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Rybnik Generating Company Model Master Plan Management Procedures

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Rybnik Power Plant
Poland

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FOREWORD

This document was prepared by a joint Polish-American team as part of a study funded by the U.S. Agency for International Development under a program to provide assistance for restructuring the Polish energy sector and improving the performance of Polish power plants operating in a market economy. The American team was led by Bechtel Corporation as a prime contractor to USAID under the Regional Energy Efficiency Project, Electric Power Systems Component, Contract No. EUR-0030-C-00-2055-00. The principal subcontractor was Arthur Andersen & Co. whose Warsaw office worked closely with the staff of the Rybnik power plant to develop questionnaires, obtain and analyze information, and prepare most of the material in this document. Subcontractor MODELPOL, Ltd. performed the financial analyses summarized in Section 3.7, using their proprietary financial planning model. Consultant Francis Staszesky, a former United States electric utility executive, prepared an evaluation of alternate corporate structures based on utility experience in the U.S. and other Western countries, and provided input and comments on the other material prepared during the study.

The Rybnik power plant was selected by the other hard coal power plants to participate in the study as a typical Polish generating company, and a Rybnik project team was formed to work directly with the contractor team to provide key organizational, operating, financial, and other information essential for the study. The Rybnik team also prepared key portions of this document, including the recommendations in the Introduction on how other power plants can use the information in this document.

By participating directly in the study, key members of the Rybnik staff have become familiar with the practices and recommendations outlined in this document and are now applying many of them to the operations of the Rybnik plant. Their experience will provide a practical demonstration of the value and difficulties of applying modern business practices in the Polish electric power sector, both in current individual plant generating companies and in possible future groupings of power plants.

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Introduction

This document is a product of Polish-American cooperation to assist in improving the performance of Polish energy companies operating in a market economy. The American contributions to this effort were financed by the U.S. Agency for International Development (USAID).

Numerous activities have been undertaken in Poland by USAID to assist in the restructuring the energy sector and to improve the financial viability and performance of the energy companies. This document is a product of one of these activities, initiated by the Ministry of Industry and Trade and the Polish Power Grid Joint Stock Company (PSE S.A.). The purpose of the project was to provide assistance to the Rybnik Power Plant in evaluating various organizational structures, developing new management approaches and procedures, and preparing a Master Plan to guide their reorganization and performance improvements.

Cooperation between representatives of the Rybnik Power Plant and USAID was established in May 1993. The primary USAID contractor in the project was Bechtel Corporation who subcontracted much of the work to Arthur Andersen & Co. and MODELPOL, Ltd. in Warsaw. On the Polish side, the team included representatives of the Rybnik power plant. Changes in government plans and the schedule for commercializing the plants resulted in delays and reorientation of the project, but development of procedures, contained in this document, continued.

The Rybnik Power Plant was selected by the Polish hard coal generating plants as a typical company for detailed evaluation during this project, and most of the information in this document is directly applicable to Rybnik. However, a principal purpose of the project was to produce a document of direct value to more than one organization, and the project team believes that the procedures and organizational approaches contained herein are applicable to other electric industry organizations as well.

PURPOSE OF THIS DOCUMENT

Problems faced by power-generating utilities as independent organizations are very similar and are largely independent of organization size or composition. In general, they may be divided into two major groups:

- Technical issues associated with the need for improving the energy efficiency of the power plants and for improving their environmental performance
- Management and economic issues, related to internal organization, management systems, and procedures for rational allocation of financial and other resources

The technical issues are well recognized by the technical staffs of the plants. However, implementation of technical modernization programs will require large investments of capital and will involve the use of outside financing. Securing the capital for the necessary technical projects hinges on:

- Development of modernization programs that are both technically and financially viable
- Introduction of modern management methods for planning and control which give confidence to the potential lending agencies that the projects will be completed within budget and schedule.

The objective of the authors was to propose certain advanced management practices for implementation on the level of an individual power plant. These practices are intended to enhance the effectiveness of plant management in the fields of information flow and fiscal planning and control. Implementation of these practices could have an important educational benefit, providing an opportunity for personnel training and for adjusting the details under typical Polish conditions. Many of the proposed approaches are now being implemented at the Rybnik plant and additional details are being developed.

The management issues treated in this document and the proposed solutions are applicable to any of the power plants in Poland. Application of these proposals would significantly improve the quality of management systems and procedures. These improvements will lead to better economic performance and will make the plans more attractive to private investors.

DOCUMENT ORGANIZATION AND CONTENT

The body of this document consists of seven sections, containing topical reports presenting procedures and initiatives that can be implemented almost immediately by individual power plants. A valuable attribute of these reports is that they are firmly anchored in Polish realities, since they are based on the Rybnik Power Plant. Since individual power plants across Poland face similar situations, using a specific power plant as an example has resulted in realistic solutions for Polish conditions.

The content of each section is summarized below. These summaries also include comments on the importance of these topics and suggestions for implementing the recommendations based on the experiences of the Rybnik team in participating in this project and applying the results.

Planning and Control

An important group of issues faced by power plants today is planning and control. In the period of transition to a market economy, the term "planning" has bad connotations. But it is clear that an efficient planning system is a must if the operations are to be efficient. Without a doubt, every power plant possesses some planning systems. In most cases, however, these are systems based on rather arbitrary development of a plan, serving the renovation requirements of a company.

Section 1, "Planning and Control," presents a different approach to planning. The planning function is, in some sense, only a subordinate function that assists the power plant managing team in developing a plan. In other words, the plan is not a product of one unit in the organization but the result of the joint effort of all members of staff. Such an approach should allow for development of very reasonable plans based on experience possessed by staff directly involved in specific activities.

The method for ensuring efficiency of the planning system is a set of controls that allows for identification of variations from the plan. The key is analysis of variances, identification of reasons for differences, and the process of learning the system on the basis of conclusions drawn from the variation analysis.

Practical implementation of this concept in the management practice requires appropriate training of executive personnel focused on the planning processes. Practical implementation of such procedures should enhance the capabilities of power plants management and business organization.

Management Information System

Another package of solutions that can be implemented almost immediately in any of the power plants is covered in Section 2, "Management Information System" (MIS). Most Polish companies do not employ an efficient MIS which provides management with the right information in the right form. In general, the executives use the standard reports generated for the Central Statistical Office and other external bodies. These documents are suited to the needs of the recipient, but they do not always contain interesting and important information needed by the company management to support rational decision making. The MIS presented in the study can be implemented immediately. However, the full advantages of having such a system may become more visible by its association with an efficient planning and control system, or rather, after installing both systems.

Cash Management

A particularly interesting area is covered in Section 3, "Cash Management." Cash management is important both for holding companies and individual power plants. The section considers cash flow from all four plants of the original Rybnik Group. Due to the volume of cash flows, power plants could obtain significant benefits from reasonable liquidity management. The developing Polish financial market offers more and more opportunities for exercising cash management.

The report provides an estimate of possible benefits that can be obtained by application of cash management with low-risk instruments in the form of term deposits. Such activities may produce interesting results of two kinds: increased income (i.e., interest on deposits) on one hand, and reduction or elimination of the need for working capital credit on the other hand. The best results can be obtained with an efficient planning and control system, but the benefits are available practically without any investments and in a short time. These solutions will have to be introduced to Polish business practice sooner or later.

Assessment of Capital Investment Projects

An important package of procedures and methodologies is contained in Section 4, "Assessing Capital Investment Projects." The energy industry faces technical challenges related to modernization of the existing generating capacity and incorporating provisions to comply with environmental requirements. In addition, every power plant must implement a number of investments related to maintenance. The energy industry is exceptionally capital-intensive and the problem of selecting investments from the point of technical and financial efficiency, as well as assigning appropriate priorities to investments, are very important. Thus, investment management procedures and investments evaluation processes should take full account of the time value of money. The importance of these issues is understood by management, and attempts are being made to work out appropriate procedural solutions. This section is a kind of a road map with instructions.

Non-Core Activities - Assessment of Restructuring Options

An important issue faced by the power plants today is internal restructuring. Every electric company must work out its own solutions. The study, covered in Section 5, "Non-Core Activities - Restructuring Options," uses the Rybnik example for the purpose of identifying functions that are directly associated with electricity generation (core functions) and other (non-core) functions in the organization, with details of costs of specific functions and their strategic importance for the company. Using such methodology should facilitate the development of a viable company organization and assist in carrying out the restructuring process. Restructuring based on the

proposed methodology allows for clear definition of economic results and facilitates evaluation of actions under consideration.

Procurement Functions

Purchasing and warehousing of spare parts and supplies offer opportunities for cost savings. This topic is covered in Section 6, "Procurement Functions." Development of an appropriate strategy and organizational structure for materials management is an important aspect of plant finances.

The strategy for this function must strike a balance between the conflicting desires of plant operators who want ample reserves and spare parts to ensure continuous production, and the financial organization which wants to keep the inventories low to conserve capital. The proper strategy takes into account the importance of specific items for plant operation and the nature of the supply availability. Four classes of materials are identified based on a combination of supply criticality and the number of sources from which the supply may be obtained.

Financial Analysis and Business Plan Preparation

The final part of this document, Section 7, "Financial Analysis and Business Plan Preparation," is an example of financial projections made using proprietary software (INWEL) developed by MODELPOL. Using this tool, it is possible to review the financial standing of a company with respect to planned investments, renovations, and modernization projects. It is possible to analyze cash flows with identification of possible financial threats, define required amounts of external financing, price parameters, and other important business parameters. It seems that this is a tool that should be used in current operations of a typical power plant. In a holding-type organization, the tool becomes even more important, facilitating development of a sustainable long-term policy.

Section 1

Planning and Control

1.1 INTRODUCTION

Fiscal planning and budgetary control are important stages of modern company activities. In the following document, some of the most significant aspects of a planning system are presented. Such a system is suitable for implementation in Polish power plants. Source data are obtained from the Rybnik Power Plant.

The document includes the following sections:

- Summary of Issues - Consists of a listing of issues to be considered in the planning process and a short review of the implementation method for effective budget planning. Recommendations apply to specific needs of the Rybnik Power Plant.
- The Current Planning System - Using the Rybnik Power Plant as an example, the planning methods currently used in power plants are discussed. The presentation concentrates on preparation and execution control of annual budgets. This section also contains initial appraisal of the most important elements of the current planning process.
- Modern Planning System - Overview of up-to-date budgeting systems. This section also includes relations between the corporate plan and lower-level budgets prepared by departments.
- Responsibility for Plan Implementation - Discussion on importance of each department regarding plan completion and methods of influencing lower-level management behavior.
- Plan Preparation - This section describes each stage of plan creation that may be implemented by the plant. Budgetary Committee authority and methods of work are also described.
- Plan Implementation Control - Methods for budget control and application of variance analysis for controlling purposes. This section also includes methods of considering external factors in budgetary control.
- Zero Base Review - Short review of the modern management controlled fixed costs planning method. The Zero Base Review, a modern method of discretionary cost planning, is described. This method aims to achieve maximum benefit for the company using limited resources.

1.2 SUMMARY OF ISSUES

In the planning system presented here, which could be applied to the power plant, the following issues have to be considered during strategic planning:

- An Analysis of the Industry - Condition of the electricity industry is one of the most vital issues in power plant strategic planning. There are external factors like laws, regulations, government policy on surplus capacity, and price changes which influence position of the generating company.
- Sources of Competitive Advantage - Correctly developed plan has to define which factors are sources of competitive advantage on the market. These could be lower costs or wider market (heat sales, higher dispatch regulation ability).
- An Analysis of Existing and Potential Competitors - Developing a strategic plan, the generating company should watch the competition and compare its own solutions to the other ones. This should result in finding areas for improvement. Especially important are these factors which give other generating companies a competitive advantage.
- Selection or Ratification of Strategy - Selected strategy has to strengthen the factors which either result in competitive advantage of the company or strengthen its current position. This approach leads to continuous improvement and change. No strategy is valid forever. It has to be changed in response to the market environment and take under consideration all new factors, giving the company the competitive advantage.
- Implementation - The chosen strategies have to be implemented through annual operating plans.

As shown graphically in Figure 1-1, introduction of the planning system is a complex process, which includes the following phases:

Phase I - The objective of Phase I is to establish a responsibility chain within the company, by creating Cost Centers, Profit Centers, and Investment Centers. These centers should at least reflect departments and functions which are key in the strategic planing process.

Phase II - In this phase, activities of each center are analyzed. Based on these and on management interviews, the plant should establish control factors and control information that influence every cost center. These will be used by the department management to better control the unit. In this phase, the Zero Base Review is often applied.

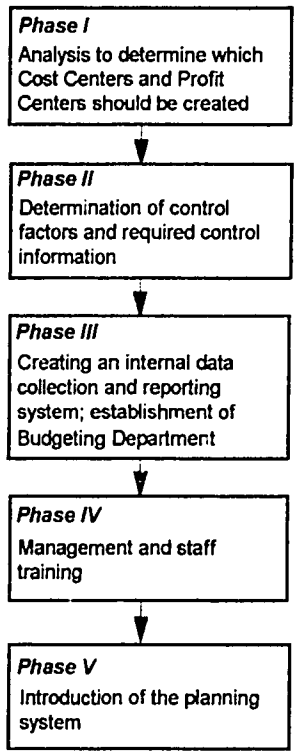

Figure 1-1
Planning System

Phase III - Based on data already collected in the previous stages, an internal data collection and reporting system is designed and created. This system is used to efficiently collect and analyze information identified in Phase II. A Budgeting Department should be established and the responsibility for the above tasks should be assigned to it. Its function and authority should be communicated to all other departments.

Phase IV - All management and staff involved in the planning process should be trained in the planning methodology before the planning system is introduced. They should also become acquainted with the principles that should be applied in the planning process. This training has to ensure a good understanding of the planning process and uniform approach within the company.

Phase V - Due to technical reasons and the relatively long period necessary for introduction of the planning system, a new system should be applied with the beginning of a new year. That means that the system has to be designed and ready by September of the previous year.

In summary, introducing an efficient planning system requires significant preparation and organizational effort. It has to be connected with introduction of project appraisal methodology and financial management. These elements form a solid foundation for the efficient management of the company.

1.3 THE CURRENT PLANNING SYSTEM

Plan Preparation

Current method of annual plan preparation is shown in Figure 1-2.

The most important features of the current system are as follows:

- The starting point for the annual plan preparation is the maintenance plan, which contains a schedule for generating unit shutdown. It allows for preparation of a monthly capacity production budget.
- Because of delays and inconsistencies in the plans prepared by PSE, the production plan also considers the previous years' experience. Differences can reach up to 15 percent.
- Cost planning is based mostly on previous years' figures, increased by the predicted inflation rate, also considering certain total profit margin. (This premise assumes maintaining the status quo and therefore no effectiveness improvements. It also limits implementation of new cost-reduction projects.)
- The annual plan is prepared as a worksheet containing the following information for each month:
  1. Electricity sales revenues, variable costs (fuel cost, including in-bound logistics cost and environment protection costs), and variable cost mark-up.
  2. Capacity sales revenues, variable costs (maintenance, depreciation and other costs), and mark-up on fixed cost.
  3. Total profit for Items 1 and 2, above, extraordinary profits and losses, gross profit, income tax, excess salary tax, obligatory dividend and net profit both cumulatively and for each month.
- The above plan is not formally connected with the annual capital expenditure plan.
- The plan is prepared for the plant as a whole, apart from the maintenance issues. (This creates an obstacle to identifying the source of inconsistencies when actual costs exceed planned costs. It also results in lack of coordination between the corporate plan and department activities.)
- There is no cash flow budget or working capital budget (cash, debtors, stock vs. payables and short-term loans).
- The plan is imposed on managers. (They cannot influence the budget for their department. As a result, they have no commitment to it or feel responsible for the company.)

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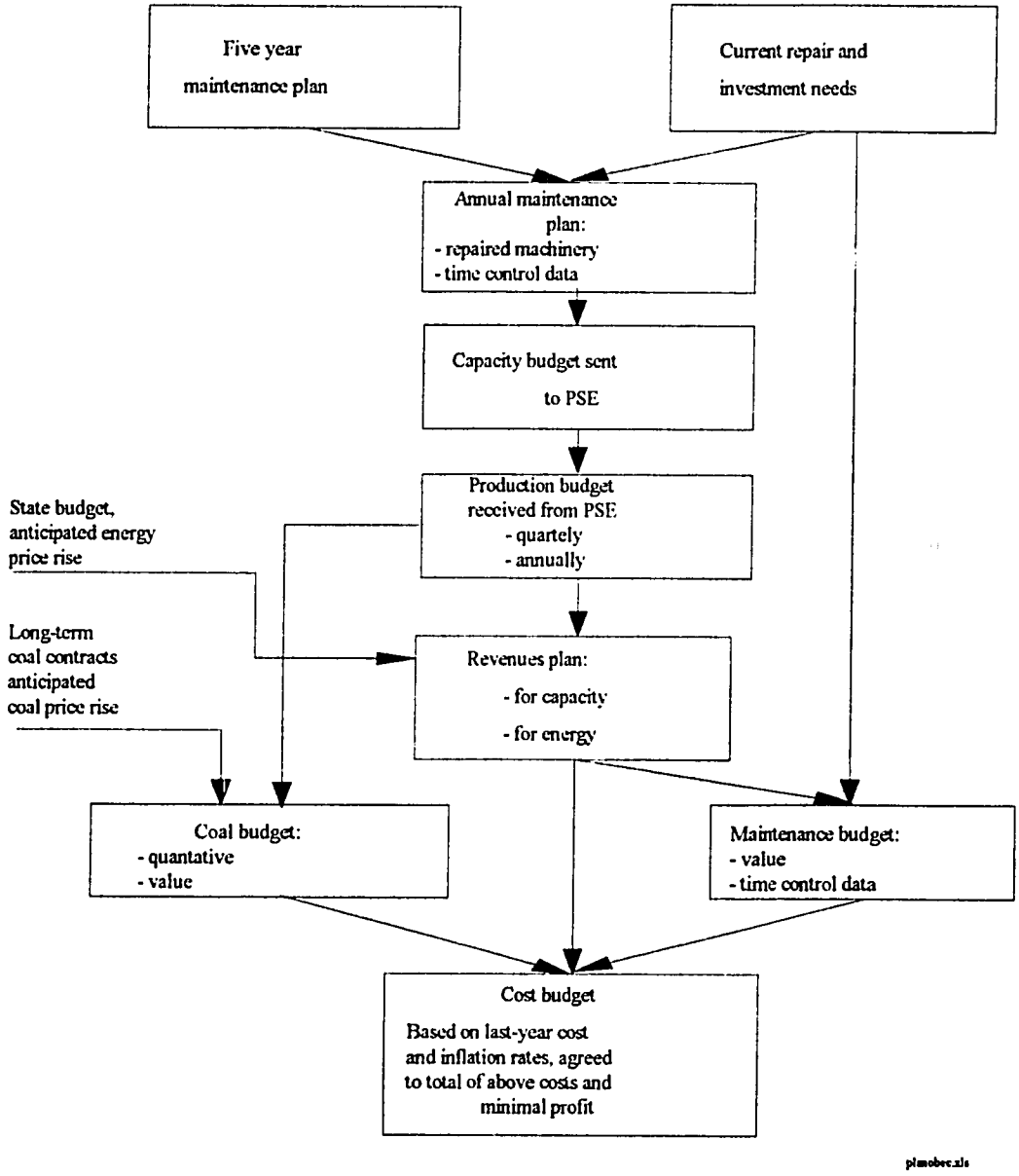

Figure 1-2
Current Planning System

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Budgetary Control

Both budget preparation and budgetary control are the responsibility of the Budget Control department. It uses financial report data for the plant and some additional information from accounting records (e.g., maintenance data). If a difference between planned and actual results occurs, the following course of action is followed:

- If the difference is significant (the figure is undefined) - It is explained by departments and plant management is informed.
- Result of the difference is included in the worksheet; therefore, worksheet figures always show actual data for months past and revised budget.
- Budget is changed according to some important external factors (e.g., price changes of coal or energy and tax modifications) or internal changes.
- If it is necessary, cost predictions are also adjusted (mostly for accounting purposes - [e.g., transferring from maintenance to capital expenditures]).
- No formal document is prepared to present budgeted vs. actual data or to clearly show the variances.

1.4 MODERN PLANNING SYSTEM

Modern planning aims not just to forecast, but to identify the target and coordinating activities leading to its achievement. Budget control not only confirms that plant activities are consistent with the plans, but also measures the effectiveness of managers at different levels.

The annual plan should be subordinated to strategic goals, as shown in Figure 1-3.

Financial plans of each department and the corporate budget as a total of department plans should support the company's strategic objectives.

Preparation of detailed plans for several departments (or groups of departments) is reasonable, when there is a sound budgetary control system and variances from the budget are identified. For purposes of such a control, it is necessary to gather current data (mainly financial ones) and process it for presentation to the relevant level management.

Gathering and processing of financial data requires an accounting system that allows proper grouping of relevant information for each function. It may be achieved by creating cost and revenue centers. This aspect will be further developed later.

Activities necessary to use the modern budgetary process are described in detail in this section, and the most important issues are outlined in Figure 1-3.

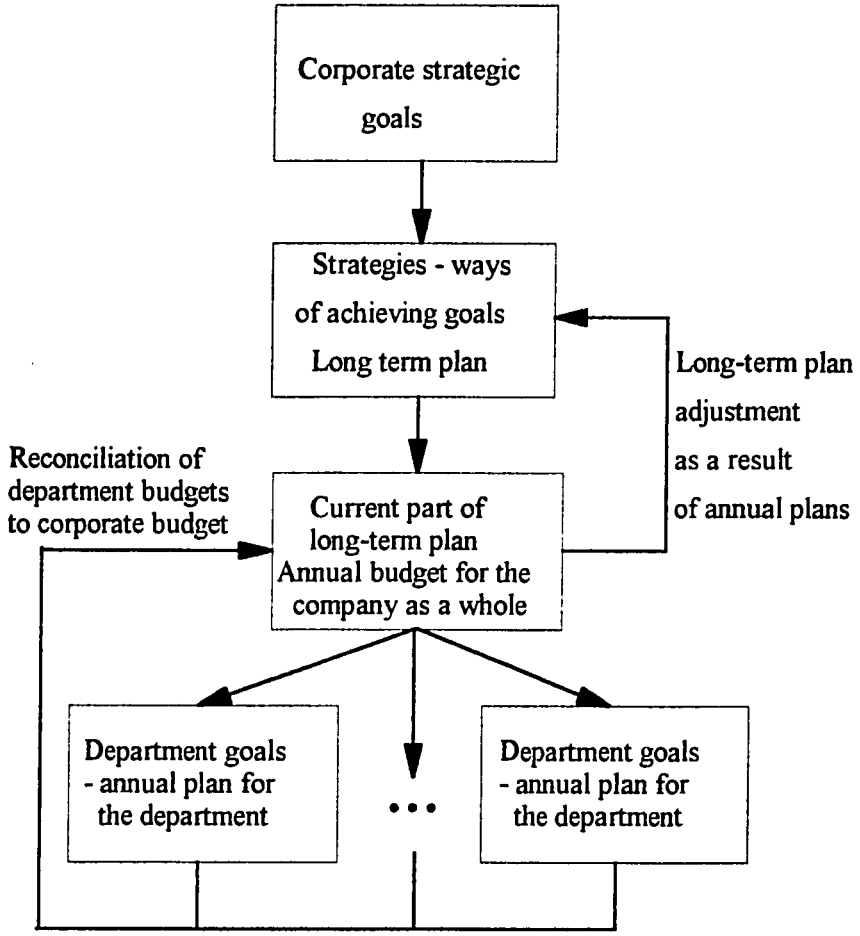

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Figure 1-3
Strategic Goals

Selection of Strategic Goals for Current Year

Goals should result from long-term strategic plans, adjusted to the company's current situation. If no strategic plans exist, management should define activities in the plant that will lead to:

- Effectiveness improvement
- Positive changes in cost structure
- Improvements of liquidity position

The above goals should be:

- *Clearly defined.* General statements like "effectiveness improvement" or "improving relationships with regulatory bodies" should be avoided.

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- *Measurable.* Results should be easy to measure e.g., decrease of fixed costs per MW by (X) Zl, short-term loan decrease to (N) Zl.
- *Agreed.* All parties involved should agree that the goals are proper.
- *Realistic.* That means:
  - There are enough resources to achieve them
  - Realization costs are not excessive
  - No serious external obstacles exist
- *Time-scheduled.* The time frame for goals achievement should be clearly defined.

Recognizing Budget-Limiting Factors

Some of the factors that influence company activities cannot be controlled by the company itself. For power plants, such factors include the level of power or thermal energy demand. This determines production level and affects several cost elements.

The corporate plan should take into consideration the means for reducing the impact of such limitations. The whole plan should aim at maximizing benefits for the company. For example, repairs or overhauling should be scheduled for low-demand periods in order to maximize electricity sales.

Preparation of Master Budget Outline

A draft master budget should be prepared taking goals and limitations into consideration. This allows preparation of initial cost estimates, and income and profit estimates for each department or groups of departments.

Preparation of Subordinate Budgets by Departments

The commonly used "bottom-up" planning approach requires that separate and independent annual budgets be prepared by each department. The department goals should be consistent with overall corporate goals. This can be achieved only by free information flow between management of different levels and employees and cooperation of lower-level staff during goal setting.

Department budgets should be detailed and cover the full range of activities controlled by the department management. Some plans may be prepared by giving physical rather than financial data. For example, when a department describes the demand for employee transportation, it may give the number of lines, lengths, and frequencies, but without cost-per-km calculation. The Transport Department may then calculate the total transportation cost after receiving estimates from all departments.

Consolidation of Department Plans and Reconciliation of Divisions and Corporate Budgets

This is the most important stage of the "bottom-up" approach. However, participatory budgeting may result in some behavioral problems:

- Excessive budget requests (inflation and new activities cost being given as a reason) which allows management to mitigate the risk of exceeding budget and reduces needs for cost saving
- Conservative goal setting (manager wants to succeed - it is always easier when goals are set low)
- Unrealistically high goals (lack of experience or desire to impress higher managers may lead to stating inflated goals)
- Budget submission delays (large number of departments, lack of experience, and unclear responsibilities may cause budget preparation delays)
- Difficulties with reconciliation (when resources are limited, usually the total of the first-cut budget exceeds them)
- Apparent commitment (if lower-tier management feels that their budgets will be adjusted to high-level assumptions anyway, they will not commit seriously to the job)

To cope with the above issues, the company should:

- Make each manager directly responsible for the relevant department plan. High-level managers should be responsible for its reconciliation to corporate budget. A useful tool here may be the planning scheme (described in Section 2.2.3) that should be accepted by top management as an approved document.
- Grant the Planning Department authority to adjust the budget.
- Ensure proper information flow between management levels.

It is difficult to overestimate the role of proper information flow and constant communicating to department managers in corporate level planning.

Preparation of Corporate Plan

When all divisions have their budgets prepared, a final reconciliation should be made. The Budget Committee has the authority to do this. Decisions of the Committee are based on sensitivity analysis prepared by the planning department using divisional budgets (after initial aggregation of budgets - see Section 3.1.5 and market predictions). Detailed cash flow analyses should be also prepared at this stage to allow for evaluation of financing possibilities for each variant.

Annual Plan Approval

The annual corporate plan, usually as a planned balance sheet, profit and loss statement and cash-flow, should be approved by top management and (in case of joint stock company) the Board of Directors.

1.5 RESPONSIBILITY FOR PLAN IMPLEMENTATION

In modern companies, a significant part of the decision-making authority is delegated to lower management levels, such as departments or even employee groups. This transfer of authority is closely tied to the responsibility for:

- Setting tasks to be completed in the nearest future (short- and medium-term goals)
- Budget preparation
- Supervising current activities and taking corrective actions where variances occur

There are several organizational levels in a company linked to decision-making authority and performance measurement factors :

- Investment Centers
- Profit Centers
- Cost centers
- Revenue Centers

Decision-making authority and performance measures are presented in Figure 1-4.

It should be pointed out that:

- An Investment Center can consist of several profit centers which, in turn, may contain several Cost Centers and Revenue Centers.
- A Cost Center is usually the smallest organizational part of the company where costs are accumulated and charged to production.
- The decision-making authority of a given organizational unit can be limited or directed by the company management (i.e., capital expenditures in the Investment Center can be limited to a particular magnitude or field of activity).

Some of the above described organizational levels may be omitted in smaller, less complex companies.

The above organizational structure requires responsible planning and commitment to implementation of the agreed-upon budget. A system of incentives to reward managers who meet their budgetary targets is a useful tool for encouraging performance.

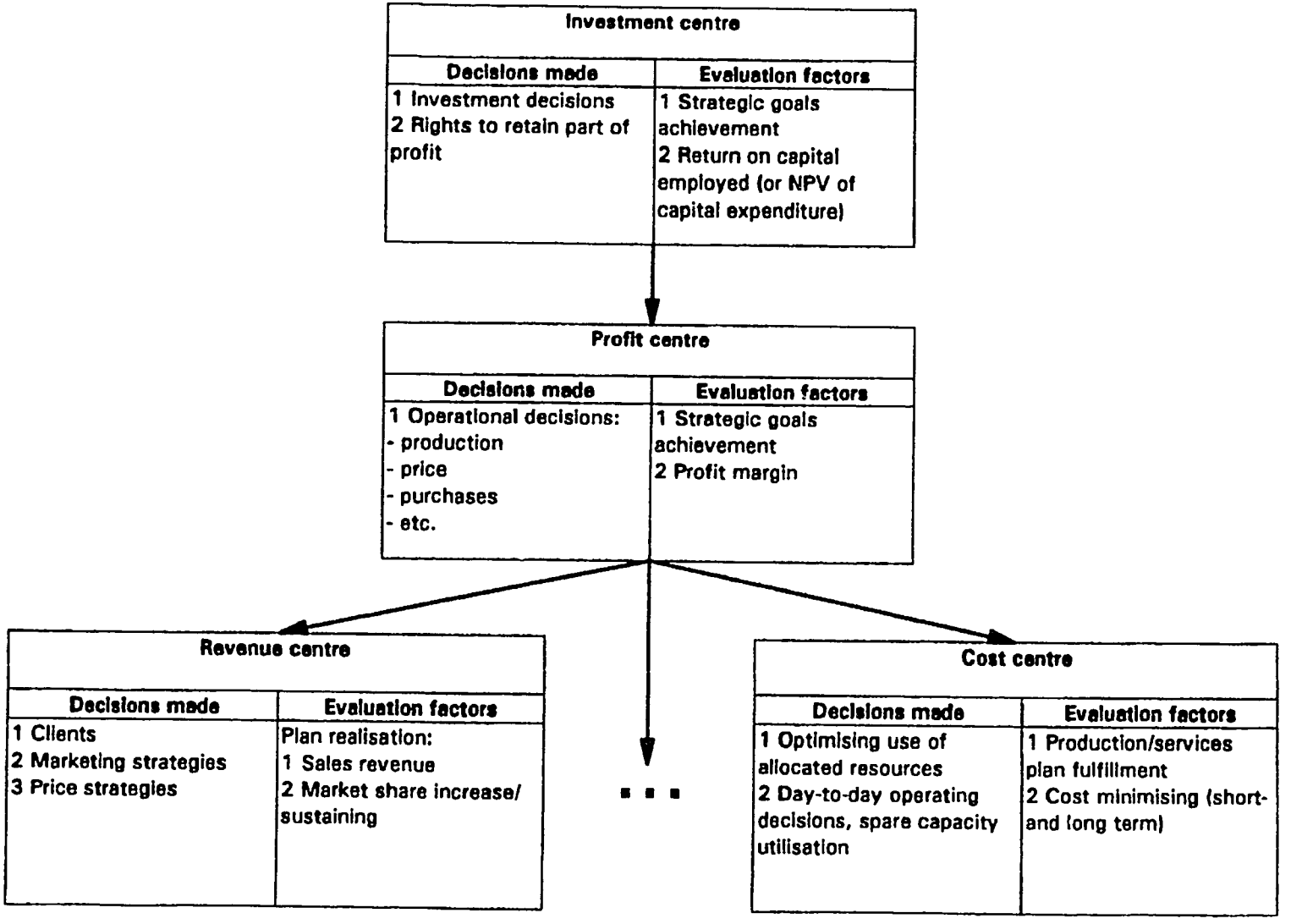

Figure 1-4
Decision-Making Levels in the Company

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The "bottom-up" budgeting system can work effectively, when data for each organizational unit are collected, analyzed, and properly presented to the responsible manager. Methods for comparing budget vs. actual results are described in detail in Section 1.6. The special importance of an accounting system should be emphasized because it has to:

- Gather information for income (and its structure) for Revenue Centers and Profit Centers.
- Gather cost information for Cost Centers, allowing for separation of controllable costs, which could be a basis for performance measurements.
- Enable to gather real economic cost data, for example by use of market transfer prices.
- Enable considering the time value of the money and cost of working capital and other charges applicable to Investment Centers and Profit Centers.
- Provide the above information fast enough to enable each manager to initiate corrective action. Usually, data are provided every month (no later than the 10th of the following month) but some departments need weekly or even daily reports.

The above functions usually require development of an accounting system with a set of databases and worksheets and often changing accounting procedures and Chart of Accounts. An effective management information (or internal reporting) system requires also direct access to accounting data by responsible departments. In the computerized accounting systems, it is usually stored in read-only files.

Effective sharing of management responsibilities require:

- Convincing all levels of management that the proposed system is justified
- Change in the mental attitude of lower management from fulfilling orders to independent goal-setting and achieving these goals
- Profit Center and Investment Center managers must thoroughly understand the underlying economic principles
- Clear definition of responsibilities and prerogatives for each management level
- Setting up clear criteria for the incentive system (salary, promotion, and personal development), first of all, based on effectiveness of the manager

The proper internal information flow and exchange of ideas are the base for proper responsibility-sharing.

In practice, such a system is implemented gradually. The authority may be dispersed only after creation of proper planning and control infrastructure, information channels, reporting systems, and staff training.

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1.6 PLAN PREPARATION

Before proceeding to plan preparation, it is necessary to:

- Define the Planning Department authority (as the planning process coordinator).
- Supply the Planning Department with proper tools that will enable it to prepare short-term financial projections, cash-flow planning, and probabilistic analysis in the uncertain environment (e.g., sensitivity analysis).
- Train managers in planning through workshops for explaining the role and responsibility of each manager in the planning process and production.
- Expand these workshops in departments to explain the importance of the goals and employee participation in goal setting.
- Create a formal internal document on plan preparation that contains the "Planning scheme." The "scheme" has to define managers responsible for preparation of department plans (or unit plans) and for reconciliation of group plans.
- Recognize factors requiring special attention.
- Set information flow paths for data necessary for plan preparation.
- Appoint a Budget Committee and assign Planning Department staff to it for technical support during reconciliation of the corporate plan.
- Establish a time schedule for each stage of the planning process, and set deadlines for department planning work and Budget Committee meeting dates.

Table 1-1 summarizes each stage of the planning process and the recommended time table for power plants. A detailed description of each planning stage is presented below.

Budget Limiting Factors

As has been mentioned, the main uncertainty in the planning process is the level of power sales. It should also be the starting point for the planning process. Plant management in cooperation with planning department and operations supervisory staff should:

- Discuss possible ways of maximizing sales in the existing market situation. (Maintenance schedule does not have to be considered at this stage; instead, it should be subordinate to sales maximizing).
- Prepare variant analysis for sales forecast and its time schedule based on historical data and predictions.
- Forecast sales, as this becomes the base for furthering the planning process, subject to corrections from PSE and feasibility analyses.

Table 1-1
Planning Time Table

Time	Planning stage	Responsible for Planning/Approving
September	Sales plan and production plan, discussions with PSE	Operating departments' managers, operation control department with help from planning department / Budget Committee
Beginning of October	Cash flow plan - part 1	Financial department
Beginning of October	Fuel purchase plan	Managers of fuel and transport departments, operating control, financial dept. supported by planning dept. / Budget Committee
October	Maintenance plan	Groups from operating and maintenance departments, analyzed by Planning dept. / Budget Committee
November	Capital expenditure plan	Data from different departments analyzed by planning dept. and reviewed by section managers / Budget Committee
Beginning of November	Plan of other expenses - part 1	Groups in each department / section managers
November	Cash flow plan - part 2	Financial dept., Budgetary Committee
End of November	Plan of other expenses - part 2.	Groups in departments/ Budget Committee
December	Final plan approval	Planning dept., assessed by Budget Committee / Board of directors

Special attention should be paid to the importance of PSE, currently the plant's only client, and therefore sales profile should satisfy its needs. Client requirements analysis (PSE in this case) and adjusting sales to it (e.g., through negotiations) is a precondition for meaningful operational plans and possible increase of power sales volume. Future income diversification should also be considered.

This stage should result in the sales plan prepared at least for the following scenarios:

- Optimistic
- Most probable
- Pessimistic (sensitivity analysis with probabilities attached would be the best)

The sales plan should be first prepared in technical units (capacity in MW, energy in MWh). The planning department then calculates the revenue from the price forecasts. This allows next year's comparison of the budget with the strategic goals for the next year, for example:

- Revenue increase (considering price changes)
- Changes in the revenue structure (increase of income from dispatch regulation, and heat sales increase)
- Increase in capacity utilization

Preparation of Production Plan

The energy and power production plan should be created by the responsible department (for Rybnik Power Plant the Operations Control Department). The plan should be prepared in cooperation with managers directly involved in production (Carbonation Department, Energy Blocks Operations Department, and Slag Removal Department). Their experience would be very helpful in evaluating the credibility of the budget and its optimization.

Because of the power plant's specific production profile, an aggregation in stages should be considered. This would help to avoid budget inconsistencies or an overly optimistic sales budget, and strengthen the position of the Operations Department managers. These managers would not only influence departments' budgets but also the higher level plans that may be implemented in the future.

From the organizational point of view, inconsistencies can be resolved by setting up a group including:

- The Planning Department manager (because sales production plans are the most important component of the corporate plans)
- A representative of the Operations Control Department (the one responsible for negotiations with PSE and for technical Operations Control)
- Department managers of Energy Blocks Operations, Carbonation, and Slag Removal departments

Such groups would have the knowledge and contacts necessary for budget preparation. The final budget would be approved by the Budget Committee and sent to each department.

Cash Flow Preparation - Part 1

After the sales plan has been created, the sales revenue forecast (the first element of cash flow) can be defined. The pattern of collecting receivables can be forecast according to historical data (see Table 1-2).

Table 1-2
Receivables Collecting Pattern

Period	Percentage
On time	xx %
Till the end of first month	yy %
Second month	zz %
Third month	xy %

Receipts forecast based on the above statistics is very useful when cash outflow is planned. Forecasts of other cash flow components are prepared by the Financial Department. It should become a rule that the budget is prepared by the same department that will eventually be responsible for meeting it.

Coal and Fuel Purchase Plan

The cost of fuel is the most significant plant expenditure variable. Fuel is usually purchased under long-term contracts with suppliers. It should be noted that payments for coal are compensating ones and do not influence cash level. Delays in payments cause no negative effects. As this situation may change in the future, a new economical approach to coal purchases should be implemented.

A fuel purchase plan (divided into coal and oil) should be prepared by the group consisting of:

- Representative of Operations Control department - responsible for fuel and negotiations with coal mines and refining plants
- Managers of the Carbonation, Rail and Road Transport departments - responsible for transport and fuel consumption
- Representative of Financial Department - responsible for cash flow planning
- Representative of Planning Department - as a technical support

The fuel purchase plan is used for:

- Minimizing of fuel stockpile while maintaining financial liquidity and operating security
- Negotiations with suppliers

This stage should also result in updating cash flow with payments for oil and, allowing for compensations, coal. The fuel purchasing plan is to be approved by the Budget Committee.

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Maintenance Plan

Recognition of demand uncertainties influences maintenance planning priorities. The plant should aim at maximizing power sales. The maintenance plan and schedule should be consistent with the sales plan.

The maintenance plan addresses only those work items that are to be carried out during planned shutdowns. The purpose is to keep up or improve (when necessary) the technical condition of the plant equipment. They can be divided into:

- Maintenance
- General repairs and overhauls

The latter should be considered together with capital expenditures and verified the same way.

Maintenance periods should be coordinated with the production plan and their duration should be acceptable to the relevant operational departments.

Therefore, for each maintenance type, the plant should set up a team consisting of representatives of the Maintenance Department, the Operating Department (or another client department) responsible for the equipment to be repaired, and the Investment Department. Such a team will ensure optimal choice between repairs or buying a new machine.

Under the targeted holding company structure, at least a majority of maintenance functions will be spinned off through a subsidiary. With such an arrangement, the operating departments will have to take care of the machinery and decide on its repairs or replacement. At the same time, effectiveness evaluation factors for managers of these departments must promote not just sustaining or decreasing cost level, but also avoiding neglect of the machinery in order to cause excessive "savings" on maintenance.

Maintenance plans prepared by each team should be collected by the budgeting department and analyzed (where required, because of the size and nature of repair and overhaul projects). Subsequently, such budgets are evaluated and prioritized by the Budget Committee. All department managers should also participate. This will result in a detailed maintenance plan for three different levels of budget: economy, basic, and full range of needs. Such a plan will enable proper decision-making, depending on financial resources availability.

Capital Expenditure Plan

The capital expenditure plan is usually a part of the long-term investment plan. It is updated annually with current needs of each department and with planned maintenance. Investment requirements are analyzed according to capital expenditure appraisal methodology (see Section 4), and then included (or not) in the annual plan. The investment plan, as a whole, is approved by the Budget Committee after consultations with divisions.

General Expenditures Plan - Part 1

Expenditures not directly related to power generation should be planned by each department (or during the implementation stage of planning system, by its groups). Such a plan should be the result of a joint effort of the department manager and the employee group from the manager's department. Some of these plans can be quantitative (e.g., the number of employees required together with details of posts or, as in a previous example, transport routes and number of kilometers).

Initial data prepared this way are processed by the planning department that assigns values to them. Then budgets are returned to the divisions, where they are reconciled and excessive or unnecessary expenses eliminated. The suggested method is Zero Base Review, as described in Section 1.8.

The planning department prepares an initial budget for the next year based on the division's data, sales plan, fuel purchase plan, and maintenance plan.

Cash Flow Preparation - Part 2

When estimated data on revenues, costs, and investments are available, the finance department prepares a cash flow statement. It should show expected shortage or excess of funds. Using this cash flow projection, the Budget Committee has to decide whether to use external funding, reschedule expenditures to avoid negative cash flow, or reduce expenditure to such a level that will make external financing unnecessary.

General Expenditures Plan - Part 3

After initial analysis of profit and loss and cash flow predictions, the company can opt for expenditure cuts. Sweeping choices, such as "reduce all expenses by 10 percent" should be avoided. The Budget Committee should choose activities that can be stopped or limited without negative impact on the plant. Final decisions should be left for agreement within divisions, where each manager of the employee group and departments have the most thorough understanding of the available savings.

Representatives of the planning department should provide all required data and analysis results for such assessments. Results of the Zero Base Review are extremely useful at this stage.

After inclusion of the adjustments proposed by divisions, the Budget Committee finally approves the plan and sets the level of deviation from the budgeted expenditures that require budget revision and approval by the Committee. The limits may be set in terms of Zloties or a percentage of the budgeted funds. This is especially relevant to maintenance and investment costs. Cost trend analysis by the finance department is useful for showing the need for corrective actions before the budget is actually exceeded.

Final Budget Approval

After the planned profit and loss statements are prepared, the cash flow analyses and balance sheet are prepared and accepted by the Budget Committee, and final approval of the plan or of each of its variants is given. Planned profit and loss and budget for each section is then distributed to relevant managers of different levels.

1.7 BUDGETARY CONTROL

Monitoring and control of implementation are key elements of the planning process. It is based on comparison of existing results with the planned ones, analyses of variances and (if necessary), taking correction measures.

Proper implementation control requires an adequate system of collecting and analysis of technical, operational, and financial performance data. The main requirements of such a system are presented in Section 1.5.

Normally, the planning department is responsible for day-to-day data collection, analysis, processing, and presentation of relevant information to managers and directors. Such information should include:

- General information regarding the plan implementation by the plant.
- Information regarding the progress in plan implementation by a department.
- A comparison of implementation progress with selected operational and financial parameters characterizing each department. Information about effectiveness and productivity of employees may be also included.

Reports supplied to managers should be:

- Consistent - information regarding the division shall be comparable with information applicable to the department, and these should include the information for the whole plant.
- Comprehensive - complicated ratios and aggregated information, meaningless for managers of lower level, should be avoided.
- Concise - the whole plan implementation report (except for individual employees achievements) shall not exceed four pages.
- Related to factors under control of a particular manager - factors that are outside the control of a particular manager are not relevant for him. For example, administrative overheads that are calculated arbitrarily should not be included.

Such a company-wide reporting system should enable management to find meaningful information with increasing detail from descending organizational levels. This means that an

interested director must have the possibility of locating the source of variance at the plant level by looking through consecutive reports. For example, in case of an unfavorable production fixed cost variance (i.e., exceeding of planned costs of production), the report of the Production Division should show a detailed breakdown of each category, and then on the departments level, variance on each item can be searched.

The planning department should be responsible for delivery of specific information according to management requirements.

The monthly variance report should contain the following headings:

- Budget item
- Budget funds
- Planning variance
- Flexed budget
- Actual cumulative receipts (or expenditures)
- Variance from flexed budget
- Actual receipts (or expenditures) for the month
- Variance for the month

The variance should be calculated in real values and as a percentage. It is important to distinguish between planning variance and operational variance which may be illustrated by the following example.

The approach above is called *ex post* standard budgeting. This separates the effects of imposed changes from factors which were under power plant control (see example below). It is important to analyze the operational variances between:

- Volume variances - connected with different usage, effectiveness or mix
- Expenditure variances - arising from the unit price (or labor hour cost) being different from planned

With regard to the need for corrective action, the company should establish rules which will address the following:

- Significance of variance - the company should decide to investigate every variance over a specified amount or percentage
- Trend of variances - some variances may be insignificant by themselves, but their trend could show some problems, as, for example, steady increasing unfavorable efficiency variance

EXAMPLE

During budgeting, the plant planned a coal purchase of one million tons in the first quarter of the year for the constant price - equivalent of 32 dollars per ton. In this period, the effective market price reached 41 dollars per ton. But, because of long-term agreements and special negotiations, the plant has to pay 36 $/t, purchasing 1.2 million tons due to increased production level.

Table 1-3 indicates the differences between the traditional and ex post facto outlines of the report.

Table 1-3
Report Outlines

Coal purchases - Quarterly report

Budget	*32,000,000*
Actual	*43,000,000*
Variance	*11,200,000 (negative)*
Variance %	*35%*

When budgeting variance and budget adjustments because of the new activity level is considered, the report would look as follows:

Coal purchases - Quarterly report

Budget	*32,000,000*
Budgeting variance (1 million t x price change)	*9,000,000 (negative - result of price change)*
Verified budget	*41,000,000*
Budgeting variance (200 000 t x 41$)	*8,2000,000 (negative - result of higher purchase volume)*
Verified Budget	*49,200,000*
Actual	*43,200,000*
Variance	*6,000,000 (positive - result of effective negotiations)*
Variance %	*12.2%*

The traditional approach shows a single aggregated variance, giving no information on the reasons for it. In the suggested approach, we get three separate variances that allow for analysis of the total variance:

- *Market price of coal change*
- *Increased production that caused increase in fuel consumption*
- *Effectiveness of the procurement department that received the discount*

Moreover, the traditional approach gave no information about procurement department performance. The proposed method shows that some variances result from factors that cannot be controlled (market price change and production increase) and the third variance (in this case, a positive one) can be used for procurement performance measurement.

- Controllability of variance - some variances may be the result of higher management decisions. For example, unfavorable labor expenditure variance may be the effect of an agreement with trade unions. There is, of course, no need to investigate such variances on the department level.

The management-by-exceptions principle is that higher level management does not interfere with lower management activities unless variance from the agreed plan occurs. In modern companies, higher level management tries to minimize its involvement in departmental operations. In situations of unfavorable variances, the departments should develop their own proposed solutions. If the explanations or the proposed corrective actions are unsatisfactory, the department representatives work jointly with higher level managers to find an acceptable solution.

1.8 ZERO BASE REVIEW

There are several types of expenditures incurred in power plants that are not directly associated with the main function of electricity generation. These include mainly administrative and service functions. Budgets for these items are determined by management decision. In existing organizations, past experience serves as a reasonable basis for budgeting. However, during restructuring or overall reorganization of the plant, such experience does not always a provide sufficient basis. In such instances, the "Zero Base Review" (ZBR) method may be used to determine the most effective combination of individual budgets for a group of functions.

The name ZBR is derived from the starting assumption that the function or service does not currently exist. It results in an optimal combination of service levels of a group of functions or services within a pre-allocated group budget.

Information input to ZBR includes:

- An expenditure target for the group of functions. This may be an allowance derived from the overall plant budget or a best estimate from experience.
- A rating of relative criticality of each function, or service, to the efficient and economic operation of the plant.
- Two or more viable options to meet the needs of each function or service. These options should provide progressively more service for higher costs.

The initial step in the process is to obtain estimates of the cost associated with each option. The estimates should include the cost of the service itself and any expenditures (or savings) required to change over from any existing processes.

In the second step, the sum of the least cost options is compared with the target budget. If the sum is higher than the target, other options need to be sought, or, in the worst case, the target must be increased. If the sum is less than the target, then higher cost (with improved service) options can be considered. This increase is allocated according to the criticality ranking of the

functions. (The most critical function is considered first.) The process is repeated until the sum reaches the targeted budget figure.

With service groups of many components, each with a large number of options, this process may become too complicated and time-consuming for manual execution. The use of decision-making software can make it more simple.

A practical demonstration of the ZBR process is demonstrated in the following example.

EXAMPLE:

We have to make decisions about investments in three departments: Warehouses, Repairs A, and Security. Budgeted cost of the whole operation is one billion Zl a month. Expenditures were established on three levels according to demand level of each department (first - necessary; second - basic; and third - demanded).

These levels of offered services are as follows:

Table 1-4
Offered Service Levels

Level	Warehouses	Repairs A	Security
First	*35 employees used for receiving quality control of materials and equipment*	*Use two supervising inspectors supplied by an external contractor*	*18 people hired based on freelance agreements*
Monthly cost	*300 MZl*	*30 MZl own cost* *220 MZl service cost* *-----* *250 MZl total*	*80 MZl*
Second	*Leasing of a computer system and the software allows replacement of 4 employees and guarantees control over inventory.*	*Hire 15 people for maintenance and current repairs. Necessary materials will have to be purchased. This will make Rybnik partly independent from the contractor and guarantees quality. A contractor will still be used for general repairs.*	*The security system is being installed and a technician is hired for its maintenance. Four security guards are employed permanently - higher confidence to the security.*
Monthly cost	*70 MZl leasing* *30 MZl savings in salary* *-----* *40 MZl total*	*180 MZl Employees* *65 MZl Materials* *100 MZl costs reduction* *-----* *145 MZl total*	*60 MZl - additional cost*
Third	*Leasing of fork lifts to improve transport speed within the warehouse - 5 vehicle operators employed.*	*10 more workers hired and 3 machines are leased to perform the repairs within the company.*	*All security guards hired, and computer-assisted equipment recording entrances and exits from the firm is installed.. Additionally, the computer is used to track employees' work time.*
Monthly cost	*180 MZl additional cost*	*120 MZl Employees* *60 MZl Materials* *140 MZl Machinery leasing and maintenance* *120 MZl service costs reduction* *-----* *120 MZl total*	*200 MZl additional cost*
Total costs	*300 + 40 + 180 = 520 MZl*	*250 + 145 + 200 = 595 MZl*	*80 + 60 + 200 = 340 MZl*

* million Zloties

As seen above, total costs of using the optimal option for all three functions amounted to 1,455 (520 + 595 + 340) million Zl, which exceeds the budgeted costs of 1,050 MZl. To solve the problem, a decision package is developed. Management considers all possibilities (computer-aided decision-making software can be applied) and prioritizes them. In the example, assume the final weighing hierarchy looked as shown in Table 1-5 (descending order: 1 - absolutely necessary).

Table 1-5
Cost Hierarchy

Level	Warehouses	Repairs A	Security
First	*1*	*1*	*1*
Second	*5*	*2*	*3*
Third	*6*	*7*	*4*

Next, assigning costs to the certain levels, one can easily calculate that expenditures should look as follows:

Level/Department	*Cost MZl*
1/Warehouses	*300*
1/Repairs	*250*
1/Security	*80*
2/Repairs	*145*
2/Security	*60*
3/Security	*200*
Total:	*1,035*

As the example above proves, Zero Basis Review makes the best allocation of resources. Notice that activity level of Warehouses has been limited to level 1, and Repairs to level 2.

Actually, there could be more levels of activity. During the review, the following factors should be taken under consideration:

- Strategic priorities
- Demanded quality of service
- Working conditions
- Security of work environment, etc.

Implementation of Zero Basis Review does not release the management from obligation to evaluate every solution according to the above criteria. It allows one to translate the qualitative decisions into financial terms and to choose the combination of solutions which provide maximum value for the lowest cost.

Section 2

Management Information System

2.1 INTRODUCTION

Availability of accurate and up-to-date information is one of the most important prerequisites for effective monitoring of plant operations and managerial decision-making in a market-oriented economy. The management reporting system is designed to meet the requirement to provide necessary information upward in the management hierarchy. The system can be defined as a set of activities connected with collection, analysis, and presentation of financial and operational data, which should support management in its operational and strategic decision-making process. All the information processed through this system is directly connected with current, planned, and/or expected situations arising at the firm.

Development of a suitable management reporting system would benefit the Rybnik plant itself. It would become indispensable in the restructured plants where a group of plants will form holding companies or corporations. Increased fixed assets of these groups, large differences between the plants, and geographic dispersion would not allow operation under traditional management practices. This is due to increasing complexity of the economic environment and the necessity to make strategic decisions regarding the future, as well as the increased cost incurred when the wrong decisions are made.

An integrated management reporting package for any power plant, designed to facilitate the management decision-making process, should include, as a minimum, the following elements:

- Reporting Manual - this should contain all standard forms, instructions and explanations, accounting standards, reporting lines, and other relevant information on the management reporting system. It should also include examples of the packages mentioned below. Such a manual ensures that all information relating to management reporting is available in one place.
- Financial Reporting Package - designed to provide current information of the financial status of the company or plant to management. Numerical data should be coupled with commentary highlighting important issues.
- Operational Data Package - designed to present key information on the power plant's operations. Numerical data should typically be supported by short explanatory notes on crucial areas of the plant's operations and highlights of key operational events during the reporting period.
- Budgeting Package - designed to report financial status, related to the budgetary plans. It is interlinked with other elements of management reporting, designed to help the management to evaluate planned operations and intervene when necessary.

To serve its purpose, the management reporting system must not be overburdened with excessively detailed information. The report contents and its preparation process should be based on a broad consensus of all management levels who are both creating and using the system.

With regard to automation levels, the financial portion of management reporting can be set up in different forms:

- Manual system: preparation (i.e., collection, analysis, and presentation) of all information is done manually on the basis of available accounting and operational data, in accordance with specified instructions and procedures.
- Computerized system not integrated with accounting system: the data input is entered manually on the basis of available accounting and operational records. The system is not automatically integrated with the accounting system. Most generation and analysis of data is computerized.
- Computerized system integrated with accounting system: management information is generated and analyzed automatically on the basis of information recorded in accounting system, expanded with specific technical and business information. The management reporting system becomes an integral part of a general financial and accounting package, adjusted to the needs of the management reporting system.

The following paper presents some general guidelines for setting up an effective management reporting package. The reporting manual is presented together with guidelines for the preparation of profit and loss accounts and balance sheets for management purposes (the cash flow statement is prepared automatically based on the information already generated).

Drawing on our experience gathered through preliminary analysis of the accounting system at the Rybnik power plant, an example of the management reporting package is presented in Appendix A. (It is a computerized system not integrated with the accounting system.) Appendix B contains a listing of reporting package input data. Guidelines for preparation of profit and loss accounts and balance sheets are presented in Appendices C and D, respectively. Descriptions of financial ratios are contained in Appendix E.

2.2 REPORTING MANUAL

The structure of the management reporting system for the power plant or holding company should be determined by the nature of the enterprise's activities and the range of information required by the different levels of its management.

The procedures applied for the management reporting system should be gathered in the form of a "Reporting Manual." This manual, developed in liaison with the financial and operational functions of the power plant, should typically include the following as a minimum.

Introduction

A statement purpose of the manual, the scope, and mechanisms governing the enterprise's management reporting follows.

Report Types

It is envisioned that reports will be issued at different times (daily, weekly, monthly, yearly, and on demand). Contents of the reports varies with their coverage as shown below:

- Daily reports provide daily operational statistics (total generation, fuel consumption, units on line, scheduled outage time, forced outage time, and problem areas).
- Weekly reports provide weekly operational data, as above, and weekly summary of revenues earned and costs.
- Monthly reports provide a monthly operational data summary, as above, and a comparison of budgeted and actual revenues and expenditures, by Cost and Profit Centers (include data for the month and cumulative for the year).
- Annual reports provide annual operational summary, as above, and a complete financial package (as described later) for the year.
- On-demand reports should contain data requested in the demand communication. At certain periods, it may be necessary to provide, after 6 months of operation, a report containing information as specified for the annual report.

Timetable for Reporting

The manual should specify the required issue date for monthly and annual reports. The closing date for financial reports should also be specified. Indication of the departments (and people) responsible for preparation of the individual sections of the reporting package and detailed timetable for the preparation should be given.

Reporting Lines and Information Flow

The manual should provide a logic diagram for the information flow during the process of preparation of the various types of management reports.

A clear description of organizational responsibilities, reporting lines, and information flows within the power plant will form a firm basis for the computerization of the information flow.

Management Reporting Package Formats

The reporting manual should include formats of all financial statements and appendices used by the power plant. These are to provide information in a form required by (and agreed to) its users.

Sample formats of the financial and operational statements are enclosed in the Appendices section. These have been developed in consultation with Rybnik plant personnel.

Budgeting Package

Due to the importance of the planning and budgeting processes for the management reporting system, it is necessary to include an explanation of solutions applied by the power plant to these processes in the reporting manual. (Due to its complexity, the preparation of the detailed planning and budgeting systems for the power plant has not been covered in the scope of this report.)

Accounting Manual

The accounting manual must give a clear description and explanation of the accounting standards applied by the power plant for the purposes of management reporting. This manual must provide accurate notes to the financial statements and appendices relating to each item (line). The accounting standards applied for management reporting purposes may differ from those used for external reporting (WUS, Tax Office); they have to be clearly described and fully explained. Differences may exist, for instance, in such areas as provisions for bad debts, excess stock, or in allocating indirect costs.

The description of the accounting standards used will be of key importance when a power plant holding company is established. Standards consistency will be necessary for consolidation of financial statements on the group level and the assessment of the financial and operational standing of the particular power plants.

2.3 FINANCIAL REPORTING PACKAGE

A suggested financial reporting package has been developed based on the three fundamental financial statements:

- Income Statement
- Balance Sheet
- Cash Flows Statement

The formats used in the management reporting package reflect the purpose these statements were designed to serve (i.e., to provide a complete picture of the power plant's financial position to serve as a basis for sound commercial management decisions).

The statements are preceded by a set of relevant basic financial ratios and comparison of current month ratios with those of the previous month. The ratios measure profitability, capital structure, operational effectiveness, and financial liquidity. The proposed set shown in the appendices is

only an example. The criteria for the choice of a particular set of ratios depend on management requirements and the plant's financial condition.

The current period information is presented along with the budgeted and historical data (balance sheet), but also cumulative data is shown (profit and loss account). A variance analysis is designed to draw the attention of management to critical areas and to facilitate appropriate action. Cash flow statement allows for an analysis of cash management efficiency.

Guidelines for the preparation of financial statements (along with assignment of responsibility) are enclosed with each statement. The instructions should also be included in the reporting manual.

An example of a management reporting package (excluding detailed cost analysis) is presented in Appendix A. Sample guidelines for the preparation of financial statements are included as Appendices C and D.

2.4 OPERATIONAL DATA PACKAGE

An operational data package for management constitutes an important corollary to the financial information. The information package should concentrate on key performance indicators. In order to achieve that, numerical data should be supported by descriptive reports on crucial matters relating to the operation of the power plant, for example, changes in operating status of plant units.

The basic operational and labor-related ratios presented in the appendices section may serve as an example of the information which should be presented to the managing director of the power plant level. The lower the management level, the more detailed the information and the more frequently it should be submitted. The procedures should be aimed at meeting information requirements of the particular level of management at any moment in time.

Appendix A

Management Reporting Formats

Management Reporting Formats

Rybnik Power Plant
Financial Highlights
November

	Current month		Previous month	
	Actual MZl	Variance (%)	Actual MZl	Variance (%)
SALES	288,780		283,676	
GROSS PROFIT (LOSS)	33,121		46,266	
NET PROFIT (LOSS)	(10,138)		13,219	
CASH FLOW (OUTFLOW) FROM OPERATING ACTIVITY	57,960		(6,674)	
NET CASH FLOW (OUTFLOW)	(933)		(35,848)	
ACCOUNTS RECEIVABLE	444,531		530,151	
TRADE LIABILITIES	344,170		371,725	
SHORT-TERM CREDITS	83,949		64,000	
LONG-TERM CREDITS	20,000		20,000	

Management ReportingFormats

Rybnik Power Plant							
Basic financial ratios							
November							
		Current month					**Comments**
		Actual	**Budget**	**Unit**	**Variance**	**%**	
		MZl					
Profitability ratios							
1	Gross Profit Margin	11.47		%			
2	Net Profit Margin	-3.51		%			
3	Return on Net Assets	-0.52		%			
Financial ratios							
4	Debt Ratio	20.76		%			
5	Debt Coverage Ratio	21.91					
Realizability ratios							
6	Receivables Turnover Ratio	46.18		days			
7	Payables Turnover Ratio	40.39		days			
8	Cash Flow Margin	-0.02					
Liquidity ratios							
9	Quick Ratio	0.98					
#	Current Ratio	1.36					

Management ReportingFormats

Rybnik Power Plant						
Balance Sheet 1993						
November						
	Previous	*Current month*				Comments
	month	Actual	Budget	Variance	%	
		MZI				
FIXED ASSETS						
Tangible Fixed Assets		1,775,274				
Intangible Assets		613				
Investments		42,525				
		1,818,412				
CURRENT ASSETS						
Stock		190,447				
Debtors		444,531				
Cash		44,193				
		679,171				
CURRENT LIABILITIES						
Trade Creditors		344,170				
State Creditors		11,837				
Short-Term Credit		83,949				
Other Creditors		58,546				
		498,502				
TOTAL ASSETS LESS LIABILITIES		1,999,081				
WORKING CAPITAL		180,669				
LONG-TERM LIABILITIES		20,000				
SPECIAL FUNDS		41,588				
NET ASSETS		1,937,493				
CAPITAL AND RESERVES						
Capital		1,724,102				
Retained Profit (Loss)		213,391				
Revaluation Reserves		0				
CAPITAL AND RESERVES		1,937,493				

Management Reporting Formats

Rybnik Power Plant								
Profit and Loss Account 1993								
November								
	Current month				Cumulative for the year			
	Actual	Budget	Variance	%	Actual	Budget	Variance	%
	MZl							
SALES	288,780							
COST OF SALES								
Direct material	(182,855)							
Production overheads	(72,804)							
	(255,659)							
OPERATING PROFIT (LOSS)	33,121							
General & Admin. overheads	(27,456)							
Other income (expenditure)								
Financial income	72							
Financial costs	(2,645)							
Extraordinary profit	5,137							
Extraordinary losses	(3,213)							
Proceeds on other sales	(6,133)							
Subsidies	(1,929)							
PROFIT (LOSS) BEFORE TAX	(3,046)							
Corporate tax	(1,771)							
State dividend, PPWW	(5,321)							
NET PROFIT (LOSS)	(10,138)							

Management Reporting Formats

Rybnik Power Plant				
Cash Flow Statement				
	January	**...**	**November**	**...**
			MZl	
I. Operating activity				
1 Net Profit			(10,138)	
2 Depreciation			14,100	
3 (Increase)/Decrease in inventory			(33,328)	
4 (Icrease)/Decrease in acc. receivable			85,620	
5 Increase/(Decrease) in acc. payable			1,706	
Net cash inflows from operating activity			57,960	
II. Investing activity				
1. Aquisition of tangible and intangible fixed assets			(57,427)	
2. Increase in investments			0	
Net cash outflows from investing activity			(57,427)	
IV. Financing activity				
1. Increase in long-term debts			0	
2. Dividends paid			(1,466)	
Net cash inflows from financing			(1,466)	
V. Increase/(decrease) in cash and cash equivalents (IV + V)			(933)	

Appendix B

Package Input Data

Package Input Data

		Balance Sheet - input data sheet					
		Account No	January	...	October	November	...
	ASSETS						
	TANGIBLE ASSETS		MZl		MZl	MZl	
	Fixed assets						
1	#Land						
2	#Buildings and constructions						
3	acc. depreciation						
4	*net*		0		0	0	
5	#Boilers						
6	acc. depreciation						
7	*net*		0		0	0	
8	#General usage plant & machinery						
9	acc. depreciation						
10	*net*		0		0	0	
11	#Special plant & machinery						
12	acc. depreciation						
13	*net*		0		0	0	
14	#Technical plant & machinery						
15	acc. depreciation						
16	*net*		0		0	0	
17	#Means of transportation						
18	acc. depreciation						
19	*net*		0		0	0	
20	#Other						
21	acc. depreciation						
22	*net*		0		0	0	
23							
24	Fixed assets	010			3,258,651	3,259,923	
25	Acc. depreciation of FA	070			1,768,948	1,781,352	
26	*Net fixed assets*		0		1,489,703	1,478,571	
27	Equipment	017			13,972	14,516	
28	Acc. depreciation of equipment	077			13,969	14,513	
29	*Net equipment*		0		3	3	
30	CIP received not invoiced	304			27	27	
31	CIP plant & machinery	081			31,672	41,257	
32	CIP	083			459,830	459,298	
33	CIP settlement	084			-242,313	-203,855	
34	*CIP total*		0		249,189	296,700	
35	Intangibles	020			899	923	
36	Acc. depreciation of intangibles	078			295	310	
37	*Net intangibles*		0		604	613	
38	Investments	030	0		42,525	42,525	
39	#Shares						
40	#Long-term securities						
41	#Long-term loans granted						
42	#Other						
43	*NET TANGIBLE ASSETS*		0		1,782,024	1,818,412	

Package Input Data

44	CURRENT ASSETS	MZl		MZl	MZl	
45	Raw materials	311,301,341		156,210	189,470	
46	WIP	531,537,31	0	780	835	
47	Finished Goods	670		100	100	
48	Goods for resale	337,303		29	42	
49	*Stock*		0	157,119	190,447	
50	Trade debtors	200		400,958	313,102	
51	State debtors	220		23,810	40,595	
52	Other debtors	231,234,241		51,546	48,745	
		242,244,248				
		249				
53	CIP prepayments	201		44,432	30,737	
54	Prepayments for intangibles					
55	Prepayments for stock	200				
56	Other prepayments					
57	*Total prepyments*		0	44,432	30,737	
58	Disputed debtors	243		0	0	
59	Provisions for losses and	840				
60	disputed debtors	841				
61	*Total debtors*		0	520,746	433,179	
62	Petty cash	100		636	1,012	
63	Current bank account	131,132		38,612	27,607	
64	Deposits	139		2,570	11,711	
65	Special fund bank account	189		3,173	3,863	
66	Short term securities	140		0	0	
67	Other cash	145		0	0	
68	Cash in transit	149		134	0	
69	*Total cash*		0	45,125	44,193	
70	*Defferred costs*	644,649		9,405	11,352	
71	*CURRENT ASSETS*		0	732,395	679,171	
72	*LIABILITIES*					
73	Trade liabilities	200,201,301		371,725	344,170	
	including	302				
74	domestic creditors					
75	Bills of exchange liabilities	205			0	
76	State liabilities	220		10,865	11,837	
77	Payroll liabilities	231		6,289	8,000	
78	ZUS liabilities	220				
79	Other liabilities	234,241,249		14,994	12,817	
		242,304				
80	Short term bank loans	134		[illegible]	83,949	
81	Short term loans	247		0	0	
82	Overdue loans	135		0	0	
83	*Total current liabilities*		0	467,873	460,773	

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Package Input Data

				MZI		MZI	MZI
84		***WORKING CAPITAL***		0		264,522	218,398
85	Long- term liabilities						
86		Long- term bank loans	133				
87		Long- term loans	246			20,000	20,000
88		***Total long- term loans***		0		20,000	20,000
89	Special funds						
90		Social fund	851			5,371	2,164
91		Housing fund	854			37,482	37,427
92		Employees fund	858			2,331	1,997
93		Other special funds	859			0	0
94		***Total special funds***		0		45,184	41,588
95		*Defferred income*	845			0	0
96		*Accruals*	649			28,923	37,729
97		Start up fund	803			703,267	703,267
98		Retained earnings	805			1,016,307	1,020,835
99		***Capital***		0		1,719,574	1,724,102
##		***Revaluation reserve***					
##		Retained earnings brought forward	825			219,646	209,365

Appendix C

Guidelines for Preparation of Profit and Loss Account

C.1 GUIDELINES FOR PREPARATION OF PROFIT AND LOSS ACCOUNT

A suggested profit and loss statement consists of two elements:

- Input data sheet
- Summary of the above data in a form of profit and loss account

A profit and loss account includes actual data for a given month in comparison with budgeted data which is used for calculation of variances. Apart from a monthly profit and loss account, cumulative data for the period from the beginning of the year is also presented.

The input data sheet is linked directly with the profit and loss account in which input information is automatically assigned to the appropriate captions of the profit and loss account.

As a result, the profit and loss account is a read-only spreadsheet which prevents inputs of unauthorized data.

In order to enhance the control over correctness of input data, the profit or loss for the period is automatically transferred to the balance sheet, as at the end of this period (month or year-end).

In order to analyze the costs of a specific Cost Center, all costs of joint Cost Centers represented by auxiliary departments (i.e., costs of repairs, transportation, social activity) have not been allocated to other Cost Centers in the form of overheads (as is in the standard procedure applied by Rybnik), but classified as of those departments' own costs.

The first step for the preparation of the proposed profit and loss account is inserting all cost-related information into the input data sheet.

The above mentioned worksheet includes monthly data sorted by Cost Centers and type of cost.

Information is gathered from the monthly printout of costs by type which indicates the appropriate Cost Center for each of the above costs. This printout is prepared by the EDP department. For example, line 19 in the input worksheet gives information on material usage by direct production departments (data taken from cost by type accounts 401-1 and 401-2 with an indication of their Cost Center as 501).

Line 22, relating to depreciation of fixed assets held by direct production departments, includes data taken from cost accounts 400-1 and 400-2 with an indication of the Cost Center 501, as well. The same approach has been applied for generation of the cost data for all individual Cost Centers.

It should be stressed that data relating to costs of joint Cost Centers (i.e., repairs, transportation, property insurance, environmental protection, and social activity), is generated directly from the

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monthly cost registers (so called KR documents). The above mentioned procedures are designed in order to apportion only attributable costs to the individual Cost Centers without any overheads of costs of auxiliary departments (these are presented as separate cost captions).

For example, line 24 of the input data worksheet, which is an element of total production overheads, results from transferring of costs from account 538 in the amount relating only to the repairs made for direct production departments, without any allocation of the repair department's own costs.

Similarly, line 27 covers costs of transport services rendered in favor of direct production departments, which do not include any allocations of the transportation department's own costs.

All fixed and indirect costs of the auxiliary departments have been separately presented as those departments' own costs (see lines 70 and 87 of the input data sheet). Such treatment gives opportunity for more detailed analysis of costs incurred separately by each department.

According to the traditional cost accounting approach adopted by Rybnik, costs incurred due to auxiliary production are accounted for as cost of sales of other services (account 705). The suggested approach assumes that auxiliary production should be treated as a separate Cost Center (line 70) which seems to provide more valuable cost information for management purposes.

The same treatment has been applied in relation to other joint Cost Centers which, under the traditional methods, are apportioned to other individual Cost Centers. Mainly, such costs include administration and general factory overheads. Profit and loss accounts prepared for management purposes assign all costs to the Cost Center in which they were incurred, without any other Cost Center overhead. The move is designed to provide for more detailed and clear analysis of costs incurred by different Cost Centers. Due to procedures, any distortions resulting from subjective allocation methods used for indirect costs can be avoided.

In order to strengthen the controls over the accuracy of data input and profit and loss account preparation, the profit/loss for each period is automatically transferred to the balance sheet at the end of each period (month, year).

The profit and loss account should be prepared by the fifth day after the end of each month in the cost accounting department.

Appendix D

Guidelines for Preparation of Balance Sheet for Management Purposes

D.1 GUIDELINES FOR PREPARATION OF BALANCE SHEET FOR MANAGEMENT PURPOSES

Format of the balance sheet for management reporting consists of two parts:

- Input data sheet
- Consolidation of above mentioned data in the format of the balance sheet

The balance sheet is presented in the vertical format which is viewed as more suitable for purposes of analysis than the format used in statutory reporting. The format for management reporting is simplified. Only main categories of assets and liabilities are shown. Detailed data are included on the input data sheet, and these can be used for more specific analysis of trends noticed in the balance sheet.

Captions "Working capital" and "Net assets" are of particular interest to management.

The balance sheet contains data such as the last day of the current month, together with budgeted amounts, which facilitates recognition of variances and undertaking of proper actions by management. Comparative figures for the previous month are also shown.

The balance sheet should be prepared up to the fifth day of the next month by the financial accounting department. Input data should be processed by the appropriate accounting personnel (e.g., data related to stock by the raw materials accounting department, etc.).

Notes on Processing of the Input Data

1. Data relating to fixed assets and their accumulated depreciation should be drawn from the fixed assets register; in order to check accuracy, number calculated in row #24, "Fixed assets," should be checked with the balance of account #010 and in row #25, "Accumulated depreciation," should be reconciled with the balance of account #070.

2. Data relating to assets should be processed according to the account numbers shown in the input data sheet; should the account show debit balance or credit balance, data should be processed with a "+" sign for debit balance and a "-" sign for credit balance.

3. Data relating to liabilities should be processed according to the account numbers shown in the input data sheet; when the account may show a debit balance or credit balance, data should be processed with a "-" sign for debit balance and a "+" sign for credit balance.

4. If more than one account number is shown in the column, "Account No," the total of underlying balances should be put into following notes 2 and 3.

5. Start-up Fund and Enterprise Fund should be decreased by the value of all revaluations made in line with Ministry of Finance regulations, and the total (net) value of these revaluations should be shown in the row #100, "Revaluation Reserve."

Appendix E

Description of Financial Ratios

E.1 DESCRIPTION OF FINANCIAL RATIOS

1	Gross profit margin	(Operating income) ÷ (Net Sales)	Used for calculating operational income in comparison to sales. Measure of profitability of basic activities of power plant without taking into consideration indirect costs.
2	Net profit margin	(Net income) ÷ (Net sales)	Measure of profitability of basic activities of power plant after taking into consideration financial costs and taxation.
3	Net return on assets	(Net income) ÷ (Net assets)	Measure of profitability of net assets (equity) of power plant. Relation between net disposable income and assets used for its generation.
4	Total debt to total assets	(Total debt) ÷ (Total assets)	Indicates how much of firm's funds are being supplied by its creditors.
5	Interest coverage	(Operational inflow) ÷ (Interest + principals repayment)	Measure of protection of creditors from a default on interest payment.
6	Debtors collection period (in days)	(Receivables x 30 days) ÷ (Sales)	Average time of receivable settlement (30 days because of monthly sales).
7	Creditors payment period (in days)	(Trade creditors x 30 days) ÷ (Costs of sales)	Average time of trade creditors settlement (x30 days because of monthly sales).
8	Current ratio	(Current assets) ÷ (Current liabilities)	Measure of short-term debt -paying ability.
9	Quick ratio	(Current assets less inventory) ÷ (Current liabilities)	Measure of short-term

Section 3

Cash Management

3.1 INTRODUCTION

Financial management concerns itself with long-term and short-term decisions. Long-term decisions relate to investment strategy and long-term financing. Short-term financing decisions are made within working capital management (or liquidity management). An important element of working capital management is cash management. This is an area of financial management which has two distinctive features:

- Cash management can be implemented relatively quickly and independently of long-term elements of financial management.
- Once implemented, cash management is likely to result in tangible financial benefits within a short time.

The report presents a preliminary estimate of financial benefits which may accrue from cash management to individual power plants and a group of power plants.

The analysis is based on the actual cash balances of Rybnik, Dolna Odra, Halemba, and Blachownia power plants during the 12 months between July 1992 and June 1993. To avoid unnecessary complication and to enhance comparability of results, a number of assumptions have been made and are stated in this report. It is important to note that this paper is not trying to authoritatively state that, if applied in practice, cash management would result in a definite sum of extra income and savings. Rather, it estimates the order of magnitude of potential benefits available from cash management based on actual data.

For the purpose of this paper, cash management can be defined as managing cash balances so as to invest surplus cash and minimize the requirement for external short-term financing. The benefits of cash management have been presented in terms of additional returns on cash balances and savings from lower external short-term loans.

In the following sections, the key conclusions (Section 3.2), an overview of actual cash balances in the analyzed plants, and an assessment of the estimated benefits of cash management (Section 3.3) are presented. The assessment is started by showing the impact of cash management at the plant level (Section 3.4), followed by an estimate for additional benefits available from cash management when it is centralized at the group level (Section 3.5). Section 3.6 illustrates how short-term financial instruments can be used to invest surplus cash. In Section 3.7, an estimate of the impact of more advanced cash management approaches is discussed. These approaches can modify the overall cash balance in addition to investing surplus cash. Finally, Appendix A presents the major calculations underlying the conclusions.

3.2 KEY CONCLUSIONS

1. Cash kept at current bank accounts is readily available but fails to deliver the returns which are available from term deposits and short-term financial instruments. Cash management aims to minimize idle cash while preserving liquidity.
2. Even the relatively simple cash management system of placing surplus cash into 30-day and 10-day deposits may result in significant additional income for Polish power plants (as high as Zl 9.5 billion annually in the case of Rybnik).
3. For a group of plants (a holding company or a corporation) centralization of cash management is likely to result in substantial additional benefits (estimated at up to Zl 13.9 billion for the group analyzed). Data supporting Items 1 and 2 is presented in Tables A-1 and A-2
4. When cash levels are fluctuating and unstable, as is the case for the power plants, surplus cash for investment may be available for very short periods. In such cicumstances, short-term deposits make it possible to earn additional income from cash.
5. The potential for additional income or savings increases considerably if cash management attempts to actively manage cash balances in order to limit cash fluctuations. This is an element of working capital management and can be done via disbursements planning and need not involve delaying payments to creditors.
6. Summary of estimated returns on cash for Rybnik power plant for the period 1 July 1992 - 30 June 1993 is as follows:

No cash management	Zl 4.0 billion
Simple cash management	Zl 13.5 billion
Working capital management	Zl 16.1 billion

7. Cash management requires a system of short-term cash flow planning and monitoring and cooperation with financial institutions. In practical terms, management has to have the ability to forecast cash requirements and cash collections in the short term and to invest surplus cash.
8. Cash management is an element of working capital management which, in turn, fits into the overall financial management. However, cash management can be implemented independently of other initiatives and is likely to bring tangible benefits in a relatively short time.

3.3 OVERVIEW OF ACTUAL CASH BALANCES

The assessment of the benefits of cash management is based on the actual data on the cash balances in Rybnik, Dolna Odra, Halemba, and Blachownia power plants for the 12-month period from July 1992 to June 1993. The data have been provided in the questionnaires and have not been otherwise verified.

Cash balances analyzed between current cash and deposits are shown in the four charts in Figure 3-1. The following observations can be made about the actual cash balances in the four plants:

- Each plant had significant cash balances.
- Cash balances fluctuated widely.
- Rybnik and Dolna Odra power plants are keeping all their cash in current accounts, while Halemba and Blachownia are also using short-term deposits.

Each of the four plants had significant cash balances during the period. The average cash balance ranged from Zl 15 billion in Dolna Odra to Zl 68 billion in Halemba. Maximum cash balances ranged from Zl 54 billion for Blachownia to Zl 155 billion for Rybnik.

There were major fluctuations in cash balances during the period, but the degree of fluctuation was not the same for all plants. Dolna Odra had the most fluctuating pattern of cash balances with balances ranging between Zl 0.2 billion and Zl 60.2 billion. Rybnik, on the other hand, had the largest absolute difference between maximum and minimum levels of cash. This amounted to Zl 146 billion. Halemba had the most stable pattern of cash balances, the maximum balance of Zl 85.7 billion being less than twice the minimum balance. Further details are available in Table A-3 in Appendix A.

According to information provided by the plants, Blachownia and Halemba are using term deposits to invest surplus cash during the 12 months in review. Blachownia uses 1-month deposits and Halemba uses 3-month deposits for this purpose. Rybnik and Dolna Odra are keeping all their cash in current bank accounts. In all cases, current cash was comprised of several types, including cash in hand, cash on normal current account, cash on guaranteed checking accounts, cash belonging to Housing Fund, etc.

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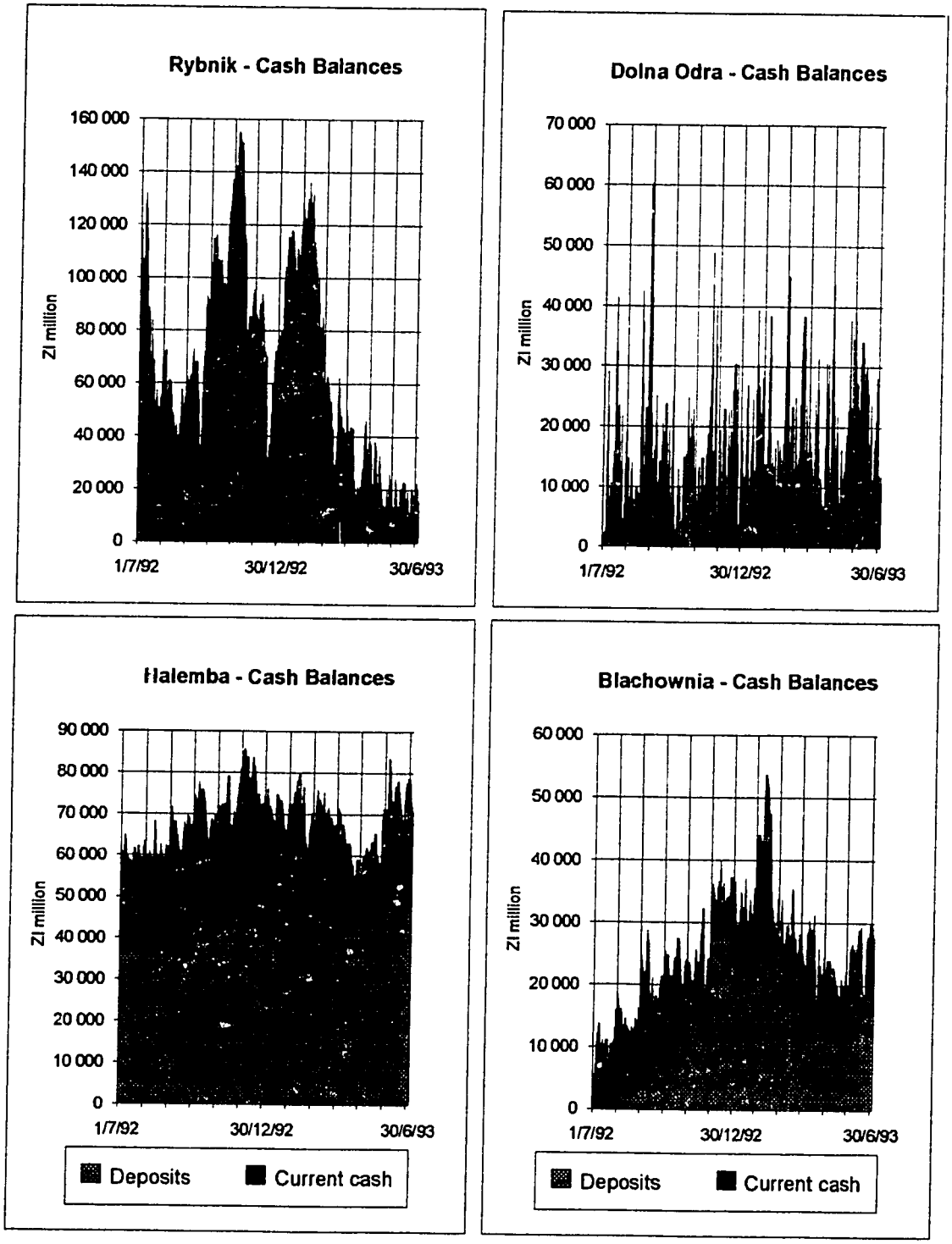

Figure 3-1
Actual Cash Balances During the Period Analyzed

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3.4 BENEFITS OF SIMPLE CASH MANAGEMENT

In preparing an estimate of the potential financial benefits of introducing simple cash management systems at each of the plants, all actual current cash balances were assumed to bear interest at the rate of 6 percent per annum, and actual deposits balances to bear interest at 26 percent per annum (30-day deposits) and 30 percent (90-day deposits). According to the data provided, this appears to be a good approximation of the actual situation, although interest rates were generally higher in 1992.

The estimate of the benefits of cash management is based on the following assumptions:

- There are no reasons to keep cash in current accounts if it can be invested elsewhere.
- Management should be able to forecast minimum cash balances required in the next 30-day and 10-day periods so as to identify surplus cash (i.e., cash above the minimum level).
- Surplus cash would be placed into 30-day deposits and 10-day deposits, depending on the pattern of cash changes.
- Minimum deposit would be Zl 1 billion.
- No overdraft facilities would be used. This means that the total of free cash and invested cash would never exceed total actual cash balance.
- Total cash balances are the same as actual.
- Potential income from reinvestment of additional interest received is ignored.
- Transaction costs and delays are ignored.
- Interest rates assumed are 6 percent for current cash, 22 percent for 10-day deposits, 26 percent for 30-day deposits, and 30 percent for 90-day deposits. This reflects current available market rates.

The cash management system described above is referred to as "simple" because it has a number of simplifications (constraints) which have been assumed to facilitate calculations and comparisons. The constraints are as follows:

- Deposits shorter than 10 days are not used (in fact, even 24-hour deposits are available).
- No financial instruments other than bank deposits are utilized.
- No attempt is made to actively affect cash balances (for example, by appropriate timing of payments).
- Deposits are placed automatically in equal 30-day or 10-day intervals (which may result in obvious "opportunities" foregone).

Each of these simplifications results in lower potential income because income theoretically available (for example, from 5-day, 3-day and 1-day deposits) is not included in calculation. In a system operated by skilled individuals, higher benefits would be achieved. An assessment of the impact of more sophisticated cash management systems is included in Section 3.7.

The financial benefits from a simple cash management system outlined are presented in Figure 3-2.

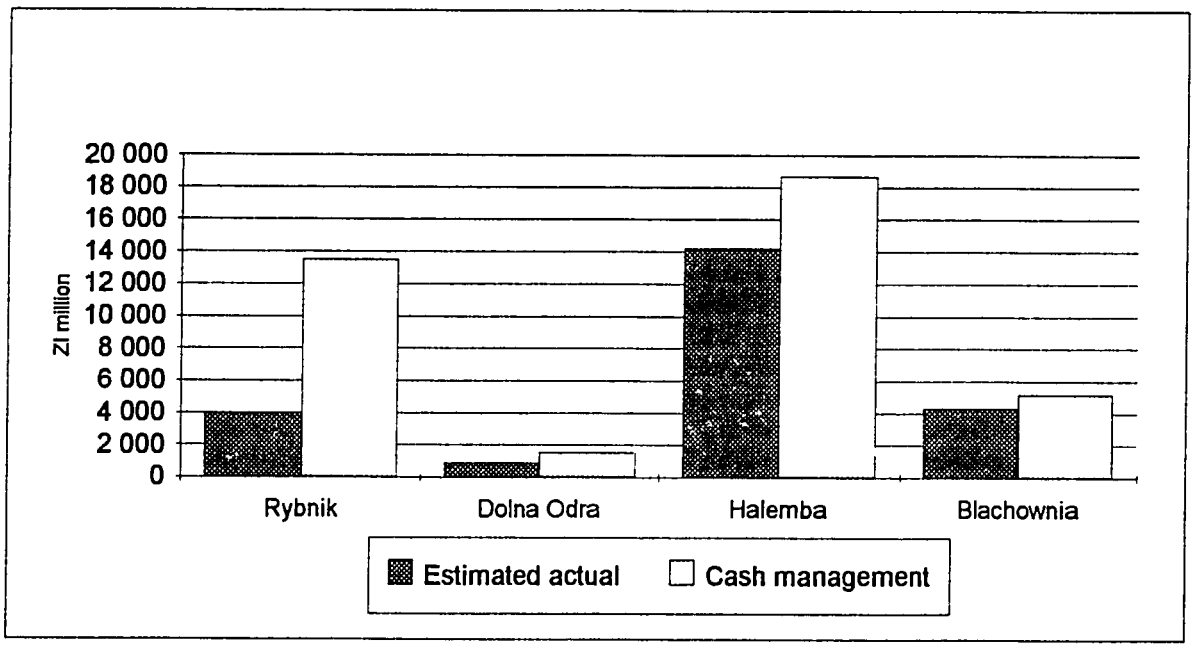

Figure 3-2
Simple Cash Management - Financial Benefits

As can be seen, the financial income for each plant from simple cash management would be higher than the estimate of actual income from cash without this approach. The additional benefit would be highest in the case of Rybnik and would equal Zl 9.5 billion. For other plants, the potential benefit is lower. In the case of Dolna Odra, this is due to the highly unstable nature of its cash balances. This seriously limits the scope for placing term deposits. Blachownia and Halemba, on the other hand, are already using deposits to place surplus cash.

Details of the calculations for all plants are presented in Table A-4 of Appendix A.

The charts shown in Figures3-3 through 3-6 illustrate how the proposed cash management approach could be superimposed on each of the plant's cash balances to improve performance. They also illustrate that this approach would not starve the plants of cash.

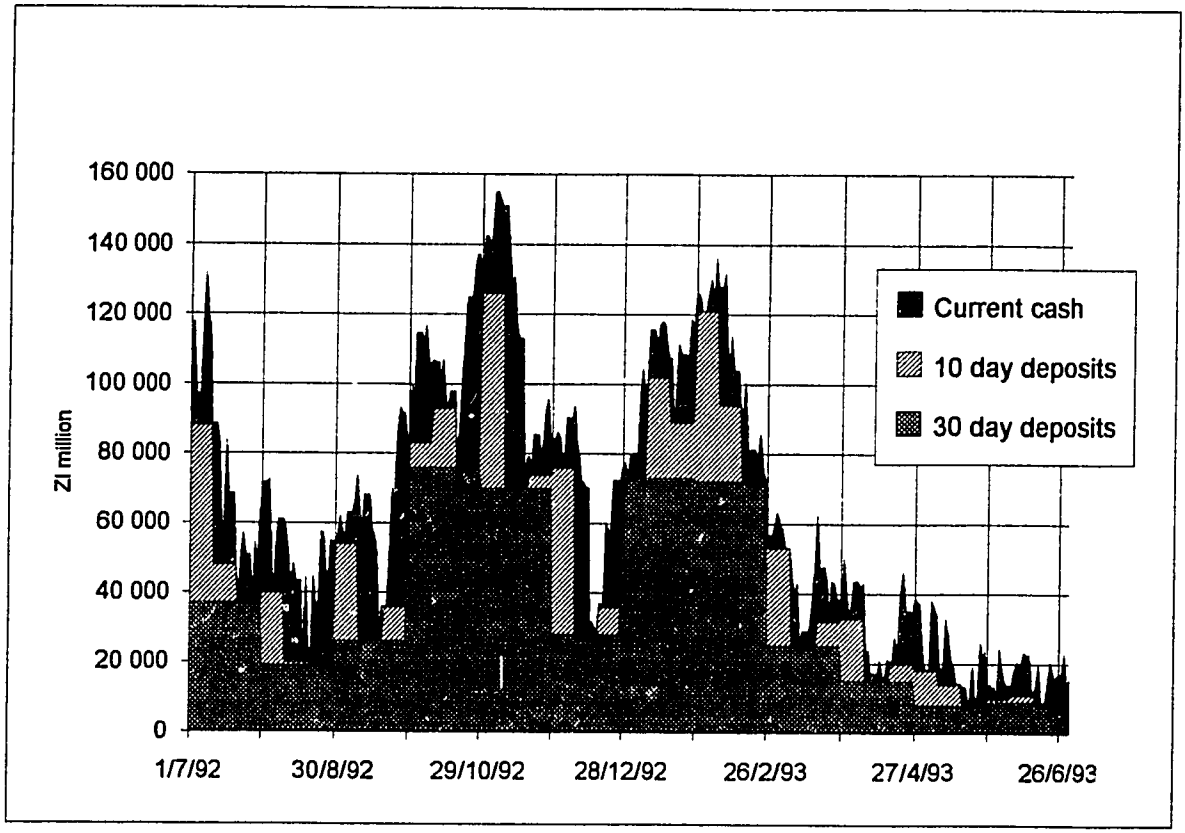

Figure 3-3
Rybnik - Cash Management

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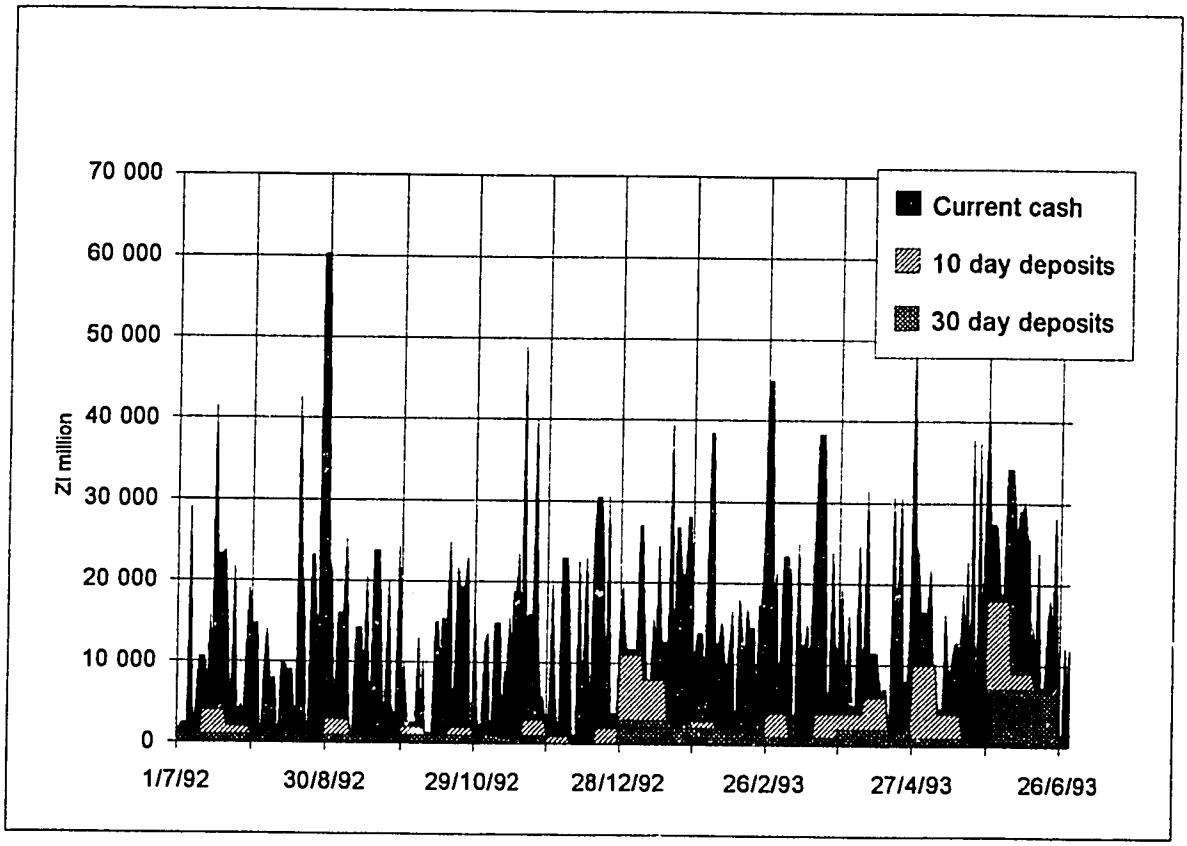

Figure 3-4
Dolna Odra - Cash Management

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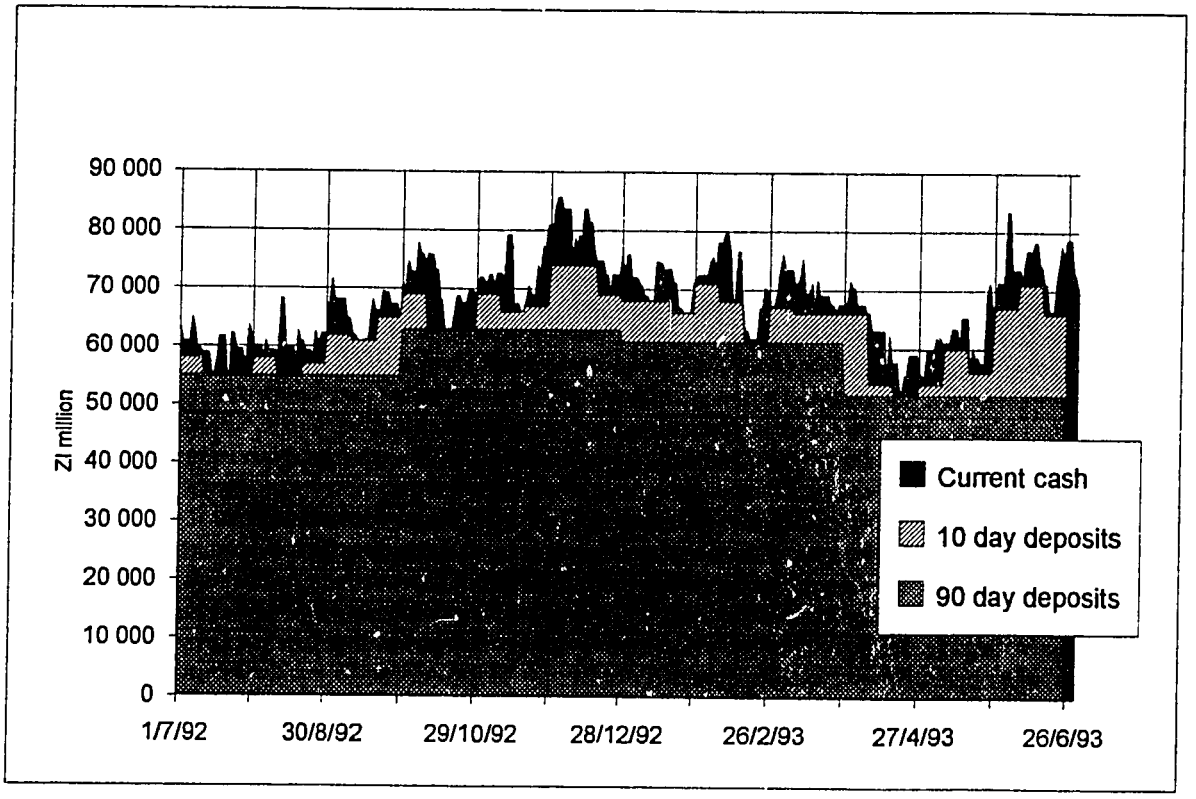

Figure 3-5
Halemba - Cash Management

63

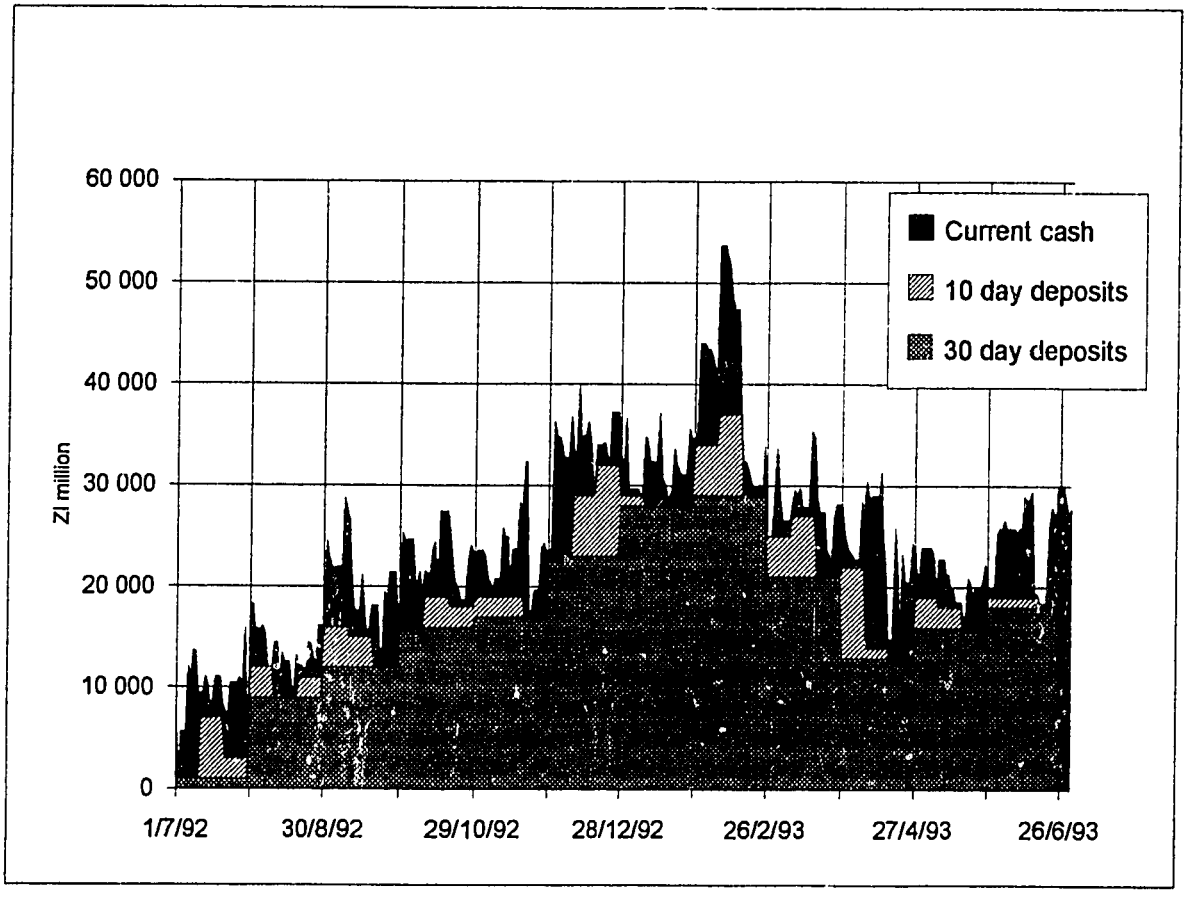

Figure 3-6
Blachownia - Cash Management

3.5 BENEFITS OF CENTRALIZED CASH MANAGEMENT

If the company consists of a grop of power plants,it is recommended that cash management function for the group be centralized. A centralized cash management group would manage the cash of all power plants, pooling it to maximize the benefits. Such pooling of cash would have the following advantages:

- Improved liquidity and lower fluctuations of cash across the group, which should result in the ability to invest more cash and/or decrease short-term financing requirements
- Ability to obtain better interest rates on larger amounts of cash invested
- Ability to access more sophisiticated financial instruments

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A preliminary estimate of the additional benefits available from centralized cash management has been made using the following assumptions:

- As the actual level of cash for the total of the four plants never fell below Zl 89 billion, this balance is used to reduce external short-term loans, which was assumed to bear an annual interest of 38 percent.
- In addition to 30-day and 10-day deposits, 5-day deposits are also used.
- Interest available for the group from current cash will be at 15 percent per annum which is at the level of 1-day deposits.
- Other assumptions remain the same.

Our estimates show that centralized cash management as described above would yield an additional Zl 13.9 billion for the group. (See Table A-5 in Appendix A.)

The relative benefits of centralized and decentralized cash management for each power plant are shown graphically in Figure 3-7. The incremental benefit to plants of a centralized approach has been apportioned on the basis of their individual average cash balances. Two conclusions can be drawn:

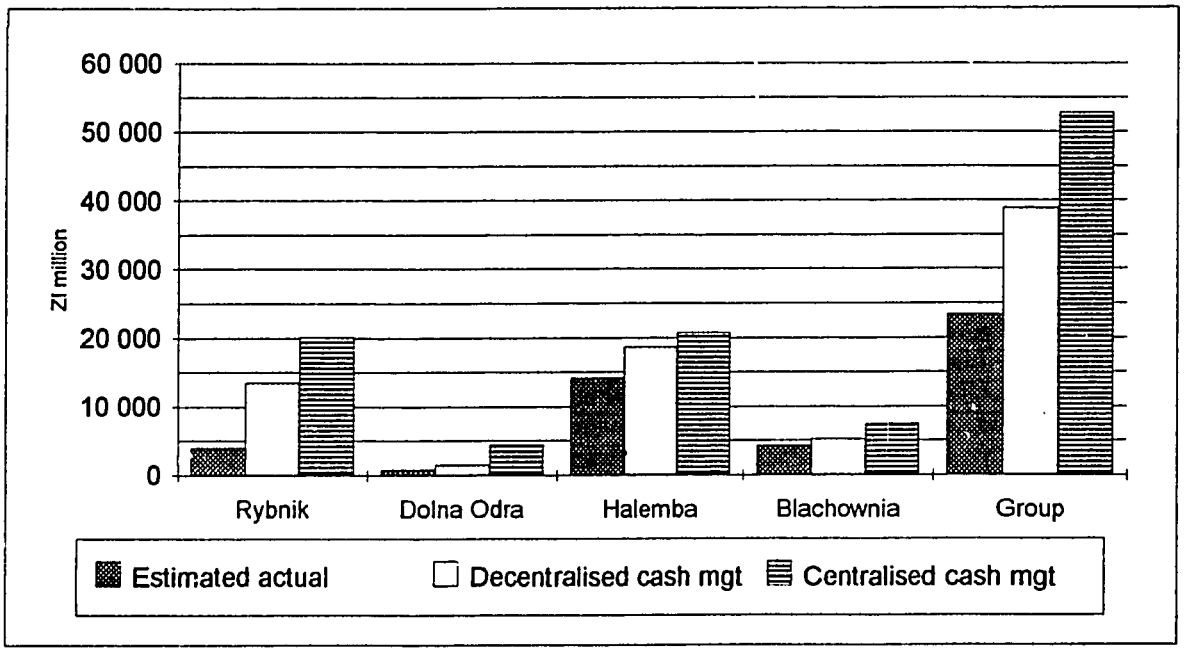

Figure 3-7
Centralized Cash Management - Financial Benefits

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- Each plant benefits significantly from centralized cash management;
- Financial benefit for the whole group is much higher than the total of benefits from decentralized cash management at plant level.

The financial benefits can also be shown in terms of the return on cash as a percentage of the average cash balance. Such an approach enables direct comparisons between plants as shown below. It can be seen from the comparison that centralized cash management allows Rybnik and Dolna Odra to elevate their return on cash from approximately 6 percent to 30 percent per annum (see Figure 3-8).

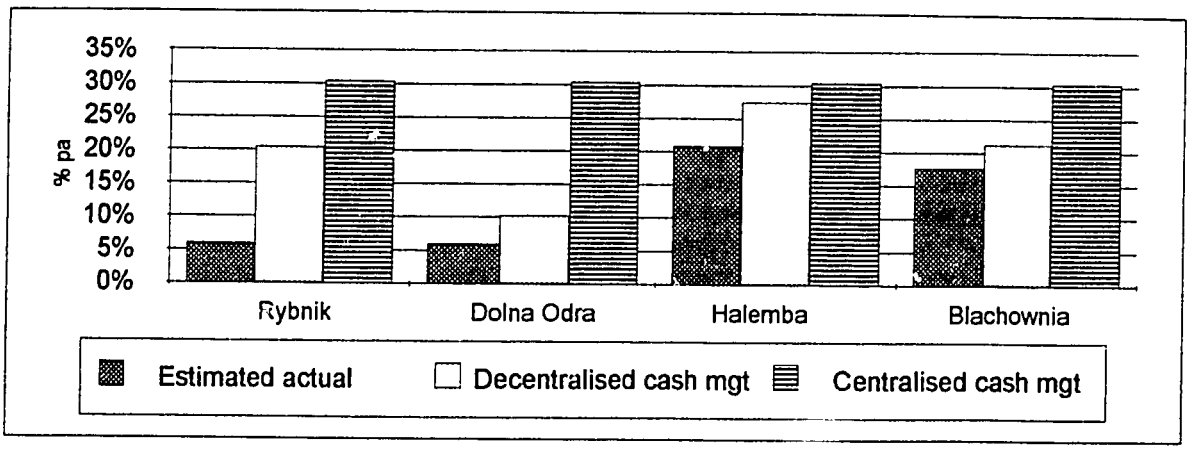

Figure 3-8
Comparison of Return on Cash

Centralized cash management at a group level is presented graphically in Figure 3-9. The shape of the curve reflects actual total cash balances for the four plants. The chart shows how various types of cash balances changed over time, from current cash at the top to surplus cash balances which could be used to reduce external financing at the bottom.

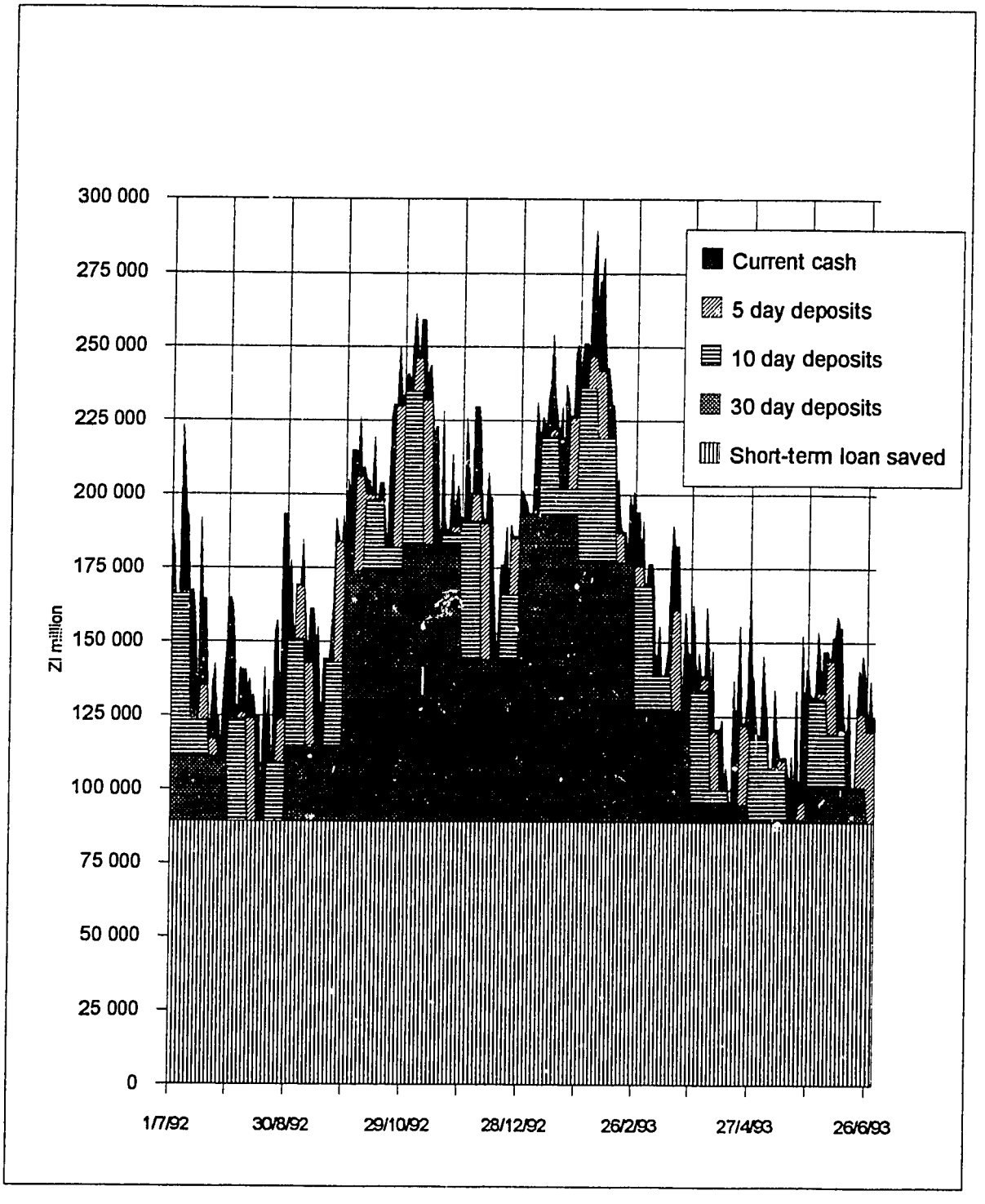

Figure 3-9
Group - Cash Management

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The calculation showing how the financial impact of centralized cash management was arrived at is shown in Table A-5 in Appendix A.

3.6 USING SHORT-TERM INSTRUMENTS

As mentioned earlier, the "simple" cash management system described in Section 3-4 had a number of simplifying assumptions. In this section, one of them has been removed and 5-day deposits have been added to the range of investment possibilities available for cash management, and it is assumed they will bear interest at 17 percent per annum. This system is referred to as flexible cash management.

An estimate of the additional benefit of flexible cash management has been made using Rybnik power plant data as the basis of calculation. The analysis of short-term instruments has been limited to 5-day deposits because this is a fairly simple instrument which is available in Poland. Like other short-term instruments, 5-day deposits are much more liquid than long-term deposits, yet they provide returns significantly in excess of returns available on current cash balances.

With other assumptions being unchanged, adding 5-day deposits to cash management in Rybnik results in extra income of Zl 765 million and the overall return on cash improves by over 1 percent per annum (see Table A-6 in Appendix A). This results from the lower level of free cash kept on current accounts (average of Zl 9 billion as compared with Zl 16 billion without 5-day deposits) and the difference (average Zl 7 billion) being invested in 5-day deposits. Supporting calculations are included in Table A-5 in Appendix A.

In summary, when cash levels are fluctuating, surplus cash may be available for a very short time. In such circumstances, short-term instruments make it possible to invest short-term surplus cash and thereby increase earnings significantly.

3.7 ADVANCED CASH MANAGEMENT

Cash management systems can be much more sophisticated than the simple system shown in Section 3-4. This section briefly describes a more advanced cash management and estimates its financial impact.

Cash management can be performed most effectively if it fits into an overall framework of financial management. For the purpose of discussion, it is important to note that a component of financial management which is directly linked with cash management is working capital management.

Working capital management focuses on the coordinated control of all components of working capital which are:

Current assets: Cash
Investments
Receivables
Stock

Current liabilities: Unpaid bills
Short-term financing

Effective working capital management will actively influence all those components so that the company preserves liquidity while minimizing costs associated with working capital management (costs also include opportunity cost). Cash management is just one element of working capital management and is interrelated with other areas such as collections, disbursements, and short-term financing decisions.

Estimation of the total available benefits from effective working capital management is beyond the scope of this paper. However, by smoothing the daily fluctuations of cash, it is possible to improve net.

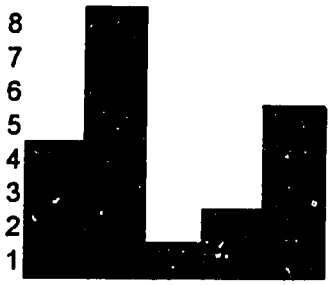
Limiting the daily fluctuations of cash enables more cash to be invested, thereby improving the returns on cash. Smoothing cash fluctuations can be done solely by planning and control of disbursements. In addition, planning and control of disbursements does not involve delaying payments to creditors and incurring additional penalty interest for late payment.

This can be shown by using a theoretical example of cash movements (collections and disbursements) and the resulting cash and creditor balances over a 5-day period. The fluctuating cash is shown in Table 3-1 on the left hand side (Case A). The cash balance with fluctuations eliminated is shown on the right hand side (Case B).

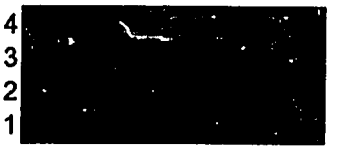
In both cases, the external parameters assumed are the same (i.e., the opening balances of cash, unpaid bills, and cash received from debtors). The difference is that, while cash collections remain the same, in Case B disbursements are made, so that the cash balance remains stable. The example shows that average cash balance is the same in both cases (4) and, more importantly, managing cash balances has not been achieved by delaying payments. This would result in unpaid bills in Case B being higher than Case A. As can be seen from the example, average unpaid bills are the same (92), which means that, on the average, there is no delay. Therefore, increases and decreases in penalty interest liability resulting from disbursements planning will offset each other.

Table 3-1
Disbursement Planning

Case A
FLUCTUATING CASH



Case B
MANAGED CASH BALANCE VIA DISBURSEMENTS PLANNING



	Day 1	2	3	4	5		Day 1	2	3	4	5
Cash											
Opening balance	-	4	8	1	2		-	4	4	4	4
Cash in	-	6	2	3	5	remains	-	6	2	3	5
Cash out	-	-2	-9	-2	-2	changed	-	-6	-2	-3	-5
Closing balance	4	8	1	2	5		4	4	4	4	4
Unpaid bills	100	98	89	87	85		100	94	92	89	84
Average cash balance					4						4
Average unpaid bills balance					92						92

+ Note 1: Unpaid bills equal 100 (opening balance) less payments (cash out)

In real life, it may be difficult to eliminate cash fluctuations altogether. This would require timely knowledge of incoming payments so that disbursements can be made accordingly on the same day. Here, two observations can be made:

1. A system less effective than that should still be able to significantly limit fluctuations.

2. Limiting cash fluctuations over short periods is easier because effect of changing economic conditions and seasonality can be ignored in the short term.

To illustrate the impact of smoothing cash balances, an estimate has been prepared for Rybnik assuming that for each 5-day period, the cash balance will be the average for this period of the actual cash balances. This is illustrated in Figure 3-10.

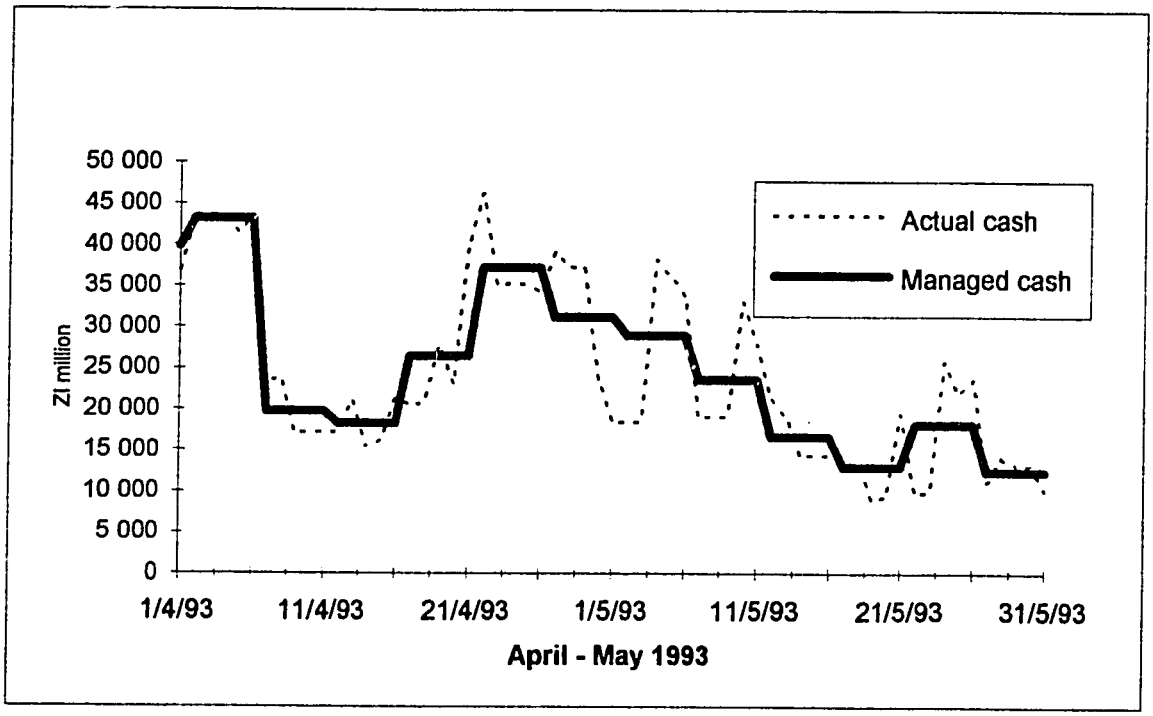


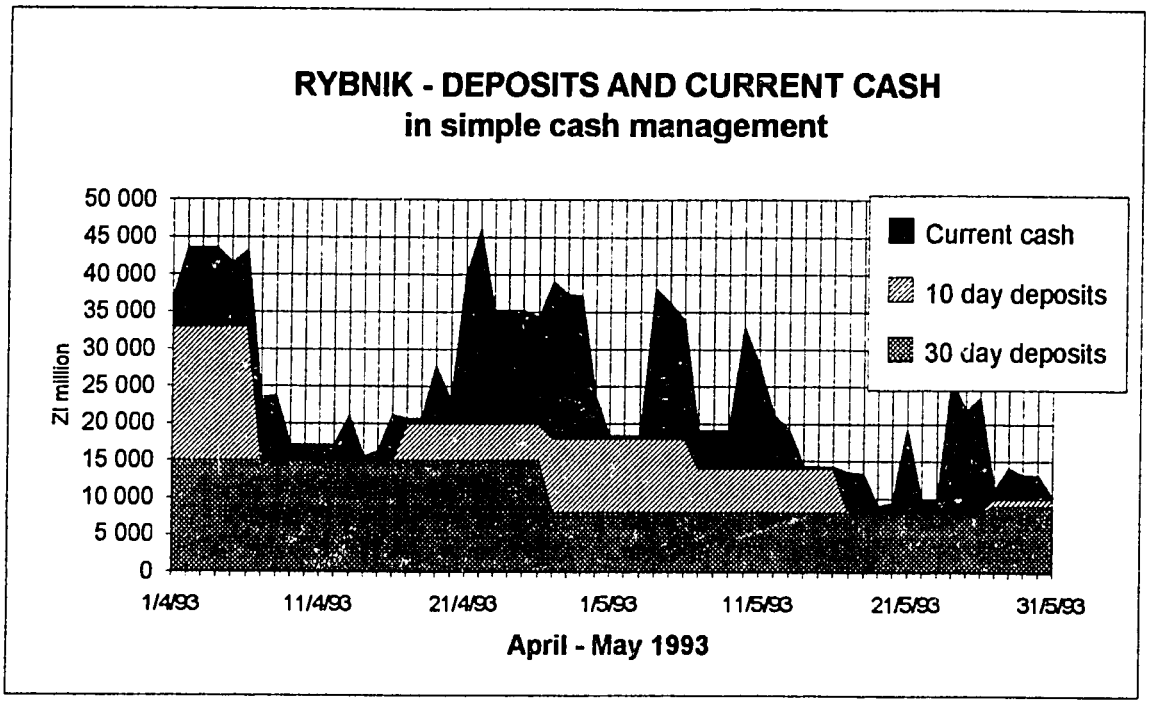
Figure 3-10
Rybnik - Managing Cash Balances

Calculations show that working capital management (as defined above) results in an extra Zl 12.1 billion of income in the case of Rybnik when compared to the actual situation. This is Zl 2.6 billion more than simple cash management and Zl 1.8 billion more than flexible cash management. Supporting calculations are presented in Table A-7 in Appendix A. Table A-8 of Appendix A shows estimate of benefits assuming approximately three times lower cash balances (such as those in April-June 1993).

A number of conclusions can be drawn from the above:

- Managing cash balances in order to limit cash balances fluctuations is likely to significantly improve cash returns.
- This can be achieved by careful disbursement planning.
- Disbursement planning is not likely to result in any additional penalty interest liability.
- In order to implement disbursement planning an efficient system of receipts monitoring, payments planning, and payments execution is required.

At the end of this section, the cash invested under working capital management and simple cash management using data for Rybnik in April-May 1993 are compared in Figures 3-11 through 3-13. This is then followed by a comparison with flexible cash management for the whole year analyzed.



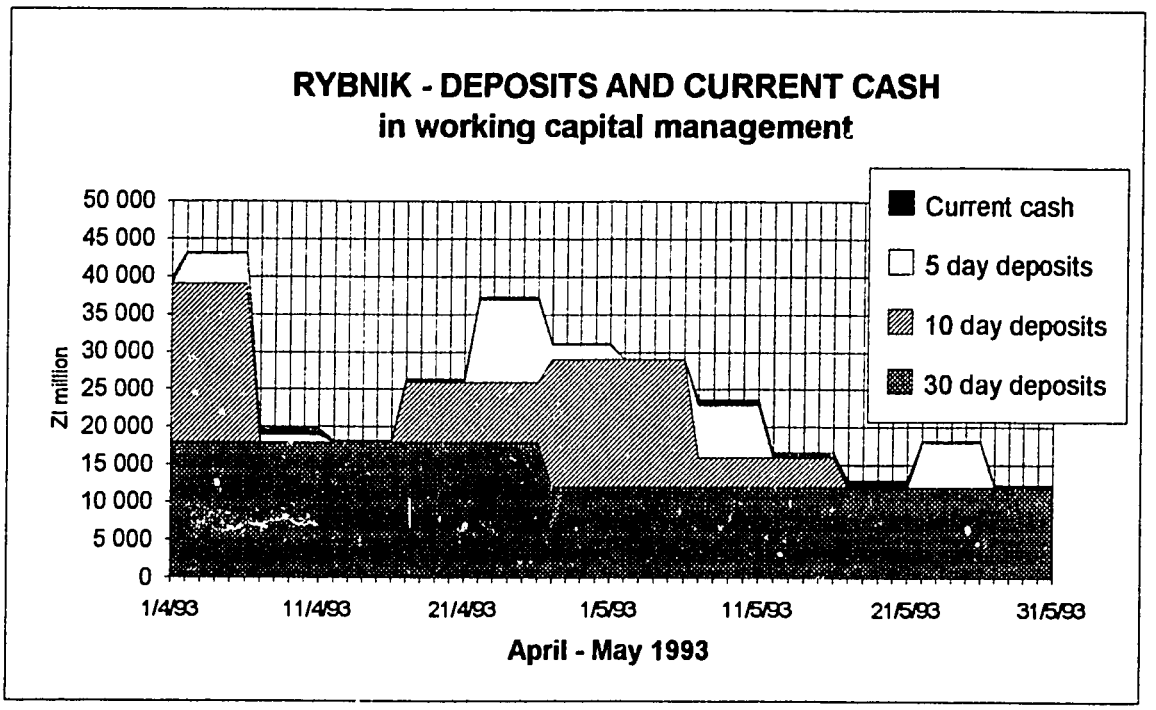


Figure 3-11
Rybnik - Deposits and Current Cash

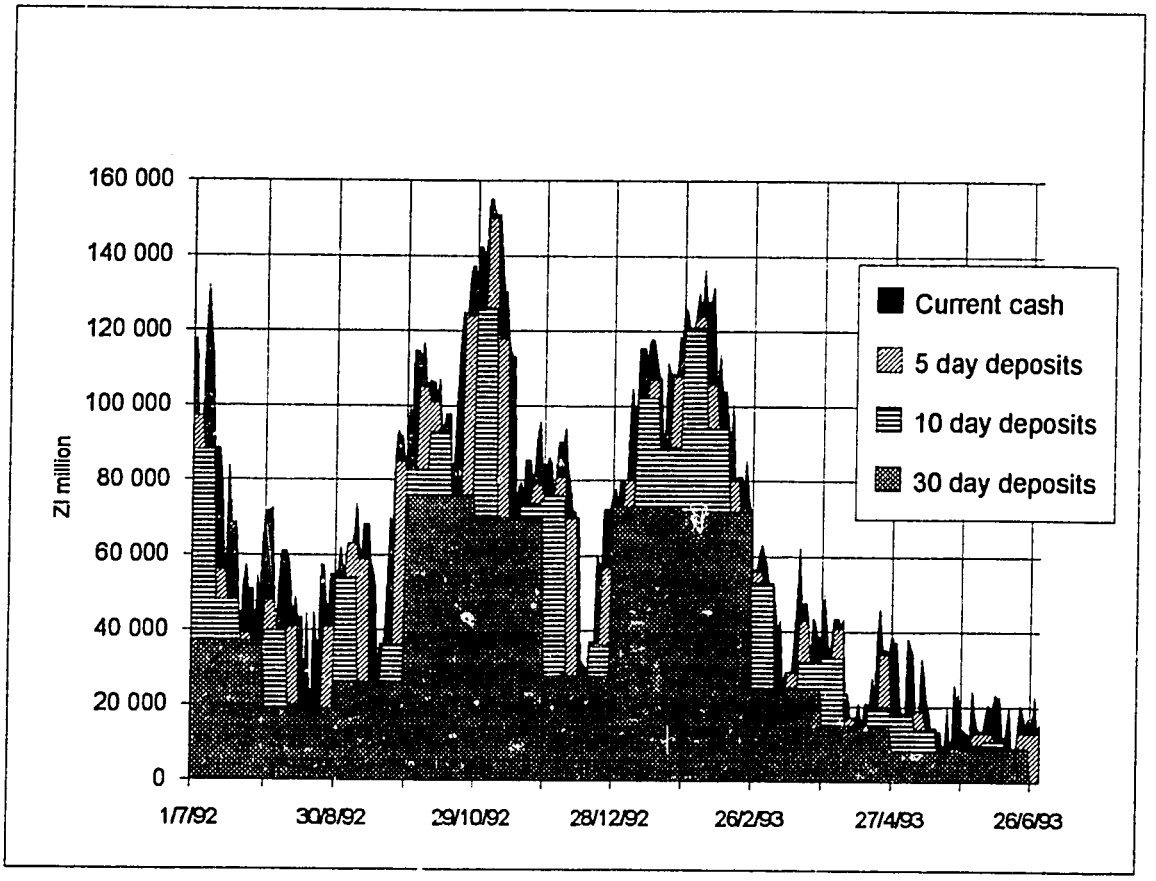


Figure 3-12
Rybnik - Flexible Cash Management

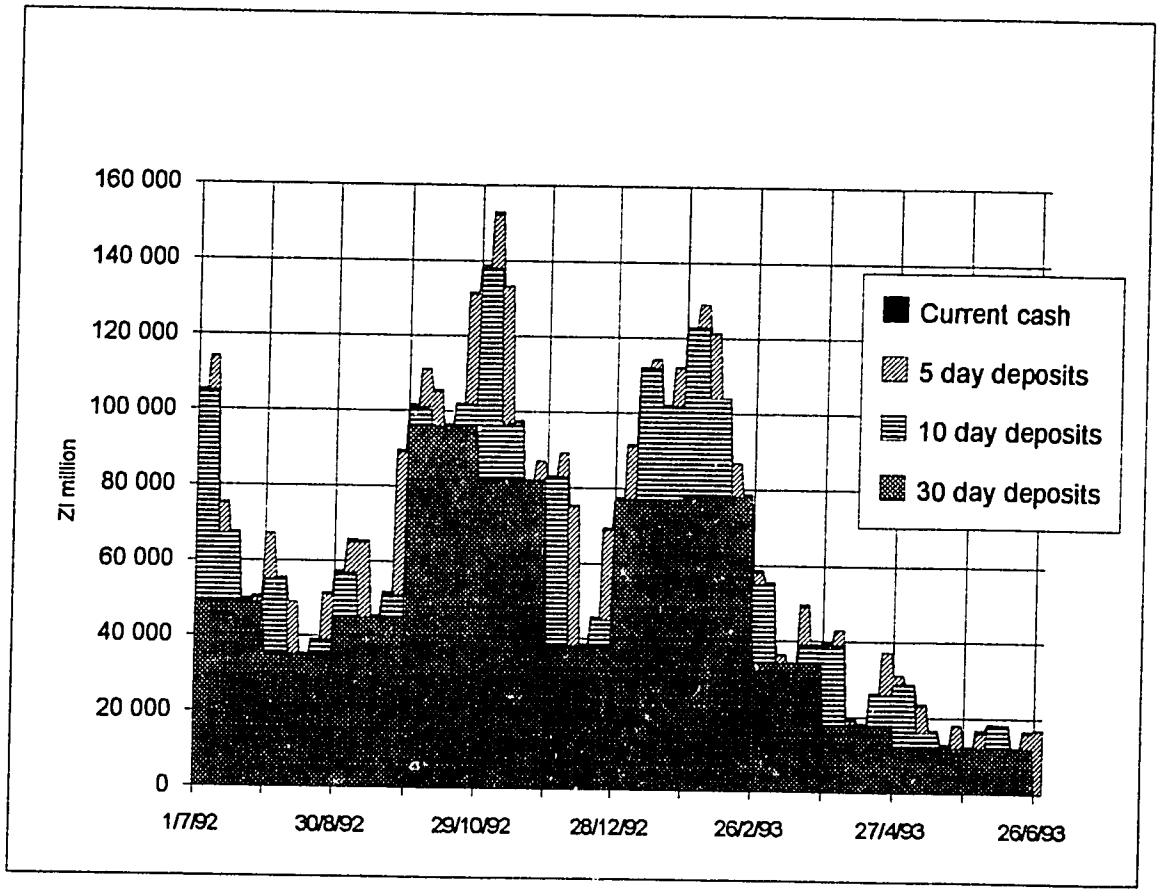


Figure 3-13
Rybnik - Working Capital Management

Appendix A

Selected Calculations

A.1 SELECTED CALCULATIONS

This appendix includes tables with details of the calculations underlying the comments and conclusions in this paper.

Table A-1
Summary of Financial Benefits of Cash Management

(Zl million)	Rybnik		Dolna Odra		Halemba		Blachownia	
		%		%		%		%
Estimate of actual	3 974	*100%*	888	*100%*	14 192	*100%*	4 304	*100%*
Simple cash management	13 498	*340%*	1 514	*170%*	18 671	*132%*	5 173	*120%*
Centralised cash management	20 136	*507%*	4 499	*507%*	20 720	*146%*	7 416	*172%*

Note 1: Financial benefits under centralised cash management are apportioned to plants in proportion to their average cash balance.

Source: Team analysis

Table A-2
Summary of Financial Benefits of Cash Management - Return on Cash

	Rybnik	Dolna Odra	Halemba	Blachownia
Average return on cash:	% pa	% pa	% pa	% pa
Estimated actual	6%	6%	21%	18%
Cash management	20%	10%	27%	21%
Centralised cash mgt	30%	30%	30%	30%

Source: Team analysis

Table A-3
Actual Cash Fluctuations

(Zl million)	Rybnik		Dolna Odra		Halemba		Blachownia	
		%		%		%		%
Average cash balance	66 238	*100%*	14 799	*100%*	68 158	*100%*	24 395	*100%*
Maximum cash balance	155 242	*234%*	60 249	*407%*	85 676	*126%*	53 687	*220%*
Minimum cash balance	8 992	*14%*	221	*1%*	52 842	*78%*	1 538	*6%*
Standard deviation	38 246	*58%*	10 977	*74%*	6 972	*10%*	8 998	*37%*

Source: Information questionnaires

Table A-4
Simple Cash Management - Estimate of Benefits

(Zl million)	% p.a.	Rybnik	Dolna Odra	Halemba	Blachownia	Total 4 plants
ACTUAL						
Average total cash balance:		66 238	14 799	68 158	24 395	173 591
- 90 day deposits		0	0	42 096	0	42 096
- 30 day deposits		0	0	0	14 201	14 201
- ave. curr. balances		66 238	14 799	26 063	10 194	117 294
Estimated financial income:						
- on 90 day deposits	30%	0	0	12 629	0	12 629
- on 30 day deposits	26%	0	0	0	3 692	3 692
- on current balances	6%	3 974	888	1 564	612	7 037
Total estimated income	*(A)*	**3 974**	**888**	**14 192**	**4 304**	**23 358**
CASH MANAGEMENT						
Ave. 90 day deposit balance		0	0	56 959	0	0
Ave. 30 day deposit balance		37 644	1 726	0	16 685	56 055
Ave. 10 day deposit balance		12 466	1 753	5 699	2 329	22 247
Ave. current balances		16 129	11 320	5 501	5 381	38 330
Return on cash:						
- 90 day deposits	30%	0	0	17 088		
- 30 day deposits	26%	9 787	449	0	4 338	14 574
- 10 day deposits	22%	2 742	386	1 254	512	4 894
- current balances	6%	968	679	330	323	2 300
Total potential income	*(B)*	**13 498**	**1 514**	**18 671**	**5 173**	**38 856**
BENEFIT FROM CASH MANAGEMENT	*(B-A)*	**9 524**	**626**	**4 479**	**869**	**15 498**

Note 1: Financial income on cash without cash management is estimated using actual balances of deposits and other cash and assumed interest rates as stated.
It is estimated for the purpose of comparison only and may differ from actual figures.
Note 2: Cash in hand balances, being marginal, were included in current account balances.
Note 3: Interest rates on time deposits are based on information received from leading Polish banks.
Note 4: To allow for more accurate comparison, 90 day deposits were assumed for Halemba, which had the most stable cash balances.

Source: Information questionnaires, team analysis

Table A-5
Benefits of Centralized Cash Management

(Zl million)	Balance		% p.a.		Financial benefit
Short-term loan not taken	89 000	x	38%	=	33 820
Ave. 30 day deposit balance	43 644	x	26%	=	11 347
Ave. 10 day deposit balance	18 411	x	22%	=	4 050
Ave. 5 day deposit balance	8 616	x	17%	=	1 465
Ave. current balances	13 920	x	15%	=	2 088
	173 591				
Total potential benefit					**52 771**
Less: total of benefits from decentralised cash management					**38 856**
POTENTIAL ADDITIONAL BENEFIT					**13 915**

Note 1: Total of benefits from decentralised cash management is the total of simple cash management benefits for the four plants.
Note 2: Potential interest on time deposits is based on information received from leading Polish banks.
Note 3: Interest rate on short-term loan is assumed at the actual level paid by Dolna Odra.

Source: Information questionnaires, team analysis

Table A-6
Flexible Cash Management

	% p.a.	RYBNIK			
		Cash mgt		Flexible cash mgt	
		Zl m	%	Zl m	%
Average cash balance:		66 238	*100.0%*	66 238	*100.0%*
ave. 30 day deposit	26%	37 644	*56.8%*	37 644	*56.8%*
ave. 10 day deposit	22%	12 466	*18.8%*	12 466	*18.8%*
ave. 5 day deposit	17%	0	*0.0%*	6 959	*10.5%*
ave. current cash	6%	16 129	*24.3%*	9 170	*13.8%*
Return on cash (Zl m)		13 498		14 263	
Return on cash (% pa)			20.4%		21.5%
Extra gain on 5 day deposits				**765**	

Source: Team analysis

Table A-7
Working Capital Management - Comparison of Benefits

(Zl million)	% p.a.	RYBNIK Cash management		Flexible cash mgt		Working cap. mgt	
Average cash balance:		66 238	*100.0%*	66 238	*100.0%*	66 238	*100.0%*
ave. 30 day deposit	26%	37 644	*56.8%*	37 644	*56.8%*	47 342	*71.5%*
ave. 10 day deposit	22%	12 466	*18.8%*	12 466	*18.8%*	12 685	*19.2%*
ave. 5 day deposit	17%	0	*0.0%*	6 959	*10.5%*	5 767	*8.7%*
ave. current cash	6%	16 129	*24.3%*	9 170	*13.8%*	444	*0.7%*
Return on cash	*(A)*	**13 498**		**14 263**		**16 107**	
Comparison:							
Estimated actual	*(B)*	3 974		3 974		3 974	
Estimated potential benefit from cash management	*(A-B)*	**9 524**		**10 289**		**12 133**	

Note 1: Estimated potential benefit does not include income to be earned from reinvestment of received on cash.

Note 2: Estimated actual (B) is return to be earned when all cash is kept on current account at 6%

Source: Information questionnaires, team analysis

Table A-8
Cash Management with Lower Cash Balances

Note: To illustrate potential for benefits of cash management during times with lower cash balances, we have taken such a period (late March to late June 1993) and calculated returns for this period. The returns shown are annualised which makes them comparable with other data.

		RYBNIK					
(Zl million)	% pa	Cash mgt		Flex. cash mgt		Working cap. mgt	
Average cash balance:		22 841	*100.0%*	22 841	*100.0%*	22 841	*100.0%*
ave. 30 day deposit	26%	10 667	*46.7%*	10 667	*46.7%*	14 000	*61.3%*
ave. 10 day deposit	22%	4 667	*20.4%*	4 667	*20.4%*	6 222	*27.2%*
ave. 5 day deposit	17%	0	*0.0%*	2 167	*9.5%*	2 167	*9.5%*
ave. current cash	6%	7 508	*32.9%*	5 341	*23.4%*	452	*2.0%*
Return on cash	*(A)*	**4 250**		**4 489**		**5 404**	
Comparison:							
Estimated actual	*(B)*	1 370		1 370		1 370	
Estimated potential benefit from cash management	*(A-B)*	**2 880**		**3 118**		**4 034**	

Note 1: Estimated potential benefit does not include income to be earned from reinvestment of interest received on cash.

Note 2: Return on current cash (B) is return to be earned when all cash is kept on current account at 6% pa.

Source: Information questionnaires, team analysis

Section 4

Assessment of Capital Investment Projects

4.1 INTRODUCTION

This study report discusses issues related to the appraisal of capital investment projects by Polish power generation entities consisting of one or more power generating stations. Facing the need for restructuring the capital intensive electric power industry, proper appraisal of investment projects is one of the most significant elements of strategic planning.

The report describes recommended methods, gives a procedure example, and describes practical problems of project appraisal. Methods for both commercial and non-commercial appraisals are included.

Project appraisal methods compare, in different ways, costs and benefits connected with investments. Some of the methods take into account the cash value in time, some do not. As shown below, the most appropriate methods, from a fundamental point of view, are those based on the concept of discounted cash flows that assume the time value of cash.

Practical applications for assessment of economic merits of projects cover two stages:

(a) Calculation of future cash flows resulting from a given investment, and

(b) Assessment of revenues as compared with the project's costs.

In order to minimize risk of economically or socially inappropriate projects, more significant investments of the company (fulfilling specific conditions) should be analyzed in accordance with the following criteria:

- The proposed investment should be formally analyzed, including preliminary and the detailed assessment (depending on needs).
- To be acceptable, the project analysis must show net economic benefits and acceptable social impacts.
- The analyses must consider only those benefits and costs which are directly connected with the project (i.e., resulting directly from the investment)
- The period of completion of the project should be correctly specified and the final (salvage) value should be defined.
- The appraisals must take inflation into account.
- The investment risk is to be taken into account, usually through sensitivity analyses.
- To be acceptable for implementation, it is necessary that the project meet the following requirements:

- The net present value (NPV) is greater than zero at the assumed real discount rate.
- The internal rate of return (IRR) exceeds the rate acceptable by the company.
- The social (non-commercial) benefits exceed the social costs.

Wherever possible, discounted cash flows are to be used in preparation of appraisals.

4.2 CAPITAL INVESTMENT PROCESS

It should be recognized that projects undertaken in power plants may fall into two major categories:

- Expensed projects - where the costs are covered by annually budgeted funds
- Capital projects - major, usually multi-year undertakings, requiring special financing provisions

Distinction between these types are usually defined in national accounting standards. For example, the USA standards classify projects of overhaul and repair aimed at restoring original capacity or efficiency as expensed projects. Conversely, projects resulting in increased production capacity (e.g., addition of a new generating unit, replacement of smaller component, thus adding to the generating capacity, upgrading of existing assets to increase generating capacity) would be included in the capital category.

Capital projects undertaken by power plants may be subdivided into the following phases:

- Preliminary conception of the project
- Preliminary economic appraisal
- Detailed economic appraisal
- Management approval
- Physical completion
- Post-completion appraisal

These stages are described below.

Project Conception

This is the stage where the project and potential responses to these needs are identified. Such projects may be considered desirable to solve current operational problems, improve plant operating efficiency, to expand the generating capacity as needed to meet demand growth, or to meet regulatory requirements. At this stage, the project definition may be quite sketchy.

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Preliminary Project Appraisal

At this stage, the project undergoes a screening evaluation. This evaluation is often more qualitative than quantitative. During this appraisal, it is frequently possible to identify projects that are clearly ineffective and should be abandoned or those of fundamental importance that should be analyzed and implemented in a special, accelerated way. For purposes of this preliminary appraisal, the project objectives should be defined in greater detail. The appraisals may use minimum standards, based on the technical, physical or financial criteria.

Detailed Project Appraisal

For projects that were found promising during the preliminary appraisal, more detailed technical specifications are prepared and the project costs are firmed up through budgetary cost estimates in this stage. An estimate of investment costs is prepared and the benefits and costs of the project are evaluated both from the commercial social points of view. As a result of these evaluations, recommendations are made to management to carry out the project or to stop its consideration. Decisions are based on the investment criteria of the company and conformance to its general strategy.

Project Implementation

This stage covers the preparation of final technical specifications, project implementation plans, and development of financing arrangements. Supervision and control of the project during the physical implementation phase are typically assigned to a project manager, responsible for completion of the project within schedule and budget.

Retroactive Project Appraisal

This stage takes place after physical completion and startup of the project, when the project benefits should be realized. The retroactive (ex-post facto) assessment is carried out to determine if the established goals of the project have been achieved and the initially postulated assumptions regarding the project results, costs, and benefits have turned out to be correct.

4.3 PROJECT APPRAISAL PROCEDURE EXAMPLE

This section describes a typical procedure for project appraisal, based on models practiced in companies operating under conditions of developed market economy. It is to be noted that in special cases (for instance, during urgent projects) some of the stages may be omitted.

The procedures of the project appraisal are to be applied in definite cases:

- Where the cost exceeds a specified threshold value (e.g., 1 billion Zl), except when the project was released from this obligation by the Board of Directors (or by a director)
- For smaller investments if formal appraisal is specified by the Board of Directors or by the authorized director

Project Conception

The organization that initiates the project sends the proposed project form (see Appendix A) to the entity that deals with investments (hereafter referred to as the Investment Department). Such forms may be submitted at any time. However, the Investment Department typically asks all departments to consider possible investment proposals once a year, in preparation for the annual update of the 5-year business plan.

The proposed project form contains the following information:

- Purpose of the project
- Expected benefits resulting from the project (qualitatively defined)
- Different options to accomplish the purpose of the investment
- Preliminary estimate of project costs

It is desirable to have the investment proposals submitted at least 1 year ahead of the intended project start date in order to allow time for proper assessment and financial planning work. This recommendation does not apply to urgent investments.

Preliminary Project Appraisal

The Investment Department, in cooperation with the initiating department (or with other relevant units), completes the preliminary project appraisal form for each proposed investment project.

The preliminary project appraisal form (see Appendix A) covers a detailed description of the following items:

- Justification for undertaking the investment project
- Benefits resulting from the investment
- Possible options to meet the project objectives
- Estimated costs in current prices (with accuracy for instance ± 40%)
- Relationship with other investments
- Probable schedule for preparation of the detailed appraisal (see below)

- Probable period of planning and completion of the project

The plant's Planning Department confirms that the project is consistent with the goals and strategy of the company. Then a report, covering the preliminary evaluation of all proposed investments, is prepared. The report should contain a recommendation for placement of the project among investments proposed in the long-range plans.

Preliminary Evaluation of the Project

The Board of Directors analyzes the preliminary project appraisals and decides whether or not the project should be considered for inclusion in the proposed long-term (for instance, for 5 years) investment program. The Board reviews the long-term investment program on a regular basis (annually).

Detailed Project Appraisal

The detailed project appraisal is performed by the Investment Department. The detailed project appraisal covers the following items:

- Different options to accomplish the project objectives
- Estimated costs of the project (with better accuracy than that preliminary assessment - for instance ± 20%)
- Projected period of operation of the project
- Analysis of non-commercial benefits and costs
- Analysis of commercial benefits and costs
- Influence of external organizations
- Profitability measures
- Proposed plan of the project, and dates of project start and completion

Project Authorization

The Investment Department forwards to the Board of Directors a report containing a detailed appraisal of a given project. If acceptable, the Board of Directors approves the project for inclusion in the long-range plans, preparation of design and cost estimates, and authorizes funds for these activities. The Board also sets a target date for finalization of the technical and financial preparations for the project.

Authorization to Implement the Project

The Investment Department, in cooperation with the Technical Department, establishes an overall milestone schedule for the project. This schedule includes, among other things, the date of completing the engineering effort and the detailed cost estimates. These activities are initiated with sufficient lead time to meet these critical milestones.

If the cost estimates for the detailed design and major equipment vendor proposals are within the approved limits (say +/- 15%), the implementation of the project may proceed in accordance with the prior Board of Directors approval.

If the detailed cost estimates are considerably higher than those of the preliminary evaluations, the Board of Directors must review the projected costs before authorizing the project for implementation and approving the project related expenditures.

Supplementary Project Authorization

The project cost should be re-estimated whenever a significant cost increase is projected. Even without this, the estimates should be confirmed at 6-month intervals. If the new project cost estimate exceeds the approved limit, a Request for Supplementary Authorization should be submitted for Board approval. This request must clearly state the reasons for the increase. It must also include a re-evaluation of the benefits and/or the anticipated economic return under the new cost.

4.4 PROJECT SPECIFICATION

This section explains the premises underlying the formal project appraisal.

Project Specification and Implementation Alternatives

In a broad sense, a project consists of a certain set of actions aimed to achieve a definite goal of the company, for example, meeting load requirements, improvement of operating efficiency, or compliance with national environmental regulations. Each project is characterized by certain physical, financial, and temporal merits for achieving the company's goal. Identification of real goals of each project is necessary in order to allow consideration of the whole range of the possible alternative concepts for meeting the postulated goals.

For instance, a real goal of the project is the solution of the problem of ash management, not the construction of a new ash yard. Such formulation of the goal broadens the field of options for solving the problem of ash management. One may consider the alternative of entering into a long-term contract with a receiver of ashes and fitting the ash removal to the requirements of transportation to such a receiver. Even the merits of purchasing coal with lower ash content or an extension of the existing ash yard, etc. could be considered.

Types of Projects

Capital investment projects may be of different types. Examples of the most frequently encountered types include the following:

- Large expenditure for new fixed assets (e.g., turbine replacement, new boiler, etc.) in existing plant units, resulting in additional revenues as well as expenditures related to operating costs
- Large expenditures to modernize existing equipment to improve efficiency or reliability (e.g., upgrading steam turbine sections or turbine controls)
- Large expenditures to install new generating capacity (installing gas turbines to meet peak load requirements)

Divisibility of the Project

The project may be a part of a broader program of projects, linked to a common goal. For instance, the program of power boiler modernization may consist of a series of smaller projects (e.g., modernization of individual boilers). Care must be taken to avoid making the project appraisal at the proper level of aggregation. The following examples illustrate typical situations:

- If several existing boilers are to be replaced by one new boiler, it should be treated as one project.
- If two different old boilers are to be replaced by two new boilers, it would be an error to consider this as one project (in particular when the boilers have different characteristics). Considering the replacement of both boilers as one project might show that total benefits exceed total costs whereas in reality, the benefits for one of them may turn out to be less than the costs.
- If construction of new boilers is considered, a method of gradual appraisal is to be assumed, starting from one additional boiler. Considering each subsequent additional boiler, additional benefits are to be compared with additional costs.

4.5 TYPES OF PROJECT APPRAISALS

The appraisal of a project should be carried out considering the commercial (economic) factors and the social factors in separate evaluations. A situation where both factors are considered in a single appraisal is to be avoided.

Commercial (Economic) Evaluation

The most common power plant projects are undertaken to reduce operating costs by retrofitting or replacing poorly performing, obsolete, or defective equipment. Another motivator is compliance with government regulations. Economic evaluations compare the initial costs with the

cumulative reduction of operating costs. Cost of compliance with government regulations may be compared with financial penalties assessed for non-compliance, or against the loss of revenue if the plant is forced to operate at reduced load to comply with the regulations.

Evaluation of the Social Benefits and Costs

The project may be considered in light of its influence on the company as a whole, or - in a broader perspective - on the local community, province, or the country. In such an approach the benefits and costs will be considered that relate to all subjects connected with the company (together with the labor force and management), including, if possible, also the external communities, the country, or the nation. This approach is described as an evaluation of the social benefits and costs, where the word "social" indicates that:

- The benefits and costs are given in terms of the economy of the company/country/nation as a whole.
- Both direct and indirect benefits and costs are taken into account.
- Benefits and costs may be evaluated qualitatively since numerical (monetary) evaluations are difficult.

An Example of Project Appraisal Method

Under normal conditions, project appraisal should include both social and financial impacts. In practice, the evaluation of social benefits and costs often has a quantitative and a qualitative component. Some social factors are readily quantifiable (e.g., reduction of dust emission, reduction of the level of employment). Other factors, such as morale of the labor force, noise level, visual impact, etc., may be only evaluated qualitatively.

The project should be accepted if:

1. The social benefits have been found greater than the social costs.
2. The financial benefits have been found greater than the required minimum.

4.6 BENEFITS OF THE INVESTMENT

Connection of Benefits with the Project

Before considering different types of benefits that may result from the project, it is important to verify that a postulated benefit is truly the result of the proposed project.

The following are examples of improper assignment of benefits to projects:

- An increase of an existing benefit factor may be improperly considered as a benefit from a proposed project. For instance, considering future growth of total revenues

from sale of the electric power as a "benefit" from construction of a new power generating unit would be appropriate only if greater sales were caused by increase of demand that could not be satisfied with the existing generating capacity, or if the benefit is reduced cost of power generation;

- Certain changes may appear to be a benefit for a department of the company but may not benefit the entire company. For instance, a project which results in reduction of labor requirements would not benefit the company if the released staff will be subsequently maintained in the company as a reserve. Such reductions may be counted as benefits, however, if they resulted in net reduction in the labor force or avoidance of staff additions that would be otherwise required. If the investment results in gradual reduction of labor force (e.g., through attrition), such a benefit should be included into the evaluation while taking into account its distribution over operation period of the project.
- Revenue benefit that in fact is a benefit carried forward from another operational area without creating any net revenue increase should not be credited to the project. For instance, when no general increase in power sales is expected from the new power station, the revenues from the new power unit may not be considered as a benefit from the project because it has just been transferred from other power units. It is, however, appropriate to consider any net reduction of company-wide cost of power generation (e.g., as the result of greater efficiency).
- The benefits should not be counted twice. For example, let us assume that additional revenues can be produced due to installation of a new generator with improved characteristics and adequate control devices. If separate project appraisals are prepared - one for the generator and one for the control devices - ascribing all of the additional revenues as the benefits in each appraisal would be an error. In such a case, a single evaluation should cover both the generator and the control devices as one project and compare the costs of both items with the additional revenues.

Measurement of the Benefits

Even if the benefits resulting from an investment have been identified, their measurement may be difficult. Benefits from improvements in power generating efficiency resulting from upgrading of equipment may be readily estimated. Many other benefits (e.g., improved safety, better staff morale, improvements in visual impact, better service to customers) cannot be estimated quantitatively, but have to be expressed qualitatively. Other examples in a broader sense would include items relating to national security, decentralization, etc. Nevertheless, qualitative benefits should always be included in all evaluations together with description and assessment of their importance.

Valuation Of Benefits

Wherever possible, the benefits should be expressed in financial terms. Some benefits may be measured in physical terms but lack of the market mechanisms may make their valuation in cash terms difficult or even impossible.

There are benefits that are difficult to evaluate in cash terms because their value often changes, depending on circumstances. Some of these may be approximated by use of historical records or analysis of surrogate systems. Examples of such items include:

- Savings of train time (e.g., in unloading of coal)
- Savings of wheeled vehicle time (loading/unloading)
- Savings resulting from reduction of the stock level

Intangible benefits that are practically impossible to evaluate in cash terms include noise reduction, improvement of architecture, or landscape.

Financial Benefits

The commercial (economic) benefits resulting from capital investments in power stations may - as an example - include such items as:

- Additional revenues from sale of electric energy and heat
- Additional revenues resulting from improved plant operation
- Additional revenues from sale of ash
- Additional revenues resulting from sale of services to external customers
- Revenues from leasing of ground, buildings, devices or space that is feasible as a direct result of the project
- Revenues from sale of assets as a direct result of the project
- Savings due to reduction of repair and maintenance costs
- Savings due to reduction of operating costs
- Reduction of financial costs (e.g., reduction of the capital invested in excessive stock which reduces demand for working capital)
- Reduction of charges and fines related to the pollution of environment
- Reduction of administration costs
- Others

Non-Commercial Benefits

The non-commercial (social) benefits resulting for the subjects connected with the power station and the community may include:

- Reduction of adverse environmental impacts
- Improvement of power production efficiencies
- Improvement of the country's energy security
- Increased employment possibilities in the company
- Increased employment opportunities in companies serving the power station
- Improvement in income of local community due to secondary effects
- Improved recreational opportunities for the local community
- Others

In the case of social benefits and coats, a qualitative assessment is usually applied unless the effects may expressed in financial terms (e.g., improvement of the qualitative parameters of the electric power). It is also to be noted that, in practice, the social benefits received by others must not be manifested in additional income flow for the company.

4.7 PROJECT COSTS

Relation of the Costs to the Project

As with benefits, the costs used in the project appraisal should include only costs that will be incurred as a result of undertaking the project. For example, wages of the existing staff should not be considered as part of the project costs if this staff would still be employed in another area of the organization if the project is not implemented.

Costs already incurred and irrevocably committed should be neglected. (However, they should be taken into account for purposes of calculating the prices for services and products.)

The value of resources or equity (e.g., land or fixed assets) that are owned by the power station and will be used by the project should, however, be taken into account, if they could be sold or could be otherwise disposed of in a profitable way. It is not necessary that the sale or disposal actually take place. But if charged to the project, a reduction must be made in other company asset accounts.

Measurement of Costs

Determination of projects costs is usually less problematic than that of benefits. Some costs, however, (e.g., increased noise, worsening of the visual impact of the site, etc.) may turn out to be impossible to measure. Even the non-measurable costs should be included in the evaluation.

Valuation of Costs

In most cases, the evaluation of costs will take place on the basis of the market price (i.e., the price actually paid). For purposes of project appraisal, the evaluation should be made on the basis of opportunity cost (i.e., the value of the benefits at the best alternative way of their utilization). The market price of a resource does not necessarily correspond to the alternative way of utilization. In practice, such a deviation will most often relate to the following areas:

- *Land* owned by the company is not a gratuitous resource. If the land will not be utilized in the project under consideration, it should bring alternative revenues. The opportunity cost can be taken into account by using the lost annual income from leasing the land.
- *Wages* independent from alternative opportunities of earning the wages (or lack thereof) the labor cost should be valued at full wage rate.

4.8 METHODS OF PROJECT APPRAISAL

The most frequently used traditional methods of project appraisal practiced in Poland are:

- Payback period - how many years are needed in order to have the initial capital expenditures returned
- Book rate of return - revenues from the project expressed as a percentage of the initial capital expenditures

These methods do not take into account the time value of money and have other disadvantages as well. Consequently, they are not recommended for use in the utility industry and will not be discussed in this study.

Discounted Cash Flow Method

At present time, project appraisals are made primarily on the basis of the discounted cash flow (DCF) method and the indices related to it. The DCF method involves "discounting" of the future revenues and costs using an appropriate "discount rate" in order to express them in terms of "present value" (PV). This takes into account the time value of money (i.e., the fact that one Zl received today is worth more than one Zl received in the future), because the cash received today can be reinvested to earn additional revenue.

The concept of discounted cash flows is presented in Appendix B and the summary of formulas for discounting are contained in Appendix C.

Treatment of Depreciation in the DCF Method

Depreciation should not be shown as a cost in any of the evaluations made using the DCF method. Depreciation is not considered as a cash flow. Instead, it is an accounting instrument used to distribute the amount of funds (already expended) over the operating period of the fixed asset. The primary expenditure (capital outlay) is already taken into account in the evaluation, so including the depreciation would mean double counting of the same cost.

Treatment of Financial Costs in the DCF Method

The project's financing cost is an important item influencing the decision whether the project is economically justified or not, but in a standard appraisal by means of the DCF method the financing costs should NOT be taken into account as cash expenditures.

Evaluation by means of a DCF method is an attempt to identify the revenues resulting from the project and compares these revenues with costs of financing of the project. Such a comparison is yielded by using the discount rate for calculation as the net present value (NPV) and by comparing the required rate of return with the project internal rate of return (IRR) where these rates are determined in relation to the financing cost rate.

If the interest costs are included as cash expenditures in the DCF method, then obtaining a loan and repaying principal are to be considered as cash revenues and expenditures. The NPV of all of the additional cash revenues related to the financing would be equal to zero, provided the discount rate applied is equal to the interest rate of the loan.

Under special circumstances, where financing of the project is very complicated, taking into account all the revenues and expenditures together with the revenues and expenditures related to construction or project purchasing might be desirable. The NPV can then be calculated by using the discount rate in the amount corresponding to the interest rate on loans (standard), or to the interest rate that could be achieved by investing the cash. The best method may be the analysis of all cash flows in each year (by applying separate interest rates for the financing and for the investing of cash surpluses) in order to ensure that the project is finally profitable (i.e., after completing the implementation and operation of the project a cash surplus remains)ash revenues related to the financing would be equal to zero provided the discount

4.9 INDICES APPLIED IN THE DCF METHOD

Indices most often used in project appraisals by the DCF method are:

- Internal Rate of Return (IRR)

- Net Present Value (NPV)
- Benefit/Cost Ratio (B/C Ratio)
- Equivalent Annual Value (EAV)

Net Present Value (NPV)

The NPV is calculated by subtracting the present value of costs from the present value of benefits. The NPV greater than zero indicates that the project is acceptable. Calculation of NPV also requires utilization of appropriate discount rates (see below).

In the situation where some of the benefits or costs are difficult or impossible to express in cash terms, the NPV (and other DCF-type indices) may be used to determine what cash value of these benefits (or costs) is necessary in order to make the NPV of the project positive.

Internal Rate of Return (IRR)

The IRR is defined as a discount rate at which after discounting project benefits and costs, the NPV becomes zero. The project is acceptable if its IRR is equal to or greater than the previously determined required rate of return.

The IRR is often treated as a rate of return of the invested funds. This is valid only in relation to the funds that at a given time remain invested (i.e., the initial outlays minus all revenues that may be treated as returns of the invested capital). The IRR does not reflect in any way the possibility of obtaining revenues from reinvesting funds that have been generated by the project.

It needs to be pointed out that the IRR is not linearly proportional to the amount of net revenues from a given project. For example, if the IRR is half of the required rate of return, doubling the net revenues will not necessarily achieve the required IRR value.

The IRR should not be applied to projects that do not have a typical course of cash flow. Such as in cases where after initial outlay a series of periods with positive cash flow follows, then a period with negative cash flow occurs because of general overhaul. In cases when more than one sign change of cash flows occurs, one can calculate several totally different IRR values, all yielding zero NPV. In such cases, other DCF measures must be used, mainly NPV.

Benefit/Cost Ratio (B/C Ratio)

The B/C Ratio is an index calculated by dividing the (discounted) present value of benefits by the present value of costs. A B/C Ratio greater than one indicates that the project is economically acceptable. In calculating this index, an appropriate discount rate must be applied - similar to the case of NPV.

Equivalent Annual Value (EAV)

The EAV is related to NPV. It reflects an equal distribution of NPV during the operating period of the project. Practically, in order to calculate EAV, a series of unequal, non-uniformly time distributed benefits and costs (such as those used to calculate the NPV) is used and subsequently uniformly distributed over the entire project life to obtain a stream of equal net benefits (or net costs) which - if discounted - would give the same NPV as the original unequal stream.

To calculate EAV, a discount rate is chosen to be used for both the discounting process (to obtain NPV) and for the inverse procedure to transform the NPV into EAV. An example of calculating the EAV is presented in Appendix C.

The EAV value is useful for comparing projects with different service life. The concept of EAV can be also applied for transformation of lump-sum costs into the equivalent annual cost (sometimes called as annuity). For instance, a primary project outlay of U.S. $ 10 million dollars for a turbine is equivalent to an annual "cost" of 1,547,000 U.S. dollars (discount rate = 15%; operating period = 25 years).

Discount Rate and Required Rate of Return

Choice of an appropriate discount rate and a required rate of return is a complicated matter. In countries with a developed market economy, a rate equal to the cost of capital is most often applied. The cost of capital is calculated as a weighted average of the debt cost and the cost of share capital for a given company.

For instance, for a case where the following conditions apply:

- rate of return required by the shareholders: 20%
- interest rate on loans: 15%
- debt/equity ratio: 1:3 (or 25% : 75%)

the average cost of capital is equal to:

$$15\% \times 25\% + 20\% \times 75\% = 18.75\%$$

Under conditions of the Polish economy, the influence of inflation cannot be neglected. This issue is discussed in Section 3.4.11.

Service Life and Salvage Value of the Project

The service life of the project, assumed for the purpose of project appraisal, should correspond to a probable period of the economic operation of the project (i.e., the period for which benefits and costs can be foreseen with acceptable certainty).

After shutdown of the project operation, certain components purchased under the project may have residual salvage value. This final value should be taken into account in the analysis. It should be valued at an appropriate percentage of the purchase price or on the basis of probable price if the equipment is to be sold to others.

The salvage value may be even negative if, after shutdown, the installation must be decontaminated, dismantled, or destroyed.

4.10 COMPARING AND RANKING THE PROJECTS

Application of DCF Indices for Comparing and Ranking of Projects

All the economic indexes (NPV, EAV, B/C Ratio, and IRR) have their own criteria that indicate whether or not the project - taken by itself - is economically acceptable. However, in real life, more complicated comparisons are often encountered. For instance:

- When the values of a range of options for implementing a given project are compared.
- When the values of mutually exclusive projects are compared. This situation occurs when only one of the competing projects can be implemented because they would all serve the same objective or would require the use of the same resources.
- When projects must be prioritized because, due to funding limits, only a limited number can be implemented. The objective is to select the economically most attractive combination of projects.

For comparison of project variants mutually excluding projects, the NPV must be used regardless whether the initial project outlays are equal or not (see Appendix D). For project prioritization, the B/C Ratio or IRR may be used.

Comparing Projects with Different Service Lives

The net present value (NPV) and the related equivalent annual value (EAV) are appropriate measures to compare the mutually exclusive projects with different service lives.

In comparing such projects, several methods can be applied:

- Differences in service lives may be neglected if repetition of the project is unlikely. One can assume that the funds released from the earlier completed project are reinvested at a rate that is equal to the discount rate. At such an assumption, the NPV does not grow during the period between completion of the shorter-lived project and the end of the longer project; thus, the standard comparison of NPV is valid.

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- If there is a probability that the project will be repeated, one of the following methods may be applied:
  - One may assume that the projects are compared for a period that contains an integral number of repetitions of each project (the least common multiple of the service lives).
  - Alternately, one may assume that each project is repeated infinitely.
  - The projects are compared on an annual basis, using the EAV.

4.11 PROJECT APPRAISAL UNDER INFLATIONARY CONDITIONS

Nominal and Real Discount Rates

Interest rates on financial projects are typically expressed in "nominal" terms in economies with modest inflation. In countries with high inflation rates, such as Poland, it is easier to express future revenues and costs in terms of present prices and use the "real" interest rates. Real interest rate (Rr) is defined by the relation (1+Rr)=(1+Rn)/(1+Ri). For instance, at an annual inflation rate (Ri) of 35% and a nominal interest rate (Rn) of 40%, the real interest rate is approximately 30.7% per annum (1.40/1.35=1.307). Similar relations exist between the nominal and the real discount rates. Nominal discount rate can be always used provided the projected cash flows are expressed in real future cash amounts. The concept of real interest and discount rates implicitly assumes that future revenues and costs escalate according to the inflation rate.

Changes of Cash Amounts Different than Those Resulting from Inflation

If the projected cash amounts deviate from inflation rate, several methods of procedure may be applied:

- Calculate future cash flows in real future cash units and discount according to the nominal discount rate.
- Calculate future cash flows in real future cash units, then to express them in terms of current prices (through discounting according to the inflation rate), and subsequently to discount according to real discount rate.

Discounting under Polish Conditions

For many years, Poland has experienced high inflation rates. A decrease of inflation rate to a single-digit level, typical for highly developed countries, is not foreseen for some years. An additional complication is the unpredictability of inflation rates for more than 1 year in the future.

Under these conditions, all future cash flows are practically expressed in terms of fixed prices (according to the price level at a definite moment) and discounted by using the real discount rate.

Future revenues and expenses may be expressed in terms of Polish Zloty or in terms of a convertible currency (e.g., in U.S. $). An advantage of calculations in convertible currencies is more easy comparability of valuations made at different moments. For instance, the result of a project appraisal made in March 1992 that yielded in the present net value + U.S. $1 million is more informative than the statement that the net present value was for instance + Zl 10 billion according to the prices from the beginning of 1992.

One has to keep in mind that the real purchasing power of one U.S. $ in March 1992 does not have to be equal to its present purchasing power. The real value of convertible currencies in terms of Zl may change due to devaluation or exchange rate changes on international currency markets. The project appraisals that will be compared with each other should be made according to prices as at the same date, unless IRR or other percentage indices are compared rather than the NPV (or EAV).

Choice of Real Discount Rates under Polish Conditions

As mentioned earlier, the choice of real discount rate is not an easy matter and there is not *one* right method for all cases. In countries with market economies, the "cost of capital" method is most frequently used. This method has only limited value in Poland for several reasons:

- First, calculation of the cost of equity capital is difficult in most cases.
- Second, calculation of the real cost of external financing is also difficult.
- Third, the costs of equity and borrowed capital are subject to changes from year to year because of weak development of financial markets in Poland.
- Fourth, the discount rate may be related to financial risks (higher risks require higher rates of return, and consequently higher discount rates). In Poland, the financial risks are high because of the unpredictability of the economic situation (see Section 3.4.12 on investment risks).

If the project is to be financed with foreign funds, using the currency of loan and its interest rate as a minimal required rate of return in the project appraisal seems to be almost natural.

4.12 TAKING RISK INTO ACCOUNT

Investment Risks

Up to now, it was tacitly assumed that despite problems related to the measurement and valuation, we were always sure of the level of benefits and costs in different variants of the projects. This certainty is justified when only relative values are sought, and the variants cover the same time frame and are affected by the same market segment. Practically, it is seldom guaranteed that the projected result will be achieved. Most of the calculated results bear certain

dose of uncertainty - the result may be better or worse than expected. This uncertainty represents a risk that the financial objectives will not be met.

The risk can be "external" or "internal." External risks (e.g., force majeure, government regulations, exchange rate fluctuations) can seldom be influenced by the company . The external risks can be transferred onto another party, for example, by purchasing insurance. Internal risks (e.g., design delays, strikes) are more susceptible to company influences.

Assessment of financial risks is an essential part of project appraisals. Numerical methods for risk assessment are discussed below.

Sensitivity Analysis

Sensitivity analysis is one of the more often applied methods for analyzing the influence of various parameters, or group of parameters, on the calculated benefits and costs. In the sensitivity analyses, the parameters are varied by a selected amount and new values of NPV and IRR are calculated with the changed parameters. Changes in the NPV and IRR for a given change in the parameters are the indicators of sensitivity. The sensitivity may be expressed in differentials, ratios or percentages, whichever is consistent with the algorithms. One must remember that the direction of simultaneous changes of several items must be logically consistent (if there is a correlation between the items).

A corollary application of sensitivity analysis is to determine the magnitude of parameter change needed to achieve a given NPV or IRR.

Sensitivity analyses are relatively simple to carry out. It must be remembered that this analysis is used to predict NPV changes in response to parameter changes. However, they cannot predict the likely actual changes.

An often applied form of the sensitivity analysis employs appraisals at three sets of assumptions:

1. Pessimistic evaluation of all (or most) items - so called pessimistic variant
2. Evaluation at the most probable set of assumptions - so called basic variant
3. Optimistic evaluation of all (or most) items- so called optimistic variant

Another method of applying sensitivity analysis is the examination what value a given item (e.g., revenues) has to assume in order to achieve the expected results.

Because of its relative simplicity, sensitivity analysis should be applied when project appraising involving considerable costs and bearing a high risk.

Probabilistic Methods

Sometimes risk assessments may be carried out on the basis of the probability of particular results occurring. The assigned probabilities may be objective (i.e., based on the statistically observed data) or subjective (i.e., based on a subjective personal assessment).

The expected value of NPV (ENPV) of a given project option may be calculated as a weighted average of all possible NPVs according to their probability. The possible NPV may be calculated by ascribing a probability to the total value of benefits and costs or to particular items in each period. If there are many benefit and cost items in a large number of periods, computer simulation based on probability distribution for different benefits and costs can save much time.

A disadvantage of using ENPV in isolation is that it does not tell anything about the distribution of possible results around the expected value. The greater the spread, the more risky is the investment. The spread can be expressed mathematically in the form of standard deviation of the NPV distribution. If the organization is reluctant to undertake the risk, it will want the standard deviation to be small, whereas an organization more ready to accept the risk will accept greater deviation.

Appendix A

Project Appraisal Forms

APPENDIX A PROJECT APPRAISAL FORMS

The letters and numbers relate to those applied on the original pages:

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A XYZ S.A. POWER STATION

B PROPOSED PROJECT FORM

1 PROJECT NAME

2 PROJECT DESCRIPTION (PHYSICAL MERITS)

3 PURPOSE OF THE PROJECT

4 BENEFITS FROM THE PROJECT

5 OTHER INFORMATION (OTHER VARIANTS, CONSEQUENCES OF NON-REALIZATION OF THE PROJECT, EARLIER ANALYSES, ETC.)

6 ESTIMATED COSTS (IF POSSIBLE)

C THE PROJECT IS PROPOSED BY

D SIGNATURE

E DATE

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A XYZ S.A. POWER STATION

B PRELIMINARY PROJECT APPRAISAL FORM

1 PROJECT NAME

2 PROJECT DESCRIPTION (PHYSICAL MERITS)

3 PURPOSE OF THE PROJECT

4 BENEFITS FROM THE PROJECT

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A PRELIMINARY PROJECT APPRAISAL FORM

B PAGE 2

5 PROJECT HISTORY (IF APPLICABLE) (EARLIER OBLIGATIONS, CORRESPONDENCE, ETC.)

6 CONSEQUENCES OF NON-REALIZATION OF THE PROJECT (FOR THE COMPANY, CUSTOMERS, IN VIEW OF REGULATIONS, STATE POLICY, ETC.)

7 ALTERNATIVE VARIANTS (IN ORDER TO ACHIEVE THE GOALS OF THE PROJECT) (COSTS, REASONS FOR REJECTION, ETC.)

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A PRELIMINARY PROJECT APPRAISAL FORM

B PAGE 3

8 INFLUENCE ON THE BUSINESS ACTIVITY OF THE COMPANY

9 INFLUENCE ON EMPLOYEES (NUMBER, ACHIEVABILITY, UTILIZATION OF RESERVES OF HUMAN RESOURCES, ETC.), CUSTOMERS, IN VIEW OF REGULATIONS, STATE POLICY, ETC.
STAGE OF PLANING AND REALIZATION

C AFTER COMPLETION THE PROJECT

10 INFLUENCE ON CUSTOMERS

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A PRELIMINARY PROJECT APPRAISAL FORM

B PAGE 4

11 ESTIMATED TOTAL COST
ACCORDING TO THE PRICES AS AT

12 INDIVIDUAL PROJECT COMPONENTS AND THEIR COST

13 POSSIBLE EXTERNAL FINANCING (ON COMMERCIAL, PREFERENTIAL TERMS ETC.)

14 ESTIMATED TIME SCHEDULE

C ANALYSIS OF PRELIMINARY APPRAISAL
DETAILED APPRAISAL
PROJECT APPROVAL
PROJECT DRAFT
DETAILED COST ESTIMATE
DETAILED PLAN
IMPLEMENTATION (CONSTRUCTION)
OPERATION PERIOD (IN YEARS)

D TIME IN MONTHS

E DATE OF COMPLETION

F PROJECT SUBMITTED BY
FINAL USER
INVESTMENT DEPARTMENT (SIGNATURE)

G SIGNATURE

DATE

Appendix B

Cash Flow Discounting

B.1 CASH FLOW DISCOUNTING

An example illustrating the concept of discounted cash flows is given below.

Example

Let's assume that we want to receive U.S. $100 at the last day of each of the next 5 years, assuming that the cash can be reinvested on 15 percent per annum. The question is how many dollars must be invested on the first day of the first year.

Description

If we invest U.S. $86.96 on 15% per annum on the first day we will receive at the end of the year together with the interest U.S. $100. So, U.S. $100 to be received in 1 year is worth U.S. $86.96 today (i.e., has the present value of U.S. $86.96).

Similarly, 100 U.S. $ to be received in two year has the present value 75.61 U.S. $ (= 100/1.15/1.15). So the present value of the five payments of 100 U.S. $ each to be received each year is equal to:

$$\begin{aligned}\text{Present value (PV)} &= 100\text{ U.S. }\$/1.15 + \text{U.S. }\$100/(1.15)^2 + \text{U.S. }\$100/(1.15)^3 \\ &\quad + \text{U.S. }\$100/(1.15)^4 + \text{U.S. }\$100/(1.15)^5 = \\ &= \text{U.S. }\$86.96 + \text{U.S. }\$75.61 + \text{U.S. }\$65.75 + \text{U.S. }\$57.18 + \text{U.S. }\$49.72 \\ &= \text{U.S. }\$332.22\end{aligned}$$

The general mathematical formula for the present value is the following:

$$PV = F_1/(1+r)^1 + F_2/(1+r)^2 + \ldots + F_n/(1+r)^n$$

where:

F_n = cash stream in the *n-th* period

r = interest rate

n = number of periods

In the subsequent appendix, we describe different formulae applied in discounting of the cash flows.

Appendix C

DCF Measures

C.1 DCF MEASURES

In this appendix, we give formulae for particular measures of the discounted cash flows (DCF) as well as an example of their application to project appraisal.

C.2 SUMMARY OF FORMULAE FOR DISCOUNTING

PV	=	present value of the future cash stream
FV	=	future value of the cash stream
EPV	=	equivalent periodic value of the present value
F	=	cash flow in a given period
r	=	discount rate
n	=	number of periods

The present value of a single cash flow F taking place in n periods

$PV = F/(1+r)^n$

The present value of constant cash flows F taking place within n periods

payments at the end of the period $PV = F(1-1/(1+r)^n)/r$
payments at the beginning of the period $PV = F(1+r)(1-1/(1+r)^n)/r$

The future value for n periods of a single flow F taking place in the zero period

$FV = F/(1+r)^n$

The future value for n periods of constant cash flows F taking place within n periods

payments at the end of the period $FV = F((1+r)^n -1)/r$
payments at the beginning of the period $FV = F(1+r)((1+r)^n -1)/r$

Equivalent periodic value within n periods of the present value PV

payments at the end of the period $EPV = PV(r/(1-1/(1+r)^n))$
payments at the beginning of the period $EPV = PV(r/(1-1/(1+r)^n))/(1+r)$

C.2 DCF MEASURES IN THE PROJECT APPRAISAL - AN EXAMPLE

Let's assume we have undertaken the appraisal of purchasing of a new device with the following parameters:

Purchase price	U.S. $5,000
Expected period of operation	4 years

End value U.S. $300

	Annual cash flow (U.S. $)	Expenses for operation and maintenance	Revenues
End of year	1	100	1500
	2	110	2000
	3	150	2000
	4	200	3000

All flows are given in U.S. $ of the given year.

We assume a nominal discount rate in the amount 15%.

For the investment proposed we calculate the benefit to cost ratio (B/C), the present value (NPV), the equivalent annual value (EAV), as well as the internal rate of return (IRR).

Calculations (the present value PV as at the end of the year 0 = beginning of the year 1):

At the End of the Year		Expenditures		Receipts		Net Incoming	
	Coefficient	Cash	PV	Cash	PV	Cash	PV
0	1	5000	5000	0	0	-5000	-5000
1	0.870	100	87	1500	1305	1400	1218
2	0.756	110	83	2000	1512	1890	1429
3	0.658	150	99	2000	1316	1850	1217
4	0.572	200	114	3300*	1888	3100	1744
			5383		6021		638

(* 3300 = 3000 + end value 300)

- B/C ratio = 6021/5383 = 1.12
- NPV = 6021 - 5383 = 638 (U.S. $)
  (the same result can be obtained by calculating the net flow for each year and discounting it)
- EAV = U.S. $638 NPV distributed over 4 years =
  $= (638 \times 0.15)/(1-1/(1+0.15)^4) = 223$ (U.S. $)
- IRR = 20.4%
  (calculated iteratively, for the purpose of illustration:
  for the discount rate of 20%, NPV is equal to U.S. $+45
  for the discount rate of 21%, NPV is equal to U.S. $-62
  for the discount rate of 20.4%, NPV is equal to 0

Appendix D

Projects with Different Capital Outlays

D.1 PROJECTS WITH DIFFERENT CAPITAL OUTLAYS

Example:

We assume two mutually excluding projects with following parameters:

	Project A	Project B
Investment outlay (in the 0 period)	U.S. $1,000	U.S. $1,600
Duration period	4 years	4 years
Discount rate	15% per annum	15% per annum
Annual cash revenues (as at the end of the year)	U.S. $500	U.S. $800
Present value of benefits	U.S. $1,570	U.S. $2,284
B/C Ratio	1570/1000 = 1.570	2284/1600 = 1.428
NPV (U.S. $)	1570 - 1000 = 570	2284 - 1600 = 684
NPV coefficient (NPV/investment outlay)	570/1000 = 0.570	684/1600 = 0.428
IRR	41.1% per annum	34.9% per annum

The B/C Ratio, the NPV coefficient, and the IRR indicate that the project A is more favorable than the project B. For instance, the NPV coefficient indicates that for each dollar primarily invested project A yields income U.S. $0.57 and project B U.S. $0.428. However, comparison of NPVs suggests that investment B is better than investment A. In fact, the comparison of NPVs and the choice of the project B are correct.

Investment B requires additional expenditures in the amount of 600 U.S. $ but generates an additional NPV of U.S. $114 (= U.S. $684 - U.S. $570) for this additional investment. So, keeping in mind that NPV takes the primary outlay into account and that each NPV above zero is attractive we may conclude that spending additional U.S. $600 is as much as possible justified. Investment B is more attractive than the investment A despite of the higher cost. It is assumed at this point that the additional U.S. $600 could not be utilized in another project that would yield NPV higher than U.S. $114.

In summary, one may conclude that mutually excluding investments with different initial capital outlays should be compared by means of differential method. It is to determine whether the increase of outlays in one project compared to the other do result in increase of the net present value. It is not the same as the question which investment has higher net present value for each dollar invested. Assuming there are no budget limitations in regard to the outlays, only comparison of NPVs gives the right answer.

Section 5

Non-Core Activities - Restructuring Options

5.1 INTRODUCTION

It is generally recognized that in the future competition will play an increasingly important role within the Polish energy sector. Keeping this in mind, a closer look has been taken at the cost structure of the Rybnik power plant to identify potential for reductions in the cost of power generation.

This report is primarily considering costs which are not directly related to energy production. These costs represent approximately 16 percent of total operating costs. The operating costs for electricity generation are basically predetermined by the thermodynamic efficiency of the power generating units, the cost of fuel, and the operating labor costs. These cannot be quickly or easily influenced by plant management. Conversely, improvements can be made in costs not related to power generation without extensive capital expenditure and could be tackled regardless of future capital expenditure or industry restructuring plans.

The level of non-production costs may become an important differentiating factor when power plants are commercialized and operate in a competitive market. Opportunities to reduce these costs have been identified through organizational restructuring. By beginning this process earlier than other generating plants, Rybnik or any other plant may gain a competitive edge which will be difficult to match in the short run for other Polish power plants.

As with many other state-owned enterprises, the power plant has a number of service activities, not directly related to power production. Spinning off these areas into companies run by former plant employees or obtaining them through outside contracts are only some of the options which can be considered by the plant's management.

In broad terms, there are two major factors against which a company's service activities need to be evaluated.

- First, is the activity strategically important and to what extent
- Second, is the activity cost competitive with alternative providers

Strategic importance can be assessed in a number of ways: contribution margin; percent of total revenues; impact on the core business, etc. In the case of electricity generating plants, strategic importance can be considered in terms of activity's impact on the company's ability to generate electricity. For example, the activity of maintenance is clearly of high strategic importance since without access to an effective maintenance capability, a plant is unable to avoid breakdowns or recover fast from unplanned downtime. By comparison, certain social activities such as facilities for leisure activities are of lower strategic importance.

Cost competitiveness is based solely on a comparison of the activity's costs against the price available from alternative providers. The comparison should, ideally, factor in the costs for the company of switching to an alternative provider. These costs may include those associated with technical or engineering changes as well as the costs of redundancies, retraining, or outplacement for employees no longer required in the core business.

Subject to the relative cost competitiveness and strategic importance of the activity, there are a number of generic approaches which can be considered with regard to managing the activity (see Table 5-1).

Table 5-1
Activity Management Options

Strategic Importance	Low Cost Competitiveness	High Cost Competitiveness
High	• Retain + improve cost structure. • Outsource under tight control.	• Retain in-house + maintain cost competitiveness.
Low	• Improve cost structure + sell for a premium. • Sell as is. • Close. • Outsource the product or service	• Sell + outsource the product or service • Retain + sell excess capacity

Although plant management is often tempted to retain a non-strategic activity in-house for revenue generation, profit generation, or employee morale, it is generally regarded as preferable to divest or close such activities, as they demand management time and attention which could otherwise be applied to the core business. Strategically important yet non-competitive activities

are also frequently retained in-house in situations where a company does not have the skills or experience to contract the activity out. This is quite reasonable but does not absolve management of their responsibility to seek and to develop such skills in their organization if outsourcing could provide them a competitive advantage.

Having identified whether an activity should be retained, divested, or closed, the challenge is to identify the strategy for divestiture or closure. In the Polish environment, where management has social responsibilies not to add unnecessarily to the already high unemployment, divestiture or closure must be handled in a manner which typically takes longer than in a western environment. Divestiture, for example, is commonly achieved by first establishing the activity as a subsidiary of the plant and then, once it has had time to build the necessary capabilities to compete in the open market, allowing it to "spin-off" as a separate company owned by employees or by some other party. Closure, by comparison, is often achieved by allowing for natural attrition of the work force (i.e., retirements, normal staff resignations etc.) to reduce the employees to a number that can be usefully redeployed in the core business.

The Rybnik plant has been a pioneer in implementing such initiatives, and some of the satellite companies it has created have been operating quite successfully (Energoinwest, Ekol). However, it appears that the relationship between the plant and some of its "daughter" companies is informal in terms of payments, accounting, and even investments. There appears to be little control or monitoring of daughter companies activities or their impact on the Rybnik power plant. One general recommendation is that control over financial dealings with daughter companies should be strengthened and the relationship between the power plant and its affiliated companies formalized in order for the restructuring process to show more tangible financial benefits.

Having interviewed managers of non-core departments, substantial opportunity for further restructuring is apparent. Table 5-2 lists the 15 non-core departments and shows their head count and wages. These departments employ 700 people and account for over 40 percent of payroll costs at the Rybnik plant.

Table 5-2
Head Count and Payroll of Non-Core Departments

	Department Name	Head count	% of total headcount	Wages	% of total wages
1.	Rail Road	127	7.98	7,014	8.02
2.	Cleaning Department	79	4.97	2,123	2.43
3.	Maintenance of Electrical Equipment	78	4.90	3,927	4.49
4.	Mechanical Workshops	75	4.84	4,482	5.13
5.	Maintenance of Boilers	58	3.65	3,276	3.75
6.	Auto Transportation	54	3.40	2,737	3.13
7.	Maintenance of Turbines	48	3.02	2,992	3.42
8.	Maintenance of Auxiliary Machinery	35	2.20	2,665	3.05
9.	Chemical Analysis	26	1.63	1,142	1.31
10.	Maintenance of Gantries, Compressors & Oil	25	1.57	1,963	2.25
11.	Maintenance Planning	24	1.51	1,402	1.60
12.	Telecommmunication	24	1.56	980	1.12
13.	Maintenance Training Center	20	1.26	875	1.00
14.	Training & Leisure Center	18	1.07	701	0.80
15.	Water Sports Center	8	0.50	685	0.78
	Total	699	44.19	36,964	42.28

Note:

1. Head count data at the end of the year 1992.
2. Wages - annual figures of 1992 in million Zl. Item represents gross figures including social insurance (ZUS), etc.

Source: Information questionnaires.

The following pages of this paper provide an assessment of the non-core departments in terms of their strategic importance, potential for divestiture, and other important dimensions.

In a top level analysis, it is important to recognize that each department is specific with regard to its operations and should be considered separately in terms of restructuring options. For example, one strategy may be required for the maintenance departments (see Appendix A), and a different strategy will be necessary for the Maintenance Training Center.

Although a detailed assessment of restructuring options for each department, dependent on different internal and external factors, is beyond the scope of this task, these factors were considered. Such specific issues should be carefully considered if decisions are made to implement the restructuring discussed in this document.

The main objective of this paper is to show the potential for cost improvements. These improvements, once realized, may place the Rybnik plant (or the Rybnik group) in an advantageous position in the future competitive environment, where generating companies will be pressed to produce energy at competitive cost.

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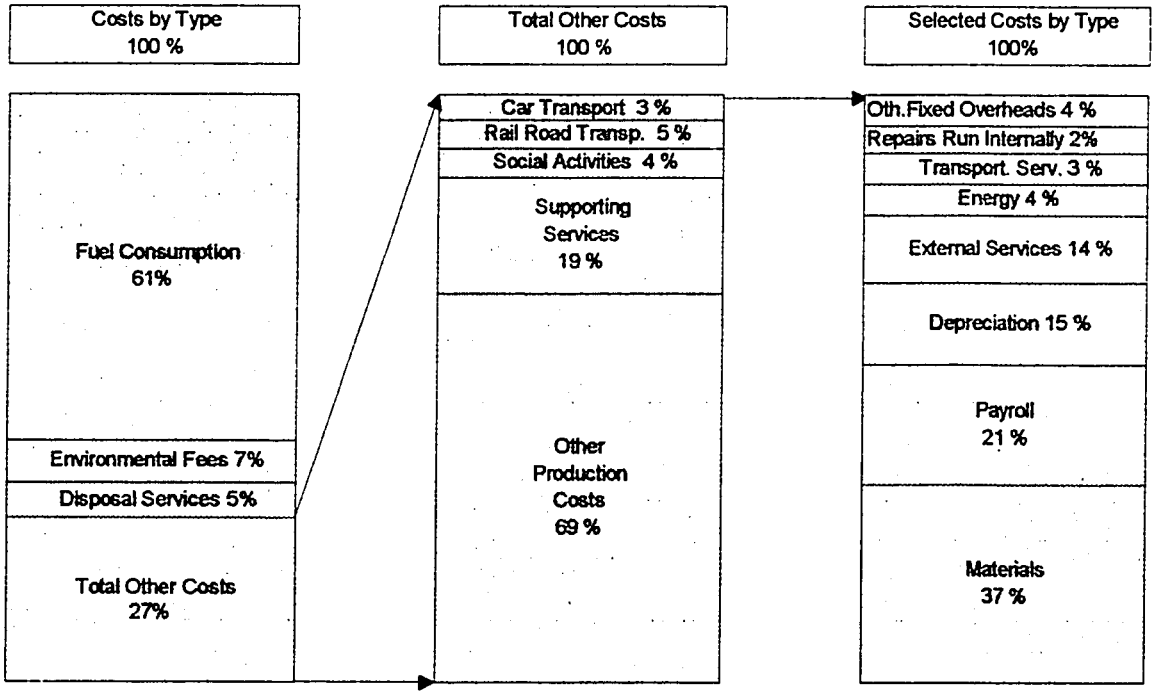
5.2 OVERVIEW OF COST STRUCTURE

Figure 5-1 shows a graphic representation of Rybnik plant costs classified by type. The main purpose of this representation is to illustrate that portion of costs which should be more easily controllable by management in the near term.



Cost by Type	**2,186,969**	Total Other Cost	**600,051**	Sel. Cost by Type	**190,394**
Fuel Consumption	1,331,327	Car Transport	20,176	Other Fixed Overheads	6,781
Environment. Fees	151,905	Rail Road Trans.	28,930	Repairs Run Internally	4,493
Disposal Services	103,686	Social Activities	25,276	Transportation Services	4,904
Total Other Costs	**600,051**	Support. Services	116,012	Energy	7,490
		Sub-Total	**190,394**	External Services	26,747
		Other Prod. Cost	409,657	Depreciation	29,874
				Payroll	39,297
				Materials	70,808

Source: Information questionnaires, team analysis, and accounting records.

Figure 5-1
Rybnik Plant Costs
(Costs in million Zl per year)

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As can be seen from the above cost breakdown, Rybnik plant's total costs can be grouped into four major categories. These are fuel consumption (61 percent), environmental fees (7 percent), disposal services (5 percent) and total other costs (27 percent). Total other costs are further divided into car transport (3 percent), rail road transport (5 percent), social activities (4 percent), supporting services (19 percent) and other production costs (69 percent).

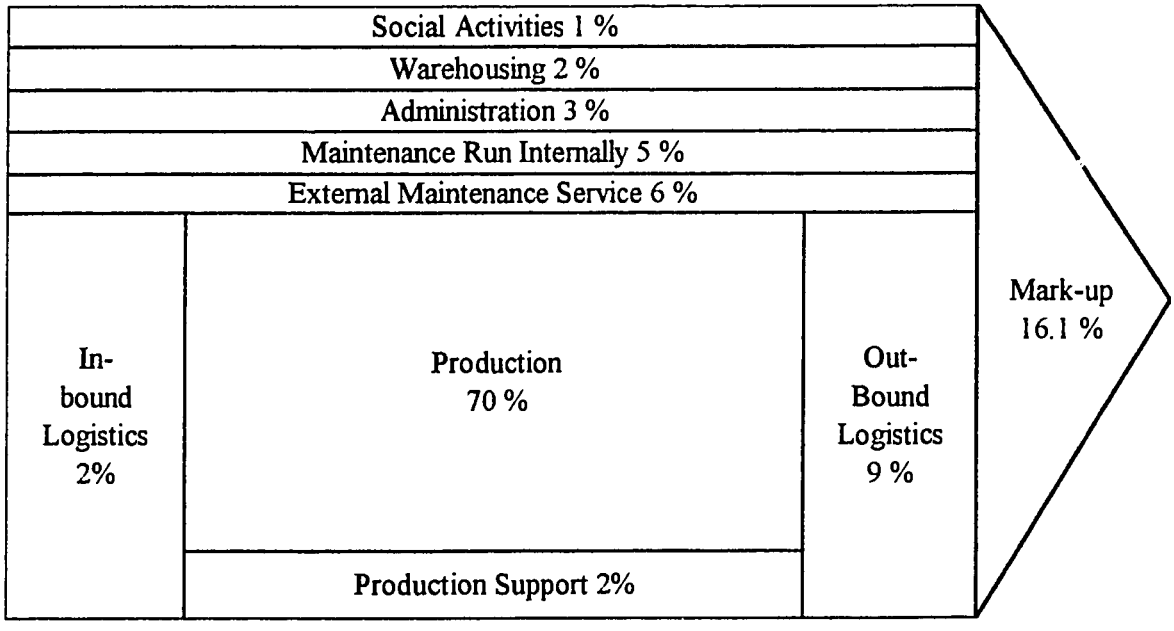
It should be noted that management has direct influence over the total other cost. Estimated total for these controllable costs, based on available evidence, is about 600 billion Zl per year which is 27 percent of total costs.

The costs incurred by non-core activities are directly related to the controllable costs. However, the available data does not allow a more detailed analysis of this relationship without significant further work.

A cost map of the Rybnik power plant (see Figure 5-2) has been prepared to facilitate comparison with international or domestic generating companies. A cost map, as opposed to traditional cost analysis, aims to present costs associated with specific activities. This process of analyzing costs by activity differs from traditional cost analysis which analyzes the plant's costs by type (i.e., labor, materials, overheads, payroll, etc.). The starting point for cost map analysis is to define the plant's set of activities and to assign costs to each of the activities.

Each activity is assigned a group of relevant departments. For example, social activities consist of the Training and Leisure Center and the Water Sports Center. The detailed grouping of departments into activities is presented in Table B-1 (see Appendix B) which also lists head count and wages for each activity and department.

The cost map for the Rybnik power plant was derived from the total operating costs of the power plant. The costs were divided into two distinct groups: costs which are directly related to production of electricity and those which are of a supporting nature. The former are physically linked to the generation process and include In-Bound Logistics (2 percent), Production (70 percent), Out-Bound Logistics (9 percent) and Production Support (2 percent). The support activities are not physically linked to the generation process and include External Maintenance Service (6 percent), Maintenance Run Internally (5 percent), Administration (3 percent), Warehousing (3 percent), and Social Activities (1 percent).



Total Revenue from Production		2,539,422
Mark-up (16.1 %)	352,453	
Total Operating Cost		2,186,969
In-Bound Logistics	34,578	
Production	1,523,510	
Production Support (*)	44,643	
Out-Bound Logistics	207,272	
Maintenance Run Internally	116,012	
External Maintenance Services	131,085	
Administration (*)	70,820	
Social Activities	25,276	
Warehousing (*)	33,773	
Total Operating Costs		2,186,969

Note: 1. All numbers in million Zl per year.
(*) Partly estimated on a head count allocation basis.

Source: Information questionnaires, accounting records, and team analysis.

Figure 5-2
Rybnik Plant Cost Map

Such a breakdown of activity is useful when compared with comparably sized Western power plants. It can help to identify potential cost savings in terms of employment or cost structure within the plant.

Probably one of the most significant points that becomes evident from the cost map is that only 1 percent of costs is associated with social activities which represents a relatively minor impact. Even though the costs are small, management must still assess the amount of management time required for these activities and assess whether this time could deliver better results if focused on the core electricity generation business. The relative insignificance of social activities is also seen in the employee head count distribution in Figure 5-3.

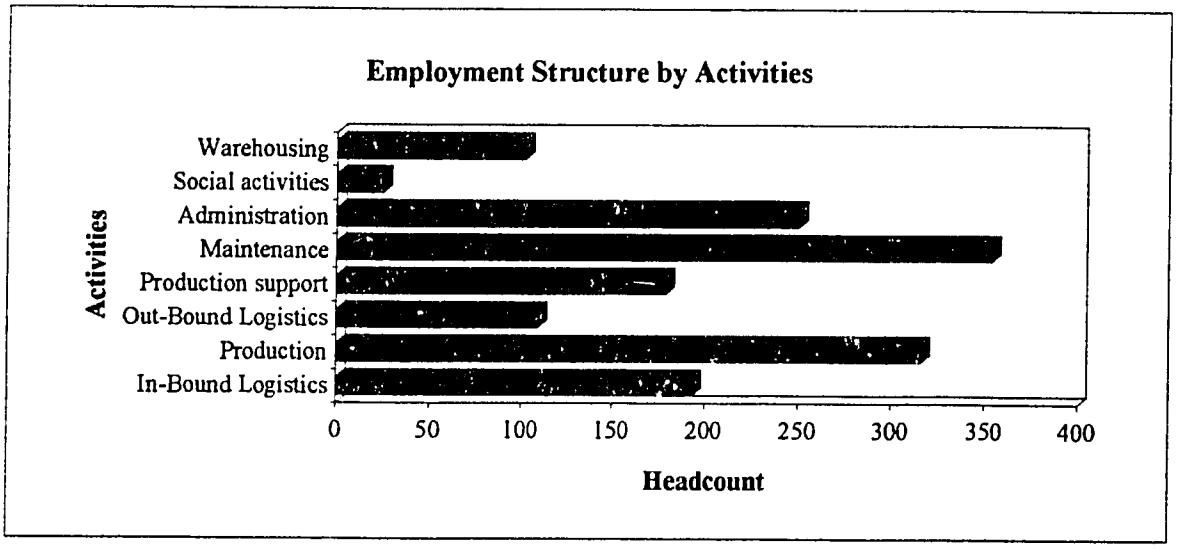


Figure 5-3
Employment Structure by Activities

In contrast to the social activities, the maintenance component represents 11 percent of the operating cost and has by far the largest head count. A comparison of the maintenance component with a similar size Western power plant indicates that both the cost and head count are significantly higher at Rybnik. A detailed study of Western practices would be of significant value, in part to identify areas where cost saving could be achieved, and in part to acquaint the staff of the Rybnik plant with modern Western practices with the possibility to have some introduced at their plant.

In Western countries, such as the United States, plant staffing levels are influenced by high levels of automation, rigorous labor classification, regulatory compliance and, long experience in a market-oriented economy. High wage rates are driving the plants for ever higher labor productivity and automation to maintain profitability with electricity prices set by local or regional utility commissions.

A large power plant, similar to Rybnik, would have the following staff:

Warehousing	15
Administration	110
Maintenance (all)	183
Production operations	255
Total	563

Other than mine-mouth locations, the plants would receive their coal supply in unit trains operated by the rail company, and fuel oil would arrive in tank cars. Receiving would require few people, often from the existing staff. Only a few plants would have social facilities.

5.3 SPARE CAPACITY

The project team then worked with managers of the Rybnik plant's earlier identified 15 non-core departments (see Table 5-3) to try to assess the extent of existing spare capacity in terms of staffing level and equipment. As a result, it is estimated that there is 19 percent spare capacity in terms of labor and 45 percent spare capacity in equipment utilisation.

The following graphs (Figures 5-4 and 5-5) and Table 5-2 illustrate the spare capacity for the labor and equipment of each department. (Each department is assigned a number as shown in Table 5-3.)

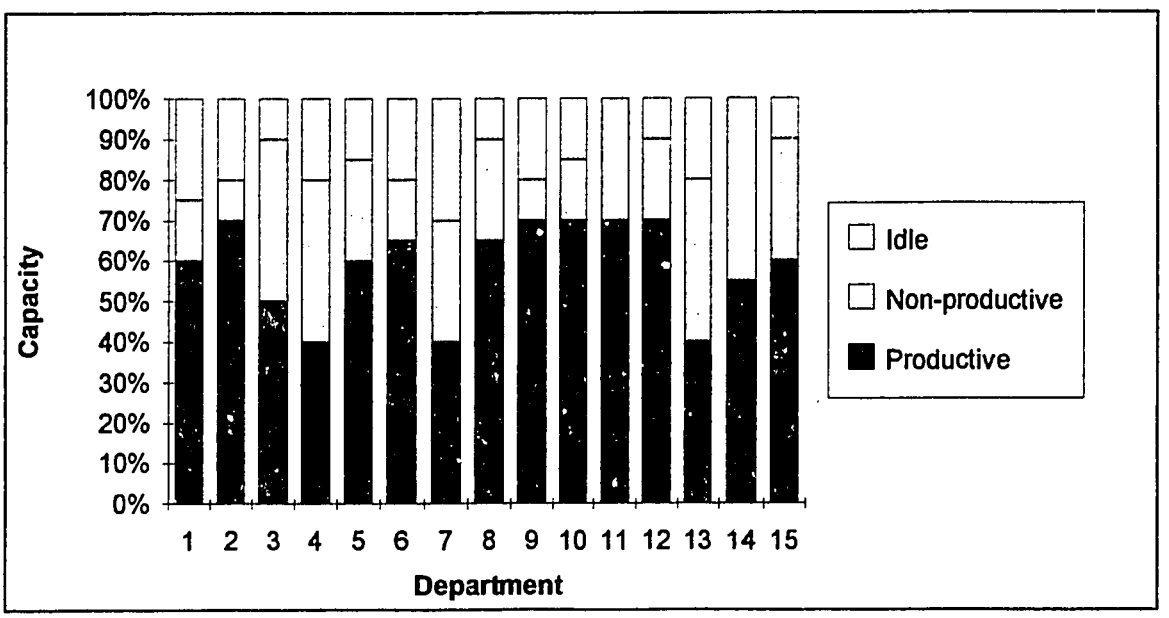


Figure 5-4
Labor Utilization Analysis by Departments

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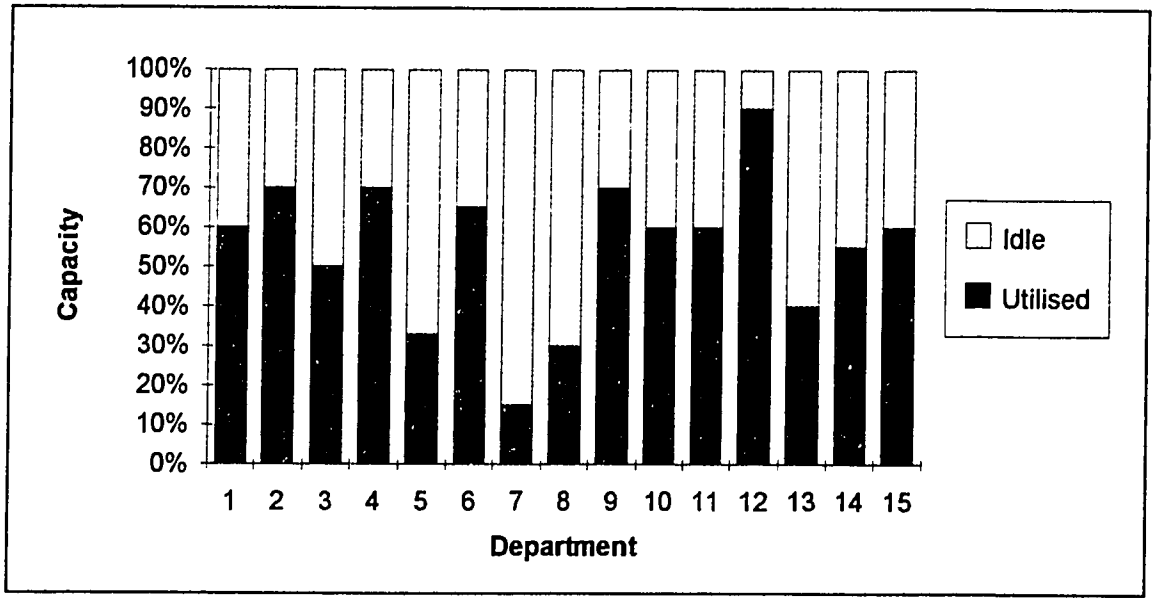

Figure 5-5
Equipment Utilization Analysis by Departments

Labor utilization is portrayed in two categories:

- Productive - average percentage of labor hours *directly* related to a department's core activities.
- Non-productive - average annual percentage of labor hours *not* directly related to a department's core activities.

For all 15 non-core departments, the total figures for productive and non-productive labor utilization are 58 percent and 23 percent respectively.

Equipment utilization is defined as the average annual percentage of machinery and equipment hours directly related to the department's core activities or actual time of machinery/equipment usage justified by the department's specific objectives and activities. For all 15 non-core departments, this figure totals 55 percent.

It should be noted that a portion of maintenance equipment usually consists of special tools needed for plant maintenance that are kept on a "standby" status to respond in case of breakdowns. As such, they do not constitute true excess equipment.

For all 15 non-core departments, the estimated labor spare capacity equals 19 percent. In practical terms, this figure represents the average annual idle time of employees within the working hours available. The estimated equipment spare capacity, for all 15 non-core departments, is 45 percent.

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This reveals the average annual time during which the equipment of all 15 non-core departments is not utilized and sits idle.

For all estimates, the project team made the assumption that 100 percent represents the current state of working hours both for labor and equipment.

From these figures it is clear that equipment utilization is generally substantially lower then expected in a western plant. This excess capacity may have arisen as a result of plants needing to be fully integrated under the command economy. However, as the market economy evolves, opportunities for additional utilization of surplus capacity by contracting for outside work, formation of subsidiary companies, or contracting for outside services should be pursued.

Table 5-3
Spare Capacity Analysis of Non-Core Departments

	Department	Head-	Labor Utilization		Equipment	Est. Spare Capacity	
	Name	count	productive	non-prod.	Utilization	Labor	Equip.
1.	Rail Road	127	60%	15%	60%	25%	40%
2.	Cleaning Depar[illegible]	79	70%	10%	70%	20%	30%
3.	Maintenance of Electrical Equipment	78	50%	40%	50%	10%	50%
4.	Mechanical Workshops	75	40%	40%	70%	20%	30%
5.	Maintenance of Boilers	58	60%	25%	33%	15%	67%
6.	Auto Transportation	54	65%	15%	65%	20%	35%
7.	Maintenance of Turbines	48	40%	30%	15%	30%	85%
8.	Maintenance of Auxiliary Machinery	35	65%	25%	30%	10%	70%
9.	Chemical Analysis	26	70%	10%	70%	20%	30%
10.	Main. of Gantries,Compress.& Oil	25	70%	15%	60%	15%	40%
11.	Maintenance Planning	24	70%	30%	60%	0%	40%
12.	Telecommunication	24	70%	20%	90%	10%	10%
13.	Maintenance Training Centre	20	40%	40%	40%	20%	60%
14.	Training & Leisure Centre	18	55%	0%	55%	45%	45%
15.	Water Sports Centre	8	60%	30%	60%	10%	40%
	Total	**699**	**58%**	**23%**	**55%**	**19%**	**45%**

Notes:
1. Labor Utilization:
Productive - average annual percentage of labor hours directly related to a department's core activities.
Non-productive - average annual percentage of labor hours not directly related to a department's core activities.

2. Equipment Utilization - average annual percentage of equipment hours directly related to a department's core activities.

3. Estimated Spare Capacity:
Labor - average annual percentage of labor hours spent on a department's irrelevant activities.
Equipment - (100 percent - Equipment Utilization)

4. Totals for labor are averages weighted by the headcount of each department.
Totals for equipment are averages of the listed departments.

Source: Management interviews.

In the following charts, Figures 5-6 and 5.7, the average labor and equipment utilization are summarized for the non-core departments.

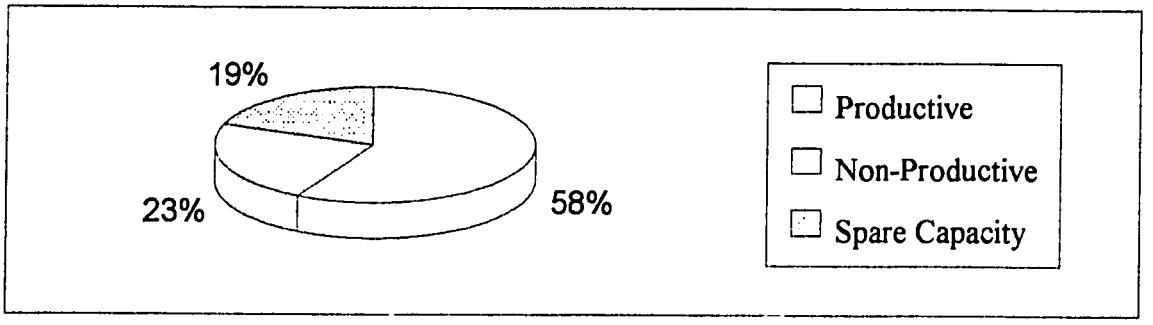

Figure 5-6
Average Labor Utilization of Non-Core Departments

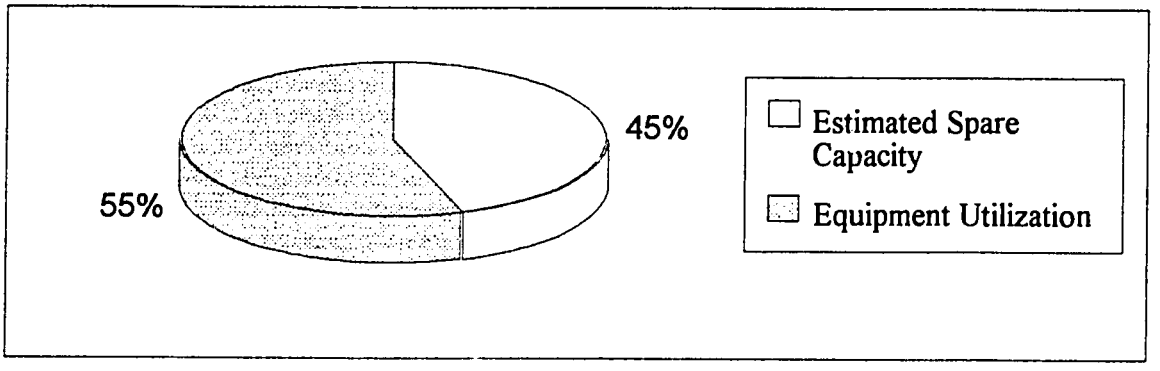

Figure 5-7
Average Equipment Utilization of Non-Core Departments

As mentioned earlier, non-productive labor utilization is defined as the average annual percentage of labor hours *not* directly related to a department's core activities. The project team believes that a significant portion of these hours could be eliminated, resulting in further savings. Such improvements, however, would require further analysis to reorganize work and eliminate activities that do not contribute added value.

5.4 DIVESTITURE OR CLOSURE POTENTIAL

Divestiture or closure of non-core activities is one way to improve efficiency. Within the context of the Polish environment and the approach accepted by Rybnik, divestiture means transforming non-core activities into separate companies with capital shares held by the plant and the employees. The newly established company is expected to render services under contract to the "mother" plant. At the same time, as a separate commercial entity, it is expected, in the longer term, to sell excess capacity elsewhere and ultimately to survive on its own. Exposure to market forces is expected to promote an increase in operational efficiency and seek new external customers. It should be noted that external customers which fill the existing spare capacity will make it possible for Rybnik to relieve itself of the cost burden of maintaining this spare capacity.

The potential for divestiture, closure, or internal merger of each non-core department has been assessed in consultation with Rybnik personnel and has a direct bearing on the detailed management structure which maybe required in Rybnik in the future. By considering the cost structure, management time, spare capacity, and strategic issues associated with each department, management should be better positioned to decide on the specific strategy to be adopted for each department.

The project team considered the following issues when reviewing each of the non-core activities: strategic importance, external competitiveness, existence of alternative providers, quality of external providers' services and expected, realistic timing of divestiture, closure or merger.

As previously discussed, strategic importance is defined as the level of impact the department's activities have on the production of energy. External competitiveness is a measure of how the department's services (in terms of quality and price) would compare with that obtainable in the external market. The existence and quality of alternative providers and the expected timing of divestiture, closure, or merger are based on an assessment by the management of each department. The results of the assessment are shown graphically in Figure 5-8 and in Table 5-4.

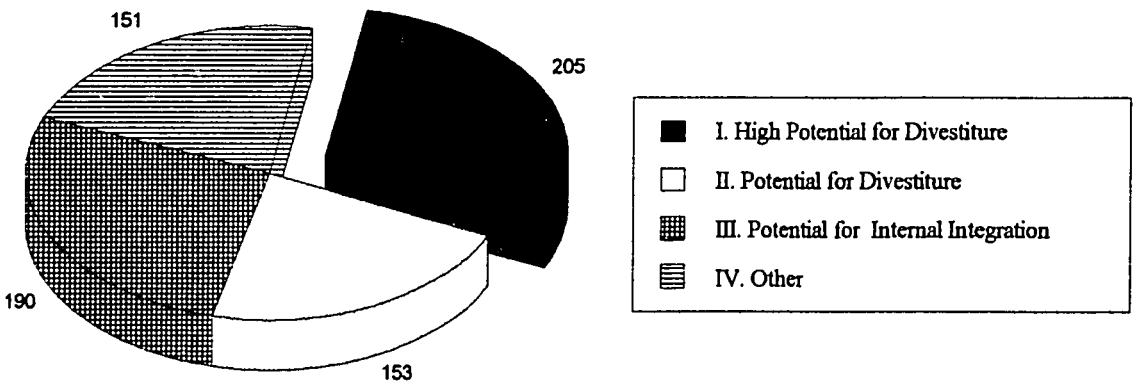

Figure 5-8
Divestiture Assessment for Non-Core Departments (by Head Count)

Table 5-4
Divestiture/Closure/Merger Assessment of Non-Core Departments

Department Name	Head-count	Strategic Importance	External Com-petitiveness	Alternative Providers	Quality of Altern. Prov.	Exp. Timing of Spin-off
I. High Potential for Divestiture						
Cleaning Department	79	low	low	yes	acceptable	1 year
Auto Transportation	54	med./low	low	yes	acceptable	1-2 year
Chemical Analysis	26	medium	high	yes	acceptable	3 years
Maintenance Training Centre	20	medium	high	yes	acceptable	4 years
Training & Leisure Centre	18	low	medium	yes	acceptable	3-5 years
Water Sports Centre	8	low	low	yes	acceptable	5 years
Sub-Total	205					
II. Potential for Divestiture						
Maintenance of Electrical Equipment	78	high	low	yes	acceptable	1-2 years (*)
Mechanical Workshops	75	high/med.	low	yes	acceptable	1-2 years
Sub-Total	153					
III. Potential for Internal Integration						
Maintenance of Boilers	58	high	"?"	yes	acceptable	1-2 years
Maintenance of Turbines	48	high	"?"	yes	acceptable	1-2 years
Maintenance of Auxiliary Machinery	35	high	med./low	yes	acceptable	1-2 years
Maint. of Gantries,Compress. & Oil	25	high	high	no	N/A	1-2 years
Maintenance Planning	24	medium	low	no	N/A	1-2 years
Sub-Total	190					
IV. Other						
Rail Road	127	high	low	yes	unacceptable	1 year
Telecommunication	24	high/med.	high	no	N/A	1 year
Sub-Total	151					
Total	**699**					

Notes:

1. External Competitiveness - how competitive the department's services would be on the external market in terms of quality & price

(*) - existing possibility for internal integration.
N/A - not applicable
"?"- no data available

Source: Team analysis; Management interviews.

Table 5-4 groups the 15 non-core departments into four categories with regard to restructuring options. The following categories are used: High Potential for Divestiture, Potential for Divestiture, Potential for Internal Integration, and Other.

It is noted that the expected timing of divestiture is understood as the time period from the day when decision for divestiture of the department (i.e., transformation into an employee-owned affiliated company) is made to the day when the department becomes a fully independent business entity. The estimates listed in the above table are best estimates of the managers in charge of the selected departments.

The time frame takes into account the complexity of present internal and external factors such as maintaining current conservative downsizing policy (no lay-offs without alternative employment), the time period required for the development and implementation of the necessary business plan and strategy, as well as the current economic and political situation in the country.

High Potential for Divestiture

This category includes six departments: Cleaning, Auto Transportation, Chemical Analysis, Maintenance Training Center, Training and Leisure Center, and Water Sports Center. The departments are characterized by low to medium strategic importance in the management's view. Alternative providers with acceptable quality services are available. Expected timing of divestiture for these departments ranges from 1 year (i.e., Cleaning Department) to 5 years (i.e., Water Sports Center), depending on department specific problems which would have to be overcome if the divestiture were to be completed.

The main problems currently include:

Cleaning Department

- Lack of vision and strategy
- Lack of commercial and marketing skills
- Low external competitiveness
- High average employee age
- Poor understanding of the external market

Auto Transportation Department

- The power plant management is unclear as to what extent the fixed assets of the department need to be available to the plant
- High fixed assets value
- Strong competition on the external market

Chemical Analysis Department

- Low demand for the department's services on the external market
- Current potential clients have limited ability to pay for the department's services

Maintenance Training Center

- Binding 4-year contract for the trade school administrated by the plant
- High fixed assets value

- Social impacts

Training and Leisure Center

- Lack of vision and strategy
- Lack of marketing plan
- Poor location
- High fixed assets value

Water Sports Center

- Lack of vision and strategy
- Lack of marketing plan
- Need for additional investments
- Poor location
- High fixed assets value

The six departments employ 205 employees. In the event that these departments are eventually removed from the plant, there would be a plant head count reduction of up to 205 employees.

Potential for Divestiture

This category includes two departments: Maintenance of Electrical Equipment and Mechanical Workshops. These departments have similar characteristics as the departments in the previous category. However, in the view of management, these departments are more strategically important and provide a wide range of specific services. In addition, the power plant management lacks experience in obtaining such services from the external market. These issues limit the possibilities for divestiture and require more complex solutions. The management of these departments believes that the time period required to overcome these problems may range from 1 to 2 years. In the event that the two departments are eventually removed from the plant, there would be a plant head count reduction of up to 153 employees.

Potential for Internal Integration

The departments included in this category are all maintenance departments which altogether constitute a Maintenance Division in the power plant organizational structure. These departments are characterized by high strategic importance and hence require a different approach to the restructuring process. Benefits could be achieved if those services were grouped into one integrated department within the plant or integrated within the future group structure. These departments are discussed further in Appendix B.

Other

This category consists of Rail Road and Telecommunication departments which are also characterized by high strategic importance. However, there are no alternative providers which could take over the services rendered by those departments to the plant, or their quality of services is unacceptable. The special case of Rail Road Department is presented in more detail in Appendix C.

Appendix A

Spare Capacity of Maintenance Departments

A.1 SPARE CAPACITY OF MAINTENANCE DEPARTMENTS

The Maintenance Division consists of five different departments responsible for a specific group of machinery. In spite of the non-core nature, their high strategic importance (see Table A-1) requires a different approach which would provide optimal security for energy blocks operation and hence production of energy.

The project team is of the opinion that the Maintenance Division has the potential for internal integration. Various maintenance functions could be grouped together into one department. The department would consist of a highly skilled specialists group (engineers for boilers, turbines, gantries, etc.) supported by a larger group of lower skilled workers having a broader knowledge of the power plant's machinery and equipment than is currently the case.

Such organizational integration is possible but would require higher and broader qualifications on the lower level of employment. This, in turn, calls for additional training and possibly incentives in terms of higher wages to encourage employees to improve their skills. Currently, the payroll policy does not provide for any increases in wages associated with completion of training programs. As a result, some modification of the current system may be required.

The five maintenance departments (Electrical Equipment, Boilers, Turbines, Auxiliary Machinery and Gantries) currently employ 244 people. It is estimated by management that 16 percent of their current working time is wholly unproductive. This would indicate a potential for head count reduction of approximately 39 employees.

Further savings would be possible by reducing the unproductive time which is estimated by management at 30 percent of total time.

There is general consensus among the maintenance managers that the power plant needs to establish its optimal organizational structure for the maintenance activities. Individual job areas and scopes, especially of lower level employees, are not well defined. This situation provides opportunities for unnecessary duplication of work and overlapping skills resulting in suboptimal labor usage.

The average labor, equipment utilization, and spare capacity of the maintenance departments are presented in Figures A-1 and A-2 and in Table A-1.

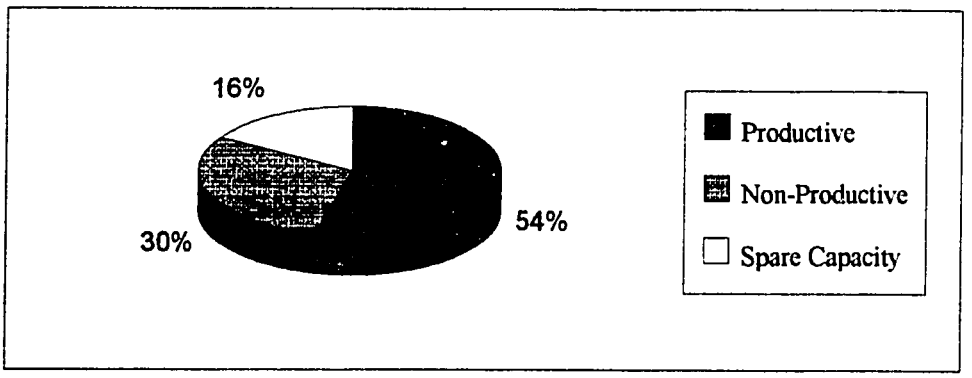

Figure A-1
Average Labor Utilization of Maintenance Departments

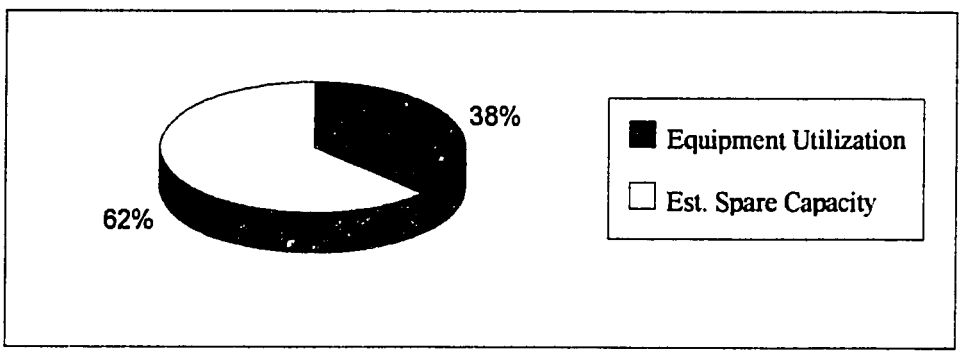

Figure A-2
Estimates of Equipment Utilization of Maintenance Departments

Source: Management interviews

Table A-1
Spare Capacity Analysis of Maintenance Departments

Department Name	Head-count	Labour Utilization		Equipment Utilization	Est. Spare Capacity	
		productive	non-prod.		Labour	Equip.
Maintenance of Electrical Equipment	78	50%	40%	50%	10%	50%
Maintenance of Boilers	58	60%	25%	33%	15%	67%
Maintenance of Turbines	48	40%	30%	15%	30%	85%
Maintenance of Auxiliary Machinery	35	65%	25%	30%	10%	70%
Main. of Gantries,Compress.& Oil	25	70%	15%	60%	15%	40%
Total	244	54%	30%	38%	16%	62%

Notes:

1. Labor Utilization:
Productive - average annual percentage of labor hours directly related to the department's core activities.
Non-productive - average annual percentage of labor hours not directly related to the department's core activities.

2. Equipment Utilization - average annual percentage of equipment hours directly related to the department's core activities.

3. Estimated Spare Capacity:
Labor - average annual percentage of labor hours spent on the department's irrelevant activities.
Equipment - (100 percent - equipment utilization)

4. Totals for labor are averages weighted by head count of each department.
Totals for equipment are averages of the listed departments.

Source: Management interviews.

Appendix B

Costs by Activities and Departments

B.1 COST BY ACTIVITIES AND DEPARTMENTS

Table B-1 presents a cost analysis of Rybnik plant's departments grouped by activities. Employment and annual wages are listed for each department. Subtotal amounts are shown for each activity. Departments have been grouped into the following activities: in-bound logistics, production, out-bound logistics, production support, maintenance, administration, social activities, and warehousing.

Table B-1
Cost Analysis of all Departments Grouped by Activities

Activities : Departments	Headcount	% of total Headcount	Wages	% of total wages
IN-BOUND				
Rail Road (60%)	76	4.79	4,208	4.81
Carbonization	117	7.36	6,329	7.24
Sub-Total	**193**	**12.15**	**10,537**	**12.05**
PRODUCTION:				
Chief Operations Engineer	2	0.12	232	0.27
Operation Engineers	6	0.38	695	0.79
Energy Blocks Operations	216	13.58	12,653	14.47
Hydro-Sewage	38	2.39	2,283	2.61
Electrical Operations	54	3.36	3,646	4.17
Sub-Total	**316**	**19.83**	**19,509**	**22.31**
OUT-BOUND				
Rail Road (15%)	19	1.20	1,052	1.20
Slag Removal	90	5.66	4,560	5.22
Sub-Total	**109**	**6.86**	**5,612**	**6.42**
PRODUCTION				
Chief Utilization Control	1	0.06	198	0.23
Chief Energy Engineer	12	0.75	792	0.91
Environmental Protection Services	2	0.12	147	0.17
Fire Department	7	0.44	402	0.46
Chemical Analysis	26	1.63	1,142	1.31
Dispatch Department	25	1.58	1,612	1.84
Automatization & Measures	48	3.02	2,747	3.14
Security & Electrical Measures	34	2.14	1,837	2.10
Telecommunication	24	1.50	980	1.12
Sub-Total	**179**	**11.24**	**9,857**	**11.27**
MAINTENANCE				
Maintenance of Boilers	58	3.65	3,276	3.75
Maintenance of Turbines	48	3.02	2,992	3.42
Maintenance of Auxiliary Machinery	35	2.20	2,665	3.05
Maint. of Gantries/Compress.. & Oil	25	1.57	1,963	2.25
Mechanical Workshops	77	4.84	4,482	5.13
Electrical Maintenance	79	5.03	3,927	4.49
Rail Road (25%)	32	2.00	1,754	2.01
Sub-Total	**354**	**22.31**	**21,059**	**24.09**

Table B-1 (Continued)

Activities : Departments	Headcount	% of total Headcount	Wages	% of total wages
ADMINISTRATION				
General Director	1	0.06	397	0.45
Chief Accountant	1	0.06	228	0.26
Chief Engineer	1	0.06	328	0.38
Vice-Director for R&D	1	0.06	197	0.23
Management Organization	15	0.94	702	0.80
Legal Advise	1	0.06	49	0.06
Business Analysis	2	0.12	151	0.17
Safety	2	0.12	233	0.27
Defence	1	0.06	51	0.06
Security	17	1.07	847	0.97
Personnel	5	0.31	929	1.06
Cleaning	79	4.97	2,123	2.43
Accounting	12	0.75	589	0.67
Finance	8	0.50	441	0.50
Recruitment, Wages & Social Insur.	10	0.63	475	0.54
Internal Auditor	vacant			0.00
Research & Development	4	0.25	353	0.40
Investment Planing	4	0.25	188	0.22
Control Supervisors	5	0.31	455	0.52
Maintenance Training Centre	20	1.26	875	1.00
Maintenance Planning	24	1.51	1,402	1.60
Water Reservoir Maintenance	37	2.32	1,617	1.85
Sub-Total	**250**	**15.67**	**12,630**	**14.45**
SOCIAL				
Training & Leisure Centre	17	1.07	701	0.80
Water Sports Centre	8	0.50	685	0.78
Sub-Total	**25**	**1.57**	**1,386**	**1.59**
WAREHOUSING				
Procurement	17	1.07	1,011	1.16
Warehousing	31	1.95	1,275	1.46
Auto-Transportation	54	3.40	2,737	3.13
Sub-Total	**102**	**6.42**	**5,023**	**5.75**
Total combined full-time	**1528**	**96.04**	**85,613**	**97.92**
Other (*)	61	3.96		
Other (**)			1,816	2.08
Total number of employees	**1589**	**100**	**87429**	**100**

Notes:

1. All wage figures are given in million Zl for 1992.

(*) Difference due to combining of part-time employees.

(**) Item includes "General Director Fund" and "Bonus Fund."

Source: Information questionnaires and management interviews.

Appendix C

Example of Interview Summary: Rail Road Department

C.1 EXAMPLE OF INTERVIEW SUMMARY: RAIL ROAD DEPARTMENT

Tables and charts included in this report were built from the information extracted from interviews, questionnaires, and accounting records, as well as through joint analysis of each department by Arthur Andersen and Rybnik plant management. Below is an example of information gathered on one of the departments - the Rail Road Department.

General Activities: Supply of fuel (coal) and other materials for the power plant and indirectly for operation of the Energy Blocks Department. Transportation of slag and other waste materials accumulated as a result of energy production. On the average, the department ships (transportation in and out) 6 to 8 million tons annually.

Fixed Assets: 39.2 kilometres of rail track, four rail stations, seven locomotives, four strippers and other auxiliary machinery. In 1991, the fixed assets were valued at 100 billion Zl. Today, it is estimated to be about 250 billion Z1. Equipment utilization = 60 percent.

Employment and Wages: The department's 127 employees represent about 8 percent of total employment of the power plant. Its salary and wages of 7,014 million Z1 represent 8.02 percent of total power plant wages for 1992. At present, management considers that there is a possibility of downsizing the department by 50 employees. This could be achieved through the modernization of unloading machinery. This information was revealed during the next interview with the Chief Power Plant Engineer. However, due to a very conservative downsizing policy, such a reduction is not likely to be considered in the near future. Labor utilization: productive = 60 percent, non-productive = 15 percent, idle = 25 percent.

Strategic Importance: The department is regarded as strategically important to the smooth and continuous operations of energy blocks. Therefore, it is neither considered for separation from the plant nor transformation into a satellite company. This view was confirmed during further interviews with the Chief Power Plant Engineer, the Chief Engineer of Energy Blocks Operations, and the Chief Engineer of Utilization Control Department. The strategic importance of the Rail Road Department can be viewed from two aspects. In the short run (1 day), the department's strategic importance is low due to the accumulated supplies of coal. However, in the event of a shortage of coal, the department becomes very important strategically as it becomes critical to ensuring a steady supply of coal for electricity generation and the removal of waste. There is a general consensus among the power plant's management that this department should not be separated.

Alternative Providers: PKP (Polish State Rail Road Company) and two other alternative firms that currently exist on the market cannot guarantee a safe and steady supply of coal. There is a strong belief that any transportation solutions which rely on external services would have a negative impact on the smooth operations of the energy blocks. In short, the director of the department believes that today there is no company that would be a good alternative provider of

coal for the energy blocks. Due to seasonal and fluctuating demand levels for coal, the power plant requires a very dependable and flexible service which, he believes, can only be provided by its own Rail Road Department. It is also believed that the plant's operations have very specific needs which cannot be properly met by other providers and especially by such a complex organization as PKP. The plant's own Rail Road Department is considered by management to be in a much better position to assess the plant's needs and to organize the transportation of coal. As a result, employees of the department have very close contacts with coal mines which are also essential to the steady supply of coal.

Privatization Approaches: In 1989, the power plant tried to privatize the department and to transform it into an employee-owned affiliated company. This was not successful. This was primarily because employees did not want to be positioned "outside" the power plant. Employees of the department continue to resist any such changes. The high fixed assets of this department could also present a problem in efforts to privatize, especially if such privatization was to be by employee purchase. Two service areas within the department have been successfully transformed into employee-owned affiliated companies These include the Rails Maintenance Company and Wagons Maintenance Company. The transformation of these areas was possible as they do not directly affect the supply of coal and hence are considered to be not very strategically important. Currently, both companies render services for both the power plant and external clients.

Section 6

Procurement Functions

6.1 INTRODUCTION

The development of an appropriate organization structure for the Rybnik power plant which ensures efficient operations should take the company's procurement strategy into consideration. Such a strategy requires a clear understanding of the nature of the plant's purchases as well as the supply markets in which it operates. It also requires sound organization of the procurement function to facilitate implementation.

Materials management is among the most important operational functions because inventory requires a great deal of capital and affects the production process. Materials management has an impact on all business functions. In the case of power plants, the functions which are particularly affected are operations, maintenance, and finance. Finance is concerned with the overall financial picture of the plant, including funds allocated to inventory. Operations and maintenance need inventories to ensure smooth and efficient production.

In general, however, these organizations have conflicting inventory objectives. The finance function generally prefers to keep the level of inventories low to conserve capital, while operations and maintenance prefers higher inventories for efficient and smooth production. Materials management must balance these conflicting objectives and manage inventory levels in the best interest of the plant as a whole.

During the analysis of the plant's organizational structure, a preliminary assessment of the procurement function was made. The aim was to provide an independent opinion on its efficiency and to identify areas where potential savings can be made. At this stage, there was not enough work done to form detailed organizational recommendations.

Rybnik plant employees were interviewed in the process of this analysis. In addition, the project team collected some available data in order to conduct a preliminary analysis of inventory management. The brief analysis considered only the stock accounted for by the Procurement Department. It is important to note that further analysis should also be done for capital stock. This, however, would require significant work due to the current accounting procedures for capital investment.

Based on the information acquired, in addition to Arthur Andersen & Company's experience in this area, it is evident that there are areas related to materials management where significant savings may be available. Key areas for attention include:

- The general policy and methodology for inventory management.
- Investment planning with regard to the timing and scheduling of materials acquisition for investment projects

- Management of "strategic reserves" and obsolete stock
- The procurement policy as it relates to subsidiary companies

In conducting the preliminary review, the project team observed that there is general consensus among the employees of both the Procurement and Warehousing departments that there are savings feasible at Rybnik by improving its materials management practices. In most cases, personnel have recognized existing problems and possible improvements which could be made.

As a result of an independent review, the ideas presented by the plant personnel interviewed could be broadly supported. A systematic and integrated approach to improving materials management could result in significant savings outlined in the next section of this paper. This could be attractive for Rybnik for two major reasons:

- No significant, additional capital investment would be required to realize savings.
- Existing problems and the potential for savings are generally recognized by employees and should therefore be readily implemented.

The quality of inventory management and the inventory policies set by management can have a significant impact on the plant's profitability and management's ability to implement least total cost logistics. Inventory represents a significant portion of the plant's assets. Consequently, excessive inventory levels can lower the plant's profitability in two ways.

First, net profit is reduced by out-of-pocket costs associated with holding company inventory, such as insurance, storage, obsolescence, damage, and interest expense if the plant were to borrow money specifically to finance inventories.

Second, total assets are increased by the amount of inventory investment, which thus decreases asset turnover. The result is the reduction in return on assets and return on net worth.

6.2 KEY OBSERVATIONS

In the course of our brief analysis, the following key observations were made:

- There is a potential one-time saving of approximately 24,209 million Zl which could result from the reduction of excessive stock.
- The potential saving of 24,209 million Zl represents approximately 35 percent of the total annual average stock value and is therefore significant enough to warrant attention.
- A working capital increase of up to 7,505 million Zl annually is possible by investing savings from stock reductions on 90-day deposits at a 31 percent interest rate readily available at Polish banks.

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- Alternatively, an increase in working capital of up to 9,563 million Zl annually is possible by utilizing short-term credits at a 39.5 percent interest rate also readily available on the domestic financial market.
- Nearly 96 percent of stock items account for only 21 percent of total stock value. These stock items increase complexity of materials management in the plant and thus the cost. Rationalization and standardization of these are only two of many options which may yield benefits to the plant.

The above points and other observations are further discussed in the following section.

6.3 AN APPROACH TO MATERIALS MANAGEMENT

There are several significant issues which should be considered in establishing an efficient procurement function.

Understanding the Nature of Purchases

As shown in Figure 6-1, purchases can be categorized by supply risk and strategic importance. Supply risk measures the uncertainty of supply based on availability, ability to use substitute product or service providers, storage risk, etc. Strategic importance is a measure of the purchase's potential impact on revenue and profit, and, in general, on the overall power plant's performance.

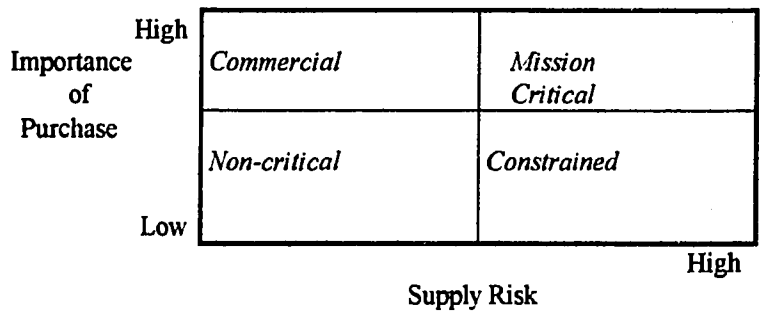

Figure 6-1
Purchase Categorization

The combination of these two factors allows the categorization of purchased goods and services into four groups:

- Mission critical:

  The unavailabilityof some suppliers or critical parts could have major impact on production (i.e., electricity generation); in power plants, these could be turbines and

parts of boilers which are produced only by one supplier (e.g., some turbine parts produced by ABB; repair services performed by some subsidiary companies).

- Commercial:

  Purchase is critical to the electricity generation (e.g., oil for turbines, etc.). There are many suppliers.

- Constrained:

  There may be undercapacity in the supply industry but this is not critical for electricity generation (e.g., some specific steel work fabricators). There are only a few suppliers.

- Non-critical:

  Items not critical to business (e.g., stationery). There are numerous suppliers.

Each group requires its own procurement strategy. For example, "constrained" purchases may require a strategy which ensures that alternative providers are maintained offshore. By contrast, for "mission critical" purchases, the key factor is developing and maintaining an understanding of the various supply markets and the development of long-term relationships with suppliers.

Understanding the Nature of Supply Markets

Understanding the nature of supply markets and the strength of the Rybnik power plant as a buyer in these markets allow the development of an appropriate procurement strategy. The following framework, shown in Figure 6-2, illustrates some of the generic strategies which can be considered.

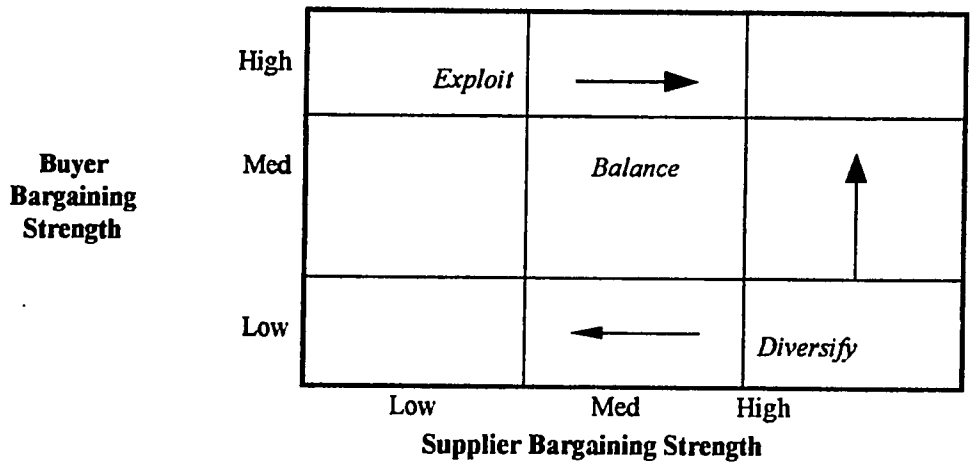

Figure 6-2
Generic Procurement Strategies

The specific strategy adopted for each product or service group must combine an understanding of both the nature of the product or service being purchased as well as the nature of the supply market.

Understanding the Levels of Information and Skills Required to Develop and Implement Successful Strategies

The levels of information and range of skills required to develop and implement successful procurement strategies vary according to the purchase category, as previously outlined in Section 6.3. For example, with "mission critical" purchases, the power plant needs to understand the suppliers' industry in detail. This requires skilled market analysis and detailed competitive data, including long-term supply and demand trends, supply industry cost structures, capacity utilization data, etc. The plant must also have skills in demand forecasting, risk management, logistics, and materials management. It is only with an investment in developing these skills that the power plant will achieve competitive advantage in procurement.

One way of looking at the market context of purchases and framing market analysis for strategic purchases is to use an industry framework. Figure 6-3 outlines a framework in which supplier market analysis can be performed and represents a model of the forces which impact the supplier market.

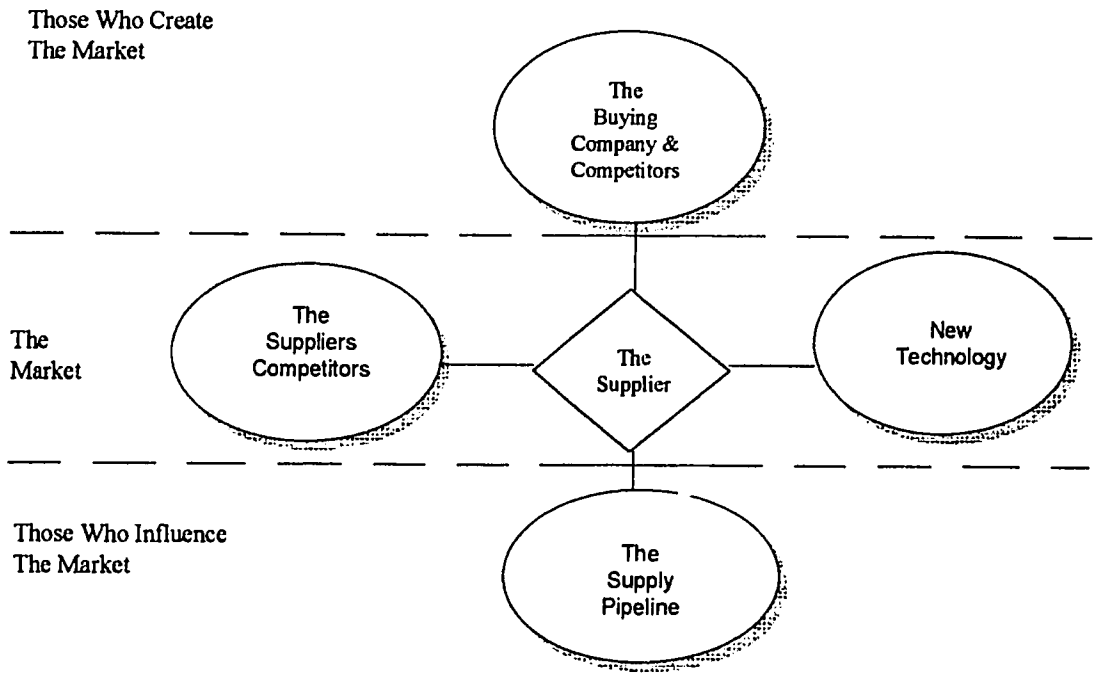

Figure 6-3
Supplier Market Analysis Framework

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By comparison to "mission critical" purchases, the information and skills required to manage "non-critical" purchases are significantly less. Thus, the use of such a comprehensive framework may not be required for this category. Primary in-house skills for non-critical purchases are those of short-term demand forecasting and inventory management. Only a broad overview understanding of the supply market is typically required.

The skills and information required by the power plant will depend largely on the proportion of purchases falling within each category. The question, therefore, becomes what skills should be attached to each level of procurement function, how should these interlink, and what support should be provided?

Recognizing the Level at Which Decisions Should Be Made and Adjusting it to Each Category

Given the diversity of purchases in a power plant, it is unlikely that a decentralized operation, such as a holding company, could justify having a comprehensive set of skills and support at each location. The authority associated with decisions on "mission critical" purchases typically rests with senior procurement personnel supported by strong industry analysis skills. Decisions at this level frequently relate to long-term, major investments, whereas decisions regarding the purchase of non-critical items can efficiently be handled at a lower level as long as appropriate controls are in place. Typical controls would include expenditure/approval delegations; automatic re-order/stop points; etc. In developing the detailed structure for the procurement function, it will be necessary to consider the levels of skills and controls required at each level of the business to ensure effective and efficient procurement. For example, although it may be sensible to manage procurement of critical items and complex purchases (e.g., combinations of goods and services) on a centralized basis, non-critical purchases may be effectively managed on a decentralized basis, where regional warehouses may draw against a centrally negotiated long-term supply contract with selected vendors.

Developing Appropriate Organizational Groupings and Clearly Defining Their Responsibilities

The distribution or concentration of skills and decision-making in the procurement function will be largely driven by the proportion of purchases falling into each category and the nature of the supply markets involved. The level of regionalization of supply industries may require strong procurement skills to be located in each region in the event of a holding company being formed. Alternatively, there may be little variation across regions in which the holding company operates enabling economies to be gained through use of a single set of skills for strategic purchases.

6.4 PRELIMINARY ANALYSIS OF OPPORTUNITIES FOR INVENTORY SAVINGS

Inventory Management

Based on the information available, the project team has estimated the total annual stock value listed in the procurement department. The accounts show over 24,000 items of which 12,398 have a positive balance. These items represent an average annual stock value of 86,387 million Zl (see Appendix A). It is important to note that only 469 items, which is 4 percent of total items, account for 68,425 million Zl or 79 percent of stock value (Table 6-1). Hence, the remaining 96 percent of stock items represent only 21 percent of stock value. This indicates opportunities for rationalization and/or standardization of stock items. Carrying such an extensive number of items with relatively small values and low usage increases the complexity of the stock management process. Selected examples of improvements are discussed in Appendix B.

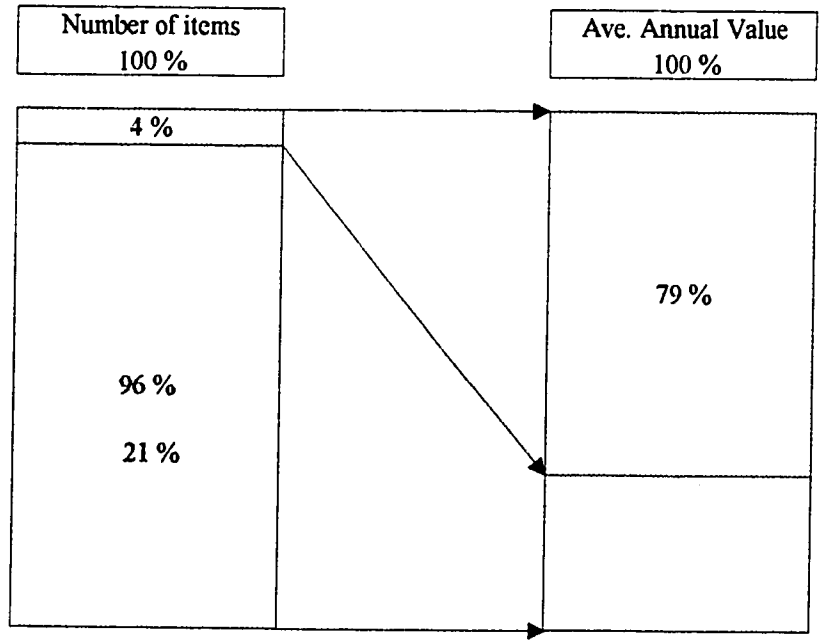
There are a number of approaches available to Rybnik to reduce the inventory which would then result in a reduction in the complexity and volume of stock items to be managed. For the plant, this would mean lower costs of holding company inventory, a reduction in the cost of administration, and space savings, as well as a reduction in costs of machinery and equipment needed for effective stock management.

Effective methods for the Rybnik plant could include:

- Shifting the storage costs to external suppliers by signing long-term supply contracts which could shorten the order lead time.
- Rationalization of stock items by eliminating redundant stock items or low usage, non-critical stock items.
- Standardization of stock items by focusing on opportunities to reduce the number of variants within stock groups.

The project team has also identified an area with high potential for savings within the general management policy regarding the order volume and frequency of purchase of goods. As stated previously, 469 stock items were identified which represent 79 percent of the total average annual stock volume. After comparing the average annual stock value in days of usage with the maximum lead time for each item, it was concluded that many stock items are stocked in excessive amounts.

Table 6-1
Relation Between Number of Stock Items and their Value



Number of listed items (in units)	% of tot.	Average Annual Value (in million Zl)	% of tot.
12.398	100%	86,387	100%
11.929	96%	17,962	21%
469	4%	68,425	79%

The potential one-time saving resulting from the reduction of apparent excess stock could amount to approximately 24,209 million Zl, which represents 35 percent of the total annual average stock value (see Figure 6-4). Clearly, a reduction in stock decreases the costs of carrying inventory. This, in turn, results in increased working capital available for management. Assuming an average interest rate on 90-day deposits is 31 percent*, the potential saving would amount to 7,505 million Zl annually. Alternatively, assuming the average annual interest rate on short-term credits is 39.5 percent,** the potential savings would amount to 9,563 million Zl annually.

Source: * Telephone interviews with major Polish banks
** Questionaires

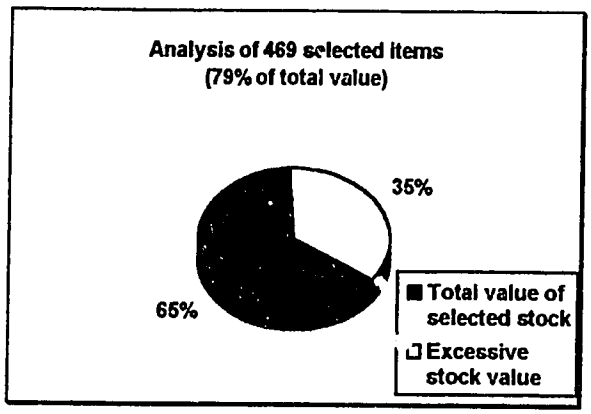


Figure 6-4
Stock Values

Investment Planning

A second area where savings may exist is in the cost of storage of the capital inventory used for investment projects. During discussions with the plant's employees and during plant tours, the project team noted that a large part of the storage cost is caused by materials purchased for future investment projects. There appears to be a lack of coordination between the purchase time and the actual usage time for particular items. In other words, the money for a capital item is spent well in advance and the product delivered a long time before it is actually used. This practice may be a residue of defensive tactics during the previous regimes. This condition offers an opportunity for working capital savings which could be achieved through a systematic review and updating of investment procedures focusing on investment planning, project management, and the scheduling of capital expenditures.

Strategic Reserves

During an interview with the Manager of the Warehousing Department, it was stated that the plant has undertaken an initiative to eliminate obsolete stock and review the stock being carried as "strategic reserves." The idea of reviewing and redefining the "strategic reserve stock" is a step in the right direction. Technological development as well as fundamental changes in supply markets appear to have made a large part of this stock obsolete or excess. Such a process should be based on a sensible analysis involving employees of both the Procurement and Warehousing departments, as well as the specialists from each department responsible for the particular stock item.

To reduce the amount of "strategic reserves," the plant should also take into consideration the possibility of joint stock sharing. This practice is commonly used in Western countries. Through negotiations with other users of the same stock which are located in the region, the companies set up a joint strategic reserve site and share the cost of carrying inventory.

The current process of cost accounting in relation to the warehousing policy allows for the existence of departmental warehouses where the inventory is not listed for accounting purposes (i.e., it is currently expensed when drawn from the main warehouse, although it may not in fact be used). This situation does not provide a realistic view of the plant cost structure to be seen by management at any point in time. According to management, the current limited control over this stock results in significant stock excesses or obsolescence which is not accounted for.

All obsolete and excess stock existing in the plant (or recognized in the "strategic reserves" redefinition process) should be sold as soon as possible for the best realizable price since this will return cash which could be better utilized elsewhere. Procedures to release the capital "frozen" by this inventory could include:

- Sale on a consignment basis
- Sale by auction
- Sale by public tender, etc.

Satellite Companies

Another important area with potential for savings is the relationship of the plant with its "satellite" companies (subsidiaries) in terms of procurement. The need to assist the newly created satellite companies in the initial period of their existence is acknowledged, but it is recognized that formalization of the relationship with regard to the procurement policy would give the plant's management a better basis for assessment of the effectiveness of the newly established companies. At the same time, this could provide the plant with more control over the costs of transition, and hence would provide a better view of savings opportunities.

Conclusions

Inventory management is an important activity because capital invested in inventories must compete with other investment opportunities available to the plant, and because of the out-of-pocket costs associated with holding company inventory. Management must control and have knowledge of inventory carrying costs in order to make informed decisions about logistics system design, transportation modes, inventory levels, maintenance planning, and the production process. For example, ordering in smaller quantities on a more frequent basis will reduce inventory investment but will typically result in higher ordering costs and increased transportation costs. Clearly, it is necessary to compare the savings in inventory carrying costs to the increased costs of ordering and transportation to determine how the decisions to order in smaller quantities will affect the profitability of the plant.

Although the preceding analysis is only of preliminary nature, the results presented in the previous sections were qualitatively confirmed by the employees involved in the Procurement and Warehousing departments. Moreover, top and middle management appears to be aware of the

general problem and of the significant savings which could result from improvements in procurement practices and materials management.

Strong coordination, or ultimately, integration of the procurement and warehousing functions may be necessary from an organizational point of view. More detailed analysis would be required to confirm this and to identify further materials management opportunities.

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Appendix A

Listing of Top 80 Percent (of Value) of Stock Items

	Stock item name	Unit of measure	Average annual stock		Supply lead time	Ave. annual stock in days of usage	Optimal average annual stock value	Potential one time saving	Potential holding cost saving
			PLZ m	Unit	Days	Days	PLZ m	PLZ m	PLZ m
			Value	Volume	Max.	Total usage			@ 31%
1	OP-650 ELEMENTY W/G ZLEC.13-0837,13-0838 PRZEGRZ.PARY SW.V ST.	kg	2,825	32,682	14	220	234	2,591	803
2	TRANSFORMATOR TWORCA 25 MVA 6,3 KV 25000/220 PN	set	2,084	1	90	no usage	2,084	N/A	N/A
3	OP-650 KULA FI.750 RYS.4-M33-131 MLYN MKM-33	unit	1,621	90	14	409	72	1,549	480
4	OP-650 PIERSCIEN MIAZDZACY RYS.R2-022-789/2-M33-320 MLYN MKM-33	unit	1,382	10	14	543	46	1,336	414
5	OP-650 ELEMENTY ELEKTR.ULOT.9600 X 4260 RYS.HE-7-111 ELEKTROF.	kg	1,353	38,678	14	35,293	1	1,352	419
6	GENERATOR TWW-200-2 ODKUWKA KOLPAKA	unit	1,236	1	90	271	534	702	218
7	OP-650 KOMORA MLYNA MLYN MKM-33	unit	1,121	7	14	no usage	1,121	N/A	N/A
8	GENERATOR TWW-200-2 STOJAN	set	1,058	1	90	no usage	1,058	N/A	N/A
9	SZCZOTKA WEGLOWA VE-50 25 X 32 X 60	unit	815	2,501	90	899	106	709	220
10	OP-650 ELEMENTY W/G ZLEC.13-132/I P.1-15 PRZEGRZ.PARY SW.II ST.	kg	808	11,422	14	81	182	626	194
11	OP-650 PIERSCIEN DOCISKOWY RYS.R1-022-205A/1-H33-2343 MLYN MKM-33	unit	722	10	14	632	21	702	218
12	NAPED M-77375-51411-A201 HYDRAUL.Z ZASOB.DO POMP ZASIL.	unit	719	3	180	no usage	719	N/A	N/A
13	OP-650 ELEMENT KOTLA WG.15-0124,15-0125 PRZEGRZ.PARY WT.II ST.5	kg	713	7,616	14	1,834	7	706	219
14	RURA STALOWA 51 X 4 MM GAT.10H2M KOTLOWA B-III	m	711	7,862	270	3,560	70	641	199
15	OLEJ TRANSFORMATOROWY NOWY Z RAFINERII	kg	629	36,118	30	268	82	537	167
16	ZASUWA FI 250 ZSW-81/121.680.01 /A-1-Z /PT-140 TP-545 Z PRZEKL.RYS.152.004.01 KONC.X	unit	627	4	270	no usage	627	N/A	N/A
17	TURB.TK-200 LOPATKA Z PLYT.STEL. RYS.7225598,2147099 WIRNIK NP	set	543	52	360	175	1,450	-907	-281
18	OP-650 PRZEWOD GLOWNY KPL. RYS.IIR3-023-802/3-1240676 PALNIK PYL.	unit	540	145	14	5,295	2	538	167
19	OP-650 DRAG STRZEPUJACY RYS.HE-5-1074 ELEKTROF.	unit	530	551	14	940	10	520	161
20	WELNA MINERALNA - MATA GR.50/4M, 50/5M, 70/3M IMPORT DANIA	m2	522	4,762	30	396	51	471	146
21	GENERATOR TWW-215-2 PRET UZWOJENIA STOJANA RYS.WG1-121036-1	set	517	24	90	no usage	517	N/A	N/A
22	OP-650 REKAW ZALADOWCZY A-4500 RYS.860.030.1.4.18 ZBIOR.RET.POP.	set	498	20	14	no usage	498	N/A	N/A
23	ZAWOR FIG. 674B FI 50 PT-545 TP-144 REGUL.Z NAP.BP 16-ZW-8-S-380 RYS.111.547.17	unit	489	12	270	744	231	259	80
24	OP-650 KOLO LANCUCHOWE I RYS.IIR2-040-420/2-1242618 ODZUZ.OZZ 4080	unit	484	59	14	3,587	2	482	149
25	OP-650 ZESPOL SPREZYN RYS.R1-022-450/1-M33-358 D MLYN MKM-33	unit	479	74	14	1,228	7	472	146
26	OP-650 KOLO ZEB.STOZK. RYS.3239147 PRZEKL.370 KW	unit	477	5	14	870	10	467	145
27	OP-650 KOLANO R-1000 BEZ WKLADKI RYS.R2-023-257/2-1231165 PYLOPRZEWODY	unit	476	19	14	1,368	6	470	146
28	OLEJ TURBINOWY TU-32	kg	471	47,283	30	101	182	289	89
29	RURA STALOWA 133 X 10 MM GAT.R35 PRZEWODOWA B	m	468	2,557	270	no usage	468	N/A	N/A
30	POMPA HD 150 X 5 WIRNIK RYS.40858 A	unit	467	51	180	no usage	467	N/A	N/A
31	OP-650 KOSZE GRZEWCZE TYP.LUVO BD 24/1700 W/G EW-20-203 OBR.PODGRZ.POW	kg	452	46,286	14	no usage	452	N/A	N/A
32	PRZEWOD NICRNI 2 X 1,5 MM2 KOMPENSACYJNY	m	447	4,281	90	185	268	179	56
33	POMPA 15 Z 33 X 8 WAL RYS.45610 MAT.2H13	unit	446	10	180	no usage	446	N/A	N/A

34	NADAJNIK PRL RYS.1020-10-2-6	unit	441	40	180	7,297	14	427	132
35	POMPA HD 150 X 8 WAL RYS.32203	unit	439	11	180	no usage	439	N/A	N/A
36	PRZEKLADNIA 502 BRR/600 II L BEZ SILNIKA	set	435	8	360	410	496	-61	-19
37	OP-650 KOLANO RYS.2-1231276 PALNIK PYL.	unit	431	71	14	2,884	3	428	133
38	KULKA GUMOWA FI 30 POLERUJACA	unit	423	99,000	180	no usage	423	N/A	N/A
39	POMPA 15 Z 33 X 8 KIEROWNICA RYS.40854	unit	419	35	180	no usage	419	N/A	N/A
40	OP-650 WODZIK FI.120 RYS.R4-024-2185 MLYN MKM-33	unit	415	175	14	no usage	415	N/A	N/A
41	OP-650 KOSZE GRZEWCZE BD 24/1200-1500 W/G ZLEC.20-008 OBR.PODGRZ.POW	kg	410	28,380	14	159	47	363	113
42	ZASUWA FIG.451.064.01 CZ.ZAM.KOLUMNA Z NAP.KD.160.ZS.OOS.380	unit	368	6	270	no usage	368	N/A	N/A
43	GENERATOR TWW-200-2 ODKUWKA KLAPY WIRNIKA	unit	363	1	90	no usage	363	N/A	N/A
44	POMPA 15 Z 33 X 8 WIRNIK RYS.40858	unit	356	42	180	no usage	356	N/A	N/A
45	TRANSFORMATOR TB-TW 240000/220 CHLODNICA 300 KW OLEJ.-POW.WYK.A.R.EK 11690000	unit	352	5	90	no usage	352	N/A	N/A
46	OP-650 MLOTEK RYS.T-101-04-02-1 ELEKTROF.	unit	351	1,547	14	671	10	342	106
47	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 1400 U21-73	unit	334	896	360	10,232	8	326	101
48	ZAWOR FIG. 449 FI 100 PT-140 T-545 Z NAP.EL.BP-40-ZW-12-8-380 KON.VIII	unit	325	4	270	no usage	325	N/A	N/A
49	ZAWOR SIZ 2507 URZADZENIE STERUJACE Z DYSZA 1,2-162 RYS.415.040.01	unit	307	3	270	no usage	307	N/A	N/A
50	OP-650 ZAWIROWYWACZ FI 480 RYS.1-1240564 PALNIK PYL.	unit	293	228	14	1,319	4	289	89
51	TURB.TK-200 UKLAD RUROWY KPL. RYS.301.000 CHLODNICA OL.F35	unit	289	5	360	497	272	17	5
52	ZASUWA FI 100 ZSW-81/121.672.01 /A-1-Z/ PR-162 TR-545 Z GLOWICA 152	unit	286	4	270	no usage	286	N/A	N/A
53	PLYTA KOMORKOWA 5 MM 980 X 5000 MM PLEKSIGLAS	unit	283	142	180	448	148	135	42
54	OP-650 WAL UZEB.STOZ. RYS.1163015 PRZEKL.370 KW	unit	282	9	14	1,600	3	278	86
55	POMPA HD 150 X 8 WIRNIK OST.ST. RYS.36646 T-23-1274 LH-14	unit	270	35	180	no usage	270	N/A	N/A
56	RURA STALOWA 57 X 6,3 MM GAT.16M KOTLOWA B-III	m	259	1,068	270	907	100	159	49
57	OP-650 ZWEZKA RYS.2-1240674 WYK.B PALNIK PYL.	unit	254	62	14	1,738	3	252	78
58	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 465	unit	253	915	360	1,057	112	141	44
59	RURA STALOWA 51 X 4 MM GAT.15HM KOTLOWA B-III	m	252	3,243	270	1,777	50	202	63
60	WENTYLATOR WPM-97/2 WIRNIK	unit	247	4	14	no usage	247	N/A	N/A
61	PRZENOSNIK TASMOWY KPT-KRAZNIK STALOWY 159 X 465	unit	243	1,598	360	no usage	243	N/A	N/A
62	ZAWOR SIZ 2507 URZADZENIE STERUJACE Z DYSZA 1,2 I 3-31 RYS.415.040.02	unit	238	2	270	no usage	238	N/A	N/A
63	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 670	unit	234	800	360	no usage	234	N/A	N/A
64	ELEMENT TERMOIZOLACJI-LISTWA IZOL.GR.IZOL.200	m	227	1,484	30	5,417	2	225	70
65	ZAWOR SIZ 2507 FI 100/200/63 BEZPIECZENSTWA RYS.101.501.212	unit	226	4	270	no usage	226	N/A	N/A
66	POMPA HD 150 X 8 DLAWICA M-15182 RYS.32166 MAT.LH14	unit	226	12	180	no usage	226	N/A	N/A
67	OLEJ TURBINOWY TU-32 REGENEROWANY	kg	224	52,339	30	79	110	113	35
68	POMPA 180 D 40-6 OSLONA WIRNIKA RYS.43825	unit	223	4	180	no usage	223	N/A	N/A
69	WENTYLATOR WPM-95/2 WAL FI 220 X 302 RYS.R1-027-23	unit	223	6	14	no usage	223	N/A	N/A
70	OP-650 WYKLADZINA ODLEW RYS.R4-022-1516 W.B PYLOPRZEWODY	unit	219	101	14	6,149	1	219	68
71	PRZENOSNIK TASMOWY KPT-KRAZNIK STALOWY 133 X 465	unit	216	3,594	360	7,412	14	202	63
72	OP-650 PODWOJNY WOR.ZSYP.FI 300/600 L-4190 RYS.13.860.030.01.1.9A ZBIOR.RET.POP	unit	215	8	14	1,002	4	211	66
73	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 465	unit	212	884	360	no usage	212	N/A	N/A
74	POMPA HD 150 X 8 WKLAD RUR.CHLODN.OLEJ.F12 RYS.R2-015-1130	unit	211	6	180	708	70	141	44
75	SPRZEGLO SRUTOWE S-50 15-45-0	unit	208	11	360	no usage	208	N/A	N/A
76	ZAWOR FIG. 674B FI 25 PT- 15,2 TP-545 REGUL.Z NAP.BP4-ZW-45-380 RYS.111.546.17 KO	unit	207	12	270	405	180	28	9

77	ELEMENT TERMOIZOLACJI-LISTWA IZOL.GR.IZOL.120	m	206	1,363	30	24,869	0	206	64
78	WENTYLATOR WOR-1700/1000 UKLAD WIRUJACY Z KOLEM TRAS.	unit	194	4	14	no usage	194	N/A	N/A
79	TERMOELEMENT NICRNI 257 2E D4X8	unit	190	100	180	3,650	12	177	55
80	OP-650 GLOWICA POMPY RYS.P-02-07-2/B STACJA WYSYL.POP.	unit	189	8	14	no usage	189	N/A	N/A
81	TURB.TK-200 TULEJA RYS.4154803 KADLUB WP	unit	189	12	360	no usage	189	N/A	N/A
82	POMPA 15 Z 33 X 8 TARCZA ODCIAZAJACA RYS.W40197	unit	186	24	180	8,926	5	181	56
83	PRZETWORNICA TPC-6,5 KVA	unit	186	10	90	1,907	11	174	54
84	RURA STALOWA 133 X 8,8 MM GAT.R35 PRZEWODOWA B	m	184	1,128	270	2,090	31	153	47
85	RURA STALOWA 44,5 X 4 MM GAT.10H2M KOTLOWA B-III	m	183	4,426	270	3,902	16	187	52
86	TURB.TK-200 DYFUZOR RYS.3597632 ZAWOR ODCIN.DN.325	unit	181	2	360	154	550	-369	-114
87	ZAWOR FIG.20521A FI 80/80 PN- 32 MPA REGUL.Z KONC.DO SPAW.	unit	180	12	270	no usage	180	N/A	N/A
88	OP-650 WLAZ DO LEJI RYS.181-09/A ELEKTROF.	unit	180	115	14	no usage	180	N/A	N/A
89	OP-650 ROLKA RYS.R2-040-881 ODZUZ.OZZ 4080	unit	179	53	14	no usage	179	N/A	N/A
90	OP-650 SEGMENT DYSZOWY/PIERSC.PRZELOT./12 SZT.=1 KPL/ MLYN MKM-33	unit	178	104	14	526	6	172	53
91	PLYTKA PODLOGOWA LASTRYKO W/YM.30 X 30	m2	176	991	30	714	10	167	52
92	TURB.TK-200 UKLAD RUROWY CHLODNICY F-15 RYS.R2-018-1376 CHLODNICA OL.	set	176	4	360	no usage	176	N/A	N/A
93	OP-650 ELEMENTY MODERN.KOMORY RYS.HE-3/223-240 ELEKTROF.	kg	174	16,512	14	262	12	162	50
94	POMPA 180 D 40-6 PANEWKA LOZYSKA RYS.44084	unit	174	12	180	2,178	19	155	48
95	POMPA 180 D 40-6 PLYTKA SLIZGOWA RYS.44083	unit	172	100	180	no usage	172	N/A	N/A
96	OP-650 SWORZEN FI 120 X 355 RYS.R4-022-35/0M33-051 B MLYN MKM-33	unit	170	141	14	no usage	170	N/A	N/A
97	SZCZOTKA WEGLOWA VE-50 30 X 22 X 60	unit	168	2,315	90	no usage	168	N/A	N/A
98	OP-650 PIERSCIEN DOCISKOWY RYS.R1-022-205A/1-H33-2343 MLYN MKM-33	unit	168	4	14	no usage	168	N/A	N/A
99	RURA STALOWA 57 X 6,3 MM GAT.K18 KOTLOWA B-III ATEST	m	164	641	270	260	221	-57	-18
100	OP-650 NAKLADKA SLIZGOWA RYS.T-101-01-12/T-101-11-12 ELEKTROF.	unit	162	661	14	no usage	162	N/A	N/A
101	OP-650 KOLANO 90 ST. RYS.R2-022-363/2-1231290 PYLOPRZEWODY	unit	161	9	14	no usage	161	N/A	N/A
102	GENERATOR TWW-200-2 CHLODNICA WODORU RYS.WG1-881002	unit	160	13	90	2,401	8	152	47
103	PRZEKLADNIA 15519-1B BEZ SIL.	unit	160	5	360	894	84	76	24
104	PLYTKA Z TOPIONEGO BAZALTU 200 X 200 X 22 MM	kg	159	33,671	30	96	65	94	29
105	ZAWOR FIG. 674C FI 50 PT- 16MPA T-550 REGUL.Z NAP.EL.RYS.111.547.14 M-13HMF	unit	157	8	270	no usage	157	N/A	N/A
106	WYKLADZINA PODLOGOWA REKORD-PARKIET RULOWANA WINIGAM	m2	157	931	30	1,192	5	152	47
107	GENERATOR TWW-200-2 WZBUDNICA WGT-2700-500 WALEK SPRZ. RYS.WWB.21102	unit	156	12	90	no usage	156	N/A	N/A
108	POMPA 180 D 40-6 TULEJA DLAWICOWA RYS.44213	unit	152	22	180	8,211	4	148	46
109	RURA STALOWA 57 X 4 MM GAT.15HM KOTLOWA B-III	m	150	2,103	270	262	202	-51	-16
110	OP-650 ELEKTRODA ZBIOR.SIGMA IV K-10000 RYS.T-064-01 ELEKTROF.	unit	150	339	14	177	15	135	42
111	RURA STALOWA 31,8 X 4 MM GAT.K18 KOTLOWA B-III	m	149	3,157	270	914	57	92	28
112	TURB.TK-200 PLYTKA STELITOWA RYS.2147097 WIRNIK NP	unit	145	34	360	130	521	-377	-117
113	OP-650 PIERSCIEN OPOROWY RYS.R4-022-220/1-M33-233 C MLYN MKM-33	unit	144	2	14	391	7	138	43
114	POMPA 10 K 22A III X 76 KIEROWNICA ODSRODKOWA RYS.W-17000	unit	141	49	180	no usage	141	N/A	N/A
115	TURB.TK-200 LOPATKA STR.A4 L. RYS.7225589 WIRNIK NP	unit	141	19	360	no usage	141	N/A	N/A
116	PRZEKLADNIA SH-512 SPRZEGLO HYDROKINETYCZNE RYS.2-23704906	unit	141	2	360	768	86	55	17
117	OP-650 MLOTEK-ODKUWKA RYS.T-093-01-03-1/A LP.7 ELEKTROF.	unit	140	1,198	14	1,596	2	138	43
118	OP-650 REKAW ZALADOWCZY-SZAFA STEROWNICZA 91242-OOP ZBIOR.RET.POP.	unit	140	12	14	no usage	140	N/A	N/A
119	KABEL TKD 96 X 2 MM2	m	137	1,030	90	187,936	0	136	42

120	OP-650 KORPUS PODAJNIK. RYS.R1-021-1007 PODAJ.SLIM.	unit	136	3	14	629	4	132	41
121	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 159 X 465	unit	135	450	360	no usage	135	N/A	N/A
122	OP-650 JARZMO RYS.1-M33-318 A MLYN MKM-33	unit	134	4	14	no usage	134	N/A	N/A
123	OP-650 NAKLADKA RYS.T-101-01-09 ELEKTROF.	unit	133	2,001	14	4,347	1	133	41
124	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 1400 U21-73	unit	133	578	360	no usage	133	N/A	N/A
125	POMPA 20 K 37 WIRNIK RYS.3[illegible]071A MOD.15749 RYS 29763A	unit	132	21	180	no usage	132	N/A	N/A
126	TURB.TK-200 SUWAK POSREDNI RYS.1045479	unit	132	0	360	no usage	132	N/A	N/A
127	OP-650 WKLADKA TRUDNOSC. RYS.R2-023-257 PYLOPRZEWODY	unit	132	114	14	416	6	126	39
128	ZAWOR FIG. 674A FI 50 PT- 15,9 TP-520 REGUL.RYS.111.547.16 KONC.I Z NAP.BP16-Z	unit	131	4	270	1,366	34	97	30
129	ZASUWA FI 200 ZSW-81/121.678.03 /A-3-Z/ PT-200 TP-160 Z NAP.BP160-ZS-00S-380 KONC.IX KON.I	unit	131	1	270	no usage	131	N/A	N/A
130	POMPA 10 K 22 WIRNIK RYS.170150	unit	130	36	180	no usage	130	N/A	N/A
131	GENERATOR TWW-215-2 PRET UZWOJENIA RYS.WG1-121036	set	129	6	90	no usage	129	N/A	N/A
132	ZASUWA FI 400 FIG.122 KWASOODP.Z KOLKIEM	unit	128	2	270	91	492	-364	-113
133	OP-650 RAMIE RYS.T-101-01-08 ELEKTROF.	unit	127	1,906	14	2,108	1	126	39
134	ZAWOR FIG. 650 FI 50 PR- 16,3 TP-425 SPUST.Z KONC.III RYS.111.547.21	unit	127	13	270	148	301	-174	-54
135	OP-650 SRUBA Z NAKRETKA M 10 RYS.R4-029-822 PRZEGRZ.PARY WT.II.ST	set	127	1,537	14	no usage	127	N/A	N/A
136	OP-650 SLIMAK RYS.R2-021-937 PODAJ.SLIM.	unit	127	7	14	no usage	127	N/A	N/A
137	WENTYLATOR WPM-95/2 KORPUS RYS.RO-022-21	set	126	3	14	1,012	2	124	38
138	UZIEMNIK NAPOWIETRZNY TYP OZP 8-1/DW 420 KV	unit	126	2	90	142	103	22	7
139	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 670	unit	125	465	360	451	130	-5	-1
140	RURA STALOWA 57 X 5 MM GAT.16M KOTLOWA B-III	m	122	924	270	3,373	13	109	34
141	OP-650 MLOTEK RYS.T-097-00-01-1 APAR.WYDM.ELEKTROF.	unit	121	990	14	873	3	118	37
142	OP-650 STRZEPYWACZ ELEKTROD RYS.T-101-06-01 ELEKTROF.	unit	121	570	14	no usage	121	N/A	N/A
143	OP-650 ROLKA DP-300 RYS.R2-040-421/2-1242545 ODZUZ.OZZ 4080	unit	120	38	14	no usage	120	N/A	N/A
144	TURB.TK-200 PIERSCIEN USZCZ. RYS.2064327 DLAW.WP.WLOT	unit	120	42	360	2,212	25	94	29
145	AMBERLIT IRA-67 ANIONIT KONDENSACYJNY	kg	120	937	270	489	86	34	10
146	ZASUWA FI 150 FIG.122/S23-111-006 PN- 6/10 KWASOODP.	unit	119	37	270	267	157	-38	-12
147	OP-650 REKAW ZALADOWCZY A-2800 RYS.860.030.01.4.1G ZBIOR.RET.POP.	unit	119	4	14	no usage	119	N/A	N/A
148	POMPA HD 150 X 8 TULEJA DLAWICOWA RYS.32200	unit	119	20	180	no usage	119	N/A	N/A
149	OP-650 RAMIE UCHWYTU RYS.T-097-00-01-2 ELEKTROF.	unit	118	1,132	14	no usage	118	N/A	N/A
150	PRZENOSNIK TASMOWY KPT-KRAZNIK STALOWY 133 X 315	unit	118	1,501	360	772	72	47	14
151	OP-650 ZDERZAK RYS.T-071-01-11 ELEKTROF.	unit	118	2,022	14	1,456	1	116	36
152	OP-650 PRZEWOD PYLOWY I RYS.1-1240708 PYLOPRZEWODY	unit	114	5	14	982	2	112	35
153	TURB.TK-200 PIERSCIEN USZCZ. RYS.2064335 DLAW.NP.	unit	114	15	360	no usage	114	N/A	N/A
154	OP-650 KOLANO 180 ST. RYS.R3-024-236/2 PODGRZ.WODY I ST.	unit	113	1,991	14	36,339	0	113	35
155	POMPA 15 Z 33 X 8 TULEJA DLAW.STR.TLOCZNA RYS.45661	unit	113	43	180	5,239	5	108	34
156	TURB.TK-200 SRUBA M100 X 6 X 645 2-STR.RYS.4100276 KADLUB WP	unit	108	71	360	1,444	35	73	23
157	RURA STALOWA 31,8 X 6,3 MM GAT.10H2M KOTLOWA B-III	m	106	6,472	270	34,740	1	105	33
158	OP-650 WKLADKA ROZDZ.PYLU FI 730/433 PYLOPRZEWODY	unit	106	24	14	617	3	103	32
159	PRZENOSNIK TASMOWY KPT-PRZESUWNIK PEL-6/250/380	unit	105	9	360	no usage	105	N/A	N/A
160	TURB.TK-200 SRUBA M100 X 6 X 695 2-STR.RYS.4100277 KADLUB ZEW.WP	unit	103	65	360	1,179	41	62	19
161	WYMIENIACZ JONOWY WOFATYT AD-41	l	103	6,506	270	2,199	16	86	27
162	ZAWOR FI 4 P- 20,1 T-555 MANOMETR.Z KONC.DO SPAW.M20 X 1,5	unit	102	40	270	no usage	102	N/A	N/A

163	OP-650 PLYTA BOCZNA 20 X 150 X 780 RYS.OM-33-051 B MLYN MKM-33	unit	102	785	14	2,606	1	101	31
164	OP-650 KOLANO GAT.L 30 GS RYS.R4-022-46 PYLOPRZEWODY	unit	101	18	14	555	3	98	30
165	OP-650 KOLANO R-1000 Z WKLADKA RYS.R2-023-257/090-053 PYLOPRZEWODY	set	100	3	14	no usage	100	N/A	N/A
166	POMPA 180 D 40-6 OSLONA WIRNIKA RYS.43825	unit	100	2	180	652	36	64	20
167	WEGIEL KAMIENNY POLPRODUKT TYP 31-43 PRZEROST 17-35	t	99	225	180	106	219	-120	-37
168	POMPA 15 Z 33 X 8 TULEJA DLAW.STR.SSAWNA RYS.45659	unit	99	27	180	9,786	2	97	30
169	ZASUWA FI 200 FIG.122/S23-111-006 KWASOODP.	unit	98	5	270	102	337	-239	-74
170	POMPA 20 K 37 KIEROWNICA MAT.B 10 RYS.29763A MOD 14893	unit	98	18	180	2,160	11	87	27
171	URZADZENIE"HYDROFLEX"-PRZEWOD GIETKI DN-150 UZBROJONY	set	97	0	180	95	240	-142	-44
172	TURB.TK-200 SRUBA M 76 X 4 X 445 RYS.4036960 KADLUB WP	unit	97	127	360	no usage	97	N/A	N/A
173	KOMORA WODNA KOSZE CZYSZCZACE DO SIT OBROTOWYCH	unit	97	156	180	196	115	-19	-6
174	DLAWIK PRZECIWZAKLOCENIOWY D-380/78/750 DO ZESP.PROST.	unit	96	8	90	no usage	96	N/A	N/A
175	SILNIK SUDG 280 S-6 70/60/52 45 KW 968/974/978/980 OBR. 380 V	unit	96	4	90	no usage	96	N/A	N/A
176	OP-650 NAKLADKA USTALAJ.LOZYSKA RYS.T-101-01-10/T-101-11-10 ELEKTROF.	unit	96	464	14	2,116	1	95	29
177	WENTYLATOR BAB-106 PANEWKA RYS.08-003-2-0872	set	96	12	14	no usage	96	N/A	N/A
178	OP-650 OBUDOWA LOZYSKA RYS.R1-022-435A/27.01.00.00.03 WENTYL.WP30/3 MLYN MKM	unit	95	36	14	no usage	95	N/A	N/A
179	RURA STALOWA 406,4 X 8,8 MM GAT.R35 PRZEWODOWA B IZOLOWANA	m	95	171	270	4,447	8	88	27
180	OWIES "DIADEM"-I ODSIEW	kg	95	33,942	180	295	75	20	6
181	PRZETWORNIK APU-315-612-20600-01-5 POMIAROWY	unit	95	40	180	no usage	95	N/A	N/A
182	RURA STALOWA 168 X 8,8 MM GAT.32AH TRUDNOSCIER.	m	94	375	270	no usage	94	N/A	N/A
183	RURA STALOWA 31,8 X 7,1 MM GAT.10H2M KOTLOWA B-III	m	93	2,354	270	2,085	16	77	24
184	OP-650 PODAJNIK SLIMAK. RYS.R1-021-770	set	92	2	14	378	4	88	27
185	OP-650 SLIMAK RYS.R2-021-1391 PODAJ.SLIM.	unit	92	6	14	126	13	79	24
186	POMPA 20 K 37 WAL 4 ST. RYS.29774 A	unit	91	8	180	1,517	14	77	24
187	RURA STALOWA 244,5 X 10 MM GAT.R35 PRZEWODOWA B	m	91	323	270	5,903	5	86	27
188	OP-650 ZBIORNIK POMPY POP. RYS.T-512-1 STACJA WYSYL.POP.	unit	90	2	14	no usage	90	N/A	N/A
189	OP-650 ZAMEK LANC.FI 24 ODZUZLACZ OZZ 5020	unit	90	2,108	14	962	2	89	28
190	RURA STALOWA 168,3 X 10 MM GAT.32HA TRUDNOSCIER.B/SZ	m	90	334	270	no usage	90	N/A	N/A
191	RURA STALOWA 133 X 12,5 MM GAT.K18 KOTLOWA B	m	90	266	270	3,466	9	81	25
192	POMPA 10 K 22 WAL VII RYS.W-29280	unit	89	12	180	no usage	89	N/A	N/A
193	WENTYLATOR WPM-95/2 WIRNIK RYS.02-1-1628/3	unit	88	2	14	no usage	88	N/A	N/A
194	URZADZENIE"HYDROFLEX"-PRZEWOD GIETKI DN- 20 UZBROJONY 2 X DKU M 36 X 2/750 BAR /40 M/	unit	87	2	180	no usage	87	N/A	N/A
195	WENTYLATOR WPM-97/2 OBUDOWA RYS.R1-022-541	unit	86	3	14	no usage	86	N/A	N/A
196	POMPA 15 Z 33 X 8 PRZECIWTARCZA RYS.W40861	unit	86	21	180	7,596	3	83	26
197	OP-650 PLYTA POKR.POZ.14 20X240X780 RYS.R4-022-34/OM-33-051B MLYN MKM-33	unit	85	278	14	5,077	0	85	26
198	OP-650 WKLADKA I KOLANA RYS.R2-022-464 PYLOPRZEWODY	unit	85	16	14	1,947	1	84	26
199	RURA STALOWA 323,9 X 40 MM GAT.13HMF KOTLOWA B-III	m	85	15	270	5,598	5	79	25
200	OP-650 PLYTA EKRANOWA RYS.3-1178713/R3-024-200 PALNIK PYL.	unit	85	136	14	225	7	78	24
201	PLYTA TEKSTYLNO-REZOTEKST TFE-1 E-1 4 MM	kg	84	749	180	1,872	11	74	23
202	RURA STALOWA 177,8 X 8,8 MM GAT.20GB TRUDNOSCIER.B/SZ	m	83	326	270	5,667	5	78	24
203	BUTELKA ZWYKLA PO WODZIE MINERALNEJ	unit	82	102,078	180	46	415	-332	-103
204	POMPA 15 Z 33 X 8 PRZECIWTARCZA RYS.W40861	unit	81	11	180	no usage	81	N/A	N/A
205	OP-650 ROLKA DP-383 RYS.R3-040-833/3-1223198 ODZUZ.OZZ 4080	unit	80	27	14	no usage	80	N/A	N/A

206	WENTYLATOR WPM-97/2 ULOZYSKOWANIE /PANEWKA/ RYS.R1-026-586	unit	80	12	14	no usage	80	N/A	N/A
207	POMPA 15 Z 33 X 8 TULEJA DYSTANSOWA RYS.40919	unit	80	15	180	5,341	3	76	24
208	TURB.TK-200 PIERSCIEN USZCZ.6-SEGM. RYS.2064328 DLAW.WP.WLOT	unit	80	28	360	1,287	29	51	16
209	ZAWOR FIG. 649B FI 50 PT-162 TP-560 RYS.111.547.03 Z KONC.DO SPAW.	unit	80	9	270	381	73	6	2
210	OP-650 WIENIEC ZEBATY ST.LOZYSKA RYS.2239143 PRZEKL.370 KW	unit	79	1	14	no usage	79	N/A	N/A
211	OP-650 MLOTEK Z UCHWYTEM RYS.T-093-01-03 ELEKTROF.	unit	79	362	14	639	2	77	24
212	TRANSFORMATOR TB-240 MFA POMPA CTR 125-5,5/A	unit	78	5	90	1,976	5	74	23
213	OP-650 KOLANO 90 ST. RYS.R2-022-372/2-1231222 PYLOPRZEWODY	unit	78	5	14	94	15	63	20
214	OP-650 WODZIK FI.120 RYS.4-M33-479 MLYN MKM-33	unit	78	45	14	827	2	77	24
215	POMPA W 14-P WAL GAT.45 KUTY RYS.56697	unit	77	3	180	1,084	17	61	19
216	POMPA 190 D 40-8 PANEWKA 225 RYS.43839AB	unit	77	16	180	640	28	49	15
217	OP-650 WKLADKA II KOLANA RYS.R2-022-463 PYLOPRZEWODY	unit	77	16	14	1,947	1	76	24
218	OP-650 REGULATOR STER.RECZ."MILLERA RYS.435.040.01.1.0D ZBIOR.RET.POP.	unit	77	5	14	no usage	77	N/A	N/A
219	AKCESORIA KOLEJOWE WTYK ERL-11012 ZESTAW	unit	76	40	360	no usage	76	N/A	N/A
220	OP-650 ZABIERAK P.3,5 RYS.T-122-01-04-3 ELEKTROF.	unit	75	385	14	2,425	1	75	23
221	POMPA 190 D 40-8 PLYTKA SLIZGOWA RYS.44083	unit	75	40	180	no usage	75	N/A	N/A
222	SZKLO ZBROJONE GR.7 MM GAT.I WYM.150 X 165 CM	m2	74	518	30	302	10	64	20
223	OLEJ PRZEPRACOWANY ROZNY	kg	73	50,603	180	82	208	-135	-42
224	OP-650 PANEWKA RYS.T-093-01-02-3 ELEKTROF.	unit	73	1,452	14	2,409	1	72	22
225	OP-650 ZAWOR OBROTOWY RYS.P-08-9/B,C,D ZBIOR.RET.POP.	unit	70	6	14	no usage	70	N/A	N/A
226	OP-650 OBEJMA FI 24 DO ZAMKA LANC. ODZUZLACZ OZZ 5020	unit	70	2,590	14	no usage	70	N/A	N/A
227	TURB.TK-200 WEZOWNICA SPIR.FI.32X4 LE. RYS.2-1127172 PODGRZ.REG.PWC	unit	70	28	360	10,164	3	66	21
228	SZCZOTKA UZBROJ. LFC-557 25 X 32 X 64	unit	69	546	90	1,230	7	63	19
229	TURB.TK-200 SRUBA M 90 X 4 X 440 2-STR.RYS.4144251 KADLUB WP	unit	69	52	360	613	53	16	5
230	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 108 X 465	unit	68	394	360	533	60	8	3
231	TURB.TK-200 POKRYWA GRZYBA RYS.2073086 ZAWOR ODCIN.DN.350	unit	68	17	360	208	152	-85	-26
232	RURA STALOWA 177,8 X 10 MM GAT.20GB8 PRZEWODOWA B/SZ	m	67	234	270	15,831	1	66	20
233	TURB.TK-200 WEZOWNICA SPIR.FI.32X4 PR.K18 IIIST.RYS.2-1127171 PODGRZ.REG.PWC	unit	67	27	360	9,799	3	64	20
234	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 159 X 465	unit	67	216	360	790	40	27	8
235	TURB.TK-200 TULEJA RYS.3240605 ZAWOR REG.DN.150	unit	67	20	360	no usage	67	N/A	N/A
236	TURB.TK-200 TULEJA RYS.3240603 ZAWOR REG.DN.150	unit	66	18	360	6,491	5	61	19
237	FILTR HH-8300 F-40DNX BPML WKLAD FILTR. HC 8300 FDZ 39H	unit	66	4	180	131	119	-52	-16
238	KWAS SOLNY PN-67/C-84046 33% HCL GAT.I	kg	66	37,702	270	82	281	-215	-67
239	RURA STALOWA 159 X 6,3 MM GAT.10HNAP WALCOWANA B/SZ	m	66	460	270	no usage	66	N/A	N/A
240	SZCZELIWO AZBEST.GRAFIT.PLEC.SUCHE GAT.H 12 X 12 MM	kg	66	234	180	792	19	46	14
241	TURB.TK-200 PIERSCIEN TLOKOWY RYS.3282043 SERWO ZAW.REG.WP/SP	unit	65	3	360	no usage	65	N/A	N/A
242	OP-650 LOZYSKO RYS.T-101-01-20 ELEKTROF.	unit	65	238	14	1,673	1	64	20
243	OP-650 NAKLADKA LUZNA RYS.T-093-01/06/A ELEKTROF.	unit	65	462	14	1,575	1	64	20
244	TURB.TK-200 PIERSCIEN USZCZ. RYS.2064334 DLAW.WP.WLOT	unit	65	10	360	no usage	65	N/A	N/A
245	OP-650 USZCZ.OBW.DOLNE LEWE POZ.1-2 RYS.R2-028-40/2-165302 OBR.PODGRZ.POW	unit	64	1,562	14	3,802	0	64	20
246	SILNIK SG 200 L-4 30 KW 1472 OBR. 380/660 V	unit	63	4	90	457	16	47	15
247	POMPA HD 150 X 8 TARCZA ODCIAZENIOWA RYS.38855	unit	63	8	180	no usage	63	N/A	N/A
248	LOZYSKO 6324 JF 21 KULKOWE JEDNORZ.	unit	63	35	14	1,279	1	62	19

249	OP-650 KOLANO Z WYKL.BET.FI.150-15ST.RYS.506.000.11.1.1 STACJA WYS.POP.	unit	63	10	14	no usage	63	N/A	N/A
250	GENERATOR TWW-200-2 TASMA USZCZEL.DO WZBUDNICY	m	63	1,185	80	no usage	63	N/A	N/A
251	RURA STALOWA 177,8 X 12,5 MM GAT.20GB TRUDNOSCIER.B/SZ	m	63	177	270	no usage	63	N/A	N/A
252	OP-650 ODLEW KOLA LANCUCHOWEGO RYS.IIR-2-040-429 ODZUZ.OZZ 4080	unit	62	20	14	no usage	62	N/A	N/A
253	SMAR PRZECIWRDZEWNY MOLIPAS- 80N	kg	62	418	30	627	4	58	18
254	TURB.TK-200 SEGMENT DRUTU TLUM. RYS.4270071 WIRNIK NP	unit	62	9	360	72	397	-336	-104
255	RURA STALOWA 51 X 4 MM GAT.K18 KOTLOWA BZ-III	m	60	1,606	270	821	26	35	11
256	OP-650 USZCZ.PROMIEN.GORNE RYS.R2-028-40/2-165302 OBR.PODGRZ.POW	set	60	562	14	1,369	1	59	18
257	OP-650 OPRAWA ZDERZAKA RYS.T-071-01-01 ELEKTROF.	unit	60	2,731	14	1,225	1	59	18
258	RURA Z MOSIADZU CIAG. 1 X 14 MM GAT.MA77	kg	60	1,490	270	no usage	60	N/A	N/A
259	OP-650 ODLEW SUROWY ZAWIROWACZA RYS.R-023-470 A PALNIK PYL.	unit	60	42	14	286	4	56	17
260	OP-650 SRUBA M 52 X 240 RYS.R4-022-2316/4-M33-324 MLYN MKM-33	unit	60	160	14	no usage	60	N/A	N/A
261	TURB.TK-200 SEGMENT DRUTU TLUM. RYS.4106682 WIRNIK NP	unit	59	9	360	67	409	-350	-109
262	SILOWNIK SWB-27 CIEGNO SZTYWNE Z PRZEG. 1386-4-2	set	59	21	180	no usage	59	N/A	N/A
263	OP-650 RURA OPLET.FI 57 X 4 RYS.R4-024-2516 MAT.15HM PRZEGRZ.PARY	m	59	200	14	no usage	59	N/A	N/A
264	OP-650 RURA OPLET.FI 57 X 5 RYS.R4-024-2516 MAT.16M PRZEGRZ.PARY	m	59	200	14	no usage	59	N/A	N/A
265	PRZETWORNIK APU-711-05-20721-01 ZAK. 50 -600 ST.	unit	58	32	180	no usage	58	N/A	N/A
266	TURB.TK-200 PIERSCIEN USZCZ.KPL. RYS.2161093 TARCZA KIER.NP	unit	58	17	360	3,038	9	49	15
267	RURA STALOWA 219 X 38 X 5000 MM GAT.K-18 KOTLOWA B-III	m	58	25	270	no usage	58	N/A	N/A
268	TASMA DENSO IZOLACYJNA	m2	58	8,042	30	97,845	0	58	18
269	POMPA HD 150 X 8 PRZECIWTARCZA RYS.38857 A	unit	58	8	180	no usage	58	N/A	N/A
270	OP-650 WKLADKA TRUDNOSC. RYS.R4-022-1433 PYLOPRZEWODY	unit	58	46	14	4,218	0	57	18
271		set	58	25	14	no usage	58	N/A	N/A
272	LOZYSKO 22240 BMB C-3 BARYLKOWE POPRZECZNE	unit	57	8	14	3,094	0	57	18
273	OP-650 SRUBA M 64X300 MLOTECZK. RYS.R4-022-1890/4M33-176B/K3-0002/I MLYN MKM-33	unit	57	72	14	262	4	53	16
274	WENTYLATOR WP-30 WAL RYS.R2-026-124	unit	57	2	14	246	4	52	16
275	OP-650 KOLANO 180 ST.R-60 RYS.R3-024-236/1 PODGRZ.WODY I ST.	unit	56	991	14	18,089	0	56	17
276	ZAWOR FIG. 441 FI 50 ZAPOR.MINIM. PRZEPL.RYS.111.312.91/II	unit	56	2	270	52	381	-325	-101
277	TURB.TK-200 SRUBA M 64 X 4 X 485 2-STR.RYS.4144179 KADLUB ZEW.WP	unit	56	80	360	no usage	56	N/A	N/A
278	ZAWOR FIG. 674A FI 25 REGUL.RYS.111.546.12	unit	56	21	270	no usage	56	N/A	N/A
279	TURB.TK-200 NAKRETKA M 42 X 3 RYS.4144171 KADLUB SP	unit	56	333	360	268	97	-42	-13
280	KABEL XTKMX 100 X 4 X 0,5 MM2	m	56	1,200	90	no usage	56	N/A	N/A
281	OP-650 PIERSCIEN DZIELONY RYS.R4-024-2398 ARMATURA	unit	55	268	14	no usage	55	N/A	N/A
282	PRZENOSNIK TASMOWY KPT-PROG T-03200-48	unit	54	146	360	295	86	-32	-10
283	KABEL YAKY 3 X 120 MM2 1 KV	m	54	618	90	no usage	54	N/A	N/A
284	OP-650 SRUBA REGUL. RYS.R4-022-2086/4M33-400 MLYN MKM-33	unit	53	135	14	588	2	52	16
285	RURA STALOWA 159 X 6,3 MM GAT.09GA B/SZ	m	53	425	270	812	23	30	9
286	OP-650 TROJNIK 30 ST.WYK.B RYS.PR-01-718 LP.1 STACJA WYSYL.POP.	unit	53	16	14	no usage	53	N/A	N/A
287	OP-650 PIERSCIEN DZIELONY RYS.R4-024-2395 ARMATURA	unit	53	40	14	no usage	53	N/A	N/A
288	TURBOSPREZARKA 4VRZ 220/430 WIRNIK KPL.Z USZCZEL.IMP	unit	53	2	180	287	43	10	3
289	SPYCHACZ HAWESTER TD-25C PAS GASIENICY 28 RYS.399-150-504	unit	52	1	360	no usage	52	N/A	N/A
290	ZAWOR FIG. 650 FI 50 PR- 16 TP-390 SPUST.Z KONC.III RYS.111.547.21	unit	52	6	270	177	104	-51	-16
291	OP-650 WYKLADZINA ODLEW RYS.R4-022-1516 PYLOPRZEWODY	unit	52	22	14	410	2	50	15

292	GENERATOR TWW-200-2 SPREZYNA DO OBSAD SZCZOTKOWYCH	unit	52	716	90	no usage	52	N/A	N/A
293	ZASUWA FI 200 FIG.122 KLINOWA PLAS.KOLN.	unit	52	10	270	306	59	-8	-2
294	OP-650 KLAPA MIGALKOWA Z NAP.ELEKTR.PODWOJNA ELEKTROF.	set	51	5	14	no usage	51	N/A	N/A
295	SRUBA 20 X 100 MM Z LB.6-K.MASZ.Z GW.KR. PN/M-82101	kg	51	1,836	7	1,279	0	51	16
296	KRATA MOSTOSTAL OCYNK. 40 X 1000 X 1200	unit	51	91	30	60	33	18	6
297	OPAKOWANIE ELEKTROD ULOT.T-252-01/A	kg	51	3,844	180	no usage	51	N/A	N/A
298	OP-650 NAKRETKA M-64 X 4 RYS.R3-022-972 MLYN MKM-33	unit	51	360	14	no usage	51	N/A	N/A
299	WELNA MINERALNA GRANULOWANA	kg	51	2,011	30	122	16	34	11
300	AKCESORIA KOLEJOWE WTYK ERL-10001 ZESTAW	unit	50	37	360	no usage	50	N/A	N/A
301	TURB.TK-200 SRUBA M 55 X 3 X 405 RYS.R4-011-2208 P PODGRZ.WP XW	unit	50	164	360	no usage	50	N/A	N/A
302	ZESPOL ZAZ-M1-12 WERSJA II R-411676	unit	50	3	180	no usage	50	N/A	N/A
303	OP-650 KOMORA GORNA EKRANU TYLNEGO PAROWNIKA BEZ KROCCY PRZEGRZ.PARY	kg	50	4,200	14	no usage	50	N/A	N/A
304	BRAMA ZALUZJOWA ZWIJANA 4500 X 5100 MM	unit	50	3	30	no usage	50	N/A	N/A
305	OP-650 PROSTKA L-700 WYK.B RYS.R4-022-45/4-159404 PYLOPRZEWODY	unit	50	14	14	518	2	48	15
306	ZAWOR SIZ 2507 FI 65/125/44 BEZPIECZENSTWA RYS.101.501.011	unit	50	1	270	no usage	50	N/A	N/A
307	PRZETWORNIK PNPB-4 0-5 MA	unit	50	99	180	3,605	3	46	14
308	OP-650 KOLO LANCUCHOWE · RYS.IIR2-040-429/2-1242619 ODZUZ.OZZ 4080	unit	49	10	14	1,241	1	49	15
309	TURB.TK-200 SRUBA M 76 X 4 X 480 2-STR.RYS.4036960 KADLUB SP	unit	49	54	360	978	24	26	8
310	ZASUWA FI 100 FIG.122/S23-111-006 KWASOODPORNA	unit	49	23	270	155	111	-62	-19
311	PRZEKAZNIK MCX 913-5-5-1 ZABEZPIECZENIA SILNIKOW	unit	49	2	180	no usage	49	N/A	N/A
312	TURB.TK-200 PIERSCIEN USZCZ. RYS.4288007 KADLUB SP	unit	49	76	360	868	26	22	7
313	KULKA GUMOWA FI 27 DO CZYSZCZENIA KONDENSATOROW	unit	49	24,260	180	886	13	36	11
314	OP-650 KORPUS LOZYSKA RYS.850.125.0131 C ELEKTROF.	unit	48	16	14	no usage	48	N/A	N/A
315	ZAWOR FIG. 674B FI 50 PT-154 TP-540 REGUL.RYS.111.547.13	unit	48	6	270	691	25	24	7
316	ZAWOR FIG. 674 FI 25 PR- 13,2 TP-440 REGUL.Z KONC.II RYS.111.546.11	unit	48	21	270	599	28	20	6
317	TURB.TK-200 PIERSCIEN USZCZ.KPL RYS.3104505/R3-011-368 TARCZA KIER.NP	unit	48	40	360	no usage	48	N/A	N/A
318	OP-650 USZCZ.OBW.GORNE PR. POZ.1-2 RYS.R2-028-40/2-165302 OBR.PODGRZ.POW	unit	48	1,164	14	no usage	48	N/A	N/A
319	OP-650 KOLANO 90 ST.FI 219 PD06/1/6A RYS.506.000.11.1.1A ZBIOR.RET.POP.	unit	48	12	14	no usage	48	N/A	N/A
320	ZAPRAWA TIKSETROPOWO-PLASTYCZNA DO NAPRAW BETONU "EMACO"S88 THIX C W PROSZKU	kg	48	3,019	30	301	6	41	13
321	URZADZENIE SN-04-05 ANALIZUJACO-STERUJACE DO SYSTEMU AKUSTYCZNEGO NADZORU KOTLA	set	48	7	180	no usage	48	N/A	N/A
322	RURA STALOWA 57 X 4 MM GAT.K18 KOTLOWA B-I	m	47	730	270	730	23	24	8
323	TURB.TK-200 PIERSCIEN USZCZ. RYS.2282506 DLAW.NP.	unit	47	9	360	no usage	47	N/A	N/A
324	AKCESORIA KOLEJOWE OGRZEWANIE ELEKTR.ZWROTNIC SGE-1011	unit	46	6	360	no usage	46	N/A	N/A
325	OP-650 SRUBA POC.GW.PRAWY RYS.R3-021-101 PODAJ.WEGLA	unit	46	36	14	no usage	46	N/A	N/A
326	OP-650 SRUBA POC.GW.LEWY RYS.R3-021-101 PODAJ.WEGLA	unit	46	36	14	no usage	46	N/A	N/A
327	OP-650 ROZDZIELACZ CCU-1/1200 RYS.3-1300013A PALNIK ROZPAL.	unit	46	250	14	4,563	0	46	14
328	OPAKOWANIE ELEKTROD ZBIORCZYCH WG-253-17	kg	46	2,559	180	no usage	46	N/A	N/A
329	BLACHA CZ. 4 X 1500 X 3000 MM GAT.H13JS	kg	46	1,413	270	3,580	5	41	13
330	WENTYLATOR WPM-95/2 WAL RYS.R2-026-377	unit	46	3	14	no usage	46	N/A	N/A
331	KRATA MOSTOSTAL OCYNK. 40 X 1000 X 1500	unit	46	64	30	80	22	23	7
332	PRZENOSNIK TASMOWY KPT-PRZESUWNIK PE-600/250/380 G-52-114	unit	46	8	360	no usage	46	N/A	N/A
333	KRATA MOSTOSTAL OCYNK. 40 X 850 X 1000	unit	45	70	30	289	6	39	12
334	SILNIK KAX 60-80Z 0,85 KW 2500 OBR. 220 V REPULSYJNY DO NAP.ZWROT.KOLEJ.	unit	45	15	90	no usage	45	N/A	N/A

335	WYMIENNIK CIEPLA JAD-M-6/50	unit	45	7	180	141	74	-29	-9
336	OP-650 RURA OPLET.FI 57X6,3 RYS.R4-024-2516 MAT.K18 PRZEGRZ.PARY	m	45	153	14	337	2	42	13
337	ZAWOR FIG. 482 FI 50 PR-132 TR-450 ZWROTNY R.112.203.01	unit	45	21	270	7,819	2	43	13
338	TURB.TK-200 PIERSCIEN USZCZ. RYS.2064345 DLAW.SP.WYLOT	unit	45	12	360	431	49	-4	-1
339	BATERIA AKUMULAT.STACYJNA HYTC 112X8 220 V 880AH	set	45	0	90	30	177	-133	-41
340	ZAWOR FIG. 677A FI 10 BEZ NAKRETKI I KROCCA Z KON. M 27 X 1,5	unit	45	76	270	392	40	5	1
341	PRZEKAZNIK RT-60 220 V = 6 SEK. CZASOWY ELEKTROMECH.	unit	45	101	180	3,684	3	42	13
342	TURB.TK-200 PIERSCIEN USZCZ. RYS.4288006 KADLUB SP	unit	45	76	360	868	24	21	6
343	WENTYLATOR WOR-1700/1000 TRZPIEN WENTYLATORA RYS.R3-026-672	unit	44	31	14	no usage	44	N/A	N/A
344	WENTYLATOR WPM-97/2 OBUDOWA LOZYSKA RYS.121802	unit	44	13	14	960	1	43	13
345	TURB.TK-200 NAKRETKA M 52 X 3 ZN-69/MPC-0117009 KADLUB SP	unit	44	132	360	no usage	44	N/A	N/A
346	SILOWNIK SWC-27 CIEGNO SZTYWNE Z PRZEG.1388-4-2	set	44	16	180	no usage	44	N/A	N/A
347	OP-650 KOLO LANCUCHOWE RYS.IIR2-040-426/2-1223217 ODZUZ.OZZ 4080	unit	44	2	14	no usage	44	N/A	N/A
348	RURA STALOWA 31,6 X 4 MM GAT.15HM KOTLOWA B-III	m	44	1,281	270	1,694	9	35	11
349	WENTYLATOR WPM-97/2 PANEWKA 19.105.312.1.2820 Z RYS.IIR1-020-321A	unit	44	7	14	no usage	44	N/A	N/A
350	ELEMENT TERMOIZOLACJI-LISTWA IZOL.GR.IZOL.140	m	44	287	30	no usage	44	N/A	N/A
351	TURB.TK-200 SRUBA M 56 X 4 X-295 2-STR.RYS.4144180 KADLUB ZEW.WP	unit	44	135	360	no usage	44	N/A	N/A
352	TURB.TK-200 GRZYB RYS.3144100 ZAWOR REG.DN.150	unit	43	3	360	146	138	-95	-29
353	RURA STALOWA 159 X 6,3 MM GAT.R45 PRZEWODOWA W POWLOCE PCV	m	43	408	270	no usage	43	N/A	N/A
354	KABEL YKSY 48 X 1 MM2 1 KV	m	43	1,000	90	no usage	43	N/A	N/A
355	POMPA 125 PJM-170 Z SIL.NS=22 KW N-2900 OBR./MIN.	unit	43	2	180	101	100	-57	-18
356	ZASUWA FI 80 ZSW-81/121.677.03 /B-3-Z/ Z NAPEDEM	unit	43	1	270	263	57	-14	-4
357	ZAWOR FIG. 482B FI 50 P-162 T-545 ZWROTNY KLAP.STAL.RYS.120.203.03	unit	43	30	270	no usage	43	N/A	N/A
358	URZADZENIE"HYDROFLEX"-OSPRZET DLA UKLADU PLUCZNEGO	set	43	0	180	95	105	-63	-19
359	POMPA PL-400 WAL WYK.A,B RYS.G61-80-11	unit	42	10	180	no usage	42	N/A	N/A
360	POMPA 15 Z 33 X 8 PANEWKA FI 85 RYS.40883A	unit	42	6	180	no usage	42	N/A	N/A
361	ZASUWA FI 150 ZSW-81/121.668.03 /A-3-Z/ PT- 80 TP-450 Z GLOWICA RYS.152.014.01 KONC.VI	unit	42	1	270	no usage	42	N/A	N/A
362	STEROWNIK MSE-0 /KMS-1/ ZMODERN.MIKROPROCESOWY DO STER.STRZEPYWACZAMI NK-91262	set	42	1	180	417	24	18	6
363	SILNIK SG 180 M-4 18,5 KW 1420 OBR. 380 V	unit	42	8	90	no usage	42	N/A	N/A
364	PRZENOSNIK TASMOWY KPT-KRAZNIK OGUMOWANY 133 X 315	unit	42	200	360	no usage	42	N/A	N/A
365	OP-650 TRZPIEN RYS.R3-080-2106 ARMATURA	unit	42	16	14	194	4	38	12
366	OP-650 ZAWOR OBROTOWY WN-501 ZBIOR.RET.POP.	unit	42	15	14	no usage	42	N/A	N/A
367	OP-650 LANCUCH 24 X 86 KL.C "N" BN-68/1719 ODZUZ.OZZ 4080	m	42	171	14	97	8	34	10
368	RURA STALOWA 88,9 X 10 MM GAT.R35 PRZEWODOWA B	m	41	230	270	367	40	2	1
369	TRANSPORTER DO BUTELEK 0,33 L PLASTIK TWORZYWO SZTUCZNE	unit	41	5,163	180	47	205	-163	-51
370	WENTYLATOR WP-30/3 WIRNIK RYS.02-1-S188 A	unit	41	10	14	no usage	41	N/A	N/A
371	ELEKTRODA ESTEL NI-50 FI 4,00 MM STELITOWA	unit	41	9,630	7	no usage	41	N/A	N/A
372	LADOWARKA LWKS-250-20 WALEK ZEBATY R-314 ZB RYS.602-001	unit	41	24	360	no usage	41	N/A	N/A
373	KRATA MOSTOSTAL OCYNK. 40 X 1000 X 1100	unit	41	78	30	135	12	29	9
374	RURA STALOWA 44,5 X 7,1 MM GAT.15HM KOTLOWA B-III	m	41	581	270	no usage	41	N/A	N/A
375	STOP LOZYSKOWY GAT.L60S	kg	41	500	270	no usage	41	N/A	N/A
376	OP-650 SWORZEN RYS.R4-028-955/4-1138113A OBR.PODGRZ.POW	unit	41	630	14	692	1	40	12
377	PRZETWORNIK APR-315-612-20601 PRADOWY	unit	41	19	180	no usage	41	N/A	N/A

378	OP-650 SRUBA NAPED.WYK.A,B RYS.IIR3-021-821 PODAJ.WEGLA	unit	41	28	14	no usage	41	N/A	N/A
379	RURA STALOWA 168 X 10 MM GAT.32HA TRUDNOSCIER.	m	41	150	270	no usage	41	N/A	N/A
380	TURB.TK-200 TULEJA RYS.2597799 ZAWOR	unit	40	2	360	47	402	-362	-112
381	KRUSZYWO BOS 125/II	kg	40	11,139	30	71	22	18	6
382	OP-650 PODWOJNY WOR.ZSYP.FI 300/600 L-5680 RYS.13.860.030.01.1.0A ZBIOR.RET.POP.	unit	40	10	14	no usage	40	N/A	N/A
383	URZADZENIE"HYDROFLEX"-PRZEWOD GIETKI DN- 50 UZBROJONY	set	40	0	180	95	99	-58	-18
384	OP-650 GRZYB ZAW.ZAPOR.DN 25 RYS.R4-029-2288 ARMATURA	unit	40	33	14	481	2	38	12
385	OP-650 SRUBA M 9 Z NAKRETKA RYS.R4-029-821 ARMATURA	set	40	537	14	1,961	0	40	12
386	PRZEWOD OPD 4 X 25 MM2	m	40	1,487	90	10,856	0	40	12
387	OP-650 ELEMENTY LEJE ZBIORCZE RYS.HE-4-183/184 ELEKTROF.	kg	39	5,293	14	no usage	39	N/A	N/A
388	ZAWOR FIG. 674 FI 50 PT- 14,8 T-440 REGUL.Z KONC.V RYS.111.547.11	unit	39	5	270	133	104	-64	-20
389	PLYTA USZCZ.AZB.KAUCZ.KLINGERIT 1000 ZBROJONY GR.0,5 MM	kg	39	144	180	5,828	2	38	12
390	ZAWOR FIG. 674A FI 50 PR-150 REGUL.Z KONC.DO SPAW.	unit	39	7	270	no usage	39	N/A	N/A
391	LANCUCH LAMELOWY 433	unit	39	150	7	no usage	39	N/A	N/A
392	OP-650 PLASKOWNIK Z BEDN. RYS.2-1211675 POZ.10-15 OBR.PODGRZ.POW	set	39	360	14	no usage	39	N/A	N/A
393	ZAWOR FIG. 649C FI 50 PT-163 TP-540 RYS.111.547.04 Z KONC.III	unit	39	7	270	no usage	39	N/A	N/A
394	WALEK Z BRAZU 150 X 500 MM GAT.B-101	kg	38	815	270	1,984	7	32	10
395	PAROWACZ PSGR - 100 + DLAWICA CZUJNIKA	unit	38	1	180	no usage	38	N/A	N/A
396	RURA STALOWA 38 X 4 MM GAT.K19 KOTLOWA B- II	m	38	874	270	515	26	12	4
397	POMPA 15 Z 33 X 8 PANEWKA FI 75 RYS.45672	unit	38	5	180	no usage	38	N/A	N/A
398	PRZEKLADNIA 2KA-500 2-01	unit	38	2	360	no usage	38	N/A	N/A
399	LOZYSKO 29476 FY VH 16 0 BARYLKOWE WZDLUZNE	unit	37	0	14	56	12	25	8
400	SILNIK SUDF 180 L-6 14,5 KW 955 OBR. 380/220 V	unit	37	5	90	no usage	37	N/A	N/A
401	POMPA 80 PJM 215 NS-18,5 KW N-2900 OBR./MIN. U-380/660 V P.PL.250/II/82	unit	37	1	180	105	83	-46	-14
402	WIROWKA AW-1700 WAL BEBNA 75407	unit	37	1	180	41	211	-174	-54
403	OP-650 GLOWICA POMPY POP. RYS.P-02-31 STACJA WYSYL.POP.	unit	37	2	14	no usage	37	N/A	N/A
404	ZASUWA FI 80 FIG.122/S23-111-006 KWASOODPORNA	unit	37	24	270	390	33	4	1
405	AKCESORIA KOLEJOWE PRET NASTAWCZY Z2-92371.1	unit	37	35	360	6,335	3	34	11
406	LINA STAL.OCYNK.FILLERA 6 X 25 FI 14 MM RM-180 PN-80243	kg	37	1,890	7	no usage	37	N/A	N/A
407	PRZETWORNIK APR-710-05-20700-01 ZAK. 0-100 ST.C	unit	37	23	180	no usage	37	N/A	N/A
408	RURA STALOWA 70 X 8 MM GAT.15HM KOTLOWA B-III	m	37	242	270	no usage	37	N/A	N/A
409	CHLOREK WAPNIA TECHN.W PLATKACH GAT.II PN 75/C-84127	kg	37	16,457	270	334	39	-2	-1
410	OP-650 CZESCI ZLACZ. RYS.HE-42/HE-27 ELEKTROF.	kg	37	990	14	117	6	31	10
411	KABEL TKMKFTA 10 X 4 X 0,8 MM2	m	37	1,000	90	no usage	37	N/A	N/A
412	ZAWOR FIG. 650B FI 50 PR- 16,27TP-540 SPUST. RYS.111.547.23 Z KON.V	unit	36	3	270	235	54	-18	-6
413	OP-650 NAKRETKA SRUBY POC.GW.LEWY,PRAWY RYS.3-1154484 PODAJ.WEGLA	unit	36	48	14	no usage	36	N/A	N/A
414	SILNIK SF 225 M-2 45 KW 2960 OBR. 380 V	unit	36	4	90	no usage	36	N/A	N/A
415	TURB.TK-200 PIERSCIEN USZCZ. RYS.2292505 DLAW.NP.	unit	36	7	360	no usage	36	N/A	N/A
416	OP-650 GRZYB ZAWORU RYS.R4-029-2289 ARMATURA	unit	36	64	14	no usage	36	N/A	N/A
417	RURA STALOWA 159 X 6,3 MM GAT.22G2A TRUDNOSCIER.B/SZ	m	36	221	270	629	20	16	5
418	ZAWOR FIG. 649 FI 50 PT- 16,2 TP-400 ZAPOR.Z KONC.III RYS.111.547.01	unit	36	5	270	122	103	-67	-21
419	WOZEK WYGARN.SPOD WYWFI. WYGARNIACZ RYS.PU-036 KWG-01-007 C	unit	36	10	14	no usage	36	N/A	N/A
420	RAMA TRANSPORTOWA RYS.A2-3892-00 - OPAKOWANIE	unit	36	36	180	no usage	36	N/A	N/A

421	PLYTA GUMOWO-KORKOWA TYP "NEBAR" GR. 1,5 MM	unit	36	61	180	4,441	2	34	10
422	FILTR FP1-160- 25S WARSTWOWY	unit	36	47	180	no usage	36	N/A	N/A
423	GENERATOR TWW-200-2 TROJNIK KOMPLETNY	unit	35	20	90	no usage	35	N/A	N/A
424	OP-650 ELEMENT KOTLA WG.13-266 PRZEGRZ.PARY WT.I ST.	kg	35	3,626	14	16,140	0	35	11
425	POMPA 180 P 19 PANEWKA 180 MOD.15951 RYS.40802	unit	35	3	180	185	45	-9	-3
426	OP-650 KUREK OBROT.FI 70 RYS.P-06-1 APARAT WYDM.ELEKTROF.	unit	35	78	14	648	1	34	11
427	OPRAWA OSM-100 SWIATLA PRZESZKODOWEGO	unit	35	126	90	904	5	30	9
428	OP-650 KOLO LANCUCH.DP 446,21 RYS.IIR3-040-937/1256545/3 ODZUZ.OZZ 4080	unit	35	4	14	no usage	35	N/A	N/A
429	WIROWKA AW-1700 BEBEN 73342	unit	35	9	180	no usage	35	N/A	N/A
430	BLACHA CZ. 30 X 2000 X 4000 MM GAT.ST3SY	kg	35	9,028	270	193	63	-28	-9
431	TURB.TK-200 TRZPIEN RYS.3144091 ZAWOR REG.DN.150	unit	35	2	360	47	344	-310	-96
432	SRODEK DO UZDATNIANIA WODY KOTLOWEJ"CELNOX" V 771	kg	34	295	270	90	135	-100	-31
433	OP-650 SPREZYNA NACISKOWO-SRUB.WALC.D=7 D=42 Z=4,5 L=52 ZBIOR.RET.POP.	unit	34	19	14	7,057	0	34	11
434	OP-650 OPRAWA WLAZU DO LEJA RYS.T-181-07-04 ELEKTROF.	unit	34	44	14	274	2	31	10
435	TASMA DO REJESTRATOROW 120 X 15 X 12 MM WZOR 9	unit	33	1,753	180	160	49	-16	-5
436	OP-650 IZOLATOR Z TULEJ.POZ.1,2,3 RYS.T-127-01-04 ELEKTROF.	unit	33	132	14	3,208	0	33	10
437	ZAWOR FIG. 215 FI 65 P- 16 T-225 ZAPOR.KOLN.	unit	33	13	270	no usage	33	N/A	N/A
438	SILNIK SF 160 L-6 11 KW 960 OBR. 220/380 V	unit	33	8	90	no usage	33	N/A	N/A
439	OP-650 ZAWOR OBROTOWY RYS.P-08-9/B,C,D ZBIOR.RET.POP.	unit	33	8	14	no usage	33	N/A	N/A
440	SILNIK SZJR 138 R/01/E TARCZA LOZYSKA "N"BEZ LOZ.POZ.5 WS2-310019	unit	33	4	90	no usage	33	N/A	N/A
441	TURB.TK-200 KOMPENSATOR STAL.FALISTY OSIOWY JWK-AXIAL DN-125 PN 25/90 MM RUROC.	unit	33	3	360	no usage	33	N/A	N/A
442	OP-650 TRZPIEN RYS.R3-029-1639 ARMATURA	unit	33	25	14	no usage	33	N/A	N/A
443	TURB.TK-200 WRZECIONO RYS.3193002 ZAWOR REG.DN.150	unit	33	26	360	no usage	33	N/A	N/A
444	GENERATOR TWW-200-2 REGULATOR ROZ.CISNIEN RRC-14 RYS.WRK WK4-001245	unit	33	2	90	no usage	33	N/A	N/A
445	OP-650 KLAPA BEZPIECZENSTWA RYS.559.030.03.3.4 ELEKTROF.	unit	33	3	14	1,256	0	32	10
446	OP-650 RAMIE UCHWYTU POZ.1.2 RYS.T-101-06-01-2 ELEKTROF.	unit	33	539	14	655	1	32	10
447	TURB.TK-200 TULEJA RYS.2014753 SERWO ZAW.REG.WP/SP	unit	32	2	360	no usage	32	N/A	N/A
448	POMPA HD 150 X 5 PRZECIWTARCZA OBROBIONA RYS.38856	unit	32	5	180	no usage	32	N/A	N/A
449	PRZETWORNIK APU-711-05-20521-01 ZAK. 50 -400 ST.	unit	32	20	180	no usage	32	N/A	N/A
450	WYLACZNIK SCJ 4-12/20/800 MALOOLEJ.	unit	32	6	90	107	35	-3	-1
451	ELEKTROZAWOR HB-84 220V 1MPA	unit	32	16	90	no usage	32	N/A	N/A
452	SRUBA 12 X 100 MM Z LB.6-K.MASZ.Z GW.KR. PN/M-82101	kg	32	1,059	7	16,810	0	32	10
453	RURA STALOWA 273 X 7,1 MM GAT.R35 PRZEWODOWA B IZOLOWANA	m	31	96	270	no usage	31	N/A	N/A
454	ZAWOR FI 200 ODDECHOWY (BEZPIECZNIK PRZECIWOGNIOWY)	unit	31	4	270	no usage	31	N/A	N/A
455	PRZEKLADNIA SH-512 A KRZYWKI /UKLAD STEROWANIA/ RYS.2-478637	set	31	0	360	87	166	-135	-42
456	ZAWOR FIG. 4928 FI 50 P-162 T-545 ZWROTNY KLAP.STAL.RYS.120.203.03	unit	31	15	270	2,716	4	27	8
457	USZCZELKA ARMET-950 55 X 35 X 10	unit	31	3,618	180	4,402	2	29	9
458	PRZEKAZNIK RTO-60 220 V 20 SEK. CZASOWY ELEKTROMECH.	unit	31	91	180	3,309	2	29	9
459	RURA STALOWA 133 X 5 MM GAT.15HM KOTLOWA B-III	m	31	98	270	1,777	6	25	8
460	TASMA DO REJESTRATOROW 139 X 18 X 11 MM	unit	31	1,745	180	1,274	6	25	8
461	OP-650 TROJNIK 45 ST. RYS.PR-01-714 LP.1 STACJA WYSYL.POP.	unit	31	12	14	no usage	31	N/A	N/A
462	PRZEKAZNIK RT-60 220 V = 20 SEK. CZASOWY ELEKTROMECH.	unit	31	86	180	1,051	7	24	7
463	OP-650 POKRYWA RYS.R4-029-1176 ARMATURA	unit	30	234	14	no usage	30	N/A	N/A

464	OP-650 WSTAWKA KOMORY WG ZL.14-116 /PRAWA/FI 457 PRZEGRZ.PARY WT.I ST.	unit	30	3	14	no usage	30	N/A	N/A
465	OP-650 WSTAWKA KOMORY WG ZL.14-116 /LEWA/ FI 457 PRZEGRZ.PARY WT.I ST.	unit	30	3	14	no usage	30	N/A	N/A
466	OP-650 IZOLATOR NAPEDOWY P.1,2,6 RYS.T-122-01-04 ELEKTROF.	unit	30	66	14	688	1	29	9
467	PRZEKAZNIK RT-60 220 V = 100 SEK. CZASOWY	unit	30	87	180	no usage	30	N/A	N/A
468	SZAFA STEROWNICZA Z NADSTAWKA DO ZEST.DIODOWO-TYRYSTOROWEGO PK-15/07	unit	30	3	90	no usage	30	N/A	N/A
469	KONSTRUKCJA POD WYL.ELFSP 6-2	kg	30	2,226	180	no usage	30	N/A	N/A
	TOTAL		68,425				44,216	24,209	7,505

Notes:

1. Maximum Supply Lead Time is given for the whole group of stock items, not for each item individualy.

2. One group may contain many individual stock items.

3. Ave. Annual Stock in Days of Usage:

   Internal Usage = [ave. annual stock/internal usage]*365 days

   Total Usage = [ave. annual stock/(internal usage+external sales+investments+other)]*365days

4. N/A : no estimates available due to the fact that there were no usage of the particular item during the analysed period.

5. All data for the first 11 months of the year 1993.

6. Optimal average annual stock value: average annual stock value based on 1.3 * Maximum lead time

u:/client/rybnik/ryborg/procur

Appendix B

Discussion of Selected Examples

B.1 DISCUSSION OF SELECTED EXAMPLES

Some of the apparent inefficiencies within the general procurement policy and materials management are discussed below using selected examples. This should help to illustrate the recommendations in this field. The material for the following discussion was gathered by the project team during plant tours and from interviews with procurement and warehousing management and personnel.

B.2 PULVERIZER BALLS FOR BOILERS

Stock item number 3 in Appendix A includes 90 pulverizer balls used in boilers for turning hard coal into powder. For normal operations, each boiler at the Rybnik plant needs 10 pulverizer balls. Hence, the total number of balls used at any time of production is 80. According to the manager of the Warehousing Department and energy blocks engineers, the 90 balls currently held in stock significantly exceed the "strategic reserves" required. Based on management's experience, 10 to 12 pulverizer balls would be a sufficient strategic reserve to ensure security of operations. The current inventory exceeds the estimated "strategic reserve" requirement by nearly 10 times, and hence is enough to last for a 10-year period. The maximum supply lead time for balls is 14 days which further underlines the fact that the current stock level of 90 balls is excessive.

The 90 pulverizer balls represent the average annual value of 1,621 million Zl. Hence, lowering the inventory to 12 balls would decrease the average annual stock value to 216 million Zl and bring the plant the one saving of 1,405 million Zl.

According to the manager of the Warehousing Department, the major problem with lowering the inventory lies in the difficulty of selling the balls on the external market. The pulverizer balls are used specifically by the hard coal fired electricity generating plants and have very few alternative users. Perhaps one option to consider for the Rybnik plant, if this has not been tried already, is to sell the balls to other power plants.

B.3 BALL-BEARINGS ROLLS

Although ball-bearing rolls were ordered 5 years ago, they have been delivered only recently. The order was placed during the command economy when ordering well in advance was a usual procedure to secure material resources, as many companies competed for the limited supply during this time. The transformation of the Polish economy has created a reverse situation in which the supply of products and services in the energy sector exceeds demand. As a result, suppliers are now delivering products which were ordered many years ago.

Although this situation has been externally imposed on the plant, and is not a direct result of inefficient inventory management, the power plant should seriously consider renegotiating such orders. In addition, the ball-bearing rolls often do not meet current specific requirements as new

technology has made older specifications obsolete. This situation would appear to result in unnecessary financial losses to the power plant, as it increases inventory holding company costs by carrying obsolete stock.

In considering the future costs of carrying inventory, perhaps one option is to cancel the orders, not to accept the delivery, and to pay the legal penalty fees for the breach of contract. It is recommended that the power plant should thoroughly review this matter and do detailed calculations to properly assess if the penalty fees would be less than the cost of holding company inventory. In the event that this is the case, management should make a suitable decision with regard to accepting such deliveries. Further research on legal matters and renegotiating similar contracts should also be conducted in order minimize the cost of holding company unnecessary inventories.

B.4 CABLES

A variety of cables are stored for many years at the warehouses. Many of these are no longer needed due to technological changes in the power plant. These cables are too expensive to be readily sold to external, private, or industrial users. One option to be considered may be to sell this stock at its realizable salvage value. However, it is recommended that further research and effort be devoted to seeking potential buyers, both domestic and international.

The above examples present only some of the many stock items which unnecessarily increase the cost of holding company inventory. It is important to note that each of the stock items in the warehouses should be carefully reviewed in terms of its carrying cost, strategic importance, potential savings, and opportunity cost of capital. Only then may an adequate procurement and inventory strategy be formed and implemented.

Section 7

Financial Analysis and Business Plan Preparation

7.1 INTRODUCTION

This section presents the steps involved in financial analyses leading to definition of multi-year business plans for generating companies and other entities operating in a market-driven economic system. These business plans are a key part of the Master Plan for restructuring of generating companies. The financial analyses performed to support the preparation of business plans can also provide useful input to a variety of decisions in the life of generating plants.

The function of the business plans is to project cash flows (costs and revenues) and the amount of residual income over the planning horizon. In stock companies, part of the residual income is distributed to the stockholders as dividends. The remainder is preserved for funding future capital investment projects.

In generating plants, the main sources of income are:

- Revenues received from the sale of electricity and thermal energy
- Dividends and interest earned on investments

There are a number of expense categories:

- Cost of fuel and materials required for plant operation
- Staff salaries;
- Cost of services (e.g., telephone, ash disposal)
- Interest on borrowed capital and debt retirement
- Taxes
- Cost of social services
- Environmental penalties

The large number of time-consuming repetitive calculations involved in the year-by-year analysis of all of these cash flow streams suggests that this work is best performed using computerized methods. The remainder of this section illustrates the development of financial plans using the proprietary program INWEL™, developed by the MODELPOL company, specifically for Polish application. The results may be printed out in Polish or English.

7.2 FINANCIAL ANALYSIS STEPS

The logic sequence of financial analysis is shown in Figure 7-1. These steps are explained below:

Step 1. Input data preparation

Input data for financial analyses may be obtained from existing documentation but more often require analyses and calculations outside the computer program. For valid financial analyses, it is vitally important that input data be correct and accurate. The following input information is necessary:

- Power plant balance sheet for the initial year of analysis
- Fixed and variable operating costs
- Forecast of electricity and thermal energy demand, available generating capacity, controllability, other sources of income
- Working capital requirement, based on previous experience
- Financial liabilities during the planning horizon, annual sums
- Annual depreciation of existing power plant assets
- Projected price escalation for fuel and other production cost items
- Forecast of electricity and thermal energy prices, available capacity, and controllability.

A detailed listing of input items is shown in Table 7-1.

Step 2. Collect data on capital investment projects for plant improvements

If the power plant management carried out a project assessment program, as described in Section 4, a backlog of management approved capital investment projects would already be in existence. As described in the referenced section, supporting documentation for these projects includes:

- Estimated total project cost and timing of project expenditures
- Estimated benefits in terms of capacity or availability increases
- Outline of financing plans
- Desired year of commercial operation
- Projected cash flow analysis

The above data were derived from analyzing the projects one by one. There may be some indication of priorities.

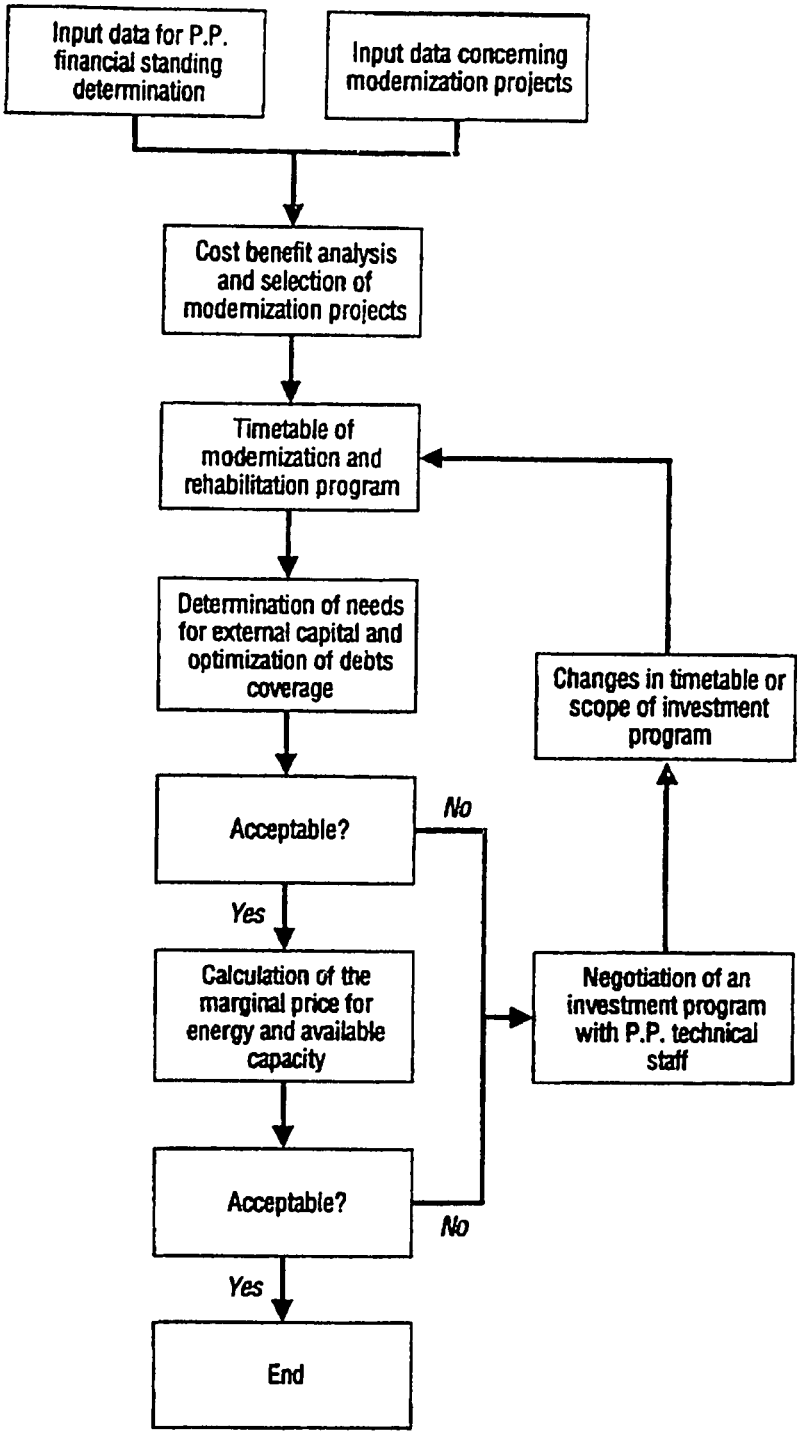

Figure 7-1
Flow Chart of INWEL™ System

Table 7-1

Input Data for the INWEL™ Financial Analysis Program

1. Profit and loss account and balance sheets for the past 2 years

2. Debt retirement (installments, interest)

3. Plant costs by categories - Fixed costs

- Normal maintenance
- Labor costs (salaries, wages, fringe benefits)
- Spare parts and materials
- External services
- Environmental protection costs
- Overhead cost of production
- Administrative costs
- Other, miscellaneous costs
- Periodic maintenance (annual, 5 year overhaul)
  - Variable costs
- Consumption rates of:
  - coal
  - sorbent
  - auxiliary fuel (oil, natural gas)
  - water
  - in-plant power consumption
  - others per MWh of gross generation (lubricants and chemicals)
- Long-term forecast prices of:
  - coal
  - fuel oil
  - sorbent
  - water
- Other variable costs per MWh gross generation:
  - outside services (e.g., ash, waste disposal)

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Table 7-1 (Cont'd)

- environmental fees
- fuel transport costs
- other costs

4. Long-term forecast for:
   - Base load electric output and price
   - Intermediate and peaking power output and price
   - Heat output and price
5. Projected escalation of components of fixed and variable costs
6. Depreciation rates of existing fixed assets
7. Amount of existing obligations and terms of the loans
8. Listing of capital investment projects in progress or already committed, plant assets committed to these projects
9. Data on each investment project to be included in the modernization programs:
   - Financial:
     - investment cost distribution over future years
     - increase in demand for working capital due to the planned projects
     - changes in the variable costs in proportion to changes in gross output (e.g., reduced generation output due to construction outages)
     - changes in fixed costs (e.g., for increased maintenance demand)
     - depreciation rates set for the new investments
   - Technical:
     - change in electric output
     - change in thermal energy output
     - change in fuel consumption per unit of generation (kJ/kWh)
     - changes in plant availability

- **changes is controllability**

Step 3. Selection of projects for inclusion in financial analysis

The plant management may have already decided which projects to consider in the financial analysis. In the absence of such decisions, it is recommended that projects necessary to ensure reliable and/or safe plant operations and those mandated by government regulations (e.g., emission control systems) should be automatically included. Beyond these, projects with highest return on investment should be considered. For the initial runs, it may be desirable to include all projects with returns on investment above an arbitrary cutoff.

Step 4. Analysis of investment program feasibility via cash flow analysis

To ensure that financial analyses of all projects are on a consistent basis it may be desirable to rerun the cost/benefit analyses for each project to be included. The results of these analyses (which include the years of project start and that of commercial operation) together with other pertinent data are then entered into the program for an initial series of computer runs. The objectives of these runs are:

- Determination of power plant financial resources and future cash generation abilities
- Estimation of the plant's own financial contribution to financing the program
- Estimation of the needs for borrowed capital (indispensable credits)
- Optimization of debt service conditions (number of years, grace period, and interest rate), in order to maintain financial liquidity and minimize the financial risk

If these initial, base case runs produce a satisfactory financial program, the sensitivity of the plans to plausible combinations of adverse changes in the financial and performance input parameters are explored through additional runs. Should the results be unacceptable, it would be necessary to modify the investment program. In cooperation with the plant technical staff the project timetables are adjusted or the scope (thus the cost) of projects is reduced.

Step 5. Optimization of investment program timetable

With the modified project time tables and costs, a new set of computer runs are carried out to optimize the timing of projects. The time table/scope change - computer analysis cycle is repeated until a financially and technically acceptable program emerges.

Step 6. Determination of the marginal price of electricity and available power

The final test of acceptability is the calculation of the marginal price of energy and the available power which ensure the liquidity of the power plant. Should these turn out to be unacceptable, Steps 4, 5, and 6 are repeated until satisfactory results are obtained.

Step 7. Preparation of cash flow projection, income statement, balance sheet, and other financial indicators

These activities involve standard financial calculations, performed on a year-by-year basis. The INWEL program is designed to carryout these calculations automatically. The results are printed out in tabular form, showing the financial performance year by year. Key financial indicators are also available in graphic form for easy overview.

Step 8. Sensitivity Analyses

Many of the input variables are derived from best estimates of the future course of electrical demand, fuel prices, the price of electricity, and other external events. Internally, cost or schedule overruns and lower than expected performance benefits can affect cash flows. There is a finite probability that some or many of these variables will follow a course different from that assumed in the input data. The function of sensitivity analysis is to show how the financial health of the company would be affected by such deviations.

Sensitivity analyses may be performed individually for each input variable. With the aid of computer programs, such as INWEL, analyses may be carried out for optimistic and pessimistic combinations of changes in the values assumed in the base case.

Step 9. Selection of optimal financial plan for the plant

The optimal financial plan shows positive cash flow for every year within the planning horizon. In addition, the financial risks revealed by the sensitivity analyses should be acceptable to the plant manager. The plan should also be acceptable to both the financial and the technical managers of the plant. Heavy involvement of the Budget Committee during the plan preparation process is useful for balancing the financial and technical considerations.

Once approved by the plant manager, the plan serves as the basis of budgets for the fiscal year. The financial plant preparation cycle is repeated annually to adjust data from actual experience and to incorporate any new capital projects approved by management.

7.3 EXAMPLE OF FINANCIAL ANALYSIS

Appendix A contains a printout of the initial INWEL run, made with financial data supplied by the Rybnik plant. A commentary on the input data is also included. The purpose of this example is to show the content of the results printout.

The financial plan in this run contains 19 plant modernization projects slated to be implemented in 1994 and 1995. One of these (Project 18) contains a summary of projects already under implementation.

The analysis was carried out on a constant currency ($U.S.) basis. The base year is 1993. The program can also be run with current currency.

The analyses assumed that in 1995, the price of coal will reach $U.S. 32 per ton. The real escalation of the coal prices to the year 2000 was assumed to be 1 percent per year. (Real escalation means the percentage above the average inflation rate). At the same time, the rate of real escalation of the electricity purchased from the Rybnik plant was assumed to be 8 percent per year in 1994, and beyond that, 5 percent per year to the year 2000.

With these assumptions, the analysis shows that the investment program does not balance with the cash flows in 1995. Even considering the plant's own resources and the available loans, the plant need to obtain an additional loan of $U.S. 6 million to bridge the gap in 1995.

As an alternative to this first case, the break-even price of electricity was calculated which would allow carrying out the planned modernization program without the use of the additional $U.S. 6 million loan.

A second alternative was to defer the modernization project Block 4 from 1995 to 1996, and the modernization project for block 5 from 1996 to 1997. It was found that the investment program so modified would not require the added load in 1995.

A sensitivity analysis was carried out for a case where the price of coal was assumed to be 5 percent higher than the initially established values, beginning in 1994. Break-even electricity prices and the sale of all available power were assumed. The results of the analysis indicate that to replace the capital unavailable due to the higher fuel costs, a supplemental loan is needed with disbursements of $U.S. 13 million in 1995 and $U.S. 2 million in 1996. With these assumptions, the total modernization program could be carried out as originally scheduled.

Appendix A

Financial Planning Model

INWELL™

MODELPOL. Ltd.
Wybrzeże Kościuszkowskie 41
00-347 Warsaw
Poland

Warsaw, January 1994

INWEL

BUSINESS PLAN

RYBNIK POWER PLANT

FINANCIAL PROJECTION AND COMPLEX ECONOMIC ANALYSIS OF MODERNIZATION PROGRAM

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BASIC VARIANT

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COMMENTS

1. INTRODUCTION.

Financial projections and economic analysis are shown in US Dollars, which is dictated by USD stability (annual inflation rate only 3-4%).

Therefore it is easier to compare different investment costs in time, and determine prices of coal and energy in Poland bearing in mind world prices.

All calculations refer to fixed prices in US Dollars (price level 1993).

2. EXCHANGE RATE AND DEPRECIATION (refer to page 2).

Rybnik Power Plant cash balance (1992) has been used as a starting point of all calculations for financial projection. Original cash balance expressed in Zlotys has been converted to US Dollars at December 1992 exchange rate (1 USD = 15,454 Zlotys).

In P.P. 1993 balance sheet the statutory fund is treated as stock capital and enterprise fund is treated as retained profit.

Based on P.P. fixed assets components in the end of 1992, a depreciation rate for further years has been estimated in USD by P.P. staff.

For projects completed after 1992 the individual rates of depreciation have been determined, and based on them, the amortization installments for years following the project completion have been calculated.

The total depreciation rate of existing fixed assets and new projects has been calculated automatically by the computer system on the ground of the modernization program schedule.

3. COMPONENTS OF PRODUCTION COSTS (refer to pages 3, 4).

Technical indices such as coal, oil, sorbent and water consumption and financial indices of variable costs refer to gross production which includes energy consumption for P.P. auxiliaries (about 6,8% of gross production).

Financial indices of variable costs and fixed costs had been calculated based on 1993 average costs and forecast for November and December 1993 and then converted to USD at 1993 average exchange rate (1 USD = 18,126 Zlotys).

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Costs of overhauls which are included in fixed costs are mainly costs of materials and spare parts plus repair service from outside.

The labour cost of overhauls as well as maintenance and operation is included (as position No 2) in fixed costs.

Because of overhauls specificity and their high costs, financial projection for further years has been shown depending on overhaul schedule.

The growing demand for assets and current liabilities in 1993 has been calculated based on comparison of 1992 balance sheet with the forecast for 1993 and financial reports from 1993.

4. COAL COSTS (refer to page 5).

In all calculations, the 1994 annual average increase in coal prices has been assumed on the level of 30,6 USD per one tonne (c.v. = 22 kJ/kg, ash content 22%, sulfur content 0.8%) and the 1995 on the level of 32 USD per one tonne.

From 1996 till 2000, the annual increase in coal prices has been assumed 1% (in USD fixed prices of 1993).

The average annual burned coal price including VAT (23.64 USD per tonne), has been used in all financial calculations concerning year 1993.

In financial analyses, the forecast of coal and energy prices increase presented in document of Ministry of Industry and Trade of March 11, 1993 has not been considered.

According to the Polish Government official declarations, the VAT on electric energy and coal sales will be 7%, which differs from previous tax regulations. Hence, VAT level taken to calculations is 3.5% for 1993 and 7% for 1994 and further years.

5. STRUCTURE OF SALES - ENERGY COSTS (refer to page 7).

The electric energy production forecast has been prepared based on information provided by Mr. Wojciech Kułagowski, Financial Manager of PSE (Polish Power Grid Co.), in November 1993, regarding energy sales forecast from Rybnik P.P. to PSE till 2000.

The market price equals average annual electric energy price which includes availability, controllability for Y0 and Y1 signals.

The above price multiplied by net production shows cash flow for energy production in a given year.

An internal price is such a price which multiplied by gross production gives the same cash flow.

To minimize the financial liquidity risk, and taking into account yearly fluctuations of production, the minimal level of cash balance of at least 25% of working capital in a given year, was assumed in calculations.

The minimal profitability of sales in a given year was assumed as 6% of net profit (including dividend). The margin price of electrical energy includes the sales of power and controllability.

The margin price of power includes the sale of availability providing that the sale of electrical energy covers:

- the real variable costs of P.P.;
- standard variable costs set by PSE (Polish Power Grid Co.) for units of a given type.

The first case was considered in calculations. The margin price of power is the base for real price negotiations with PSE when implementing the particular modernization program in P.P.

Power, energy and heat production increase as well as controllability improvement are caused by modernization activities aiming to increase sales.

6. WORKING CAPITAL (refer to page 8).

Current assets and liabilities have been estimated based on 1992 balance, 1993 balance forecast and 1993 monthly financial reports. Based on above, for each component of working capital, the minimal number of days to cover current assets and liabilities has been calculated.

For each following year, based on calculated minimal number of days, the variation forecast has been determined.

The following relations have been determined:

- debts and claims as linear function of forecasted sale;

- coal, oil, sorbent and spare parts reserves as linear function of production costs in given years;

- cash as linear function of forecasted production costs excluding depreciation, spare parts, coal, and sorbent costs;

- current liabilities as linear function of forecasted variable cost, costs of overhauls, materials, spare parts, external services, etc.

7. ONGOING CREDITS (refer to page 10).

Total liabilities of P.P. (such as interest rate and installments) connected with credits obtained before 1993 have been converted to USD in such a way that the sum of installments equals total 1992 P.P. debt and the sum of installments and interest equals the sum of liabilities for each year expressed originally in Zlotys (taking into account average USD exchange rate in a given year).

8. INVESTMENT PROJECTS - ECONOMIC ANALYSIS (refer to pages 12-30).

Economic analysis refers to each individual investment task included in modernization program and is based on expenditure and revenue flows for a given 8% discount rate (in fixed prices).

Effects and costs of each investment task are connected with every component of sales and costs of the P.P. and allow for economic analysis of a chosen investment with the aid of the following indices:

- NPV - net present value;

- IRR - internal rate or return;

- payback period calculated for discounted investments and effects at starting point of investment task.

Altogether 19 investment tasks appear in modernization program. The 18th investment task represents all 1993 and 1994 expeditures not analyzed individually.

In case of modernization tasks concerned with safety, environmental protection and indispensable rehabilitations, the effectiveness is not the most important criterion of economic analyses.

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9. CREDITS (refer to pages 31-36).

Credit No 1 will be used by Rybnik P.P. to cover the cost of Flue Gas Desulphurization system. It is a preferential credit with interest rate lower than anticipated inflation rate (0.75% of interest rate refinanced by NBP - National Bank of Poland).

Aggregated drawn portions (tranches) of credit have been converted to US Dollars, assuming the following increase of exchange rates: 1994 - 27% increase, 1995 - 17% increase; 1996 - 15% increase.

Credit No 2 from Bank Śląski (Silesian Bank) will be used to modernize LP turbine on unit No 4. The above credit is used for each year's calculations and has an annual interest rate - 5%.

Credit No 3 was obtained in 1993.

Credit No 4 is an additional credit and was obtained to implement flue gas desulfurization.

Credit No 5 is a credit line. It represents investment needed to implement the investment program, providing that the initially assumed energy prices have not been changed.

10. VALUE ADDED TAX (refer to page 37).

When calculating VAT, added value of Power Plant does not include variable costs and costs of materials, spare parts and services (the internal cost of overhauls is included in labor costs).

11. CUMULATIVE CASH BALANCE (refer to page 38).

For each year presented in financial projection, the cumulated cash balance is higher than 25% of working capital demand.

It is a safe way of financing providing that present annual fluctuation of sales is lower than 25% and other factors determining cash flows remain the same.

Net flows after 1996 give an idea how much of P.P.'s own resources can be used for modernization program implementation.

Base variant without changing the schedule;

BALANCE SHEET - BASE YEAR

YEARS	Units	1992
ASSETS		
Current assets	mln $	21.930
Cash surplus	mln $	5.892
otal current assets;	mln $	27.822
Gross fixed assets	mln $	198.296
Accred depreciatin	mln $	94.229
Net fixed assets	mln $	104.067
TOTAL ASSETS	mln $	131.889
LIABILITIES		
Accounts payable	mln $	19.915
Short-term bank loan	mln $	0.971
otal current liabilities	mln $	20.886
Long-term liabilities	mln $	0.000
Debenture	mln $	0.000
otal long-term debt:	mln $	0.000
APITAL		
Capital stock (equity)	mln $	43.708
Retained profits (earnings)	mln $	67.295
otal capital:	mln $	111.003
TOTAL LIABILITIES AND NET WORTH	mln $	131.889

Base variant without changing the schedule;

---------- VARIABLE COSTS ----------

Unit production consumption ----------

.	Coal	Mg/MWh	0.451500
.	Oil	Mg/MWh	0.001258
.	Water	Mg/MWh	0.069993
.	Sorbent	Mg/MWh	0.010532
.		Mg/MWh	0.000000
.	Others ------	Mg/MWh	0.000000
.	Spare parts, material	$/MWh	0.000000
.	Direct labour costs	$/MWh	0.000000
.	Services	$/MWh	0.000000
0.	Environment costs	$/MWh	0.643000
1.	Transport and supply of fuel	$/MWh	0.936000
2.	Others ------	$/MWh	0.000000
3.	El. energy (auxiliary)	MWh/MWh	0.068000

Escalation of unit prod. consump. ----------

.	Coal	%/a	0.0
.	Oil	%/a	0.0
.	Water	%/a	0.0
.	Sorbent	%/a	0.0
.		%/a	0.0
.	Others ------	%/a	0.0
.	Spare parts, material	%/a	0.0
.	Direct labour costs	%/a	0.0
.	Services	%/a	0.0
).	Environment costs	%/a	0.0
l.	Transport and supply of fuel	%/a	0.0
2.	Others ------	%/a	0.0
3.	El. energy (auxiliary)	%/a	0.0

Base variant without changing the schedule;

FIXED COSTS		
Fixed costs in base year:	mln $	42.422
Fixed costs structure (base year):		
. Maintenance	mln $	20.000
. Labour costs	mln $	9.550
. Materials	mln $	1.168
. El. energy	mln $	0.214
. Transport services	mln $	0.000
. Waste disposal (ext. service)	mln $	7.735
. Non direct production costs	mln $	1.882
. Administrative costs	mln $	1.715
. Environment fees	mln $	0.158
0. Others	mln $	0.000

Escalation of fixed costs		
. Maintenance	%/a	0.0
. Labour costs	%/a	0.0
. Materials	%/a	0.0
. El. energy	%/a	0.0
. Transport services	%/a	0.0
. Waste disposal (ext. service)	%/a	0.0
. Non direct production costs	%/a	0.0
. Administrative costs	%/a	0.0
. Environment fees	%/a	0.0
). Others	%/a	0.0

Incr. in current assets	-base	mln $	7.295
Incr. in current liabilities	-base	mln $	-4.152
Incr. in working capital	-base	mln $	11.447

Base variant without changing the schedule;

TOTAL COSTS OF PRODUCTION

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
PRICES FORECAST									
. Coal	$ / Mg	23.64	32.75	34.24	34.58	34.93	35.28	35.63	35.99
. Oil	$ / Mg	84.12	84.12	84.12	84.12	84.12	84.12	84.12	84.12
. Water	$ / Mg	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
. Sorbent	$ / Mg	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
	$ / Mg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
. Others ------	$ / Mg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
---------- VARIABLE COSTS									
. Coal	mln $	88.545	124.373	133.802	137.442	147.016	148.139	149.609	151.120
. Oil	mln $	0.878	0.890	0.916	0.932	0.986	0.984	0.984	0.984
. Water	mln $	0.157	0.159	0.164	0.166	0.176	0.176	0.176	0.176
. Sorbent	mln $	0.204	0.206	0.212	0.216	0.229	0.228	0.228	0.228
	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
. Others ------	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
. Spare parts, material	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
. Direct labour costs	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
. Services	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
. Environment costs	mln $	5.334	5.408	5.565	5.660	5.994	5.980	5.980	5.980
. Transport and supply of fuel	mln $	7.765	7.873	8.101	8.240	8.725	8.705	8.705	8.705
. Others ------	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Variable costs (before investment	mln $	102.882	138.910	148.760	152.656	163.127	164.212	165.681	167.193
Changes of variable costs	mln $	0.000	0.192	-1.052	-1.233	-1.949	-1.982	-2.000	-2.115
Variable costs (after investment)	mln $	102.882	138.718	149.812	153.889	165.076	166.194	167.681	169.308

Base variant without changing the schedule;

cd tab. kosztow		1993	1994	1995	1996	1997	1998	1999	2000
FIXED COSTS									
. Maintenance	mln $	20.000	19.000	20.000	16.000	15.000	14.000	14.000	14.000
. Labour costs	mln $	9.550	9.550	9.550	9.550	9.550	9.550	9.550	9.550
. Materials	mln $	1.168	1.168	1.168	1.168	1.168	1.168	1.168	1.168
. El. energy	mln $	0.214	0.214	0.214	0.214	0.214	0.214	0.214	0.214
. Transport services	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
. Waste disposal (ext. service)	mln $	7.735	7.735	7.735	7.735	7.735	7.735	7.735	7.735
. Non direct production costs	mln $	1.882	1.882	1.882	1.882	1.882	1.882	1.882	1.882
. Administrative costs	mln $	1.715	1.715	1.715	1.715	1.715	1.715	1.715	1.715
. Environment fees	mln $	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
0. Others	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fixed costs (before investment)	mln $	42.422	41.422	42.422	38.422	37.422	36.422	36.422	36.422
Changes of fixed costs	mln $	0.000	0.036	0.432	0.905	0.746	0.591	0.305	-0.014
Fixed costs (after investment)	mln $	42.422	41.386	41.990	37.517	36.676	35.831	36.117	36.436
Depreciation	mln $	8.330	6.130	8.945	11.166	11.566	10.966	10.366	9.594
Total production costs	mln $	153.634	186.235	200.747	202.572	213.318	212.991	214.165	215.339

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Base variant without changing the schedule;

STRUCTURE OF SALES

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
Energy production - before ivest.	GWh/a	8295.800	8411.200	9061.000	9216.000	9322.000	9300.000	9300.000	9300.000
Increase in energy production	GWh/a	0.000	0.000	-405.933	-412.877	0.000	0.000	0.000	0.000
Energy production - after invest.	GWh/a	8295.800	8411.200	8655.067	8803.123	9322.000	9300.000	9300.000	9300.000
Internal energy price	cent /kWh	2.173	2.427	2.548	2.676	2.809	2.950	3.097	3.252
Energy price	cent /kWh	2.332	2.604	2.734	2.871	3.014	3.165	3.323	3.489
Marginal energy price	cent /kWh	2.332	2.959	3.143	2.745	2.724	2.735	2.756	2.766
Sales revenue	mln $	180.303	204.134	220.539	235.552	261.859	274.330	288.024	302.413
Avail. capacity - before invest.	MW/a	16151.000	15972.000	16000.000	16000.000	16000.000	16000.000	16000.000	16000.000
Increase in capacity	MW/a	0.000	0.000	-875.200	-653.600	242.400	260.800	257.600	257.600
Avail. capacity - after invest.	MW/a	16151.000	15972.000	15124.800	15346.400	16242.400	16260.800	16257.600	16257.600
Standard capacity price	mln $/MW/m-th	0.003564	0.003852	0.004044	0.004248	0.004452	0.004680	0.004908	0.005160
Marginal capacity price	mln $/MW/m-th	0.004557	0.005417	0.006387	0.004396	0.004238	0.004243	0.004316	0.004327
Avail. capacity out of contract	MW/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Capacity price out of contract	mln $/MW/m-th	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sales of capacity	mln $	57.562	61.524	61.165	65.192	72.311	76.101	79.792	83.889
Controlability Y0- before invest.	MW/a	1180.000	1200.000	1200.000	1200.000	1200.000	1200.000	1200.000	1200.000
Controlability Y0- after invest.	MW/a	1180.000	1200.000	1272.000	1362.000	1362.000	1362.000	1362.000	1362.000
Price of controlability Y0	mln $/MW/m-th	0.001000	0.001000	0.001000	0.001000	0.001000	0.001000	0.001000	0.001000
Controlability Y1- before invest.	MW/a	967.200	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
Controlability Y1- after invest.	MW/a	967.200	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
Price of controlability Y1	mln $/MW/m-th	0.001722	0.001722	0.001722	0.001722	0.001722	0.001722	0.001722	0.001722
Sales of control ability Y0+Y1	mln $	2.846	2.922	2.994	3.084	3.084	3.084	3.084	3.084
Heat output I - before invest.	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output I	TJ/a	0.000	0.000	278.000	458.000	458.000	458.000	458.000	458.000
Heat output I - after invest.	TJ/a	0.000	0.000	278.000	458.000	458.000	458.000	458.000	458.000
Heat price I	$/GJ	3.300	3.300	3.300	3.300	3.300	3.300	3.300	3.300
Heat output II	TJ/a	24.500	24.500	25.000	25.000	25.000	25.000	25.000	25.000
Heat price II	$/GJ	2.040	2.040	2.040	2.040	2.040	2.040	2.040	2.040
Sales of heat	mln $	0.050	0.051	0.968	1.562	1.562	1.562	1.562	1.562
Others	mln $	1.000	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Total sales revenue	mln $	181.353	205.685	223.007	238.614	264.922	277.392	291.087	305.475

Base variant without changing the schedule;

WORKING CAPITAL - DEMAND WITHOUT NEW INVESTMENTS

YEARS			Units	1993	1994	1995	1996	1997	1998	1999
	MDC	CTO								
Acounts receivable	35.0	10.3	mln $	17.632	19.997	21.681	23.199	25.756	26.969	28.300
Spare parts in stock	70.0	5.1	mln $	3.889	3.694	3.889	3.111	2.917	2.722	2.722
Coal	18.0	20.0	mln $	4.427	6.219	6.690	6.872	7.351	7.407	7.480
Oil	100.0	3.6	mln $	0.244	0.247	0.254	0.259	0.274	0.273	0.273
Sorbent	100.0	3.6	mln $	0.057	0.057	0.059	0.060	0.064	0.063	0.063
Cash	38.0	9.5	mln $	5.754	5.644	5.880	5.452	5.526	5.437	5.469
Current assets	-	-	mln $	32.002	35.859	38.454	38.952	41.887	42.871	44.308
Accounts payable	31.0	11.6	mln $	10.582	13.581	14.623	14.629	15.507	15.517	15.645
Net working capital	-	-	mln $	21.420	22.277	23.831	24.323	26.381	27.355	28.664
Increase in working capital	-	-	mln $	11.447	0.857	1.554	0.492	2.058	0.974	1.309

MDC - minimum days of coverage
CTO - coefficient of turnover

Base variant without changing the schedule;

WORKING CAPITAL - DEMAND WITHOUT NEW INVESTMENTS

YEARS			Units	2000
	MDC	CTO		
Acounts receivable	35.0	10.3	mln $	29.699
Spare parts in stock	70.0	5.1	mln $	2.722
Coal	18.0	20.0	mln $	7.556
Oil	100.0	3.6	mln $	0.273
Sorbent	100.0	3.6	mln $	0.063
Cash	38.0	9.5	mln $	5.515
Current assets	-	-	mln $	45.829
Accounts payable	31.0	11.6	mln $	15.785
Net working capital	-	-	mln $	30.044
Increase in working capital	-	-	mln $	1.380

MDC - minimum days of coverage
CTO - coefficient of turnover

Base variant without changing the schedule;

ON GOING CREDITS

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
Long-term loans									
- repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- interest paid	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-term loans									
- repayments made	mln $	0.971	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- interest paid	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Base variant without changing the schedule;

ON GOING CREDITS

YEARS	Units	2001	2002	2003	2004	2005	2006	2007	2008
Long-term loans									
- repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- interest paid	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-term loans									
- repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- interest paid	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Base variant without changing the schedule;

Investment No	1	NPV	mln $	13.553
Project launching year	1994	IRR	%	40.220
		Payback Period	years	4.642

Modernizacja czesci NP
Modernization of LP part turbine

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
OSTS:									
Investment costs	mln $	0.000	1.514	1.680	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	1.100	1.100	1.100	1.100	1.100
Increase in controlability Y0	%	0.000	0.000	5.000	10.000	10.000	10.000	10.000	10.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.200	0.403	0.403	0.403	0.403
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Base variant without changing the schedule;

Investment No	2	NPV	mln $	-0.320
Project launching year	1993	IRR	%	4.576
		Payback Period	years	0.000

Rekonstrukcja kotla K5
Reconstruction of boiler K5

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	1.100	1.150	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.030	0.030	0.030	0.020	0.020	0.020
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.100	0.100	0.100	0.088	0.088	0.060
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.375	0.281	0.234	0.188	0.090	0.000

Base variant without changing the schedule;

Investment No	3		NPV	mln $	-0.447
Project launching year		1995	IRR	%	5.251
			Payback Period	years	0.000

Rekonstrukcja kotla K7 i K8
Reconstruction of boiler K7 and K8

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
OSTS:									
Investment costs	mln $	0.000	0.000	4.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.060	0.060	0.060	0.040	0.040
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.200	0.200	0.200	0.200	0.170
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.560	0.470	0.370	0.180	0.000

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Base variant without changing the schedule;

Investment No	4	NPV	mln $	-4.809	
Project launching year	1993	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Odsiarczanie - instalacja pilotowa
FGD - test instalation

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	1.500	3.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	-0.200	-0.200	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	-0.004	-0.004	0.000	0.000	0.000	0.000	0.000

Base variant without changing the schedule;

Investment No	5	NPV	mln $	-46.334	
Project launching year	1993	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Osiarczanie bl 5 i 6
FGD on units 5 and 6

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
:OSTS:									
Investment costs	mln $	0.100	3.750	16.140	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
:ENEFITS									
Increase in energy output	%	0.000	0.000	-4.480	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	-5.600	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	-1.000	-1.000	-1.000	-1.000	-1.000	-1.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	-0.025	-0.025	-0.037	-0.025	-0.062

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Base variant without changing the schedule;

Investment No	6		NPV	mln $	-41.017
Project launching year		1993	IRR	%	IRR out of range: (0-100)%
			Payback Period	years	0.000

Odsiarczanie bl 7 i 8
FGD on units 7 and 8

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.070	0.000	4.513	7.415	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	-4.480	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	-5.600	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	-0.700	-1.290	-1.290	-1.290	-1.290
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.000	-0.025	-0.025	-0.025	-0.037

Base variant without changing the schedule;

Investment No	7		NPV	mln $	6.047
Project launching year		1993	IRR	%	15.270
			Payback Period	years	12.080

Cieplownictwo 60 MW
Heat generation 60 MW

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.250	2.500	7.350	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	278.000	458.000	458.000	458.000	458.000	458.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	-0.006	-0.006	-0.006	-0.013	-0.013

Base variant without changing the schedule;

Investment No	8	NPV	mln $	-3.529	
Project launching year	1993	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Sprezarkownia - odpopielanie (inwestycja odtworzeniowa)
Compressor room - ash removal (rehabilitation)

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.350	4.150	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.063	0.063	0.063	0.063	0.063	0.063
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.013	0.013	0.013	0.013	0.013	0.013

Base variant without changing the schedule;

Investment No	9	NPV	mln $	-6.661	
Project launching year	1994	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Sprezarkownia odsiarcznania (inwestycja ekologiczna)
Compressor room for FGD system (ecological investment)

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.000	0.500	4.250	1.650	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	-0.070	-0.070	-0.070	-0.070	-0.070	-0.070
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006

Base variant without changing the schedule;

Investment No	10	NPV	mln $	-2.955	
Project launching year	1994	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Wymiana mostu skosnego - etap II (inwestycja odtworzeniowa)
Replacement of conveyor bridge - 2nd stage (rehabilitation)

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.003	0.006	0.006	0.006	0.003	0.003	0.003

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Base variant without changing the schedule;

Investment No	11	NPV	mln $	-1.053	
Project launching year	1993	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Komputeryzacja naweglania (BHP + odtworzenie)
Computerization of coaling system (industrial safety + rehabilitation)

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.960	0.200	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.014	0.014	0.014	0.014	0.014	0.014	0.014

Base variant without changing the schedule;

Investment No	12		NPV	mln $	2.612
Project launching year		1993	IRR	%	16.210
			Payback Period	years	10.891

Komputeryzacja blokow
Computerization of power units

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	1.205	1.687	0.482	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.100	0.150	0.150	0.150	0.150	0.150
Increase in controlability Y0	%	0.000	0.000	1.000	1.500	1.500	1.500	1.500	1.500
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.188	0.250	0.250	0.250	0.250	0.250	0.250
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	-0.003	-0.003	-0.003	-0.006	-0.006

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Base variant without changing the schedule;

Investment No	13		NPV	mln $	-0.166
Project launching year		1994	IRR	%	1.698
			Payback Period	years	0.000

Pomiary turbin Bently - Nevada
Measurements on turbines (by Bently - Nevada)

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.000	0.316	0.317	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.050	0.050	0.050	0.050	0.050
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.038	0.038	0.038	0.038	0.038

Base variant without changing the schedule;

Investment No	14		NPV	mln $	0.629
Project launching year		1993	IRR	%	23.760
			Payback Period	years	6.276

Pomiary emisji
Emission monitoring

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.328	0.657	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.150	0.150	0.150	0.150	0.150	0.150	0.150
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	-0.004	-0.004	-0.007	-0.007	-0.007

Base variant without changing the schedule;

Investment No	15	NPV	mln $	-0.961	
Project launching year	1994	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Wymiana rozdzielnic R 6 (6 blokow) - BHP + odtworzenie
Replacement of R6 switchgear (6 units) - industrial safety + rehabilitation

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
:OSTS:									
Investment costs	mln $	0.000	1.250	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.013	0.025	0.025	0.025	0.025	0.025	0.025

Base variant without changing the schedule;

Investment No	16	NPV	mln $	-1.794	
Project launching year	1993	IRR	%	IRR out of range: (0-100)%	
		Payback Period	years	0.000	

Urzadzenia przetokowe odpopielania - BHP
Wagon handling for ash removal system - industrial safety

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
OSTS:									
Investment costs	mln $	1.350	0.600	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.010	0.010	0.010	0.010	0.010	0.010	0.010

Base variant without changing the schedule;

Investment No	17		NPV	mln $	-0.559
Project launching year		1995	IRR	%	4.737
			Payback Period	years	0.000

Modernizacja generatora bl 4
Modernization of generator on unit 4

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.000	0.000	2.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.125	0.125	0.125	0.125	0.125
Increase in controlability Y0	%	0.000	0.000	0.000	2.000	2.000	2.000	2.000	2.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.003	0.006	0.009	0.009	0.009

Base variant without changing the schedule;

Investment No	18		NPV	mln $	0.000
Project launching year		1993	IRR	%	0.000
			Payback Period	years	0.000

Inwestycje drobne 1993-1994
Remaining investment 1993-1994

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	12.770	2.560	0.000	0.000	0.000	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Base variant without changing the schedule;

Investment No	19		NPV	mln $	-0.955
Project launching year		1995	IRR	%	IRR out of range: (0-100)%
			Payback Period	years	0.000

Modernizacja ukladow wzbudzenia
Modernization of excitation system

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
COSTS:									
Investment costs	mln $	0.000	0.000	0.400	0.600	0.600	0.000	0.000	0.000
Increase in working capital	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BENEFITS									
Increase in energy output	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in avail. capacity	%	0.000	0.000	0.000	0.000	0.000	0.125	0.125	0.125
Increase in controlability Y0	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in controlability Y1	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Increase in heat output	TJ/a	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - electr.	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in var. costs - heat	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Decrease in fixed costs	mln $	0.000	0.000	0.000	0.000	0.000	0.006	0.006	0.006

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Base variant without changing the schedule;

SHORT-TERM LOAN:

Cost of finance - interest (%) 10.0

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
- portion drawn	mln $	3.560	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- repayments made	mln $	0.000	3.560	0.000	0.000	0.000	0.000	0.000	0.000
- interest paid	mln $	0.000	0.356	0.000	0.000	0.000	0.000	0.000	0.000

Base year interest paid 0.000

Base variant without changing the schedule;

SHORT-TERM LOAN:

Cost of finance - interest (%) 10.0

YEARS	Units	2001	2002	2003	2004	2005	2006	2007	2008
- portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
- interest paid	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Base year interest paid	0.000								

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Base variant without changing the schedule;

LONG-TERM LOAN:

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
Investment costs	mln $	19.983	26.834	41.132	9.665	0.600	0.000	0.000	0.000
Sum of long term loans:									
portion drawn	mln $	7.344	19.250	23.330	1.600	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	5.094	0.000	6.812	10.619	10.619	10.619	7.286
interest paid + commitment fee	mln $	0.000	0.477	0.094	0.754	0.392	0.358	0.313	0.267
1. Cost of finance	%	-1.5	(-10.8)	-8.3	-7.8	-7.8	-7.8	-7.8	-7.8
Number of instalments	-	3	Amount of imst.	mln $	3.333				
Grace period	years	0	Commitment fee	%	0				
Loans 1 - total amount commited	mln $	10.000							
portion drawn	mln $	2.250	3.000	3.150	1.600	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.000	3.333	3.333	3.333	0.000
interest paid+commitment fee	mln $	0.000	-0.034	-0.564	-0.693	-0.775	-0.517	-0.258	0.000
2. Cost of finance	%	5.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-	5	Amount of imst.	mln $	0.512				
Grace period	years	0	Commitment fee	%	2				
Loans 2 - total amount commited	mln $	2.560							
portion drawn	mln $	0.000	0.880	1.680	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.512	0.512	0.512	0.512	0.512
interest paid+commitment fee	mln $	0.000	0.034	0.044	0.128	0.102	0.077	0.051	0.026

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Base variant without changing the schedule;

LONG-TERM LOAN:

YEARS	Units	2001	2002	2003	2004	2005	2006	2007	2008
Investment costs	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sum of long term loans:									
portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.474	0.000	0.000	0.000	0.000	0.000	0.000	0.000
interest paid + commitment fee	mln $	-0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1. Cost of finance	%	-7.8	-7.8	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-								
Grace period	years								
Loans 1 - total amount commited	mln $								
portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
interest paid+commitment fee	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2. Cost of finance	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-								
Grace period	years								
Loans 2 - total amount commited	mln $								
portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
interest paid+commitment fee	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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Base variant without changing the schedule;

		-- 1993 --	-- 1994 --	-- 1995 --	-- 1996 --	-- 1997 --	-- 1998 --	-- 1999 --	-- 2000 --
3. Cost of finance	%	8.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-	1	Amount of imst.	mln $	5.094				
Grace period	years	0	Commitment fee	%	0				
Loans 3 - total amount commited	mln $	5.094							
portion drawn	mln $	5.094	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	5.094	0.000	0.000	0.000	0.000	0.000	0.000
interest paid+commitment fee	mln $	0.000	0.408	0.000	0.000	0.000	0.000	0.000	0.000
4. Cost of finance	%	0.0	(-1.5)	-10.8	-8.3	-7.8	-7.8	-7.8	-7.8
Number of instalments	-	5	Amount of imst.	mln $	0.474				
Grace period	years	2	Commitment fee	%	0.375				
Loans 4 - total amount commited	mln $	2.370							
portion drawn	mln $	0.000	2.370	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.000	0.474	0.474	0.474	0.474
interest paid+commitment fee	mln $	0.000	0.000	-0.036	-0.256	-0.196	-0.147	-0.110	-0.073
5. Cost of finance	%	5.0	(0.0)	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-	5	Amount of imst.	mln $	6.300				
Grace period	years	0	Commitment fee	%	0.375				
Loans 5 - total amount commited	mln $	31.500							
portion drawn	mln $	0.000	13.000	18.500	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	6.300	6.300	6.300	6.300	6.300
interest paid+commitment fee	mln $	0.000	0.069	0.650	1.575	1.260	0.945	0.630	0.315
Total long term debt	mln $	51.524							

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Base variant without changing the schedule;

		-- 2001 --	-- 2002 --	-- 2003 --	-- 2004 --	-- 2005 --	-- 2006 --	-- 2007 --	-- 2008 --
3. Cost of finance	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-								
Grace period	years								
Loans 3 - total amount commited	mln $								
portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
interest paid+commitment fee	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4. Cost of finance	%	-7.8	-7.8	-7.8	0.0	0.0	0.0	0.0	0.0
Number of instalments	-								
Grace period	years								
Loans 4 - total amount commited	mln $								
portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.474	0.000	0.000	0.000	0.000	0.000	0.000	0.000
interest paid+commitment fee	mln $	-0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5. Cost of finance	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of instalments	-								
Grace period	years								
Loans 5 - total amount commited	mln $								
portion drawn	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
repayments made	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
interest paid+commitment fee	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total long term debt	mln $								

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Base variant without changing the schedule;

INCOME STATEMENT

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
1.1 Sales revenue	mln $	181.353	205.685	223.007	238.614	264.922	277.392	291.087	305.475
1.2 Variable costs	mln $	102.882	138.718	149.812	153.889	165.076	166.194	167.681	169.308
1.3 Fixed costs	mln $	42.422	41.386	41.990	37.517	36.676	35.831	36.117	36.436
2.0 Sales less 1.2 and 1.3	mln $	36.049	25.580	31.205	47.208	63.170	75.367	87.288	99.731
2.1 Turnover tax (value added tax)	mln $	1.735	2.734	3.100	4.188	5.316	6.181	7.035	7.928
2.2 Depreciation	mln $	8.330	6.130	8.945	11.166	11.566	10.966	10.366	9.594
2.3 Interests (financial costs)	mln $	0.000	0.833	0.094	0.754	0.392	0.358	0.313	0.267
3.0 Gross profit 2.0-2.1-2.2-2.3	mln $	25.984	15.883	19.065	31.100	45.896	57.862	69.574	81.941
3.1 Tax exempted income	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.2 Gross profit less exemption	mln $	25.984	15.883	19.065	31.100	45.896	57.862	69.574	81.941
3.3 Tax	mln $	10.394	6.353	7.626	12.440	18.358	23.145	27.830	32.776
4.0 Net profit 3.2-3.3+3.1	mln $	15.590	9.530	11.439	18.660	27.537	34.717	41.745	49.165
Dividends	mln $	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874
Retained profit	mln $	14.716	8.656	10.565	17.786	26.663	33.843	40.870	48.290
Accumulated retained profit	mln $	14.716	23.372	33.937	51.723	78.386	112.229	153.099	201.390

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Base variant without changing the schedule;

CASH FLOW FOR FINANCIAL PLANNING

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
TOTAL CASH INFLOW:	mln $	30.672	37.909	44.756	31.433	39.981	45.694	52.239	58.899
Net profit	mln $	15.590	9.530	11.439	18.660	27.537	34.717	41.745	49.165
Depreciation	mln $	8.330	6.130	8.945	11.166	11.566	10.966	10.366	9.594
Increase in current liabilities	mln $	-4.152	3.000	1.041	0.007	0.877	0.010	0.128	0.140
Short-term loan	mln $	3.560	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-term loan	mln $	7.344	19.250	23.330	1.600	0.000	0.000	0.000	0.000
Debenture loan (bond issue)	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Stock issues	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL CASH OUTFLOW:	mln $	29.123	40.219	44.601	17.850	15.029	12.477	12.931	9.680
Increase in current assets	mln $	7.295	3.857	2.595	0.499	2.935	0.984	1.437	1.520
Short-term loan repayment	mln $	0.971	3.560	0.000	0.000	0.000	0.000	0.000	0.000
Incr. in fixed assets -invest.	mln $	19.983	26.834	41.132	9.665	0.600	0.000	0.000	0.000
Loan repayments	mln $	0.000	5.094	0.000	6.812	10.619	10.619	10.619	7.286
Debenture repayment (bond)	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	mln $	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874
NET CASH-FLOW - SURPLUS	mln $	1.549	-2.309	0.155	13.583	24.952	33.216	39.308	49.218
CUMULATIVE CASH BALANCE	mln $	7.441	5.132	5.286	18.870	43.822	77.038	116.346	165.565

Base variant without changing the schedule;

BALANCE SHEET

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
ASSETS									
Current assets	mln $	29.225	33.082	35.677	36.175	39.111	40.094	41.531	43.052
Cash surplus	mln $	7.441	5.132	5.286	18.870	43.822	77.038	116.346	165.565
Total current assets;	mln $	36.666	38.213	40.963	55.045	82.932	117.132	157.878	208.616
Gross fixed assets	mln $	218.279	245.113	286.245	295.910	296.510	296.510	296.510	296.510
Accred depreciatin	mln $	102.559	108.689	117.634	128.801	140.367	151.333	161.699	171.294
Net fixed assets	mln $	115.720	136.424	168.611	167.110	156.143	145.177	134.811	125.217
TOTAL ASSETS	mln $	152.386	174.637	209.574	222.154	239.076	262.309	292.689	333.833
LIABILITIES									
Accounts payable	mln $	15.763	18.763	19.804	19.811	20.688	20.698	20.826	20.966
Short-term bank loan	mln $	3.560	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total current liabilities	mln $	19.323	18.763	19.804	19.811	20.688	20.698	20.826	20.966
Long-term liabilities	mln $	7.344	21.500	44.830	39.618	28.999	18.379	7.760	0.474
Debenture	mln $	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total long-term debt:	mln $	7.344	21.500	44.830	39.618	28.999	18.379	7.760	0.474
CAPITAL									
Capital stock (equity)	mln $	43.708	43.708	43.708	43.708	43.708	43.708	43.708	43.708
Retained profits (earnings)	mln $	82.011	90.667	101.232	119.018	145.681	179.524	220.394	268.685
Total capital:	mln $	125.719	134.375	144.940	162.726	189.389	223.232	264.102	312.393
TOTAL LIABILITIES AND NET WORTH	mln $	152.386	174.637	209.574	222.154	239.076	262.309	292.689	333.833

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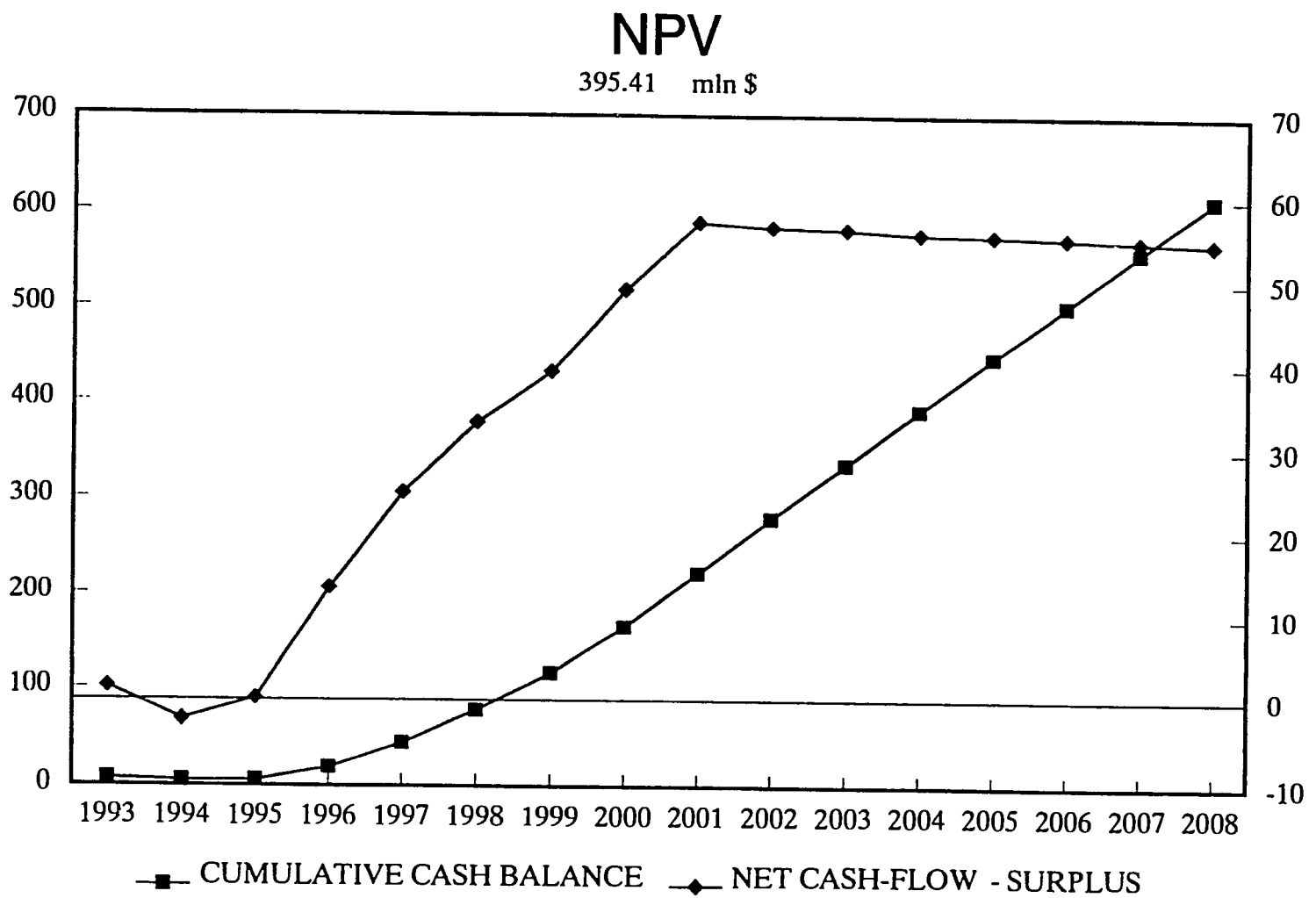
Base variant without changing the schedule;

FINANCIAL RATIOS:

YEARS	Units	1993	1994	1995	1996	1997	1998	1999	2000
GROUP 1: profitability ratios									
net profit / sales	-	0.086	0.046	0.051	0.078	0.104	0.125	0.143	0.161
net profit / total assets (ROA)	-	0.102	0.055	0.055	0.084	0.115	0.132	0.143	0.147
net profit / equity (ROE)	-	0.357	0.218	0.262	0.427	0.630	0.794	0.955	1.125
net profit / total capital	-	0.124	0.071	0.079	0.115	0.145	0.156	0.158	0.157
n.p.+interests/debt+equity (ROI)	-	0.117	0.064	0.061	0.096	0.128	0.145	0.155	0.158
n.p.+interests/fixed assets	-	0.135	0.073	0.068	0.116	0.179	0.242	0.312	0.395
GROUP 2: liquidity ratios									
net work. capital / total assets	-	0.141	0.128	0.114	0.109	0.110	0.104	0.098	0.090
current assets/current liab. (CR)	-	1.898	2.037	2.068	2.779	4.009	5.659	7.581	9.950
cash+receivables/current liab.(QR)	-	1.210	1.367	1.392	1.446	1.512	1.566	1.621	1.680
cash+receivables/expenditures	-	58.743	51.964	52.449	54.635	56.595	58.547	60.480	62.471
GROUP 3: leverage ratios									
l.t. debt/l.t. debt+capital (DR)	-	0.055	0.138	0.236	0.196	0.133	0.076	0.029	0.002
l.t. debt / capital (DR)	-	0.058	0.160	0.309	0.243	0.153	0.082	0.029	0.002
n.p.+inter.+deprec./inter.+repaym.	-	0.000	1.738	217.681	4.042	3.587	4.194	4.795	7.815
n.p.+inter.+dep.+cash/inter.+rep.	-	0.000	2.333	280.183	4.762	4.089	4.689	5.296	8.545
EBIT + deprec. / interests	-	0.000	27.434	298.745	57.054	147.633	193.154	256.677	343.661

Base variant without changing the schedule;



GROUP 1: profitability ratios
Fig. 1

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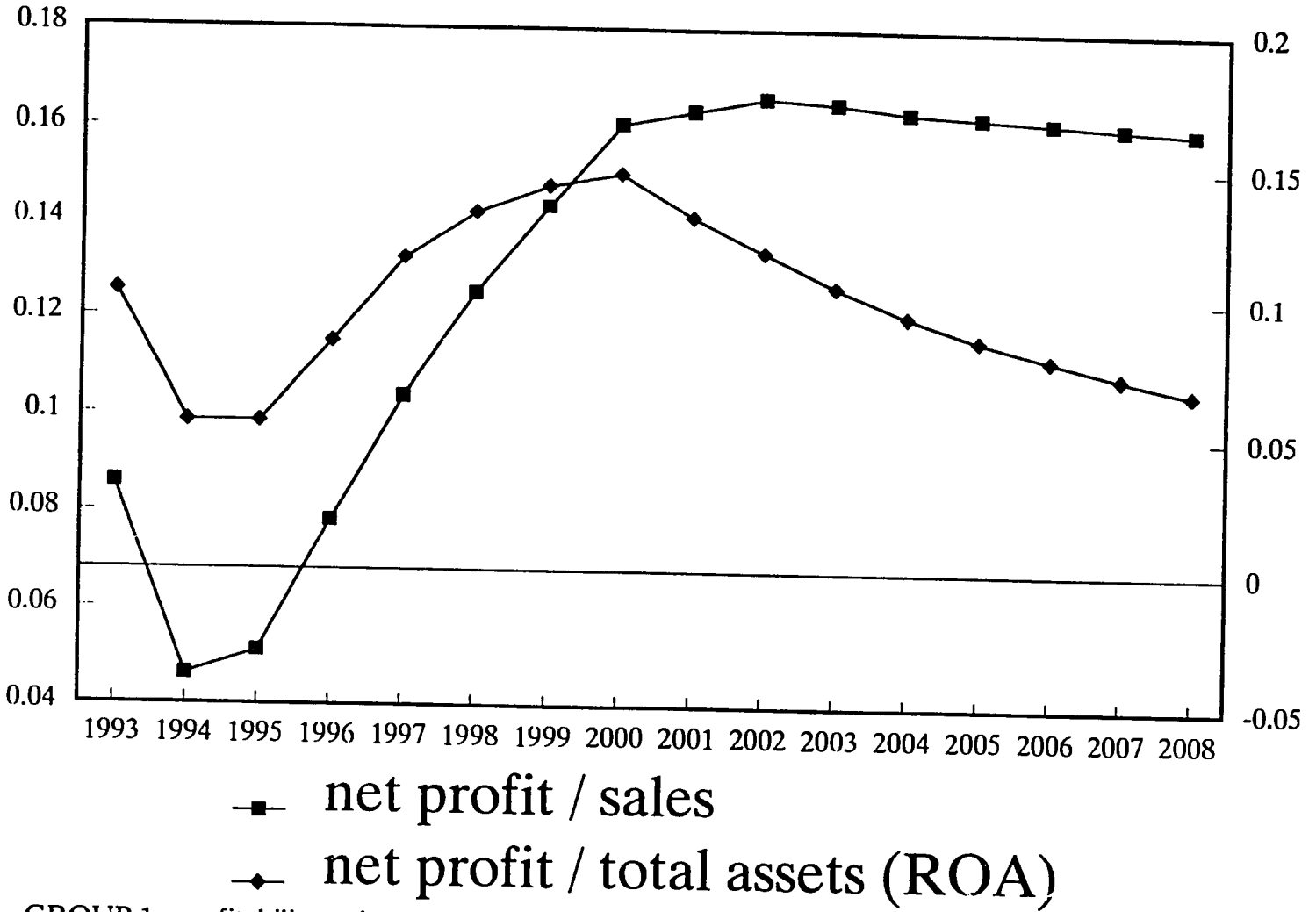
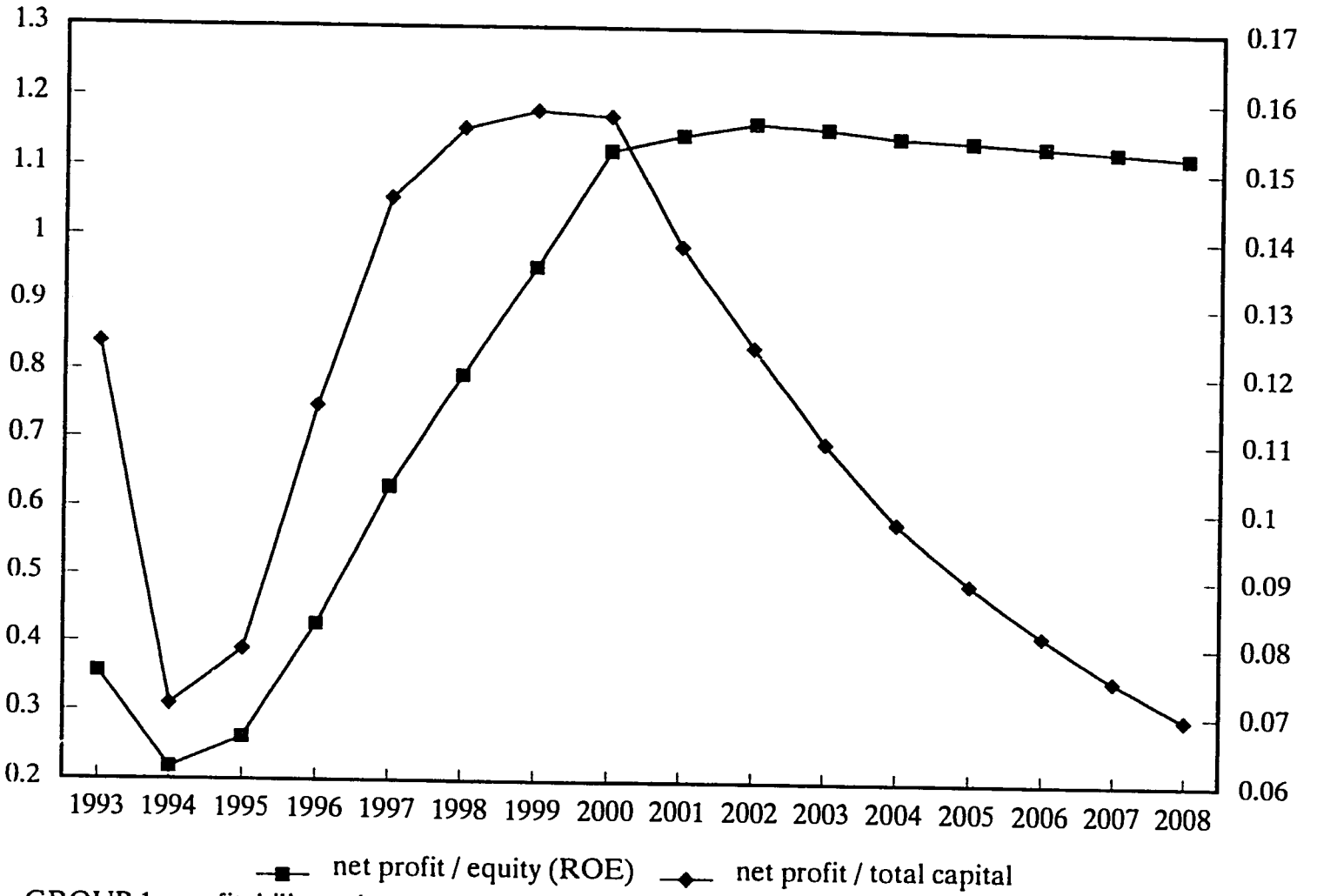
Base variant without changing the schedule;



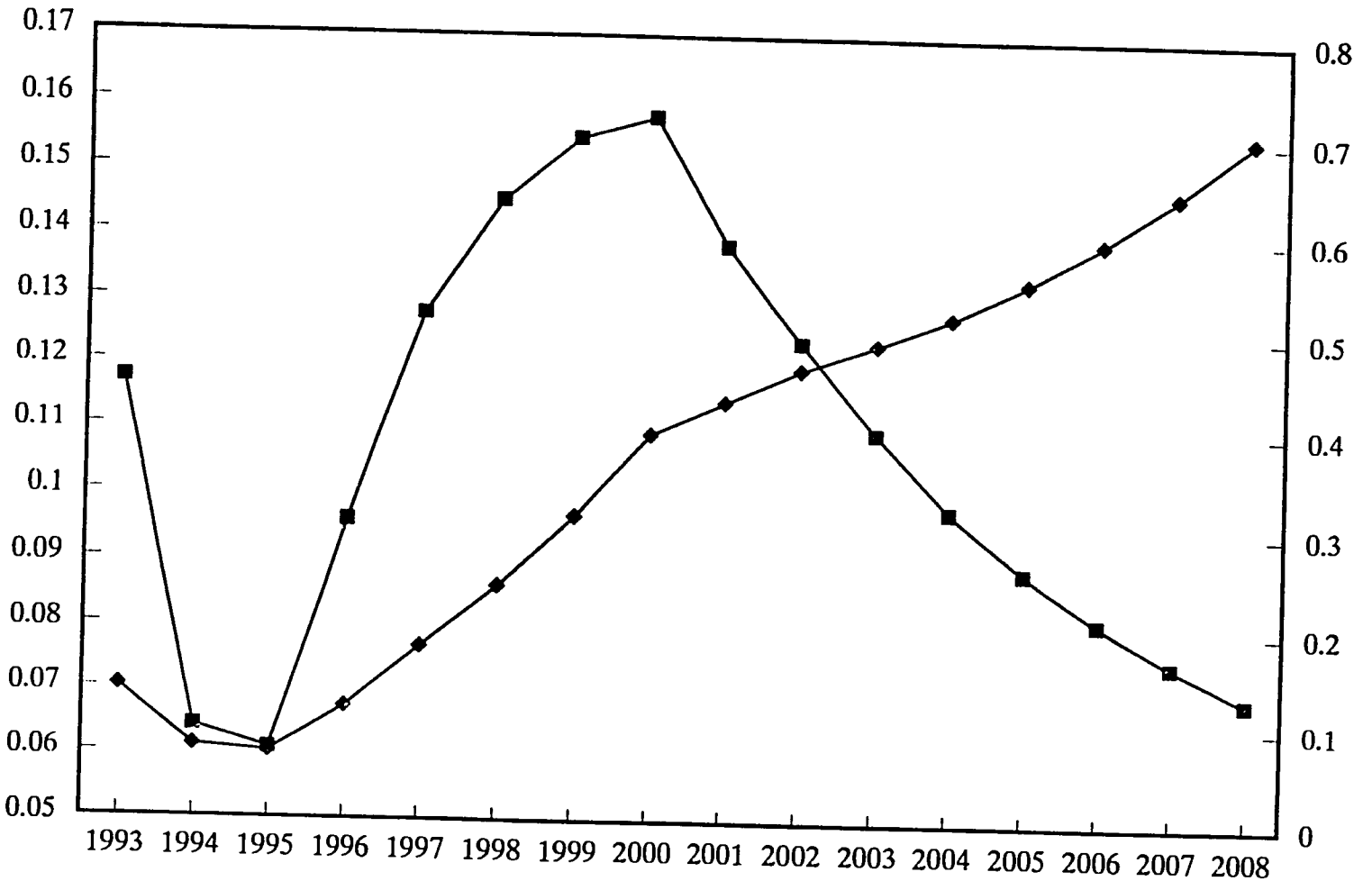
GROUP 1: profitability ratios
Fig. 2

Base variant without changing the schedule;



GROUP 1: profitability ratios
Fig. 3

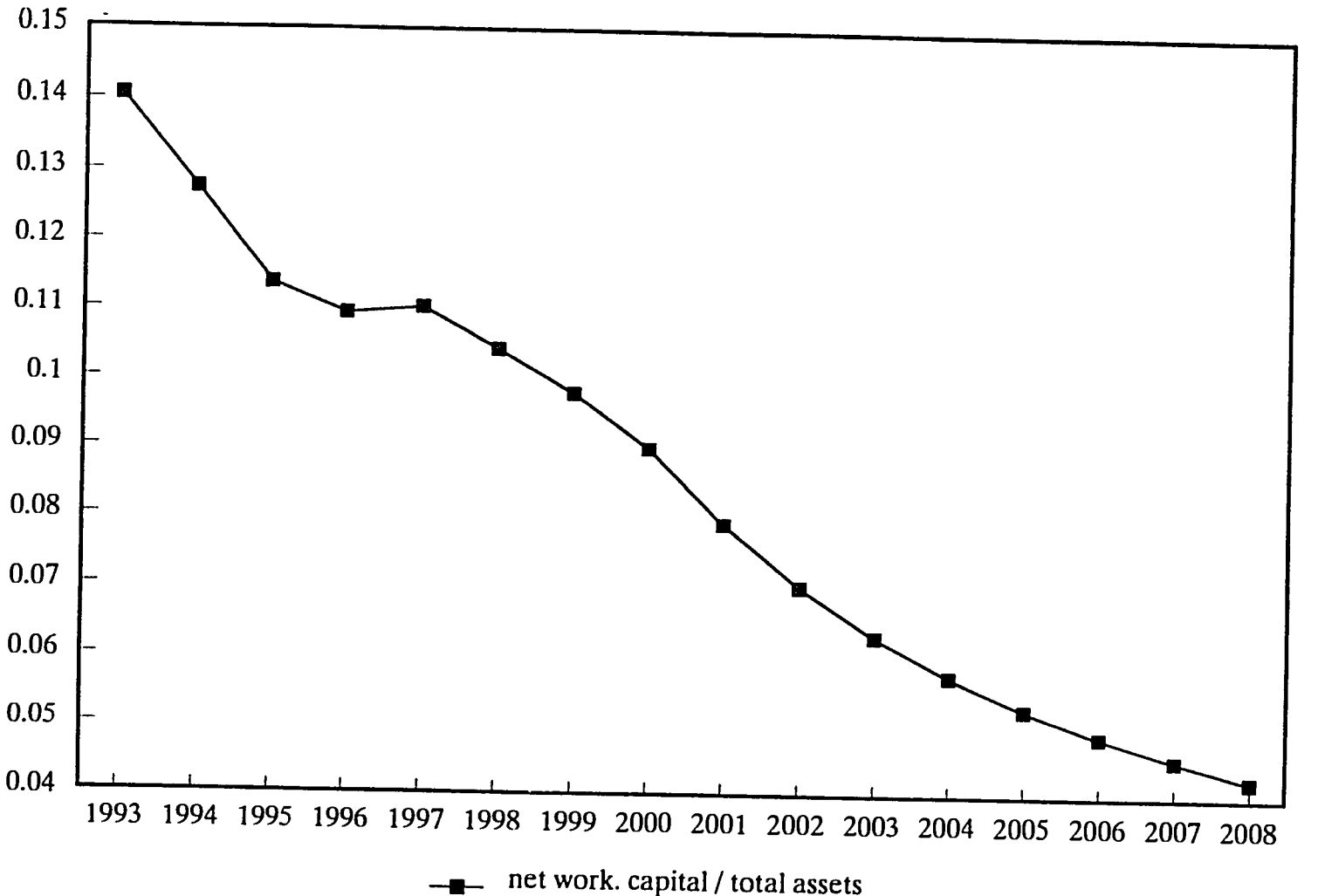
Base variant without changing the schedule;



GROUP 1: profitability ratios
Fig. 4

227

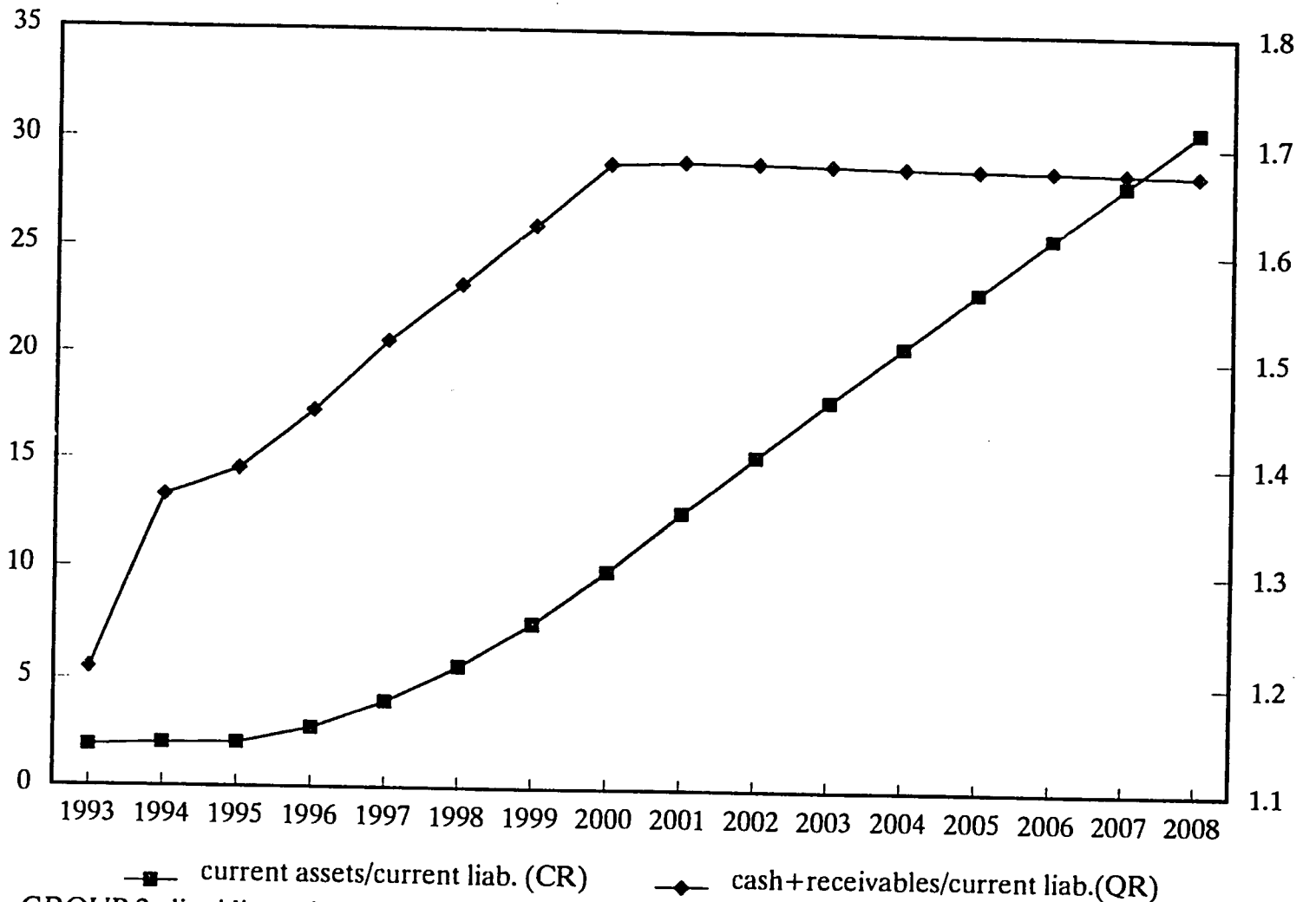
Base variant without changing the schedule;



GROUP 2: liquidity ratios
Fig. 1

228

Base variant without changing the schedule;



GROUP 2: liquidity ratios
Fig. 2

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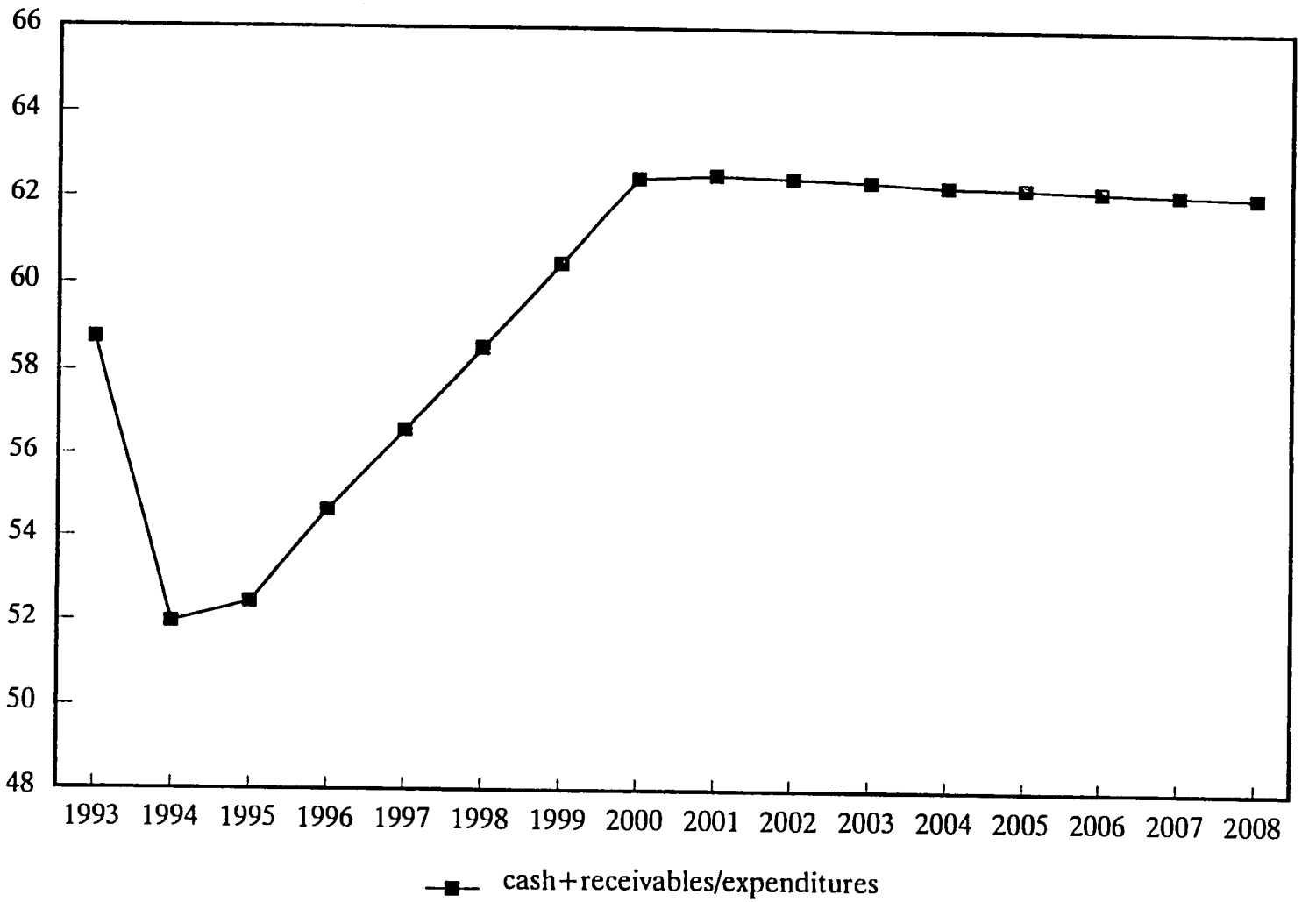
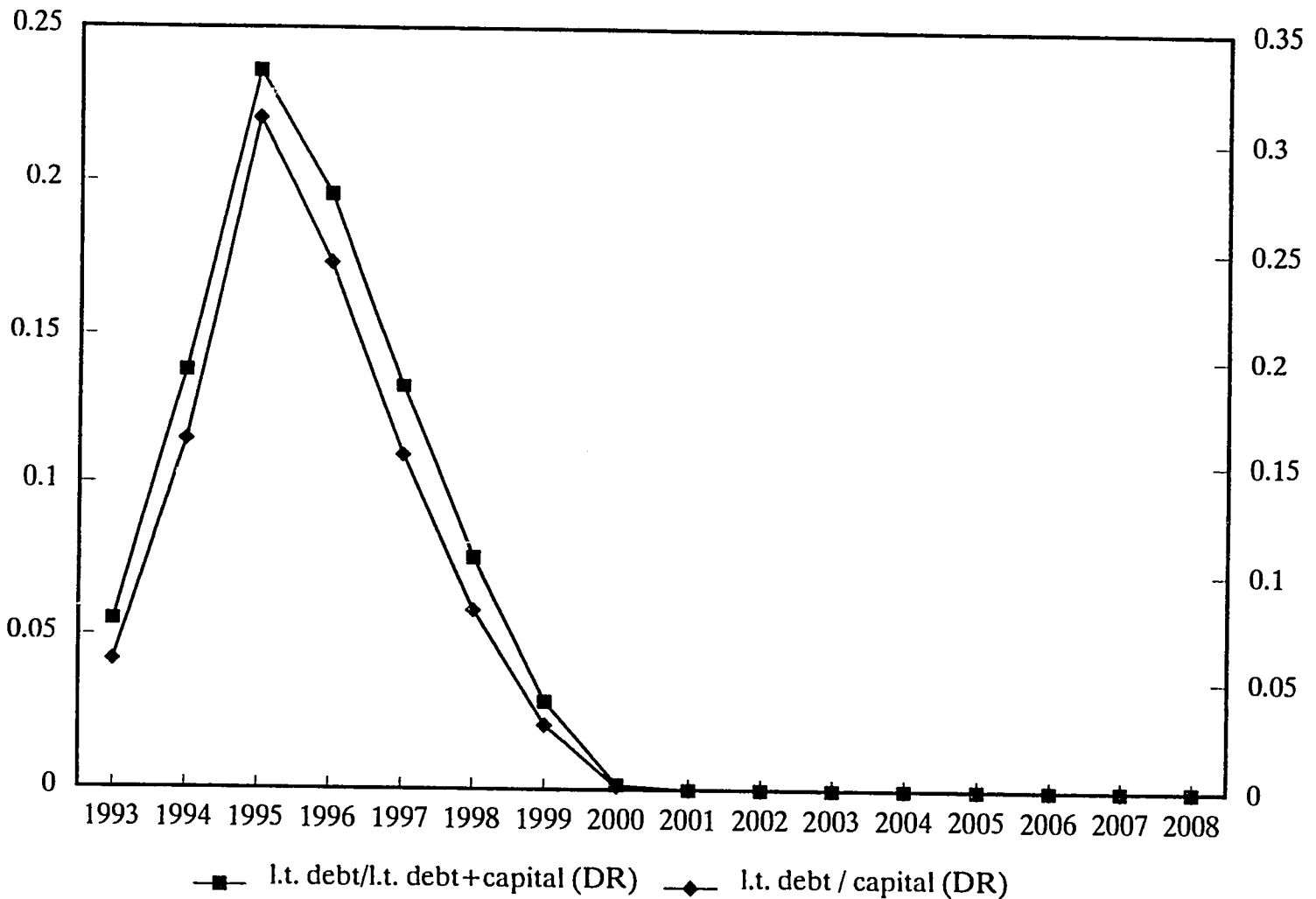


GROUP 2: liquidity ratios
Fig. 3

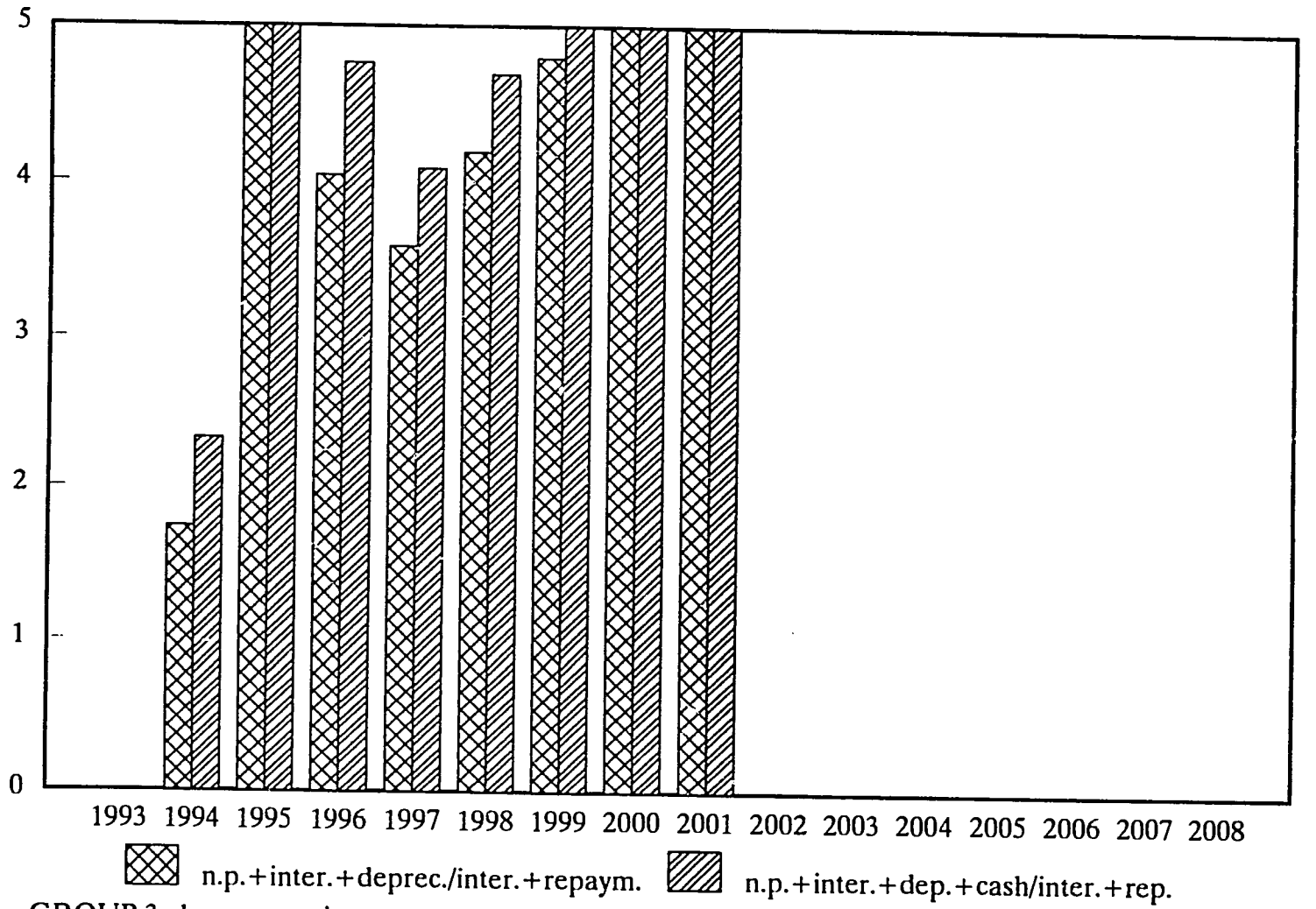
Base variant without changing the schedule;



GROUP 3: leverage ratios
Fig. 1

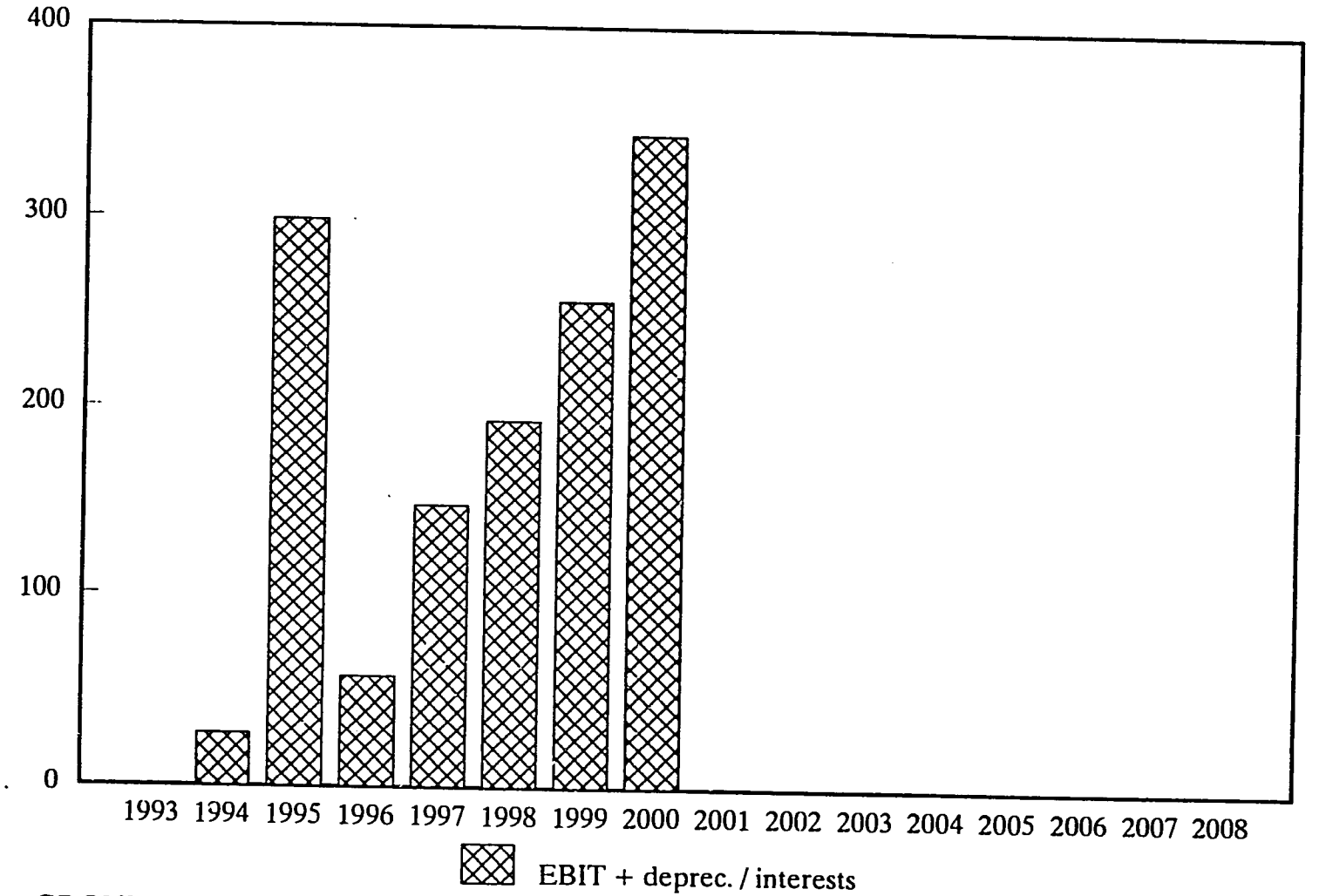
231

Base variant without changing the schedule;



GROUP 3: leverage ratios
Fig. 2

Base variant without changing the schedule;



GROUP 3: leverage ratios
Fig. 3

CONCLUSIONS

The third, intermediate variant of the investment program has also been presented. It assumed dividing project # 5 into two phases in years 1994 and 1995. In this situation the loss on energy and available capacity sales in 1994 would be lower since there would be only one unit outaged for modernization. Implementation of project # 6 remains unchanged as in the original program. Also, a modification in the schedule of investment expenditures for project # 9 has been introduced, i.e. compressor room FGD system.

If the above option is accepted for implementation, it will be necessary to draw additional credit of 11,000,000 USD in 1994 and of 5,000,000 USD in 1995.

The prices assumed in the above third variant are lump-sum, marginal prices for energy and price for available capacity which allow for program implementation without any additional credits.

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