CASE 22

Victoria Chemicals plc (A): The Merseyside Project

Late one afternoon in January 2008, Frank Greystock told Lucy Morris, "No one seems satisfied with the analysis so far, but the suggested changes could kill the project. If solid projects like this can't swim past the corporate piranhas, the company will never modernize."

Morris was plant manager of Victoria Chemicals' Merseyside Works in Liverpool, England. Her controller, Frank Greystock, was discussing a capital project that Morris wanted to propose to senior management. The project consisted of a (British pounds) GBP12 million expenditure to renovate and rationalize the polypropylene production line at the Merseyside plant in order to make up for deferred maintenance and to exploit opportunities to achieve increased production efficiency.

Victoria Chemicals was under pressure from investors to improve its financial performance because of the accumulation of the firm's common shares by a well-known corporate raider, Sir David Benjamin. Earnings had fallen to 180 pence per share at the end of 2007 from around 250 pence per share at the end of 2006. Morris thus believed that the time was ripe to obtain funding from corporate headquarters for a modernization program for the Merseyside Works—at least she had believed so until Greystock presented her with several questions that had only recently surfaced.

Victoria Chemicals and Polypropylene

Victoria Chemicals, a major competitor in the worldwide chemicals industry, was a leading producer of polypropylene, a polymer used in an extremely wide variety of products (ranging from medical products to packaging film, carpet fibers, and automobile

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This case was prepared by Robert F. Bruner as a basis for class discussion rather than to illustrate effective or ineffective handling of an administrative situation. Victoria Chemicals is a fictional company reflecting the issues facing actual firms. The author wishes to acknowledge the helpful comments of Dr. Frank H. McTigue, the literary color of Anthony Trollope, and the financial support of the Citicorp Global Scholars Program.

components) and known for its strength and malleability. Polypropylene was essentially priced as a commodity.

The production of polypropylene pellets at Merseyside began with propylene, a refined gas received in tank cars. Propylene was purchased from four refineries in England that produced it in the course of refining crude oil into gasoline. In the first stage of the production process, polymerization, the propylene gas was combined with a diluent (or solvent) in a large pressure vessel. In a catalytic reaction, the polypropylene precipitated to the bottom of the tank and was then concentrated in a centrifuge.

The second stage of the production process compounded the basic polypropylene with stabilizers, modifiers, fillers, and pigments to achieve the desired attributes for a particular customer. The finished plastic was extruded into pellets for shipment to the customer.

The Merseyside production process was old, semicontinuous at best, and, therefore, higher in labor content than its competitors' newer plants. The Merseyside plant was constructed in 1967.

Victoria Chemicals produced polypropylene at Merseyside and in Rotterdam, Holland. The two plants were of identical scale, age, and design. The managers of both plants reported to James Fawn, executive vice president and manager of the Intermediate Chemicals Group (ICG) of Victoria Chemicals. The company positioned itself as a supplier to customers in Europe and the Middle East. The strategic-analysis staff estimated that, in addition to numerous small producers, seven major competitors manufactured polypropylene in Victoria Chemicals' market region. Their plants operated at various cost levels. **Exhibit 1** presents a comparison of plant sizes and indexed costs.

The Proposed Capital Program

Morris had assumed responsibility for the Merseyside Works only 12 months previously, following a rapid rise from the entry position of shift engineer nine years before. When she assumed responsibility, she undertook a detailed review of the operations and discovered significant opportunities for improvement in polypropylene production. Some of those opportunities stemmed from the deferral of maintenance over the preceding five years. In an effort to enhance the operating results of the Works, the previous manager had limited capital expenditures to only the most essential. Now, what previously had been routine and deferrable was becoming essential. Other opportunities stemmed from correcting the antiquated plant design in ways that would save energy and improve the process flow: (1) relocating and modernizing tank-car unloading areas, which would enable the process flow to be streamlined; (2) refurbishing the polymerization tank to achieve higher pressures and thus greater throughput; and (3) renovating the compounding plant to increase extrusion throughput and obtain energy savings.

Morris proposed an expenditure of GBP12 million on this program. The entire polymerization line would need to be shut down for 45 days, however, and because the Rotterdam plant was operating near capacity, Merseyside's customers would buy from competitors. Greystock believed the loss of customers would not be permanent.

The benefits would be a lower energy requirement[1] as well as a 7% greater manufacturing throughput. In addition, the project was expected to improve gross margin (before depreciation and energy savings) from 11.5% to 12.5%. The engineering group at Merseyside was highly confident that the efficiencies would be realized.

Merseyside currently produced 250,000 metric tons of polypropylene pellets a year. Currently, the price of polypropylene averaged GBP675 per ton for Victoria Chemicals' product mix. The tax rate required in capital-expenditure analyses was 30%. Greystock discovered that any plant facilities to be replaced had been completely depreciated. New assets could be depreciated on an accelerated basis[2] over 15 years, the expected life of the assets. The increased throughput would necessitate an increase of work-in-process inventory equal in value to 3.0% of cost of goods. Greystock included in the first year of his forecast preliminary engineering costs of GBP500,000, which had been spent over the preceding nine months on efficiency and design studies of the renovation. Finally, the corporate manual stipulated that overhead costs be reflected in project analyses at the rate of 3.5% times the book value of assets acquired in the project per year.[3]

Greystock had produced the discounted-cash-flow (DCF) summary given in **Exhibit 2.** It suggested that the capital program would easily hurdle Victoria Chemicals' required return of 10% for engineering projects.

Concerns of the Transport Division

Victoria Chemicals owned the tank cars with which Merseyside received propylene gas from four petroleum refineries in England. The Transport Division, a cost center, oversaw the movement of all raw, intermediate, and finished materials throughout the company and was responsible for managing the tank cars. Because of the project's

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[1]Greystock characterized the energy savings as a percentage of sales and assumed that the savings would be equal to 1.25% of sales in the first 5 years and 0.75% in years 6–10. Thereafter, without added aggressive "green" spending, the energy efficiency of the plant would revert to its old level, and the savings would be zero. He believed that the decision to make further environmentally oriented investments was a separate choice (and one that should be made much later) and, therefore, that to include such benefits (of a presumably later investment decision) in the project being considered today would be inappropriate.

[2]The company's capital-expenditure manual suggested the use of double-declining-balance (DDB) depreciation, even though other more aggressive procedures might be permitted by the tax code. The reason for this policy was to discourage jockeying for corporate approvals based on tax provisions that could apply differently for different projects and divisions. Prior to senior-management's approval, the controller's staff would present an independent analysis of special tax effects that might apply. Division managers, however, were discouraged from relying heavily on those effects. In applying the DDB approach to a 15-year project, the formula for accelerated depreciation was used for the first 10 years, after which depreciation was calculated on a straight-line basis. This conversion to straight line was commonly done so that the asset would depreciate fully within its economic life.

[3]The corporate-policy manual stated that new projects should be able to sustain a reasonable proportion of corporate overhead expense. Projects that were so marginal as to be unable to sustain those expenses and also meet the other criteria of investment attractiveness should not be undertaken. Thus, all new capital projects should reflect an annual pretax charge amounting to 3.5% of the value of the initial asset investment for the project.

increased throughput, Transport would have to increase its allocation of tank cars to Merseyside. Currently, the Transport Division could make this allocation out of excess capacity, although doing so would accelerate from 2012 to 2010 the need to purchase new rolling stock to support the anticipated growth of the firm in other areas. The purchase was estimated to be GBP2 million in 2010. The rolling stock would have a depreciable life of 10 years,[4] but with proper maintenance, the cars could operate much longer. The rolling stock could not be used outside Britain because of differences in track gauge.

A memorandum from the controller of the Transport Division suggested that the cost of the tank cars should be included in the initial outlay of Merseyside's capital program. But Greystock disagreed. He told Morris:

> The Transport Division isn't paying one pence of actual cash because of what we're doing at Merseyside. In fact, we're doing the company a favor in using its excess capacity. Even *if* an allocation has to be made somewhere, it should go on the Transport Division's books. The way we've always evaluated projects in this company has been with the philosophy of "every tub on its own bottom"—every division has to fend for itself. The Transport Division isn't part of our own Intermediate Chemicals Group, so they should carry the allocation of rolling stock.

Accordingly, Greystock had not reflected any charge for the use of excess rolling stock in his preliminary DCF analysis, given in **Exhibit 2.**

The Transport Division and Intermediate Chemicals Group reported to separate executive vice presidents, who reported to the chairman and chief executive officer of the company. The executive VPs received an annual incentive bonus pegged to the performance of their divisions.

Concerns of the ICG Sales and Marketing Department

Greystock's analysis had led to questions from the director of Sales. In a recent meeting, the director had told Greystock:

> Your analysis assumes that we can sell the added output and thus obtain the full efficiencies from the project, but as you know, the market for polypropylene is extremely competitive. Right now, the industry is in a downturn and it looks like an oversupply is in the works. This means that we will probably have to shift capacity away from Rotterdam toward Merseyside in order to move the added volume. Is this really a gain for Victoria Chemicals? Why spend money just so one plant can cannibalize another?

The vice president of Marketing was less skeptical. He said that with lower costs at Merseyside, Victoria Chemicals might be able to take business from the plants of competitors such as Saône-Poulet or Vaysol. In the current severe recession, competitors would fight hard to keep customers, but sooner or later the market would

[4]The Transport Division depreciated rolling stock using DDB depreciation for the first eight years and straight-line depreciation for the last two years.

revive, and it would be reasonable to assume that any lost business volume would return at that time.

Greystock had listened to both the director and the vice president, and chose to reflect no charge for a loss of business at Rotterdam in his preliminary analysis of the Merseyside project. He told Morris:

> Cannibalization really isn't a cash flow; there is no check written in this instance. Anyway, if the company starts burdening its cost-reduction projects with fictitious charges like this, we'll never maintain our cost competitiveness. A cannibalization charge is rubbish!

Concerns of the Assistant Plant Manager

Griffin Tewitt, the assistant plant manager and Morris's direct subordinate, proposed an unusual modification to Greystock's analysis during a late-afternoon meeting with Greystock and Morris. Over the past few months, Tewitt had been absorbed with the development of a proposal to modernize a separate and independent part of the Merseyside Works, the production line for ethylene-propylene-copolymer rubber (EPC). This product, a variety of synthetic rubber, had been pioneered by Victoria Chemicals in the early 1960s and was sold in bulk to European tire manufacturers. Despite hopes that this oxidation-resistant rubber would dominate the market in synthetics, in fact, EPC remained a relatively small product in the European chemical industry. Victoria, the largest supplier of EPC, produced the entire volume at Merseyside. EPC had been only marginally profitable to Victoria because of the entry by competitors and the development of competing synthetic-rubber compounds over the past five years.

Tewitt had proposed a renovation of the EPC production line at a cost of GBP1 million. The renovation would give Victoria the lowest EPC cost base in the world and would improve cash flows by GBP25,000 ad infinitum. Even so, at current prices and volumes, the net present value (NPV) of this project was (GBP750,000). Tewitt and the EPC product manager had argued strenuously to the company's executive committee that the negative NPV ignored strategic advantages from the project and increases in volume and prices when the recession ended. Nevertheless, the executive committee had rejected the project, basing its rejection mainly on economic grounds.

In a hushed voice, Tewitt said to Morris and Greystock:

> Why don't you include the EPC project as part of the polypropylene line renovations? The positive NPV of the poly renovations can easily sustain the negative NPV of the EPC project. This is an extremely important project to the company, a point that senior management doesn't seem to get. If we invest now, we'll be ready to exploit the market when the recession ends. If we don't invest now, you can expect that we will have to exit the business altogether in three years. Do you look forward to more layoffs? Do you want to manage a shrinking plant? Recall that our annual bonuses are pegged to the size of this operation. Also remember that, in the last 20 years, no one from corporate has monitored renovation projects once the investment decision was made.

Concerns of the Treasury Staff

After a meeting on a different matter, Frank Greystock described his dilemmas to Andrew Gowan, who worked as an analyst on Victoria Chemicals' Treasury staff. Gowan scanned Greystock's analysis, and pointed out:

> Cash flows and discount rate need to be consistent in their assumptions about inflation. The 10% hurdle rate you're using is a nominal target rate of return. The Treasury staff thinks this impounds a long-term inflation expectation of 3% per year. Thus, Victoria Chemicals' real (that is, zero inflation) target rate of return is 7%.

The conversation was interrupted before Greystock could gain a full understanding of Gowan's comment. For the time being, Greystock decided to continue to use a discount rate of 10% because it was the figure promoted in the latest edition of Victoria Chemicals' capital-budgeting manual.

Evaluating Capital-Expenditure Proposals at Victoria Chemicals

In submitting a project for senior management's approval, the project's initiators had to identify it as belonging to one of four possible categories: (1) new product or market, (2) product or market extension, (3) engineering efficiency, or (4) safety or environment. The first three categories of proposals were subject to a system of four performance "hurdles," of which at least three had to be met for the proposal to be considered. The Merseyside project would be in the engineering-efficiency category.

1. *Impact on earnings per share:* For engineering-efficiency projects, the contribution to net income from contemplated projects had to be positive. This criterion was calculated as the average annual earnings per share (EPS) contribution of the project over its entire economic life, using the number of outstanding shares at the most recent fiscal year-end (FYE) as the basis for the calculation. (At FYE2007, Victoria Chemicals had 92,891,240 shares outstanding.)
2. *Payback:* This criterion was defined as the number of years necessary for free cash flow of the project to amortize the initial project outlay completely. For engineering-efficiency projects, the maximum payback period was six years.
3. *Discounted cash flow:* DCF was defined as the present value of future cash flows of the project (at the hurdle rate of 10% for engineering-efficiency proposals) less the initial investment outlay. This net present value of free cash flows had to be positive.
4. *Internal rate of return:* IRR was defined as being the discount rate at which the present value of future free cash flows just equaled the initial outlay—in other words, the rate at which the NPV was zero. The IRR of engineering-efficiency projects had to be greater than 10%.

Conclusion

Morris wanted to review Greystock's analysis in detail and settle the questions surrounding the tank cars and the potential loss of business volume at Rotterdam. As

Greystock's analysis now stood, the Merseyside project met all four investment criteria:

1. Average annual addition to EPS = GBP0.022
2. Payback period = 3.8 years
3. Net present value = GBP10.5 million
4. Internal rate of return = 24.0%

Morris was concerned that further tinkering might seriously weaken the attractiveness of the project.

EXHIBIT 1 | Comparative Information on the Seven Largest Polypropylene Plants in Europe

	Plant Location	Built in	Plant Annual Output (metric tons)	Production Cost per Ton (indexed to low-cost producer)
CBTG A.G.	Saarbrün	1981	350,000	1.00
Victoria Chem.	Liverpool	1967	250,000	1.09
Victoria Chem.	Rotterdam	1967	250,000	1.09
Hosche A.G.	Hamburg	1977	300,000	1.02
Montecassino SpA	Genoa	1961	120,000	1.11
Saône-Poulet S.A.	Marseille	1972	175,000	1.07
Vaysol S.A.	Antwerp	1976	220,000	1.06
Next 10 largest plants			450,000	1.19

Source: Case writer's analysis.

EXHIBIT 2 | Greystock's DCF Analysis of the Merseyside Project (financial values in millions of British pounds)

Assumptions				
Annual Output (metric tons)		250,000	Discount rate	10.0%
Output Gain/Original Output		7.0%	Tax Rate	30%
Price/ton (pounds sterling)		675	Investment/Outlay (mill.)	12.0
Inflation Rate (prices and costs)		0.0%	Depreciable Life (years)	15
Gross Margin (ex. Deprec.)		12.50%	Salvage Value	0
Old Gross Margin		11.5%	WIP Inventory/Cost of Goods	3.0%
Energy savings/Sales	Yr. 1-5	1.25%	Months Downtime, Construction	1.5
	Yr. 6-10	0.8%	Preliminary Engineering Costs	0.5
	Yr. 11-15	0.0%	Overhead/Investment	3.5%

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Year	Now	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1. Estimate of Incremental Gross Profit																
New Output (tons)		267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500	267,500
Lost Output—Construction		(33,438)														
New Sales (Millions)		157.99	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56	180.56
New Gross Margin		13.8%	13.8%	13.8%	13.8%	13.8%	13.3%	13.3%	13.3%	13.3%	13.3%	12.5%	12.5%	12.5%	12.5%	12.5%
New Gross Profit		21.72	24.83	24.83	24.83	24.83	23.92	23.92	23.92	23.92	23.92	22.57	22.57	22.57	22.57	22.57
Old Output		250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Old Sales		168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75	168.75
Old Gross Profit		19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41	19.41
Incremental gross profit		2.32	5.42	5.42	5.42	5.42	4.52	4.52	4.52	4.52	4.52	3.16	3.16	3.16	3.16	3.16
2. Estimate of Incremental WIP inventory																
New WIP inventory		4.67	4.67	4.67	4.67	4.67	4.70	4.70	4.70	4.70	4.70	4.74	4.74	4.74	4.74	4.74
Old WIP inventory		4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48	4.48
Incremental WIP inventory		0.19	0.19	0.19	0.19	0.19	0.22	0.22	0.22	0.22	0.22	0.26	0.26	0.26	0.26	0.26
3. Estimate of Incremental Depreciation																
New Depreciation		1.60	1.39	1.20	1.04	0.90	0.78	0.68	0.59	0.51	0.44	0.57	0.57	0.57	0.57	0.57
4. Overhead		0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
5. Prelim. Engineering Costs		0.50														
Pretax Incremental Profit		−0.20	3.61	3.80	3.96	4.10	3.32	3.42	3.51	3.59	3.66	2.17	2.17	2.17	2.17	2.17
6. Cash Flow Adjustments																
Less Capital Expenditures	−12.00															
Add back Depreciation		1.60	1.39	1.20	1.04	0.90	0.78	0.68	0.59	0.51	0.44	0.57	0.57	0.57	0.57	0.57
Less Added WIP inventory		−0.19	0.00	0.00	0.00	0.00	−0.03	0.00	0.00	0.00	0.00	−0.04	0.00	0.00	0.00	0.00
7. Free Cash Flow	−12.00	1.27	3.92	3.86	3.81	3.77	3.08	3.07	3.05	3.02	3.00	2.05	2.09	2.09	2.09	2.09
NPV =	10.45															
IRR =	24.0%															

Victoria Chemicals plc (B): Merseyside and Rotterdam Projects

James Fawn, executive vice president of the Intermediate Chemicals Group (ICG) of Victoria Chemicals, met with his financial analyst, John Camperdown, to review two mutually exclusive capital-expenditure proposals. The firm's capital budget would be submitted for approval to the board of directors in early February 2008, and any projects proposed by Fawn for the ICG had to be forwarded to the chief executive officer of Victoria Chemicals soon for his review. Plant managers in Liverpool and Rotterdam had independently submitted expenditure proposals, each of which would expand the polypropylene output of their respective plants by 7%.[1] Victoria Chemicals' strategic-analysis staff argued strenuously that a companywide increase in polypropylene output of 14% made no sense, but half that amount did. Thus, Fawn could not accept *both* projects; he could sponsor only one for approval by the board.

Corporate policy was to evaluate projects based on four criteria: (1) net present value (NPV) computed at the appropriate cost of capital, (2) internal rate of return (IRR), (3) payback, and (4) growth in earnings per share. In addition, the board of directors was receptive to "strategic factors"—considerations that might be difficult to quantify. The manager of the Rotterdam plant, Elizabeth Eustace, argued vociferously that her project easily hurdled all the relevant quantitative standards and that it had important strategic benefits. Indeed, Eustace had interjected those points in two recent meetings with senior management and at a cocktail reception for the board of directors.

[1] Background information on Victoria Chemicals and the polypropylene business is given in "Victoria Chemicals PLC (A): The Merseyside Project," (UVA-F-1543).