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9B18M136

Cap and Trade in Ontario: Campbell Soup Company

Adam Fremeth and Patrick Shulist wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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As the operations manager for the Campbell Soup Company (Campbell’s) facility in Toronto—the only one in Ontario—your normally complex job has just become even more challenging. With the introduction of Ontario’s cap-and-trade system, you now must directly consider the cost of carbon in your decision making, which was the government’s intention from the start. This affects your decision making in three ways: (1) making production decisions, (2) trading permits, and (3) deciding on long-term investments in clean technology.

CARBON POSITION

Given your experience, and the expertise you can draw on from Campbell’s global operations, you have become an expert in production for Campbell’s sole plant in Ontario. You have a finely tuned sense of how to run the supply chain and schedule work in the plant. However, the introduction of a carbon cap-and-trade system complicates this decision-making process. Over the past few years, the plant’s production emitted around 25,000 tonnes of carbon dioxide equivalents (CO2e) per year—the threshold for mandatory inclusion into Ontario’s cap-and-trade system. As a result, you will have to obtain emissions permits for all the Toronto plant’s emissions. Fortunately, the Government of Ontario has stated that it will give Campbell’s 24,000 emissions permits during the first year of the cap-and-trade scheme. The government’s generosity is to ensure an easy and smooth transition into the program. However, the number of free permits will decrease every year, so Campbell’s will receive 23,000 permits in year 2 and 22,000 in year 3. The number of free permits across the entire market for all four firms will see a similar decrease from 1,922,000 permits in year 1 to 1,846,000 in year two and 1,772,000 in year 3.

Given the current condition of the plant, for every pallet of 1,000 cases of soup that the Toronto plant produces, 4.8 tonnes of CO2e will be released into the air. This ratio of is known as carbon intensity (CI). The production of soup, as you well know, is moderately carbon intensive due to the heat used in cooking the ingredients. Agricultural production of the raw ingredients is also quite carbon intensive. However, under Ontario’s cap-and-trade system, you are only responsible for your direct emissions—you are not responsible for upstream or downstream emissions.

Last year, the Toronto plant’s output quantity was approximately 5,200 pallets of soup (or 5.2 million cases of soup). Soup is sold into the market at a price of CA$26,000[[1]](#footnote-1) per pallet. You have calculated the average variable cost (AVC) of soup as follows: *AVC* = $2.50 × *Q*, where *Q* is the production quantity. In addition, the factory has fixed costs of $55 million per year. These numbers are not expected to change.

In previous years, your job focused on keeping the cost of production down and ensuring smooth logistics to end consumers. However, you realize that carbon pricing will have a large impact on overall profitability. As a result, your new goal is to maximize profit within the bounds of the new policy. To help make the market stable and more predictable, the Government of Ontario is instituting a price floor of $18 per tonne of CO2e emissions and a price ceiling of $54 per tonne. The price floor is the amount that the government will pay for excess permits held by the firm at year-end. The price ceiling will also act as a penalty per tonne of CO2e for firms that do not hold the requisite number of permits at year-end. Considering Campbell’s average annual emissions of 25,000 tonnes, and the fact that you have only been provided 24,000 permits for next year, you will have a shortfall of 1,000 permits that you need to procure. This shortfall can change if your production levels change. Should the market for permits fall to the price floor, this projected shortfall would cost Campbell’s $18,000 in trades with other firms. At the price ceiling, it would cost $54,000, should you fail to acquire the needed permits. These amounts are significant.

EMISSIONS-REDUCTION STRATEGY

To avoid additional costs associated with procuring permits, Campbell’s can reduce production, although it would mean foregoing sales. Because Campbell’s permit allocation will be reduced every year, production levels would have to continually decrease. Therefore, production changes may be only part of the answer.

Instead, the bulk of Campbell’s strategy for meeting its permit needs should focus on two key activities: (1) investing in clean technology and (2) trading permits with other firms in the cap-and-trade scheme. In fact, if Campbell’s makes sufficient investments in clean technology, it could become a net seller of permits, opening a new line of revenue. Campbell’s strategy should therefore focus on reducing emissions intensity as much as possible where it can do so profitably and on trading permits in the market. Pursuing this twin strategy will ensure that minimized costs are associated with the cap-and-trade scheme.

The carbon permits act like a traditional financial instrument. Whichever company is given a permit is the legal owner of the right to emit 1 tonne of CO2e. These permits are fully transferable, so Campbell’s can “buy” from other firms the right to further emissions. This is where the concept of marginal-abatement cost comes into play. Because of the nature of their operations, some firms can reduce carbon emissions less expensively than others, through process modifications or investments in more efficient or cleaner technologies. For such firms, it is profitable to reduce emissions *beyond* the level required by the permits that they are allocated. These firms can then sell their excess permits to heavily polluting firms—like Lafarge, for example—for more money than the investment they made in emissions-reduction technologies or process modifications.

For its part, Campbell’s has identified three main strategic investments that can reduce the overall carbon intensity of its operations by reducing the carbon emissions per pallet of soup. First, Campbell’s can upgrade the cooking equipment used to prepare the soup. Newer cooking equipment will consume less natural gas, which is a fossil fuel, resulting in fewer carbon emissions. Campbell’s estimates that upgrading the equipment will reduce carbon intensity per pallet of soup by 0.7 tonnes. For example, the level of carbon intensity will be 4.1 tonnes of CO2e per pallet of soup after this modification, if done in isolation. In addition, because energy costs are a substantial cost of soup production, this upgrade will actually *save* Campbell’s money, making this clearly a positive–net present value project. Your accountant calculates that the net *annualized* savings will be $20,000 per year for the next 15 years, which means that you will realize a $20,000 gain *each year* on your income statement for the foreseeable future.

Second, you have been speaking with one of your engineers, who notes that you could retrofit the boiling unit to burn biomass, in addition to its regular fuel. The biomass she has in mind is the food waste created during the preparation stage. She tells you that the *annualized* cost for each of the next 15 years for the retrofit will be $80,000 and that it would reduce carbon intensity by 1 tonne per pallet of soup. Importantly, this investment in green technology—like all of Campbell’s options—operates independently of other investments and can be done in conjunction with other efforts to reduce carbon intensity.

Third, your engineer also points out that a lot of the heat from operations is simply lost. Your engineers suggest that you could install heat exchangers to redirect this otherwise lost heat into the building’s heating system. This change would reduce the plant’s heating load substantially in the winter, meaning that fewer fossil fuels would be consumed to heat the building. Your engineers estimate that for an *annualized*cost of $120,000 for each of the next 15 years, carbon intensity could be reduced by 0.5 tonnes per pallet of soup.

When considering all these investment decisions, *it is important to consider the number of permits you will have, the total emissions you will make based on your production levels, and the total emissions reduction enabled by each clean-technology investment.* Also, any unused permits you own at the end of the year can be sold back to the government at the price floor of $18 per permit. On the other hand, for every permit shortfall at the end of the year, you will have to pay the price ceiling, which is a penalty of $54 per permit.

**ADDITIONAL MARKET INFORMATION**

The trading platform allows for an interactive marketplace where companies will have the opportunity to present offers to buy or sell permits at a stated price per permit, and other participating companies are able to accept those terms or offer counter bids. The government of Ontario has put in place rules to ensure the smooth functioning of the carbon market. Each transaction in the trading platform is capped at 10,000 permits per transaction to ensure the smooth functioning of the market. Finally, information on market transactions will be transparent to all companies, including the number of permits traded and the price per permit.

For assistance with your planning and decision-making, some relevant details are provided, including basic operating information, clean technology investment options, and carbon market details (see Exhibit 1).

Exhibit 1: BASIC Operating INFORMATION

|  |  |
| --- | --- |
| **Operating Item** | **Calculation** |
| Quantity produced (Q) | *Q*, expressed in pallets of soup |
| Average variable production cost (AVC) |  |
| Total variable production cost (TVC) |  |
| Fixed costs (FC) | $55,000,000 |
| Sales price per pallet (P) |  |
| Total revenue (R) |  |
| Profit (π) |  |
| Baseline carbon intensity (CI) |  |
| Total baseline carbon emissions (TCE) |  |

Clean-Technology Investment Options

|  |  |  |
| --- | --- | --- |
| **Clean-Technology Investment Option** | **Annualized Cost (Savings)** | **Reduction in Carbon Intensity** |
| Upgrade cooking equipment | ($20,000) | 0.7 |
| Retrofit boiling unit | $80,000 | 1.0 |
| Redirect waste heat | $120,000 | 0.5 |

Note: It takes one year for all clean-technology investments to come online; therefore, an investment in year 1 changes the emissions intensity of year 2.

Carbon-Market Details

|  |  |
| --- | --- |
| **Carbon-Market Item** | **Calculation** |
| Meaning of one permit | Legally allowed to emit 1 tonne of CO2e |
| Price floor for a permit | $18 |
| Price ceiling for a permit | $54 |
| Campbell’s year-1 permit allocation | 24,000 tonnes of CO2e |
| Campbell’s year-2 permit allocation | 23,000 tonnes of CO2e |
| Campbell’s year-3 permit allocation | 22,000 tonnes of CO2e |
| Campbell’s current annual emissions | 25,000 tonnes of CO2e |

Note: All currency amounts are in CA$; CO2e = carbon dioxide equivalent.

Source: Created by the case authors.

1. All currency amounts are in CA$ unless otherwise specified. [↑](#footnote-ref-1)