effective execution and phased investments (Cgep, 2024d). Ananya highlights the opportunity to leverage


Analysis of Findings: Comparing the Strategic Approaches

Factor	Green Transition	Market Diversification	Balanced Strategy
EU Market Access	Maintained	Lost	Partial
Financial Stability	High upfront costs	Immediate stability	Moderate
ESG Reputation	Strengthened	Weakened	Moderate
Long-Term Competitiveness	High	Low	Moderate-increasing over time

Figure 5: Analysis of Findings Slide

EU subsidies, such as the CCFD, to offset decarbonization costs (see Appendices A.1. & A.2.). With the final Slide "Analysis of Findings" (see Figure 5) Ananya suggests that ISC should develop a phased decarbonization roadmap, starting with pilot projects for Hydrogen-Based DRI and EAF technologies to gradually align with CBAM requirements.

After presenting her findings, ISC's board remains deeply divided. While decarbonization presents a long-term strategy for maintaining competitiveness in an increasingly low-carbon global market, it requires significant upfront investments and entails financial risks. Whilst this strategy is consistent with expanding worldwide trends and ensures long-term competitiveness, it entails significant short-term financial risk. The high capital expenditure required to switch to green technologies, such as hydrogen-based steel production, and the uncertainty of when the global market will fully adopt carbon pricing makes the ROI unclear (see Figure 2). On the contrary, delaying decarbonization allows ISC to maintain its financial stability in the short term and continue thriving in less-regulated markets for a while. However, this option comes with long-term risks. The pressure of moving toward decarbonization is unlikely to slow down, and if ISC delays for too long, it may even face higher transition costs in the future and miss multiple opportunities in lucrative markets, for example in the EU, where demand for low-carbon steel is growing (see Figure 3).

Ultimately, ISC's dilemma centers on balancing short-term financial stability with the long-term need for sustainability. The board acknowledges the risks and benefits of each approach, but the consensus points toward conducting a detailed risk analysis to explore a Balanced Strategy. A delicate balance of **financial foresight**, **market trends**, and **technological investment** is required. The phased approach mitigates immediate financial risks while maintaining a foothold in regulated markets, positioning ISC for a competitive and sustainable future.

3. Teaching notes

3.1. Introduction

Environmental sustainability and regulatory compliance have emerged as critical challenges in global trade, requiring companies across various industries to adapt to increasingly stringent environmental standards. As climate change concerns grow, governments and international bodies are implementing policies aimed to reduce greenhouse gas emissions and promote greener economies. Among these measures, the European Union's Carbon Border Adjustment Mechanism (CBAM) stands out as a groundbreaking legislative initiative with the potential to transform the global market dynamics for carbon-intensive industries (*Carbon Border Adjustment Mechanism*, n.d.).

CBAM, introduced by the European Union, aims to address the issue of "carbon leakage," in which companies relocate manufacturing to countries with less stringent environmental rules to save money on carbon emissions. By placing a carbon price on imported goods, CBAM aims to level the playing field between EU-based enterprises that are subject to the EU Emissions Trading System (ETS) and foreign producers that do not face equivalent carbon constraints. The policy initially targets the sectors with the highest carbon emissions, such as steel, cement, aluminium, and fertilisers, with the possibility to expand to other industries in the future. CBAM's consequences extend beyond the European Union's borders, impacting trade policy and commercial tactics across the world (*Carbon Border Adjustment Mechanism*, n.d.). For companies exporting to the EU, the mechanism adds a new layer of compliance that might have a substantial impact on their competitiveness, profitability, and long-term sustainability. As more countries consider similar regulations, CBAM represents a transition towards a global economy in which environmental sustainability is no longer optional but necessary for market access.

This case study investigates the impact of CBAM on the Indian Steel Company (ISC), a large steel exporter facing difficult decisions in the wake of this new policy. ISC, like many other businesses in carbon-intensive industries, must navigate the strategic hurdles posed by CBAM and weigh its options: should it invest in green technology to decrease emissions and retain access to the EU market, or should it pivot to economies with lower environmental regulations? This research intends to give insight into the larger implications of CBAM for businesses throughout the world as they face the dual constraints of environmental responsibility and financial viability by investigating ISC's strategic crossroads.

3.2. Case Summary

The Indian Steel Company (ISC) is a major exporter of steel and is now facing a critical strategic dilemma as the EU implements the Carbon Border Adjustment Mechanism (CBAM). With 30 % of its revenue reliant on EU exports, ISC must choose between two primary strategic options:

1. Green Transition: Invest in decarbonization technologies to comply with CBAM and maintain access to the high-margin EU market.
2. Market Diversification: Pivot to less-regulated markets to avoid immediate costs of decarbonization, though at the risk of lower profitability and reputational challenges.

The case explores ISC’s challenges in balancing financial stability, market trends and technological investments, guiding students to assess strategic trade-offs given in a globally regulated environment.

Ultimately, the case advocates for a Balanced Strategy, recommending a phased approach to decarbonization while exploring emerging markets. Students are encouraged to conduct a risk analysis on this approach to weigh the financial, operational, and market implications of a gradual implementation of green technologies alongside market diversification.

4. Course Application

The following Learning Objectives and Key Discussion Topics are directly tied to specific classroom activities discussed in Section 6.

4.1. Learning objectives

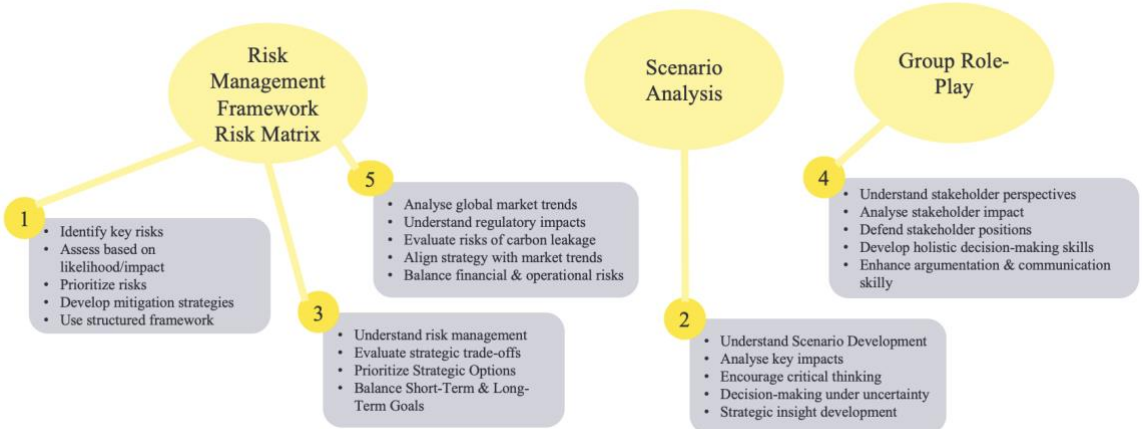


Figure 4: Learning objectives connected to class content

1. Risk Assessment Through the Risk Matrix (See Section 6.1.: Class Day 1)

Whilst crafting Risk Matrices, students will be enabled to identify and assess key financial-, market-, and technological risks that ISC faces using a structured risk matrix. Students will be taught to prioritize risks based on likelihood and impact and propose actionable mitigation strategies.

2. Scenario-Based Strategic Planning (See Section 6.2.: Class Day 2)

In this section, the students are trained to develop optimistic, pessimistic, and balanced scenarios for ISC whilst emphasizing the financial, market, and operational impact of each. This encourages critical thinking when crafting actionable insights for a situation of decision-making under uncertainty.

3. Analyzing Strategic Trade-Offs Using Risk Management Frameworks (See Section 6.1.: Class Day 1)

To present a Risk Matrix, Students will be equipped to use the risk management principles (ISO 31000) to evaluate the trade-offs between decarbonization, market diversification, and

phased strategies with the goal of developing an ability to balance short-term financial stability with long-term sustainability.

4. Stakeholder Impact Evaluation (See Section 6.1.: Class Day 2)

Through a Group Role-Play Debate, an understanding of how ISC's strategic choices impact key stakeholders, including employees, investors, and the company's reputation will be developed. This trains students to defend positions from various stakeholder perspectives, allowing a holistic approach to decision-making.

5. Understanding Global Market Trends and Regulatory Implications (See Section 6.1.: Class Day 1)

Students are taught to analyze global market trends, including the risks of carbon leakage and evolving decarbonization regulations when discussing CBAM and the strategic dilemmas in a group. This enables the students to evaluate how ISC can align with those trends while simultaneously managing financial and operational risks.

4.2. Key Discussion Topics

Strategic Decision-Making under Regulatory Pressure	
Class Section	Class Day 1: Discussion on CBAM and ISC's Dilemma
Key Questions	• How does CBAM affect ISC's strategic options? • Should ISC prioritize decarbonization for EU compliance or pivot to less-regulated markets?

Figure 5: Key Discussion Topic - Strategic Decision-Making under Regulatory Pressure

The objective of the discussion topics mentioned in Figure 7 is that students will learn to frame a core strategic challenge and understand the tension between regulatory compliance and market dynamics.

Risk Management and Prioritization	
Class Section	Class Day 1: Risk Matrix Activity
Key Questions	• What are the top financial-, market-, and technological risks that ISC faces? • How can these risks be mitigated in the context of ISC's strategic goals?

Figure 6: Key Discussion Topic - Risk Management and Prioritization

Figure 8's key discussion objective is for students to have the ability to identify, analyze, and prioritize risks by using a structured matrix approach.

Global Market Trends and Carbon Leakage	
Class Section	Class Day 1: Risk Matrix Presentation and Discussion
Key Questions	• How does ISC remain competitive amidst global decarbonization trends and the risk of carbon leakage? • What advantages or disadvantages can arise from ISC's current market strategy in regulated vs unregulated markets?

Figure 7: Key Discussion Topic - Global Market Trends and Carbon Leakage

The key discussion topics for Global Market Trends and Carbon Leakage mentioned in Figure 9 have the objective of deepening an understanding of market dynamics and how ISC's position may change in evolving global frameworks.

Scenario-Based Decision-Making	
Class Section	Class Day 2: Scenario Development Activity
Key Questions	• How do different strategic options play out in optimistic, pessimistic, and balanced scenarios? • What are the implications on ISC's profitability, market access, and stakeholder impact in each scenario?

Figure 8: Key Discussion Topic - Scenario-Based Decision-Making

For the Scenario-Based Decision-Making (Figure 10), the objective is that students will be trained to use the scenario analysis for strategic planning and decision-making in the case of ISC.

Stakeholder Impact and Corporate Responsibility	
Class Section	Class Day 2: Group Role-Play Debate
Key Questions	• What are the key stakeholders and how does the choice that ISC makes affect them? • What is the responsibility for ISC as a corporate leader in adopting sustainable practices?

Figure 9: Key Discussion Topic - Stakeholder Impact and Corporate Responsibility

The objective of the discussion topics in Figure 11 is to develop critical thinking skills about stakeholder impact and the balance between corporate responsibility and financial performance will be fostered.

5. Theoretical Frameworks: Risk Management & Scenario Analysis

The Risk Management Framework ISO 31000 is an international standard that provides guidelines and principles to effectively manage risks and applies to organizations of any size or sector (*ISO 31000:2018*, 2023). It serves as a guide for the design, implementation and maintenance of risk management (Lachapelle & Hundozi, 2015).

It establishes a structured and holistic approach to risk management as it ensures its integration into organizational processes (*ISO 31000:2018*, 2023) (see Figure 12). It provides the foundations and organizational arrangements to design, implement, monitor, review, and continually improve risk management throughout the organization. This surpasses the systematic application of policies, procedures, and practices to the activities of communication, consultation, establishing the context, and identifying, analyzing, evaluating, treating, monitoring, and reviewing risks (*ISO 31000:2018*, 2023). In the case of ISC, it allows to identify risks by assessing financial, market and operational risks that are associated with decarbonization and market diversification. Additionally, the risks can be analyzed, to allow for a quantification of the likelihood and the impacts of risks, such as the financial burden,

Figure 10: Risk Management Framework

regulatory non-compliance, or reputational damage. Finally, risk mitigation strategies can be developed to reduce the previously identified risks, such as phased investments or leveraging green financing options (*ISO 31000:2018*, 2023). In addition to the Risk Management Framework, a Scenario Analysis is beneficial (see Figure 13). A Scenario analysis is a strategic planning tool serving to analyze potential future events by considering alternative possible outcomes. This helps to understand the dynamics and variables that can lead to future states a company may find themselves in, based on different sets of assumptions and variables (*Scenario Analysis*, n.d.). Different key factors that could influence future outcomes, such as economic trends, regulatory changes, and technological advancements will be analyzed (Vipond, 2024). Scenarios will be developed, that create detailed narratives describing different plausible futures, including best-case, worst-case, and most likely scenarios. Finally, the potential impact of each scenario will be evaluated on the organization's objectives and strategies (Lawless, 2024). In terms of ISC, Scenarios can be developed based on CBAM compliance, market trends, and green technology adoption rates, as discussed in the case. Then the impact can be assessed to analyze how ISC's profitability, market access, and stakeholder impact vary across these scenarios. That leads to strategic planning, where the insights can be utilized to refine the Balanced Strategy, identifying critical risks and opportunities (see Figure 13).

Figure 11: Scenario Development

6. Class Plan: Applying the Risk Management and Scenario Analysis

Assuming the students read the case and watched the suggested video (see Section 1)

6.1. Class Day 1: Understanding Risk Management and Scenario Analysis

Duration: 90 minutes

1. **Introduction (15 minutes)**

The professor will explain the key principles of ISO 31000 and the Scenario Analysis and will discuss their relevance to ISC's Balanced Strategy (see Section 5: Theoretical Framework).

2. **Group Work: Risk Matrix Exercise (30 minutes)**

Group 1: Financial Risks	**Likelihood** (1-10)	**Impact** (1-10)

Figure 12: Risk Matrix Template Hand-out

Students will be divided into three groups to assess the risks that ISC faces. These groups will be dedicating their time respectively to financial implications, market implications, and technological implications. Each group populates a Risk Matrix with risks ranked by likelihood and impact. In this Risk Matrix (see Figure 14), students are expected to fill out the risks associated with the theme of their group and assign the likelihood of the risks taking place, as well as the expected impact on ISC. The students need to be ready to explain and discuss the likelihood and impact ratings they have decided on.

3. **Group Presentations and Cross-Discussion (45 minutes)**

Once the groups develop the Risk Matrices, they will each present their findings and facilitate a discussion on how the key risks can be mitigated using the Balanced Strategy for ISC.

6.2. Class Day 2: Scenario Analysis and Decision-Making

Duration: 90 minutes

1. **Scenario Development (30 minutes)**

The students will be divided into groups. They are expected to critically analyze ISC's potential pathways and explore the financial, market, and operational implications of each scenario. This will allow the students to better understand how various strategies impact the company's long-term sustainability and competitiveness. The following scenarios will be outlined:

- Optimistic: Assume a rapid green technology adoption, allowing for full CBAM compliance.
- Pessimistic: Assume slow adoption of green technologies or a decision to avoid decarbonization.
- Balanced: Assume a phased compliance with CBAM, investing in green technologies gradually over 5-7 years.

Students are expected to highlight potential opportunities, discuss challenges, and include information that has been discussed in the previous class. Finally, the students present their findings and discuss together which scenario seems most realistic and actionable based on ISC's current position. Figures 15, 16 and 17 are displays of the handouts that the students will receive, with one example for each opportunity and challenge.

Optimistic Scenario
ISC invests heavily in green technologies and achieves full CBAM compliance within 3 years, the EU market thrives and the demand for green steel rises globally.

Opportunities	Challenges
• Full CBAM compliance can ensure EU market access	• High upfront costs to adopt green technologies
• …	• …
• …	• …

Figure 13: Scenario Development - Optimistic

Pessimistic Scenario
ISC fails to decarbonize effectively, exists the EU market, relies entirely on less-regulated markets. Whilst the demand for green steel rises, ISC cannot compete due to a lack of compliance.

Opportunities	Challenges
• Immediate cost saving because CBAM costs were avoided	• Loss of revenue of EU market
• …	• …
• …	• …

Figure 14: Scenario Development - Pessimistic

Balanced Scenario
ISC adopts the phased compliance strategy, achieves partial CBAM compliance over 5-7 years and simultaneously explores less-regulated markets for diversification.

Opportunities	Challenges
• Gradual decarbonization reduces immediate financial risks	• Dual strategy increases operational complexity
• …	• …
• …	• …

Figure 15: Scenario Development - Balanced

2. Group Role-Play: Decision Debate (50 minutes)

The professor assigns the following group roles: ISC executives, financial analysts, and sustainability advocates. In these roles the class will discuss strategic options for ISC, focusing on the Balanced Strategy. The positions that the students are playing, need to be justified using

Instructions for students:

- Review the scenarios and the strategic options discussed in this and the previous class
- Work within your assigned roles to develop arguments supporting your position
- Use data and insight from the scenario analysis to justify your arguments
- Present your position to the class, focusing on:
  - Risks and benefits of your recommended strategy
  - How your strategy aligns with the short- and long-term goals of ISC
- Engage in a collaborative discussion to decide on the best course of action for ISC

Figure 16: Group Role-Play Instructions

the Risk Management and Scenario Analysis. Each group will present their position and collectively decide on the most viable strategy for ISC. Figure 18 shows the instructions that can be handed out to the students.

3. **Wrap-Up (10 minutes)**

The key insights from both classes should be summarized here. How Risk Management and the Scenario Analysis apply to real-world sustainability decisions should be highlighted here.

7. Anticipated Answers

7.1. Class Day 1: Risk Matrices Examples

Group 1: Financial Risks	**Likelihood** (1-10)	**Impact** (1-10)
High upfront costs of decarbonization	8	9
Delayed ROI from green technology investments	7	8
Inability to secure green financing (e.g., Bonds)	5	8
Rising operational costs due to CBAM compliance	9	10
Currency fluctuations in emerging market exports	6	7

Figure 17: Anticipated Answers: Risk Matrix - Financial Risks

Group 2: Market Risks	**Likelihood** (1-10)	**Impact** (1-10)
Oversupply in unregulated markets	6	7
Loss of premium pricing in EU market	7	8
Competition from low-cost global producers	8	9
Shifting customer preferences toward green steel	5	8
Trade barriers in new markets	4	6

Figure 18: Anticipated Answers: Risk Matrix - Market Risks

Group 3: Technological Risks	**Likelihood** (1-10)	**Impact** (1-10)
Infrastructure unavailable for green hydrogen in India	7	8
Unproven efficiency of hydrogen-based DRI	6	9
Delays in green technology implementation	8	7
High maintenance costs for the new technologies required	5	6
Outdated technology with evolving standards	4	7

Figure 19: Anticipated Answers: Risk Matrix - Technological Risks

7.2. Class Day 2: Scenario Analysis and Decision-Making

Scenario Development

Figures 22, 23, and 24 display some of the anticipated answers from students based on all the learnings gained from previous exercises.

Optimistic Scenario
ISC invests heavily in green technologies and achieves full CBAM compliance within 3 years, the EU market thrives and the demand for green steel rises globally.

Opportunities	Challenges
• Full CBAM compliance can ensure EU market access	• High upfront costs to adopt green technologies
• Strengthened ESG reputation to attract investors	• Dependency on green hydrogen infrastructure
• Green funding allowing to offset initial costs	• Uncertain ROI
• ISC becomes market leader	• Dependent on availability of green hydrogen

Figure 22: Anticipated Answers: Optimistic Scenario

Pessimistic Scenario
ISC fails to decarbonize effectively, exists the EU market, relies entirely on less-regulated markets. Whilst the demand for green steel rises, ISC cannot compete due to a lack of compliance.

Opportunities	Challenges
• Immediate cost saving because CBAM costs were avoided	• Loss of revenue of EU market
• Opportunity to expand in emerging markets	• Oversupply in unregulated markets erodes profit margins
	• Reputational damage impacting customer's and investor's decisions

Figure 23: Anticipated Answers: Pessimistic Scenario

Balanced Scenario
ISC adopts the phased compliance strategy, achieves partial CBAM compliance over 5-7 years and simultaneously explores less-regulated markets for diversification.

Opportunities	Challenges
• Gradual decarbonization reduces immediate financial risks	• Dual strategy increases operational complexity
• Partial EU access retained while revenue streams diversify	• Slow progress on green adoption
• ISC remains flexibility to adapt to global trends	• ROU can take longer to materialize

Figure 24: Anticipated Answers: Balanced Scenario

Group Role-Play: Decision Debate

ISC Executives:

- Argue to maintain EU market access to secure revenue and competitiveness
- Support a phased investment to reduce the financial strain
- Emphasize the need to balance long-term sustainability with short-term profitability

Financial Analysts:

- Emphasize cost control and ROI concerns over the phased strategies
- Highlight the risks of oversupply in unregulated markets if the EU is exited
- Advocate to diversify the funding sources, such as green financing or subsidies

Sustainability Advocates:

- Push for decarbonization as a long-term strategic priority to align with global trends and stay competitive
- Emphasize the responsibility of ISC as an industry leader to adopt sustainable practices and lead as an example
- Stresses benefits of green reputation in attracting premium buyers and investors

8. Bibliography

Anand, S. N. S. (2023a, June 23). India's steel exports to EU to come under pressure on CBAM framework: Icra. *Mint*. https://www.livemint.com/industry/indias-steel-exports-to-eu-to-come-under-pressure-on-cbam-framework-icra-11687517299420.html

Anand, S. N. S. (2023b, June 23). India's steel exports to EU to come under pressure on CBAM framework: Icra. *Mint*. https://www.livemint.com/industry/indias-steel-exports-to-eu-to-come-under-pressure-on-cbam-framework-icra-11687517299420.html

Bekaert, F., Hagenbruch, T., Kastl, E., Mareels, S., Van Hoey, M., Vercammen, S., & Zeumer, B. (2021). The future of the European steel industry. In *McKinsey & Company*. https://www.mckinsey.com/~/media/mckinsey/industries/metals%20and%20mining/our%20insights/the%20future%20of%20the%20european%20steel%20industry/the-future-of-the-european-steel-industry_vf.pdf

Boullenois, C., & Jordan, C. A. (2024, June 18). *How China's Overcapacity Holds Back Emerging Economies*. Rhodium Group. https://rhg.com/research/how-chinas-overcapacity-holds-back-emerging-economies/

Carbon Border Adjustment Mechanism. (n.d.-a). Taxation and Customs Union. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

Carbon Border Adjustment Mechanism. (n.d.-b). EU Taxation and Customs Union. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

Cgep, C. |. (2024a, April 1). *Low-Carbon production of iron & steel: technology options, economic assessment, and policy*. Center on Global Energy Policy at Columbia

University SIPA | CGEP. https://www.energypolicy.columbia.edu/publications/low-carbon-production-iron-steel-technology-options-economic-assessment-and-policy/

Cgep, C. |. (2024b, April 1). *Low-Carbon production of iron & steel: technology options, economic assessment, and policy*. Center on Global Energy Policy at Columbia University SIPA | CGEP. https://www.energypolicy.columbia.edu/publications/low-carbon-production-iron-steel-technology-options-economic-assessment-and-policy/

Cgep, C. |. (2024c, April 1). *Low-Carbon production of iron & steel: technology options, economic assessment, and policy*. Center on Global Energy Policy at Columbia University SIPA | CGEP. https://www.energypolicy.columbia.edu/publications/low-carbon-production-iron-steel-technology-options-economic-assessment-and-policy/

Cgep, C. |. (2024d, April 1). *Low-Carbon production of iron & steel: technology options, economic assessment, and policy*. Center on Global Energy Policy at Columbia University SIPA | CGEP. https://www.energypolicy.columbia.edu/publications/low-carbon-production-iron-steel-technology-options-economic-assessment-and-policy/

Chalabyan, A., Mori, L., & Vercammen, S. (2018, January). *The current capacity shake up in steel and how the industry is adapting*. McKinsey & Company. https://www.mckinsey.com/~/media/McKinsey/Industries/Metals%20and%20Mining/Our%20Insights/The%20current%20capacity%20shake%20up%20in%20steel%20and%20how%20the%20industry%20is%20adapting/The-current-capacity-shake-up-in-steel-and-how-the-industry-is-adapting.ashx

Greening the Steel Industry: A Tale of Cost and opportunity | Morgan Stanley. (2023a, May 18). Morgan Stanley. https://www.morganstanley.com/ideas/green-steel-low-carbon

Greening the Steel Industry: A Tale of Cost and opportunity | Morgan Stanley. (2023b, May 18). Morgan Stanley. https://www.morganstanley.com/ideas/green-steel-low-carbon

Iron and Steel Technology Roadmap – Analysis - IEA. (2020, October 1). IEA. https://www.iea.org/reports/iron-and-steel-technology-roadmap

ISO 31000:2018. (2023). ISO. https://www.iso.org/standard/65694.html

Lachapelle, E., & Hundozi, B. (2015, January 9). *ISO 31000 Risk Management – Principles and guidelines*. https://pecb.com/whitepaper/iso-31000-risk-management--principles-and-guidelines

Lawless, J. (2024, August 29). *Scenario Analysis*. Purple Griffon. https://purplegriffon.com/blog/scenario-analysis

MAGNUS COMMODITIES. (2023, December 11). *Carbon Border Adjustment Mechanism (CBAM)* [Video]. YouTube. https://www.youtube.com/watch?v=2mVOMxDSm5o

Scenario Analysis. (n.d.). 10xsheets. https://www.10xsheets.com/terms/scenario-analysis

Somwanshi, R. (2024, October 9). *EU's CBAM seen hurting Indian steel industry: finance minister*. S&P Global. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/metals/100924-eus-cbam-seen-hurting-indian-steel-industry-finance-minister

Vipond, T. (2024, October 21). *Scenario analysis*. Corporate Finance Institute. https://corporatefinanceinstitute.com/resources/financial-modeling/scenario-analysis/

Appendix

Appendix A: Interviews Richard J Albert & Lillian Udell

Appendix A.1.: Richard J Albert – EY DE - Partner Global Trade & Compliance

1. Customs and Regulatory Challenges with CBAM

Question: What are the most challenging aspects of implementing CBAM for companies from a customs and regulatory perspective?

- **Awareness Gap**: Many businesses are not fully aware of CBAM, as it's a new concept. Despite efforts from chambers of commerce and media, companies often don't realize it affects them directly.
- **Complexity with Customs and Tariffs**: Understanding CBAM involves navigating customs tariff numbers, which many businesses may lack. They must assess how CBAM affects specific products and suppliers to quantify its impact on their operations.
- **Organizational Requirements**: Companies need a structured approach for CBAM compliance, including data governance, role assignments, and internal control processes. This helps ensure preventive and corrective actions are in place.
- **Role Clarity**: It's challenging to assign responsibility for CBAM within companies since it intersects with tax, procurement, and sustainability. The appropriate department depends on national treatment (e.g., as a tax or environmental duty).
- **Supplier Engagement**: Effective compliance requires cooperation with suppliers to calculate and document CBAM emissions accurately. Suppliers also need motivation and support to understand their role in the process.

- **Multidisciplinary Challenge**: CBAM involves various stakeholders within an organization, making clear role assignment and inter-departmental education essential for compliance.

2. Long-Term Competitiveness and CBAM

Question: How does CBAM affect the long-term competitiveness of companies? Should companies invest in decarbonization now for a competitive edge?

- **Variable Impact by Business Type**: For companies importing minimal CBAM-regulated products, the primary impact is administrative rather than financial. However, companies heavily reliant on CBAM goods face significant competitive pressures.
- **Downstream Financial Burden**: Manufacturers importing large volumes of CBAM goods, like steel and aluminum, find compliance financially challenging. Meanwhile, local EU manufacturers argue CBAM costs are too low to offset their substantial decarbonization expenses.
- **EU Perspective on Fairness**: EU manufacturers express that CBAM doesn't fully level the playing field as their decarbonization investments are significantly higher than CBAM-related compensations.
- **Investment Timing Challenges**: Many companies, especially those in GCC and India, delay decarbonization due to the high cost and limited immediate returns, opting to wait for more affordable solutions to emerge in the coming years.

3. International Reactions to CBAM

Question: How are non-EU governments reacting to CBAM? Are there potential trade conflicts or negotiations?

- **Carbon Pricing Initiatives**: Some countries are implementing local carbon pricing mechanisms to offset CBAM, recognizing it as a lasting regulation. These initiatives help mitigate CBAM impacts on exports to the EU.
- **WTO Challenges**: Non-EU countries attempt to slow CBAM's impact by challenging it at the WTO, aiming to delay implementation and give their industries more time to adjust.
- **Muted Countermeasure Threats**: Initial fears of countermeasures (e.g., retaliatory tariffs) have quieted, though tensions could rise, especially as the U.S. under its current administration may view CBAM as protectionist.
- **Future Trade Tensions**: Albert foresees potential U.S. pushback, viewing CBAM as an unfair tariff. Similar responses from countries like China and India could lead to trade conflicts.

4. Balancing Compliance Amid Global Trade Disruptions

Question: How do companies balance CBAM compliance with disruptions from digitalization, trade wars, and geopolitical tensions?

- **Early Compliance Stage**: Many companies are at a basic compliance level with CBAM, focusing on minimal requirements without strategic, long-term planning.
- **Limited CBAM Impact Simulations**: Few companies simulate CBAM's actual impact on their business, limiting their ability to make informed strategic decisions.
- **Focus on Immediate Geopolitical Risks**: Businesses often prioritize issues like trade wars and the risk of China-Taiwan conflict, which overshadow CBAM concerns in their strategic planning.

5. Opportunities for Decarbonization Support

Question: Are there government incentives or partnerships available to help companies with decarbonization? What are best practices?

- **Government Support Variability**: Many countries, especially in the EU, offer substantial funding or incentives for decarbonization. However, support levels vary, with wealthier countries providing more extensive programs.
- **EU's Carbon Contracts for Difference (CCFD)**: This program is highlighted as a powerful tool to support EU manufacturers. While criticized, it offers valuable decarbonization incentives.
- **Potential Redistribution of CBAM Revenue**: There are discussions about redistributing CBAM revenue to fund decarbonization in developing countries, though specific plans are yet to be finalized.

6. Strategic Recommendations for High-Emission Exporters (e.g., ISC)

Question: What strategic advice would you give a high-emission exporter facing CBAM, like ISC, which exports significantly to the EU?

- **Risks of Avoiding the EU Market**: Avoiding the EU by focusing on non-regulated markets could lead to oversupply and reduced pricing in other regions, as many companies may adopt this strategy.
- **Importance of EU Market Access**: Investing in decarbonization is crucial to maintaining EU market access, as more regions (e.g., the UK, Australia, Canada) are adopting similar regulations.
- **Phased Investment Approach**: Albert advises a gradual investment in decarbonization, balancing EU market entry with lower-cost production for non-

regulated markets. This reduces financial risk while keeping a foothold in increasingly regulated regions.

Appendix A.2.: Lillian Udell – EY NL – Senior Manager Global Trade & Sustainability

1. Question: What are the biggest compliance challenges that companies face in adhering to CBAM? Are there specific industries, like steel, where these challenges are more pronounced?

- **Biggest Compliance Challenges:**
    - **Awareness:** Many companies are unaware that they even have CBAM obligations. This issue persists both for importers (declarants) and suppliers (operators). A lack of understanding of CBAM's requirements hinders their ability to comply effectively.
    - **Data Quality:** Companies face difficulties in gathering high-quality, reliable data essential for emissions calculations. Ensuring data accuracy is a recurring challenge, particularly as poor data can undermine compliance efforts.
    - **Skill Sets:** Companies often struggle with the technical skills required for emissions calculations. This lack of expertise is common across industries and creates a barrier to managing CBAM obligations accurately.
    - **Declarant vs. Supplier Responsibilities:** Lillian emphasizes that importers (declarants) need clarity on what data to report, while suppliers (operators) must determine how to provide this data. Operators, in particular, often overlook their role, as they're not directly responsible for reporting but must support their customers' compliance efforts.
    - **Industry-Specific Challenges:** Industries like steel face heightened complexity due to embedded emissions in their processes. The steel sector's

inherent challenges around emissions tracking make CBAM compliance particularly burdensome, requiring additional resources for accurate reporting.

2. Question: How do you foresee CBAM affecting trade relations between the EU and non-EU countries like India? Are companies already experiencing trade tensions or changes in demand as a result?

- **EU and Non-EU Trade Relations:**
  - **Limited Engagement from Non-EU Producers:** Non-EU producers, especially large exporters in countries like India and China, are currently showing minimal engagement with CBAM compliance. They often refrain from significant efforts to comply unless directly impacted financially, such as through potential business loss.
  - **Market-Driven Compliance Pressure:** Lillian notes that unless EU importers start actively seeking alternative suppliers who comply with CBAM, non-EU producers are unlikely to prioritize compliance.
  - **State-Owned Producers' Reluctance:** In countries where production is state-controlled (e.g., large Chinese manufacturers), there is an even lower likelihood of proactive compliance. These entities often require a substantial push, such as clear financial implications, to adapt to new regulations.
  - **Future Alignment Possibility:** If other regions (e.g., the UK, Canada, Australia, Norway) adopt CBAM-like frameworks, exporters may feel mounting pressure to align their practices to support EU importers and maintain market access. This potential global alignment might drive compliance over the longer term.

3. Question: Have you seen companies start to diversify their markets away from the EU in response to CBAM? If so, which regions are they pivoting to, and what are the risks and opportunities of this approach?

- **Market Diversification in Response to CBAM:**
    - **Short-Term Diversification Efforts:** Many companies, particularly those in emissions-heavy industries, are exploring diversification to less-regulated regions such as parts of Asia or Latin America. This shift could minimize CBAM compliance costs in the short term, though Lillian highlights that it's unlikely to be sustainable in the long run.
    - **Long-Term Viability Concerns:** Lillian suggests that diversification may provide temporary relief—potentially lasting up to 10 years—before broader carbon regulation adoption creates a more universally regulated market. At that point, companies will need to adapt their practices regardless of market diversification.
    - **Risk of Oversupply:** She warns of potential oversupply in unregulated markets if many companies pivot away from the EU. This could drive down prices and lead to revenue declines, especially if emissions-heavy goods flood these alternative markets.
    - **Strategic Tightrope:** Companies must carefully balance the immediate benefits of less-regulated markets with the potential for evolving global carbon regulations that might make these markets similarly stringent.

4. Question: From your perspective, how are companies handling the financial burden of carbon pricing under CBAM? Are they passing these costs on to consumers, or are they absorbing them internally?

- **Financial Handling of Carbon Pricing:**
    - **Minimal Cost Assessments So Far:** Lillian points out that few companies have comprehensively assessed the financial impact of CBAM, leaving them unprepared for future compliance costs.
    - **Cost Pass-Through to Customers:** In low-margin industries, where raw material costs are significant, companies may find it challenging to absorb CBAM costs. Instead, they're likely to pass these costs onto customers, which may impact final consumer prices.
    - **Gradual Cost Adjustments:** Initially, companies may try to absorb some costs to avoid immediate pricing changes, especially as CBAM phases in gradually. However, Lillian predicts that price adjustments are inevitable as CBAM-related costs increase.
    - **Differentiation with EU Domestic Producers:** Companies importing goods to the EU may face competitive disadvantages compared to EU domestic producers who already incur similar emissions costs under the EU ETS. These existing cost structures allow domestic producers to integrate carbon costs more seamlessly, unlike importers who are encountering these compliance costs for the first time.

5. Question: How are advancements in digital tools and automation helping companies manage the complexities of CBAM compliance? Are you seeing a trend toward the use of technology to streamline the reporting process?

- **Technology's Role in Managing CBAM Compliance:**
    - **Increasing Shift to Digital Tools:** There's a notable trend towards using digital solutions to streamline CBAM compliance, though the success of these

tools depends heavily on data quality. Poor-quality data can significantly reduce the effectiveness of digital solutions.

- **Advantages of Automation:** Digital tools allow companies to manage large volumes of data more efficiently and can automate parts of the compliance process, reducing the administrative burden. These tools support long-term tracking, emissions modelling, and trend analysis, which can be valuable for strategic decision-making at the CFO level.
- **Investment Reluctance:** Many companies are hesitant to invest in comprehensive tech solutions solely for CBAM compliance, especially when compliance costs remain manageable. However, companies may be more inclined to adopt digital solutions if CBAM compliance can be integrated with other regulatory obligations, such as the Corporate Sustainability Reporting Directive (CSRD).
- **Data Quality Concerns:** Lillian emphasizes the classic "garbage in, garbage out" problem; without accurate data, digital solutions may not effectively support compliance. Therefore, companies must invest not only in the technology but also in the processes and systems that ensure data quality.

Appendix B: List of Abbreviations

1	**CBAM**	Carbon Border Adjustment Mechanism
2	**ISC**	Indian Steel Company (Name of the company)
3	**EY**	Ernst & Young
4	**CO2**	Carbon Dioxide
5	**EAF**	Electric Arc Furnaces
6	**H2-DRI**	Hydrogen-based Direct Reduce Iron
7	**CCFD**	Carbon Contracts for Difference
8	**CAPEX**	Capital Expenditure
9	**ETS**	Emissions Trading System
10	**ESG**	Environmental, Social, and Governance
11	**ROI**	Return on Investment
12	**WTO**	World Trade Organization
13	**ISO**	International Organization for Standardization
14	**CSRD**	Corporate Sustainability Reporting Directive