Case 6
POWERLINE NETWORK CORPORATION
(Basics of Capital Budgeting)
Non-Directed Version

This is one of a series of cases dealing with various financial issues faced by Powerline Network Corporation. Background material on the company may be found in the document entitled Background Material on Powerline Network Corporation (PNC). The case focuses on estimating the cash flows for capital budgeting and alternative decision criteria. Case 7, the next in this series, extends capital budgeting analysis to deal in detail with risk and real options.

Bill Bostic, Sue Chung, and Sam De Felice were assigned the task of explaining the elements of financial management to PNC's board of directors. Five sessions have been completed, and the team is now preparing for the sixth, which will deal with the basics of capital budgeting. The next session will go on to discuss risk analysis in capital budgeting, decision trees, and real options. Prior sessions have provided an overview of financial management, risk analysis, bond valuation, stock valuation, and the cost of capital. The capital budgeting sessions are timely, because the firm will soon be undertaking its capital budgeting review process, and the board must approve all projects calling for expenditures greater than $10 million.

The first capital budgeting session will focus on the different criteria that the board could use to evaluate proposed capital expenditures, and the next one will extend the discussion to formal procedures of dealing with project risk. PNC's top managers have discussed the appropriateness of different criteria, including the choice between NPV and IRR, and that will be one focus of the session. The team decided that the session would be most productive if they used simplified examples, because otherwise the participants might get too wrapped up in the assumptions to focus on the conceptual issues under study. However, the team does plan to point out some actual decisions that PNC currently faces where the concepts are important, and real decisions often include some complications.

PNC has a capital budgeting model to analyze all of its proposed projects. The model first forecasts each project's cash flows, after which it calculates the payback, Net Present Value (NPV), Internal Rate of Return (IRR), Modified Internal Rate of Return (MIRR), and Profitability Index (PI). The model is also set up so that the analyst can see the effects of alternative sets of assumptions, ranging from scenarios where everything goes well to those where things go badly. These scenarios are used to get an idea of the project's risk. In addition, real options such as abandonment, expansion, and changing inputs and outputs are considered. However, Bill, Sue, and Sam plan to restrict their analysis in Session 6 to the most likely results and then, in Session 7, go on to deal with risk analysis and real options.

Only the directors have participated in the prior sessions. However, Ray Reed, the president, asked Bill to invite the controller and the vice presidents for marketing, production, and human resources to the capital budgeting sessions. Those executives must provide critical inputs for capital budgeting decisions, and Ray wants to make sure that all participents know how the data they provide will be used to analyze capital bugeting decisions. In addition, several executives have questioned the weights that Bill Bostic has

given to the decision criteria in actual capital budgeting decisions. For example, both the controller and the VP for marketing think that the most weight should be given to the payback, and that any project with a payback of less than 3 years should be accepted. Similarly, the VP for production thinks that the PI is the best method, but several directors seem more comfortable with the IRR. Bill personally would like to consider only the NPV—he would have had Sue include only this metric in her model if Ray Reed had not interceded and asked her to calculate all 5 criteria. Because of these controversies, Ray wants to make sure that Bill's focus is correct and that all the executives understand why the company makes the decisions based on the criteria it does use. He wants everyone to be on the same page when it comes to key corporate decisions like capital budgeting.

Table 1 provides some simplified data on two projects, S and L. Both involve developing a new computer chip, but with different ways of handling the operation. Under plan S, the project would be accelerated; hence it would have high sales in Year 1. However, under S the firm's competitors would learn about the product relatively soon, and sales would decline as competitors began to produce similar chips. Therefore, S's cash flows decline over its 4-year life. Under Project L, things would be handled differently. Here, PNC would operate slowly, carefully, and secretly, and customers would be locked in through long-term contracts. Thus under L, sales and cash flows would rise over time. Even so, new products would eventually replace this chip, so L would also have a 4-year life. Bill noted that most of PNC's projects actually have one or the other of these cash flow patterns. Moreover, sometimes the different projects are independent, meaning that both can be accepted because their cash flows are not related to one another, but at other times projects are mutually exclusive, meaning that only one of several alternative projects can be accepted. When choices must be made between mutually exclusive projects, past decisions have been heated and controversial, and Ray wants to make sure that PNC is analyzing the situation correctly and that everyone understands how these decisions are made.

Another issue that arose recently concerns situations in which the company can structure a project so that it will have a relatively short life or, by spending more money to buy longer-lasting equipment, a longer life. Two other proposed projects, SS and LL, whose cash flows are shown in Table 2, illustrate this situation. SS calls for the purchase of relatively inexpensive equipment that can be used for 2 years to produce a recently developed microchip for the telecommunications industry. LL calls for the purchase of more expensive equipment that can be operated for 4 years. Such projects are, by definition, mutually exclusive, and again, decisions about them have led to heated discussions.

Yet another project involves palladium, which PNC uses in some of its chips. Palladium is quite expensive, and often in short supply. The company has an opportunity to buy a palladium mine that would produce for two years, after which the ore would be exhausted. At that point, the government would require the company to spend a considerable sum to restore the land to its natural state. The project's projected cash flows are shown in Table 3. When Sue analyzed the project, she reported to Bill that it seemed to have two internal rates of return. Bill will have to report on the project to Ray Reed and the board, and a rate of return will have to be included in his report. At this point, he is not sure what return to report, so he decided to raise the issue during this session.

Bill, Sam, and Sue discussed what should be covered at the first capital budgeting session, and they identified the following issues that should be discussed:

- Identify and define the major capital budgeting criteria
- Discuss the pros and cons of each method, i.e., discuss their advantages and disadvantages
- Discuss the possibility that conflicts could exist between the various methods, i.e., one method ranks one project higher, another method ranks another project higher. Explain the conditions under which such conflicts might arise, and discuss how these conflicts should be resolved
- Explain the conditions that cause some projects to have two or more IRRs, or no IRR, and discuss how such situations should be resolved
- Explain what replacement chains are and how they are used in capital budgeting

Bill asked Sue to develop a set of questions that deal with these issues, plus any other issues that she feels are relevant for the session. Bill notes, though, that since Session 7 will go into risk analysis in capital budgeting, she should not address risk issues in Session 6. As with the other sessions, they will use an Excel model both to quantify the analysis and to help the directors learn more about how Excel is used in financial analysis. Obviously, some issues cannot (at this point) be quantified, but Bill wants to discuss qualitative as well as quantitative issues. Assume that you are Sue Chung, and you must now prepare for the session.

Table 1. Cash Flows and Other Inputs for Projects S and L

Other inputs: WACC:	10.00%	Tax Rate:	40%			
Project S	Year (t)	0	1	2	3	4
Required investment		-$100,000				
Sales revenues			$170,450	$58,333	$20,000	$20,000
Operating costs less deprn			$50,000	$25,000	$20,000	$20,000
Depreciation (straight line)			$25,000	$25,000	$25,000	$25,000
Operating income			$95,450	$8,333	-$25,000	-$25,000
Taxes			$38,180	$3,333	-$10,000	-$10,000
Net operating income			$57,270	$5,000	-$15,000	-$15,000
Add back depreciation			$25,000	$25,000	$25,000	$25,000
Net (free) cash flow		-$100,000	$82,270	$30,000	$10,000	$10,000
Project L	Year (t)	0	1	2	3	4
Required investment		-$100,000				
Sales revenues			$20,000	$36,667	$116,667	$209,583
Operating costs less deprn			$20,000	$20,000	$50,000	$100,000
Depreciation (straight line)			$25,000	$25,000	$25,000	$25,000
Operating income			-$25,000	-$8,333	$41,667	$84,583
Taxes	40%		-$10,000	-$3,333	$16,667	$33,833
Net operating income			-$15,000	-$5,000	$25,000	$50,750
Add back depreciation			$25,000	$25,000	$25,000	$25,000
Net (free) cash flow		-$100,000	$10,000	$20,000	$50,000	$75,750

Table 2. Mutually Exclusive Project with Unequal Lives

WACC:	10.00%					
	Year (t)	0	1	2	3	4
Project SS		-$8,212,670	$5,000,000	$5,000,000		
Project LL		-$15,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000

Table 3. Multiple IRRs: Palladium Project (Negative Cash Flows at End)

WACC:	10.00%				
	Year (t)	0	1	2	3
		-$10,000,000	$14,000,000	$14,000,000	-$18,800,000