

Social Business Consulting FA23 Final Round
Case Interview

Prompt:

Our client is Sinopec, a gas and oil enterprise based in Beijing. They are the world's largest oil refining, gas, and petrochemical conglomerate. Sinopec has recently committed to promoting low-carbon transformation of global energy. Their long-term goal is to “lead the future of energy and chemical industry with innovation, shouldering its responsibilities to fuel for a better life, and working with all stakeholders to build a better life.”

Engineers at Sinopec have recently invented ‘EcoDrill’ a new refining method in their extraction process that would significantly aid in reducing the company’s CO₂ emissions. Management now wants to know whether it would make sense to move towards implementing this new refinement method.

Question 1: What factors would you investigate to understand the benefits and/or efficacy of the new extraction method?

Question 2: To comprehensively evaluate the new process, management wants to understand the extent of carbon emissions reduction as well as financial implications.

A common method used to evaluate the adoption of a method is through understanding the cost per unit of emissions reduced (CER = Total Cost/Emissions Reduced). Below is some information to consider.

***Note:** The current refinement method has a CER of \$6.50/tonne of CO₂

The new extraction method requires an initial investment of \$8 million. Currently, Sinopec produces 12 million tonnes of CO₂ per year. In the first year after implementation, the method will reduce emissions by 5%. In each following year, it reduces emissions by an additional 5%. The annual maintenance cost of the project is 400,000 which increases by 4% in each successive year. Calculate the following: **(approximation allowed)**

1. The **total emissions reduction** achieved over 4 years
2. The **total cost**, including initial investment and cumulative maintenance costs, over 4 years.
3. Calculate the **cost per unit of emissions reduced (CER)** based on the emissions reduced and the costs incurred over the 4-year period.

Question 3: Suppose that Sinopec has decided to go ahead with the rollout of the extraction process in two of their oil rigs. What are some risks and challenges that you foresee, associated with the adoption of this new method?

Question 4: Based on your recommendations, the CEO would like EcoDrill to replace up to 40% of its current drilling technology in the next 8-10 years. How would you recommend Sinopec proceed with achieving this goal?

Answer Key

Question 1:

Environmental Factors:

- a. Carbon Emissions Reduction: The extent of carbon emissions reduction achieved by the new extraction method.
- b. Water Usage: The method's impact on water resources, as some extraction methods may consume substantial amounts of water, affecting local ecosystems and water availability.
- c. Air and Water Quality: Are there changes in air and water quality near extraction sites that impact local ecosystems and public health.
- d. Waste Management: How does the method handle waste materials produced during extraction, including hazardous substances and their disposal.

Economic and Social Factors:

- a. Cost-effectiveness: Economic feasibility of the new method, considering both initial investment and ongoing operational costs, compared to traditional extraction techniques.
- b. Job Creation: Impact on local employment opportunities and economic development in the region where the extraction occurs.
- c. Community Health: Health effects on nearby communities due to changes in air and water quality, noise pollution, or other factors associated with the extraction process.
- d. Regulatory Compliance: Does the new method comply with environmental regulations and standards

Technological and Operational Factors:

- a. Technology Reliability: Reliability and scalability of the new extraction technology to ensure consistent production
- b. Infrastructure Requirements: Analyze the infrastructure needed for the new method, such as pipelines, transportation, and processing facilities.
- c. Management and Operational Requirements: Will implementation require less manpower, will it reduce burden on company resources? Etc.
- d. Safety and Risk Management: safety measures to prevent accidents, leaks, or other potential environmental or human risks associated with the new extraction method.

Question 2:

1. Total Emissions Reduction over 5 years:

Year 1: 12 million tonnes * 0.05 = 600k tonnes

Year 2: 12 million - 600k = 11.4 million * 0.05 = 570k tonnes

Year 3: 11.4 million - 570k = 10.83 million * 0.05 = 541.5k tonnes

Year 4: 10.83 million - 541.5 k = 10,288,500 * 0.05 = 514,425 tonnes

Therefore, total emissions reduction = 600k + 570k + 541.5k + 514.4k
= 2,225,900 tonnes ~ **2.2 million tonnes reduced**

Shortcut (high praise if they use this)

$F(t) = 12 \text{ million } (0.95^t)$ where $t = 4$

$F(t) = 12,000,000 * (0.95^4) = 9,774,075$ tonnes of emission in 4th year

12 million tonnes - 9,774,075 tonnes = 2,225,925 ~ **2.2 million tonnes reduced**

2. Total Cost over 5 years:

Year 1: 8 million + 400,000 = \$8.4 million

Year 2: 1.04 * 400k = \$ 416k

Year 3: 1.04 * 416k = \$ 432,650

Year 4: 1.04 * 432,650 = 449,956

Total Cost = 8.4 million + 416k + 432,650 + 449,956 = \$ 9,698,606 ~ **\$9.6 million**

3. CER = Total Cost/ Total Emissions Reduction = 9.6 million / 2.2 million = **\$4.36/unit**

Question 3:

Financial and Economic Risks:

1. Market Price Volatility:
 - a. Risk: Fluctuations in oil prices can affect the profitability of the new extraction method, impacting revenue and costs
 - b. Mitigating Factors: Diversifying revenue streams and utilizing hedging strategies can mitigate the impact of market price volatility.
2. Safety Risk:
 - a. Risk: Implementing a new extraction method may introduce novel safety risks for workers that need to be carefully managed.
 - b. Mitigating Factors: Rigorous safety protocols, training, and ongoing safety assessments can help mitigate safety risks associated with the new method.
3. High Initial Investment and Payback Period:
 - a. Risk: The substantial upfront investment required for the new method may result in a longer payback period and impact financial stability.
 - b. Mitigating Factors: Robust financial planning, including risk modeling and cost projections, can help manage the financial risk associated with high initial investment.

Operational and Technical Risks:

1. Technical Difficulties of Implementation:
 - a. Risk: The new extraction method may pose technical challenges during implementation, potentially leading to operational disruptions
 - b. Mitigating Factors: Rigorous testing, training, and contingency planning can help address technical difficulties.
2. Scalability Challenges:
 - a. Risk: Scaling up the new method to meet production demands may encounter challenges, affecting efficiency and profitability.
 - b. Mitigating Factors: Comprehensive scalability assessments and phased implementation can minimize risks associated with rapid expansion.

Geopolitical and External Risks:

1. Competitive Reaction:
 - a. Risk: Other major oil-producing countries or companies may react competitively to Sinopec's adoption of the new method, potentially affecting market dynamics.
 - b. Mitigating Factors: Sinopec can conduct market research and adapt strategies as needed to respond to competitive pressures.
2. Geopolitical Risk:
 - a. Risk: Changes in geopolitical dynamics, such as international tensions or sanctions, can impact Sinopec's access to resources, markets, or partnerships.
 - b. Mitigating Factors: Sinopec can diversify its market presence and collaborate with governments and organizations to navigate geopolitical challenges.

3. Regulatory and Compliance Challenges:
 - a. Risk: Evolving regulatory requirements or changes in environmental policies can affect the feasibility and compliance of the new extraction method.
 - b. Mitigating Factors: Sinopec can proactively engage with regulators and ensure alignment with evolving environmental standards.

Strategic Alignment and Stakeholder Risks:

1. Alignment with Mission and Stakeholder Expectations:
 - a. Risk: The adoption of the new method may need to align with Sinopec's corporate mission and may face resistance from stakeholders with differing interests.
 - b. Mitigating Factors: Clear communication, stakeholder engagement, and aligning the new method with sustainability goals can address these challenges.
2. Labor Automation and Workforce Conflicts:
 - a. Risk: Increased automation in the new method may lead to workforce conflicts, including concerns about job security.
 - b. Mitigating Factors: Strategic workforce planning, retraining programs, and transparent communication can mitigate labor-related issues.

Question 4:

Comprehensive Assessment and Pilot Testing:

1. Start with a thorough evaluation of the EcoDrill technology to ensure it meets safety, efficiency, and environmental standards.
2. Conduct pilot tests in different drilling environments to validate its performance under various conditions.

Investment and Research:

1. Allocate sufficient funds for research and development to fine-tune the technology and address any potential issues.
2. Collaborate with research institutions and experts in the field to accelerate technology advancement.

Training and Workforce Development:

1. Train and educate the workforce on EcoDrill technology to ensure they are proficient in its usage.
2. Develop a certification program to recognize employees who excel in adopting and utilizing the new technology.

Regulatory Compliance:

1. Ensure that the new technology complies with all environmental regulations and safety standards in all regions of operation.

Phased Implementation:

1. Implement a phased approach to gradually integrate EcoDrill into drilling operations over the 8-10 year period. Start with lower-risk projects and gradually expand.
2. Set specific annual or quarterly targets for the adoption of EcoDrill technology to track progress.

Monitoring and Feedback:

1. Continuously monitor the performance of EcoDrill in real-world applications and gather feedback from field operators.
2. Use this feedback to make necessary improvements and adjustments to the technology.

Collaboration and Partnerships:

1. Explore partnerships with other companies or organizations that have expertise in environmentally friendly drilling technologies.
2. Collaborate with industry associations and government agencies to promote the adoption of eco-friendly drilling techniques.

Incentives and Rewards:

1. Provide incentives for teams or individuals who excel in implementing EcoDrill technology and achieving sustainability goals.
2. Highlight success stories and best practices to motivate other teams.

Public Relations and Transparency:

1. Communicate the company's commitment to environmental sustainability and the adoption of EcoDrill to shareholders, customers, and the public.
2. Publish regular progress reports on the transition to EcoDrill technology.

Continuous Improvement:

1. Foster a culture of continuous improvement, innovation, and sustainability within the organization.
2. Encourage employees to propose new ideas and technologies that can further reduce the environmental impact of drilling operations.

Risk Mitigation:

1. Develop contingency plans to manage any unexpected challenges or setbacks during the transition.
2. Diversify the portfolio of drilling technologies to reduce reliance on a single approach.

Cost-Benefit Analysis:

1. Continually assess the cost-effectiveness of EcoDrill compared to existing technologies.
2. Ensure that the transition remains financially viable and provides long-term benefits.