

6.4 Personnel Training

Even if excellent organization and a management system are established, no growth of an enterprise can be expected without the right human resources. The personnel training done within a company is to provide the necessary expertise and skills training based on the corporate philosophy, business goals and business strategy, and staff must be trained and acquire knowledge and skills for the execution of the above issues.

Also, regarding implementation of the above issues, it is necessary to make clear the purpose of a particular personnel trainings, how the personnel training will be reflected in daily work and to establish a training curriculum with understanding and awareness at organizational and individual levels. The above issues need much labor and time.

The circumstances for the implementation of personnel training in Mongolia and TES4 on the basis of the site survey result are described below. And this clause proposes that from the viewpoint of maintenance management, this training shall be required at the power plant from now on.

6.4.1 Implementation of Personnel Training in Mongolia

As for personnel training, the program has been adopted nationwide in Mongolia and the Energy Training Center (ETC) was established as the Energy Authority (EA) direct control organization in 1964. Then, with the assistance of GTZ, the German loan implementation project organization, the personnel training project for power plants has been conducted since 1998 and continuation until 2005 has been determined.

The aim of this project is to send electrical and/or mechanical experts dispatched from Germany to ETC and perform enforcement training for basic knowledge of electricity and machines, and internship training for welding, processing machines, etc., and is to train engineers on the Mongolia side. Also, the engineer who is experienced in training can then become a lecturer at ETC, they can be dispatched to the educational laboratory in each plant and also conduct training for each power plant engineer.

Specifically, an educational laboratory has been established in each power plant (6 in total) in Mongolia and the curriculum on the basis of basic and higher education for boiler and/or turbine engineers has been established. The actual attendance record in each plant is shown in Table 6.4-1. And the basic concept of the personnel training for the power plant engineers in EA direct control management is shown in Table 6.4-2.

**Table 6.4-1 Participant List of the Personnel Training for Power Plant Engineers
(1999-2001 Total)**

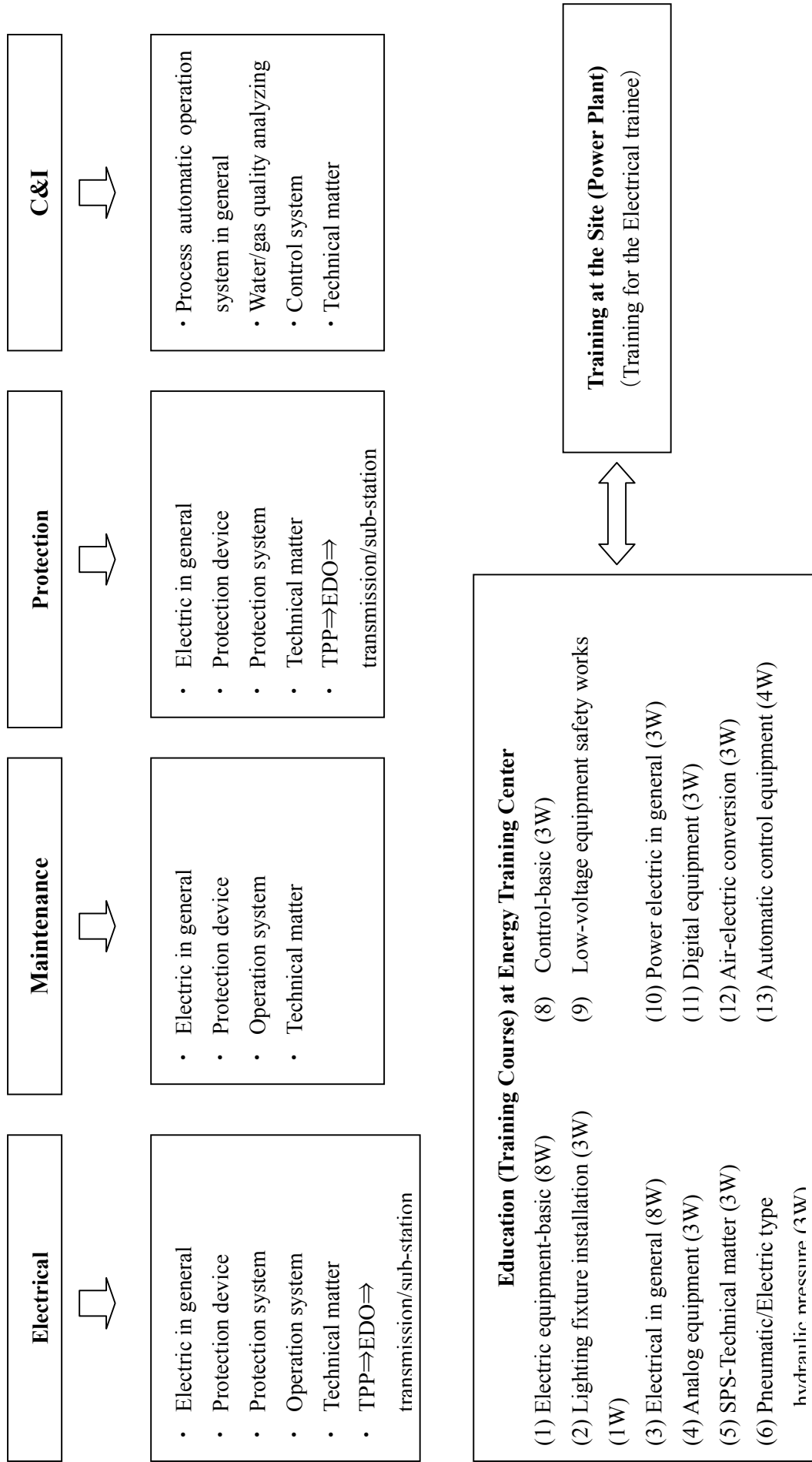
<i>Plant name</i>	<i>Engineer occupational description name.</i>			<i>Total</i>
	<i>Electricity</i>	<i>Machine</i>	<i>Welding</i>	
Ulaanbaatar TES2	8	7	15	30
Ulaanbaatar TES3	88	13	14	115
Ulaanbaatar TES4	67	15	24	106
Darkhan	24	6	8	38
Erdenet	26	9	6	41
Choibalsan	11	3	2	16
Daranzadgad	8	5	1	14
Others	41	16	57	114
Total	273	74	127	474

In addition, the training (German loan SIDA assistance) for engineers at transmission and sub-station facilities in HDO and EDO aiming at the improvement of the central area has been incorporated into the plan from January 2001 to 2005. However, since the assistance from Germany, which sets the above-mentioned educational support as the main purpose, will be completed in 2005 and beyond, establishment of the training system, which will become uniquely self-organized by Mongolia, is needed.

However, even though the purpose of the personnel training performed by the above organization is to improve the basic and specialist knowledge, repair work skills (electrical, machinery and welding works) will not be practical or sufficient in the quality control of equipment and maintenance management.

In order to aim at maintenance management of the quality control of the equipment in TES4, the establishment of an educational system, which aims at improvement in the knowledge of employment, operation, quality control of equipment and so on, is urgently required.

Table 6.4-2 Education/Training System for Thermal Power Plant Under EA Direct Control (Basic Concept for Electric)



6.4.2 Personnel Training Activities in TES4

(1) Training and Educational System in General

The curriculum of the training and the educational system, which is for employees of the power plant, is managed by the person in charge of the above issues in the Administration Department. And the introduction of a basic training curriculum for new employees, workers and engineers, has been carried out periodically. Also, a technical training curriculum for engineers has been created and it has been carried out periodically.

The contents of lectures based on the curriculum of the education/training system of EA direct control management, and the lectures based on the technical training manuals prepared by the chief engineer of each section have been prepared periodically.

Moreover, foreign training systems other than the training center directly controlled by the EA are also substantial, and attendance at night school and/or an energy university (tuition is a corporate burden) is possible for the person who is recruited and intends to graduate from a technical college (ten-year student). About 40 people have graduated from the above-mentioned university over the last decade since 1990 and acquired an engineering qualification.

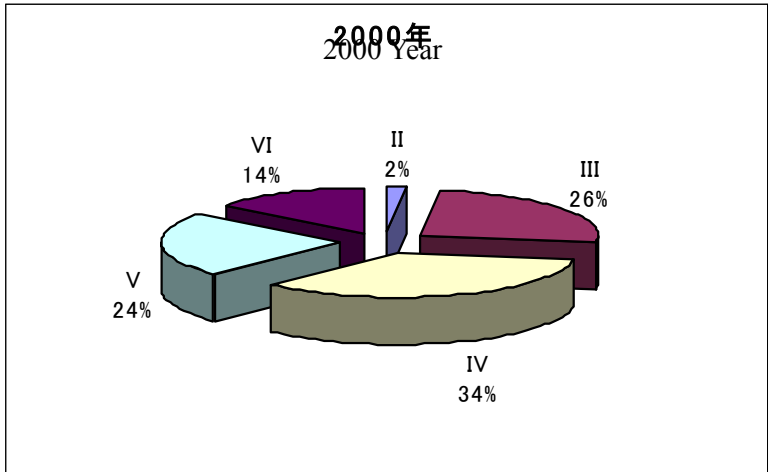
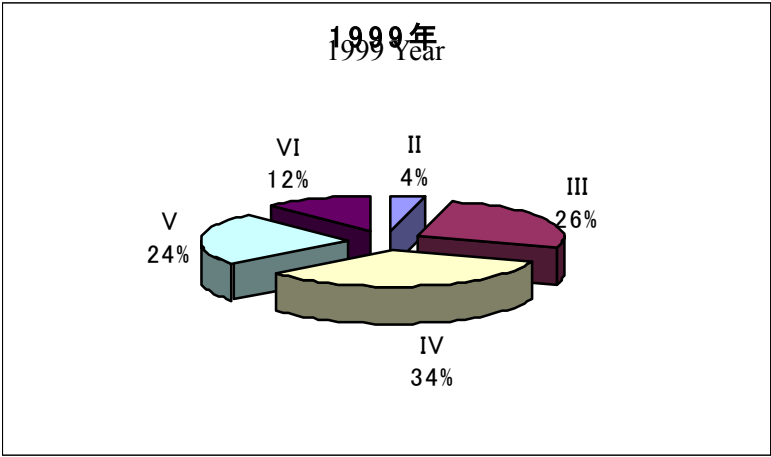
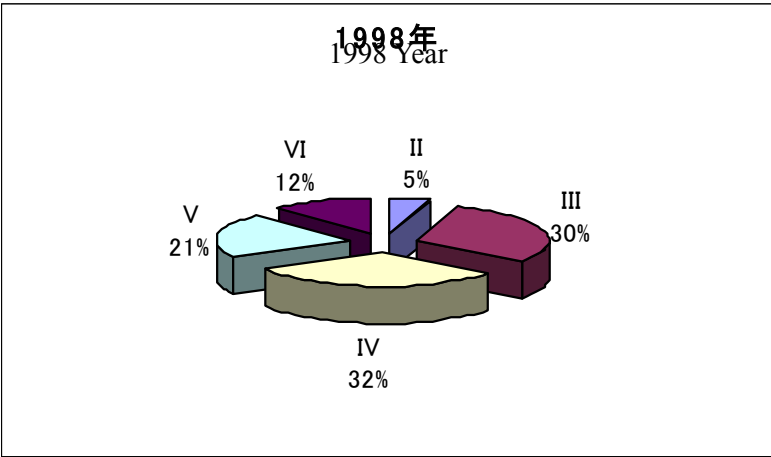
Furthermore, to attain an engineering qualification, attending Management Academy schools is also possible; at present, 12 people have graduated since 1990 (2 people are now attending the schools above). The expenses pegged for training throughout each year have increased from 70 million to 110 million Tug. (Approximate 7 million to 11 million yen).

The training budget for 2001 is shown in Table 6.4-3, and the changes of the past three years in the job class composition of engineers and workers engaged in TES4 are shown in Fig 6.4-1.

From this information, it is understood that the level of education for engineers has been improving every year.

Table 6.4-3 The Training Budget Items in 2001 at TES4

<i>No.</i>	<i>The training field and items</i>	<i>Number</i>	<i>Expense (1,000Tug.)</i>
1	Personnel training (dispatch to the special university etc.)	71	20,810
2	Educator training attendance		3,500
3	Attendance to the Training Center	80	9,600
4	Preparation and distribution of the teaching-materials		2,600
5	Attendance to the Seminar	200	1,000
6	Special expense etc., such as electrical, C&I, and other special fields for the studies	37	4,755
7	Overseas training dispatch expense etc.	6	15,000
8	Scholarship	35	7,000
9	Others (stay, traveling expenses, etc. are included)		6,435
Total			70,700



Note):
 II~VI is shown to the
 classifications.
 (For details, refer to
 Table 6.4-4.)

Fig. 6.4-1 TES4 Composition Statistics Classified by Job Class

(2) Outline of the Training Curriculum

The outline of the curriculum for new employees' introduction training in each qualification level (the 2nd - 6th classes) is shown in Table 6.4-4. Promotion of the personnel is based on the result of a promotion examination, which is conducted every year.

Table 6.4-4 The Outline of the Training Curriculum Classified by Qualification

<i>Qualification</i>	<i>New employee</i>	<i>Class II</i>	<i>Class III</i>	<i>Class IV</i>	<i>Class V</i>	<i>Class VI</i>
<i>Business experience</i>	<i>1.5 Years</i>	<i>1.5 Years</i>	<i>1.5 Years</i>	<i>2-3 Years</i>	<i>2-3 Years</i>	<i>2-3 Years</i>
Skill level	Worker			Engineer	<ul style="list-style-type: none"> • Master • Vice-chief engineer • Chief engineer 	
Curriculum	<ul style="list-style-type: none"> • Carry out introductory training for three months. • Get 1.5 years business experience (as a worker) after training ends • Take the promotion examination, which is conducted once every year. 	<ul style="list-style-type: none"> • An examination is taken once during the 1-2 years business experience mentioned, and if passed, the candidate will be promoted to the 2nd class. • Those with excellent results will be directly promoted to 3rd class. • A skill level contest will also be held once a year, and those who obtain excellent results will get a rise in their salary. 				
Penalty	<ul style="list-style-type: none"> • If the examination is failed 3 times in succession, the candidate will be retired from the course.. 					

(3) Improvement Training in a Technical Level

The training carried out in the Operation Department in 2000 is described below.

- 1) Of the staff members, one person among the senior engineers acquired an adviser engineer's qualification for the boiler equipment. And for the shift engineers, qualification improvement training was carried out periodically (one person participated in 2000) in Russia for three (3) weeks.
- 2) On the job training was carried out with technical cooperation from Germany for the plant operators from June 1 to July 15, 2000.

- 3) Desk training (basic technical matters) and an examination for all Operation Department people in charge was conducted from September 15 to October 15, 2000. And a total of eighty-six (86) staff took part in the lecture on basic knowledge education from the operation parts group in 2000.
- 4) Computer-related basic training and linguistic training (English) was carried out at the computer center in the power plant in 2000, and a total of thirty-two (32) people took part in the lecture in 2000.
- 5) The training for the improvement in technical aspects was carried out for repair workers and engineers at the electric power educational center.

(4) Power Plant Operator Training

The formation of the shift engineers for power plant operation has been organized by an engineer from each section belonging to the operation group, which is constructed by direct organization, and among those, engineers from the boiler operation section, turbine operation section and electric operation section have taken charge of the operators. These operators reside in the central control room (CCR) and the electric central control room (ECCR) of the Turbine/Generator and Switch-gears. Moreover, shift engineer selected by the Operation Department also resides in the CCR and directs all members of the operation staff.

With the above-mentioned staff arrangement, an operation and person on duty schedule is created for the operation of each section every month, and submitted to the Operation Department. The Operation Department checks the number and a member of staff's planned capability, and the chief engineer also looks over the information.

Concerning the cultivation of an operator, the plan which positively employs young college-educated engineers is one that was formed about five (5) years before and about eighty (80) percent of turbine operators and sixty (60) percent of boiler operators are college graduates at present. There is a program for cultivation of an operator and it usually takes two (2) to three (3) years.

Also, it determines which operator shall be promoted to the operation in each section, taking the candidates wishes into consideration. The operation department performs the management of an operator's quality. In addition, when an engineer that has graduated from high school and/or from a technical school is promoted to an operator, following the plan, training is given in a technical training center or at a college of engineering.

1) Turbine operator training

The trainee first enters into a duty team; desk training on the following items is mainly performed as the training for a turbine operator. The trainee is made a sub operator in the power plant operation, and is then promoted to operator within a fixed period.

- (a) Circulation water equipment (pump)
- (b) District hot water supply equipment
- (c) Deaerator
- (d) Feed water pump

2) Boiler operator training

While a boiler operator is training, the trainee enters a duty team similar to that of the turbine operator training and undergoes mainly desk training on the following items. The trainee is made a sub operator in the power plant operation and in particular, undergoes boiler-related valve training, then is promoted to operator within a fixed period.

- (a) Ash handling equipment
- (b) Mill equipment
- (c) Coal feeder and others

3) Senior operator (shift engineer)

Through five (5) year's work experience as an operator, the operator then conducts the technical generalization of the work of newcomer subordinates as a senior operator, in addition to determining technical matters, judgment, etc. and labor safety as the leader of operation shift group.

Now, the results of the site study will be presented, as well as the training required for power plant operation conducted by the boiler simulator board added during the Phase-1 rehabilitation project. However, the situation is such that only eight (8) boiler operators have experienced this simulator training in the power plant at present.

Moreover, also this simulator board is equipped in the boiler portion only, and the present condition is such that there is no opportunity to master compulsory subjects through simulator training such as power plant start-up and shut-down operations required for gaining experience as a power plant operator.

It will be necessary to make a plan that includes on the job training (O.J.T.) in power plant operation training from now on.

For reference, the outline of the operator-training curriculum and its time scale, which EPDC has been conducting as part of the power plant operator training, is shown in Table 6.4-5. In general, the trainee becomes a power plant operator three (3) to four (4) years later. And as instructed by the simulator board, which has a function almost equivalent to the power plant, the instructor (lecturer) puts into practice the matters required for the operation through this curriculum constructed periodically, which until now has been performed as an operational practice.

Table 6.4-5 Thermal Power Plant Operator Training Pattern

<i>Training candidate</i>	<i>Training items and course</i>	<i>Training period</i>
Sub-operator (New employee)	Sub-operator training course The new employee basic and introductory training	6.5 - 7.5 months
Sub-operator	Sub-operator Business	5.5 - 12.5 months
Boiler operator training	Boiler operator training Simulator basic training Accident operation and instruction training	8.5 months
Boiler operator	Simulator application training	5.5 months
Turbine/electrical operator training	Simulator application training	8.5 months
Plant (BTE) operator	Accident operation and instruction training	Operational experience 2.4 months

6.4.3 Recommendation for Personnel Training

As for the shift to a publicly traded company, the 1st phase of the privatization, which is predicted here, is such that a country accepts the independence of each power plant and the power plant itself has all the responsibility for management. Since growth of the power plant and development are not even within the view of the president in the company including staff, and the direction and the potential have been decided, training of the talented staff supporting a company, therefore, is very important theme.

In the case of TES4, which is shifting from a state-owned enterprise to a publicly traded company, the following matters are proposed for the items considered necessary for personnel training from now on.

(1) Promotion of On the Job Training (O.J.T.)

Although, OFF.J.T has been the main subject of training and external training has also been carried out, OFF.J.T is an auxiliary means of personnel training and is meaningful as basic education for a new employee; however, the matter of acquisition of fundamental knowledge and skills in a short period remains, and this will not be sufficient for gaining hands-on experience (meaning “activities one can do with the technology automatically”).

The fundamental concept of the personnel training should be based on O.J.T. (work experience study), through which an engineer learns in his day-to-day work, and if an engineer understands theories but is not applying them practically through hands-on experience, this does not constitute technical acquisition.

The training for engineers based on real experience from the field of maintenance management of the power plant is very important. Therefore, O.J.T. should be the focus of personnel training from now on, and the following are proposed as a goal.

- 1) To harness OFF. J. T. a senior instruction employee shall educate each new employee, and it is recommended that the instruction system classified by individual lectures on an O.J.T. basis executed by an instructor who has instruction responsibility shall be continuously conducted in TES4.
- 2) O.J.T. is directly linked with works conducted in the power plant, and as a result, work based on O.J.T. is different from that of OFF.J.T; it is directly linked with the production of the power plant, so the pressure on a participant is high and the educational effect also increases. Thus, training, which concentrates on O.J.T. and understanding through hands-on experience, should be performed.

- 3) By using a expert dispatching system from external assistance including Japan, a supervisor who has advanced repair technology and management experience shall be dispatched to the power plant. And during a fixed period (at least two or three years), instruction on the daily repair works shall be performed by a supervisor as O.J.T. for the power plant staff with the aim of improvement in repair technology and maintenance management.

(2) Proposal of the Definite Training Items

1) Training on operation administration

In order for the management of the power plant operation to be performed efficiently, it is necessary to employ operation staff with the proper knowledge for operation, and education should be the centerpiece of personnel training from entry into a company. Therefore, after formulating definite training items, periods, etc., a series of educational training, such as sub-operator training, plant operator training, chief operator training, etc, in addition to operation skill should be clearly executable.

This training should be incorporated into daily works, equipment repair works and power plant efficiency administration, and necessary practice should be carried out across a broad field by O.J.T.

The most important item for this training is to support the capability of the following items, which are required in operation administration of the power plant, and will lead to stable operation of the power plant.

- Preparation, maintenance and mastery of operation manuals and proceeding for special operation
- Planning of the management target value on operation and management, early detection of abnormal operation, countermeasures
- Checking and analyzing the daily operation record (log sheet, chart, investigation, and taking-over operator with necessary information), and informational communization, early detection and quick management for abnormalities
- Early detection and action for initial abnormalities in equipment by round-check (patrol) of the whole power plant area
- Scheduled change-over of the power plant auxiliary equipment and checking

2) Training on maintenance administration

After completion of the education related to operation, and development of talented staff who can operate the whole power plant, it is important to participate actively in maintenance, each specialist subject training, external training, etc. in the company, and to carry out the practice by O.J.T.

The purpose of this training is to support the capability, which makes it possible to carry out maintenance on the following items required in the power plant, by being well versed in maintenance from repair work to technical matters of equipment.

- Practice of minor maintenance through daily repair work
- Planning and administration of details for a periodic inspection (major and middle overhaul) and its items, and a cycle
- Safety control of repair work (industrial accident prevention, work safety measures)
- Preventive measures of similar failures (analysis of a failure part, permanent measure, etc.)

3) Training on power plant efficiency administration

For the administration of power plant efficiency, the most important issue is that advanced specialist knowledge, energy saving and the reduction of energy consumption are attained, while educating efficiency analysts and performing continued monitoring of their efficiency.

Therefore, after graduating from the operational education courses and becoming a talented member of staff who can operate the whole power plant, the employee should be made to participate in power plant management, each specialist subject education and external training in the company, and education through practical experience should for the most part be carried out.

Generally, serial administration for the following items is important for efficiency administration, and the early detection of an abnormal part of the equipment and the selection of a suitable and improved substitute are made through data, which has been measured and recorded.

- Early detection of an abnormal part and the communication of this to staff concerned with the creation of efficiency management.
- Thorough understanding of the actual age deterioration of equipment, calculation of thermal efficiency, analysis of an efficiency variation factor, and selection of a suitable substitute and procedure by creation of a monthly efficiency management.
- Actual result of the efficiency in the fiscal year, implementation item, planning of efficiency in the following year and the maintenance and rehabilitation plan of parts that affect efficiency deterioration by the creation of efficiency management for a fiscal year

6.4.4 Change of Mind-Set into the Work Place

Although the national property privatizing law was enacted in 1991, and full-scale market oriented economic reform has been continuing for ten (10) years in Mongolia, the breakaway from a socialist management control system over a period of seventy (70) years has not been so easy for the people in the State of Mongolia. Bureaucratism continues to prevail, a compartmentalized conscious mind dominates and lateral adjustment and collaboration is diluted. Also, there is little self-originality exerted and creative consciousness is low.

Based on this shift to a public traded company, many trials have been performed in TES4 giving the utmost importance to the problem of how to advance a change of mind-set of the work place, which has been the domain of top management for the past several years, and its necessity is increasingly on the rise.

(1) Present Condition for the Activities on Change of Mind-Set

In TES4, various activities, such as a bonus and penalty system and management by an objective system, have been initiated on the proposal of the head himself in order to increase efficiency management through permission of the EA and change of mind-set into the work place.

1) Organization and method system

The organization and method system has been carried out as part of an incentive system in TES4. The improvement method for defective equipment is considered, the idea (improvement proposal) based on operation maintenance and improvement of the power plant is submitted to the technical committee and a fixed bonus is given through the final discussion, examination and adoption by the technical committee.

As for the improvement in personnel skill on an individual level, the following incentives and commendations, which are performed once per year at the end of the year, are offered.

- (a) Labor activity bonus (in 2000: one person)
- (b) The 1st class prize of the power plant (in 2000: two persons)
- (c) The 2nd class prize of the power plant (in 2000: one person)

In addition, there is also an incentive, which is commended by the EA in each power plant. The head of each power plant gives a presentation based on their activities during a meeting that is held once every year. An explanation is provided in the technology and economic report for the year based on the program, which is drawn up in each part of the power plant,

and the actual performance result is reported to the EA. The EA then gives a fixed remuneration as a bonus to an excellent power plant.

In addition, it is aimed at improvement in consciousness in TES4 operators through the continuation of stable operation, efficient maintenance of equipment, and over a long period of time, and the following actions were implemented for the operators of each operation section in 2000.

- (a) To correspond to the peak load of the winter planned in the power plant in February and March 2000, sustaining operation competition of the target load was performed in each duty operation and the result was evaluated.
- (b) According to the EA's instruction No.52, the 1st EA inspection was performed at TES4 as a part of the process to identify the actual status of the technical level (quality level) in the power plant operation.
- (c) The 2nd national general meeting was held at TES4 and was proceeded with related workers in the energy sector. During this time, the maintenance of the work log, detailing the equipment operation maintenance record in each section was performed, the maintenance plan was checked as was the actual performance, and all operation manuals were set in each workplace.

2) Staff penalty system

Just as there is an incentive system, as mentioned above, there is also a penalty system, which severely penalizes mistakes made on the job and any activity that violates the machine (equipment) operation rule by penal regulations. As for the worker's penal-regulations situation in 2000 in the Operation Department, the "Summary of the number of penalty cases in the operation department in 2000" is shown in Table 6.4-6. In total, this amounted to 172 people in 2000.

Table 6.4-6 Summary of the Number of Penalty Cases in the Operation Department in 2000

Section name	The kind of penalty				total
	Retirement	Head command	Compensation	Fine	
Number	4	42	10	116	172

- (a) Reparations have been imposed, following penal regulations, on forty-six (46) operation workers.
- (b) In addition to those reparations mentioned above, no less than one hundred and twenty six (126) people of the Administrative Department have had penalties imposed.

As shown above, a certain penalty occurred once within two (2) days, which is a far from ideal situation and one that seems to be stultified. It is thought that time is necessary to review the effectiveness of the above system of incentives and penalties, which has been in effect since the period of socialism, from the perspective of the evaluation criteria and the evaluation method.

3) Management by objective system

In TES4, the contract to improve personnel responsibility and availability on the basis of performance in every section has been proceeding since 2000. Also, as a part of this improvement in an employee's work incentives and change of mind-set, instruction by JICA experts has also been proceeded and management based on the objectives set by each section has been conducted, and a concrete target is being followed up based on the above-mentioned contract.

Outline of the system is:

- The annual target of the power plant is set and each section strives to attain the target, sets up a more concrete target and measures and does its best to achieve the target.
- Moreover, the bonus, which is evaluated every month and is equivalent to about 80% of the salary for one month at the maximum, is paid accordingly by the degree of achievement.

The above system has just started to be managed. Although, there are many issues to be improved for enforcing this method into the system, it is expected that each section and department will outgrow the habit of waiting for a decision from upper levels of the company and this passive attitude, and will come to recognize the importance of self-reliance.

If operation management is described as an example activity of target management, the data for the cost control and operation parameters will be taken as the technical economic barometers and target values. The actual results of the power plant performance have also been compared every 6 months for 4 years, and analysis evaluation has been carried out on the basis of the operation parameter of the power plant.

(a) Main production and cost control item (target value)

- a) Electric power quantity of production
- b) Heat quantity of production
- c) Auxiliary power
- d) Coal consumption per unit requirement of electric power (g/kWh)
- e) Utility consumption

- (b) Main operation parameter
 - a) Auxiliary power ratio
 - b) Boiler efficiency
 - c) Turbine heat rate (kg/kWh)
 - d) Boiler pressure and temperature, Feed water temperature
 - e) Vacuum
 - f) Boiler, Turbine starting time and number of start

The Operation Department calculation group has mainly carried out manual calculation of those management indexes within the operation data. However, whether it is reflected in business with sufficient timing (early detection, proceeding and so forth) is queried by examining the numerical result within each section and each section correcting the measure for target achievement proper from those figures.

This is the key point of the management by objective system, and it cannot be said that there has been sufficient checking in the early cycle and feedback.

(2) Point of Change of Mind-Set into the Work Place

Advancing change of mind-set of the work place in TES4 should be performed in abundance, in order to establish the above system in the company. And it is necessary to understand and bring home to the workers the meaning of management by objective and encourage its activity, which raises the level of the whole company.

So, it may become an action where each section attains a target under its own responsibility. Matters, which should be carried out in the first stage, are described below.

1) Establishment of a cooperation organization between each section

Since the contract system has been introduced into the production section, the independence of each operation section has become strong, but information exchange between each section is severely lacking and cooperation organization is also weak.

Although, it is good to strengthen independence in respect to cost management, encouraging dense information exchange between each section and staff transferred to other sections with respect to technical management, and establishing a cooperation organization which has a good understanding of a mutual situation and which helps one another, shall be desired.

2) Enhancement of the awareness of the issues

It will not become a proper solution but only a symptomatic treatment solution, if a part of the problem that extends between sections is processed in only one part of a section due to there being many problems in the processing of daily equipment.

From now on, each person in charge of an independent section should direct his attention not only to the every day work management in each section, but also to that activated by another section, and it should become aware of the problem from a company-wide standpoint. Also, it is necessary to solve and improve the problem step by step across boundaries and actions, which elicit a common problem in the company.

3) Training of self-reliance

As may be seen in the example of safety controls in the work place, the materials arrangement on a passage, closing of a passage opening and water leakage from an upper story have occurred at the TES4 site. And it is not just the matters pointed out during the safety patrol that need to be improved, but also the arrangement order of the work place has to be carried out only after daily aims and efforts are made for every employee's safety, and safety is maintained.

The improvement of the work place cannot be achieved by waiting for instructions from the management representative. It is desired that the management representative and employee of each section unite in these efforts; the problem shall be extracted from a posture of self-reliance, which denotes positive action, and shall be improved.

4) Emphasis of a technical side --- Priority of trouble shooting

A similar problem occurring frequently has been recognized through attribution analysis for equipment problems. Moreover, even if abnormalities occur, priority is given to production reservation, and there has been a case where operation of abnormal equipment was continued for several days.

Trouble shooting to identify the cause at an early stage, forms the recurrence preventive measure, which identifies the root cause. Carrying out the repair responsibly is important, and leads to the stable operation and profits reservation of equipment.

To minimize the process, equipment maintenance is sacrificed so that priority is given to the production from now on, and all members in the company shall increase their trouble shooting activities and take into consideration measures for preventing an accident. It is desired that the identification of the cause, a suitable process, improvement of the knowledge and technical levels of the repair work are attained.

(3) Recommendation for Change of Mind-Set of the Work Place

As a part of organization strengthening for TES4, the promotion of change of mind-set of the work place is expected through the following concrete actions.

1) Establishment of the corporate philosophy of the power plant

By the new energy law in 2001, each electric power company became a Corporation under the management of the EA respectively, and is managed as a state-owned enterprise. Although, TES4 is a Corporation, in which a government-related organization holds 100% of the stock, its management can be compared to that of a commercial company, in which acceptance of independence is considerable.

The corporate philosophy of the company should be made clear inside and outside of the company, which shows the significance of directivity in the existence of TES4 as Corporation.

Clarifying a corporate philosophy heightens the centripetal force in the company, and it induces the effect, whereby all employees share a common sense of values. TES4 is the largest domestic power plant, which produces 63% of the electric power in CES and 64% of the heat supply. It is indispensable to the lives of the people in the State of Mongolia and it has great responsibility.

Therefore, the corporate philosophy executed by executives should be brought home to every employee by making them aware that they are doing significant work and contributing to the community, and to concentrate each employee's power in a recognized role, and have them put it into practice in the company.

2) Elicitation of a common issue

Capability and improvement, the issues of which the management representative of each section solves from the perspective of power plant management, in addition to the throughput of the operation and maintenance, is required.

For the purpose of the above issue, which shall be activated by the management representative of each section, the issue shall not be dependent on indirect access to the information through reports or meetings. The matter shall be devoted to by the on-site principle on the basis of the site investigation, and opinions, if any, should be exchanged candidly with an employee, and an attitude, which listens to the opinion on-the-scene, is also needed.

Moreover, the common issues in the company are extracted based on the information, which comes to hand directly, and action from the overall perspective, which is discussed and solved between sections, is also needed.

In order to elicit matters in dispute within the company, a scheme shall be established in which the president and representatives themselves who receive this information set out the purpose, realizing change of mind-set with the company's intentions made clear. The president of the group, which consists of members eager for reform, assumes direct control, and the structure is set up such that necessary opinions can be absorbed on the spot, considering the situation and helping to create such an atmosphere in the workplace.

3) Thoroughness of the management by objective system

To carry out the power plant operation together with the sufficient responsibility of each department and/or section, the premise is that the executives shall delegate the authority and responsibility related to power plant management to each department and section. And then, each leader of each department and section should recognize his role and should identify the type of management that is necessary, which should be done by himself,, and the leaders should assume the duty and responsibility for attaining the target of the power plant management by objectives.

The management by the objective system advanced by TES4 is now in progress in the initial stage as follows:

- The effectiveness of the power plant fiscal year target planned by each section is indefinite.
- The target planned for each section is not adequately grasped by each member.
- Feedback on clarifications and measures of the issue at the time of middle reexamination are inadequate.

So, there are a lot of issues, which require great improvement.

Fundamentally, the management by objective must be conducted according to the fiscal year plan and the target on the basis of the management policy over a long-term period, and the matter should be addressed as follows:

- Each section should set up the target necessary for attaining the goal according to the fiscal year plan and the target of the power plant:
- Each section should consider and fix the action necessary for the implementation of the fiscal year plan and the target of the power plant.

Again, consideration and review is necessary to fit the above matters into the fiscal year plan and the target completely.

Moreover, for the target of each section, it is required that;

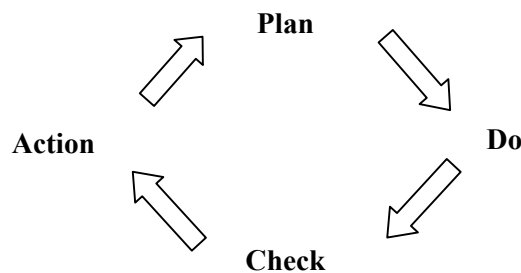
- Thoroughness of common knowledge should be attained and the final results should be challenged

- The target should be attained through analyzing the difference between the plan and the actual results
- The reason for the actual results should be clarified and correction should be added to the future activity of a self-section within the period of the enforcement stage.

Specifically, by repeating the PDCA (Plan – Do – Check – Action) cycle during the enforcement stage, as shown in the following figure, the employment status should be appropriately analyzed based on the issue and environmental changes, which are generated in the enforcement stage.

And the gaps produced in the opinions among employees and each section should be corrected.

Moreover, the fiscal year plan of the power plant and the organization should be established, which eventually leads to contributing to the target achievement, and it is important for such practice that every employee works while always being conscious of the PDCA cycle.



Furthermore, in order to fixate the management by objective system in the company from now on, it is necessary to put the main point of this system into practice on all worker levels. And the duty and responsibility for the target achievement should be clarified while making recognizable the effect, which the target of each part section has on the power plant management, and it should be made an activity, which improves the whole company.

4) Promotion of an improvement proposal system

Establishment of an improvement proposal system and/or small group activity is expected to lead to employees outgrowing the situation where they wait for the direction of executives and/or leaders decisions to take action in their daily activities, and thus lead to the emancipated and positive independent actions of employees.

In this regard, promotion of the improvement proposal system as part of the incentive system being advanced now is recommended in TES4 as follows.

Although there is a system, which at the end of the year commends a person recognized for rendering distinguished service and who has contributed to the management of the power

6.5 Financial Management

6.5.1 Financial Management Situation

Financial management mainly consists of profit management and fund management, and a budgeting system is one of the managerial control tools. This section will look at how financial management is being conducted and how the budgeting system is working in TES4.

(1) Budgeting System and Control

TES4 does not have the concept of a budget except for overhaul, but an annual budget (plan) is prepared based on the concept of a “plan.” Therefore, there is no notion of reallocation between expense items under budget control, contingency or unbudgeted expense. As for overhaul, however, a budget is prepared according to the guidelines issued by the Ministry of Infrastructure and the EA to be incorporated into the plan. It is to be noted that there are no company regulations on budgeting.

Budgeting is conducted with the Planning Department at the center around August every year. Each department estimates the work volume and the requirements for personnel, materials and so forth, and submits the estimate as the department plan to the Planning Department. The Planning Department then prepares a draft plan compiling key items as shown in the table below after making monetary conversion of the department plans of each department based on predetermined standard values called “norms” (or “normatives”) (similar to standard cost or the calculating factor).

This draft plan is submitted to the EA for approval and the EA notifies the amount of the approved plan after its review. The final plan is prepared based on that approved amount and approved by February 10th.

There is no notification of budget to each department after the final plan is approved. Instead, the department plan prepared by each department corresponds to the department budget, based on which each department executes their work.

Budgeting System

Production Plan (Plan of technical/economic indices)	Expense Plan
Power and heat production Power station use Power and heat supply Fuel consumption Water supply Others	Total expense plan Fuel plan (incl. transportation) General and administrative expenses Welfare expenses Chemicals expenses Depreciation cost

Control of the plan execution corresponding to budgetary control or cost control is conducted by each department with the above norms. Conformance to the norms leads to the achievement of the planned values. Norms were originally established in 1984, soon after the completion of TES4 and some of them are revised when necessity dictates. Deviations of actual values from those planned are analyzed with technical/economic indices to identify the causes. The Planning Department conducts a variance analysis on the actual values every month and evaluates the achievement of the plan to produce an annual performance evaluation once a year. The Accounting Department only records data on the actual performance.

In the case of an event occurring that considerably affects the planned values such as a rise in coal prices during the planned period, a revised plan is prepared. And at the department level, in the case of the occurrence of a factor affecting the department plan, a revision is made on the affected part of its plan as an “extra plan.” This can be considered to be a revised budget but expenses other than the affected expense item are not revised according to the revision but become acquired outright. This practice does not allow cost control necessary for profit control.

No long-term plan has been prepared by TES proper because TES4 was one of the production units of the EA.

(2) Profit Control

Profit control consists of revenue control and cost control. Firstly, revenue control in TES4 will be described.

TES4 has no choice but to be passive for profit control because its single products are power and heat, which must be produced according to instructions by the dispatching center and HDO, beyond the control of TES4. If actual dispatching instructions do not reach the planned production, price revision can be considered as a means to fill the gap, but political and other considerations do not allow for such a price revision as hoped. TES4 makes an application for

price revision every year but is obliged to follow the unilateral notification of the wholesale price from the EA.

This situation basically does not allow TES4 to conduct any independent profit control. When a dispatching instruction is not achieved, the Central Energy System has to import power from Russia. In this case, a penalty is imposed on an unachieved instruction by the EA (currently ERA), so that it is necessary for profit control to make efforts to maintain the plant so as to prevent failure to follow dispatching instructions. On the other hand, when another power plant fails to produce power as scheduled for some reason or other, and TES4 is instructed to supply the gap, TES4 will be rewarded for doing so. This adds to the importance in terms of profit of making the plant responsive to dispatching instructions.

Meanwhile, each department controls the planned values with the norms according to its department plan as mentioned above. This can be considered to correspond to cost control. However, no adjustment is made to cost in response to revenue change. This brings only resultant profit and profit is not sufficiently controlled.

As for overhaul, as mentioned earlier, the concept of budget is adopted and the repairs section controls the amount of overhaul work in terms of the total sum, and allows for reallocation between different expense items.

As described above, the system and mechanism of TES4 is built on the basic idea of achievement of the plan according to production instruction without the concept of profit control.

To date, each department is responsible for its department plan and has an agreement with TES4 regarding mainly work and the department plan. Performance evaluation is made based on that agreement and the bonus/penalty mechanism is incorporated. In future, that agreement-based system will be abolished and reform will be made towards the more profit-aware, financial independence of each department.

(3) Fund Control

There is no notion of fund budget or cash management and no fund control based on the same. The Accounting Department executes control of cash on hand and in banks but only checks the cash balance.

The Sales Department executes control of receivables but does not execute control of penalties for arrears (interest for delay). The Accounting Department is in charge of the control of payables. In the case of fund shortages, borrowing is averted on account of the high interest rate and unpaid bills remain unpaid, which leads to an increase in payables.

As for fund control of capital investment, replacement costs such as overhaul are to be basically financed internally (depreciation) and large-size work such as a rehabilitation project have been financed mainly by Japanese grants and yen credits under a two-step loan. TES4 has no long-term funding plan for capital investment and, as for repayment of the yen credit, follows the repayment schedule indicated by the EA, recipient of the yen credit.

The EA has so far been in charge of the collection and distribution of sales revenues for the power plants and EDO's, and superior organizations have arranged for borrowings of capital investment. That situation has not allowed TES4 to consider independent cash management. Moreover, TES4 has not been held responsible for cash shortage. This explains why TES4 has not been executing comprehensive fund control for both the working fund and capital investment fund.

(4) Asset Control

Inventory control including spare parts is conducted by the Procurement Department. The physical inventory is conducted, witnessed by the Accounting Department in June and December every year. Fuel control is conducted by the Coal Handling Section. The aim is to store enough coal for one-month production so as not to hinder heat supply in winter and is held below that stock level in summer so as not to cause excessive inventory investment.

As for heavy oil, which is imported from Russia, one-month stock is maintained in the case of supply shortage due to factors such as the international situation.

Asset control is conducted by the Accounting Department with the asset ledger updated at the beginning of 1999. The asset ledger records, among others, the name of facilities, the date of acquisition, the acquisition value, the accumulated depreciation cost and the remaining book value for each department responsible. The departments responsible for asset control are: the Electric Operation Section, Turbine Operation Section, Boiler Operation Section, Transport Section, Instrument & Control Section, Chemistry Operation Section, Workshop, Administration Department and Coal Handling Section.

There were previously monetary criteria for asset capitalization but long-time rampant inflation has made such monetary criteria meaningless. Now, therefore, there are no clear capitalization criteria other than the practice where the assets currently registered in the asset ledger are deemed to be assets.

Asset revaluation was made by a decree in 1996 but no further revaluation has been made. The State Property Committee has plans to establish a committee to study asset revaluation in 2002. In 1998, the Tax Law was revised to change the depreciation rate from 3% to 10%.

(5) Financial Ratios

Financial ratios resulting from financial analysis do exist as an important index for financial discipline. The Accounting Department of TES4 reports the following financial ratios quarterly and conducts an analysis of the change in the ratios.

Solvency 1 (Current ratio) = current asset/current liability

Solvency 2 (Quick ratio) = (current asset – inventory)/current liability

Guarantee period = (current asset – inventory)/(cash + receivables)

Receivables turnover ratio = sales/receivables

(turnover period)

Inventory turnover ratio = cost of goods sold/inventory

(turnover period)

Asset turnover ratio = sales/total assets

Employed capital turnover ratio = sales/(total assets – short-term liabilities)

Equity turnover ratio = sales/retained earnings

Ratio of net profit on sales = net profit/sales

Asset efficiency = profit/assets

Equity ratio = equity/total assets

Debt ratio = debt/total assets

Debt-equity ratio = debt/equity

Ratio of fixed liability to net worth = long-term liabilities/equity

Financial efficiency = (profit + depreciation + non-operating income)/(profit + depreciation + borrowings)

(6) Major Deviations of Financial Statements from IAS

- 1) TZBAX, which comprises capital improvement expenses and welfare expenses such as food subsidies and coal subsidies, is treated as profit appropriation in relation to tax law.
- 2) The cost of goods sold includes the expenses attributable to selling, general and administrative expenses-expenses incurred in the Planning Department, Administration Department, Accounting Department, Sales Department and other sections, which are not directly engaged in power and heat production.
- 3) Allowance for doubtful accounts is not provided.
- 4) Interest for delay is not recognized regarding receivables and payables.
- 5) Borrowings are not recognized at the time of disbursement but at the time of completion of the related work.

(7) Financial Management Organization

Financial management is conducted within the organization of the Accounting Department as follows:

Head of Finance and Accounting Dept.

One accountant for ledger

One accountant for payments and receipts

One accountant for cashflow control

Two accountants for payroll

Two accountants for materials supply

One accountant for office supplies, services and work safety

One manager for social welfare

One budget controller

One stock keeper and cashier

As for accounting regulations, TES4 follows the accounting manual, which was prepared for the common use of power plants in Mongolia by Arthur Andersen, the US accounting firm, under a technical assistance program by the Asian Development Bank in August 1997. Accounting data management is computerized by accounting software prepared by the above accounting firm at the same time.

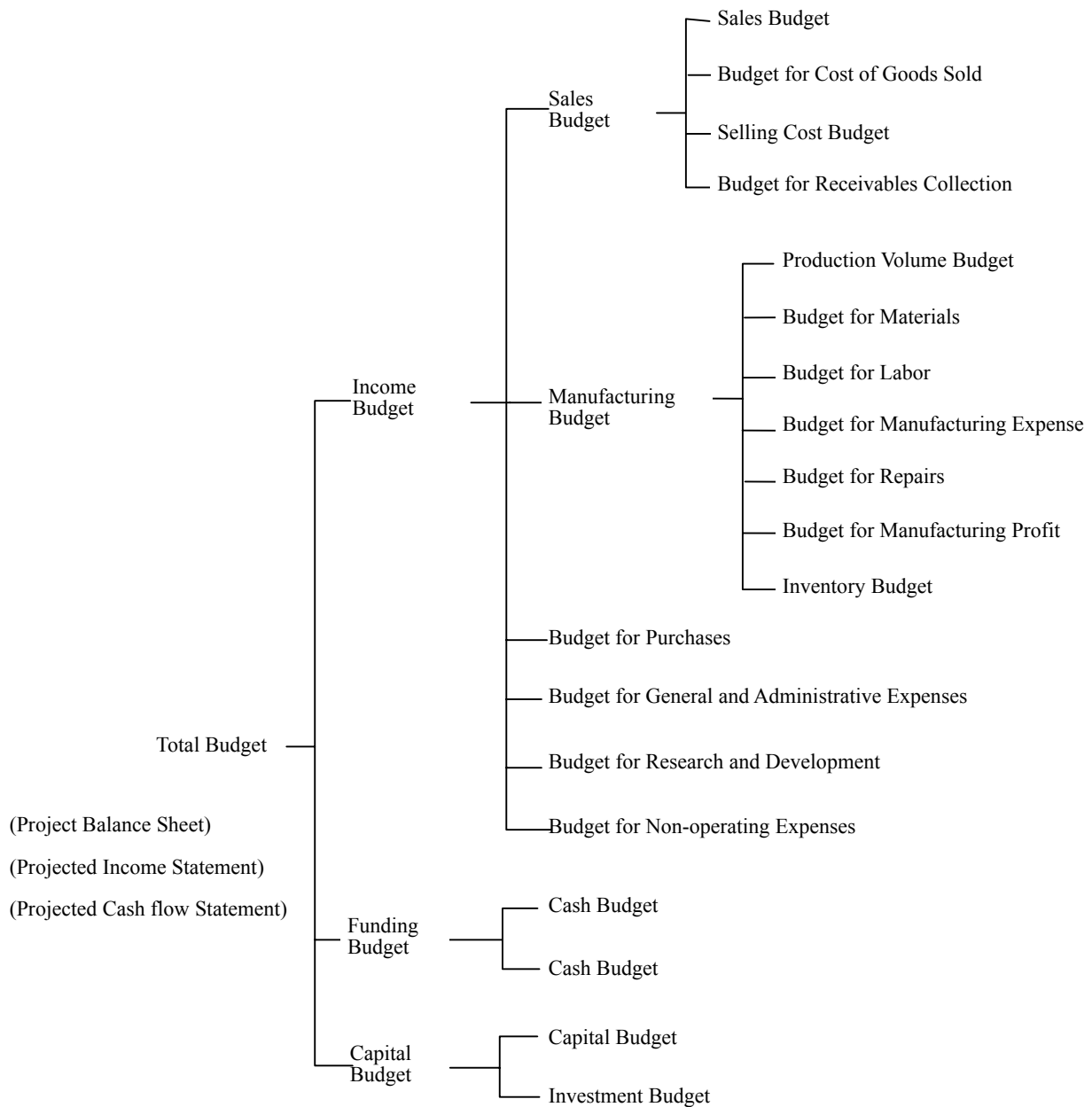
6.5.2 Assessment and Recommendations

As TES4 had long been under a socialist economy and formed an integral part of the production units of the superior organization in charge of the power supply of the whole of Mongolia, it can be said that the management of TES4 has been on a production-first basis by superior command. The efforts for sector reform made so far have been encouraging the management of TES4 for corporate reform toward commercialization. In order to make such a movement more effective, this section will give an assessment and recommendations on TES4's present financial management.

(1) Budgeting System and Profit Control

A budgeting system is an essential management tool for a profit-making company. It is necessary to change from the idea of achievement of the plan against production instruction to the idea of the achievement of planned profit, so that it is necessary to establish a budget system aiming at profit control. The "plan" adopted so far is not profit-aware and the allotted expenses are something like acquired right, so that the plan is not flexible enough to respond to revenue change.

A standard budget structure for the manufacturing industry is shown below.



It is necessary to build a budget structure suited to TES4 with the above as a reference, making clear the sections responsible for budget compilation, execution and control for each department budget and to prepare documentation of the methods and procedures as company regulations to be made known to the whole company.

By doing so, it will become possible to make a performance evaluation based on profit contribution through budget-actual comparison by assigning a profit center responsible for profit achievement and a cost center responsible for cost keeping and saving to each department/section of TES4. It is necessary to monitor budget-actual comparison not only at the end of the period but all throughout the period, and to build a mechanism responsive to the occurrence of such factors that affect revenues and costs into the budgeting system.

In the case of budget change, it is necessary to have a mechanism to flexibly modify the budget such as reallocation between expense items and the use of contingency and, in addition, revision of the plan for corrective measures.

In order to grasp a truer picture of production cost, more rational criteria should be set to make clear the cost distinction between direct sectors and indirect sectors, thus making the distinction between production cost and general and administrative cost. As for distinction of the production cost between power and heat as well, a revision should be made in such a way that fixed cost should be allocated based on the latest asset ledger, and rational distinction and variable cost-fuel cost should be allocated based on the latest state of production.

(2) Fund Control

Although the EA has so far been in charge of cash collection and allocation, which has not allowed TES4 to conduct any independent fund control, fund control will be one of the major issues of management as an independent profit-making company. In this respect, it is necessary to solve the accumulated receivables and payables not only across the whole sector, but also politically because of the nature of the problem that goes beyond a company.

To date, it is uncertain how that debt cycle issue will be solved; however, it is necessary to build a mechanism of fund control as a company.

As mentioned in the budgeting system item, it is necessary to prepare a fund budget for the working fund (cash and credit) and capital investment such as the equipment fund, and prepare a funding plan of sources and uses for each required fund. Based on that funding plan, quarterly, monthly and weekly statements of cash receipts and disbursement are made in order to execute cash monitoring and to take timely measures for predicted cash shortages.

(3) Asset Control

As for fixed assets, an asset ledger is prepared but there is a large difference between the book values registered in the ledger and the replacement costs. So, it is necessary to conduct an asset revaluation in order to maintain the capital value. But asset revaluation cannot be conducted by a company at its discretion and will require coordination with the supervisory authorities, business accounting bodies and the tax authorities because such asset revaluation is for public utilities supplying energy and would affect the tariff.

(4) Financial Ratios

Currently, TES4 is using a number of financial ratios for performance analysis but from the standpoint of financial discipline, it is reasonable to make a business plan at least with the following financial ratios as targets.

- 1) Return on asset (ROA): $\text{Net operating profit after tax} / \text{total assets}$
Index of total profitability to be targeted by management showing profitability of total investments
- 2) Working ratio: $(\text{Operating expenses} - \text{depreciation}) / \text{sales}$
Index of cost control of production cost and general and administrative expenses to curtail expenses, eliminating influence of depreciation
- 3) Turnover period of receivables and payables: $\text{Receivables (payables)} / \text{sales (production cost)}$
Ordinarily, solvency is measured by current ratio ($\text{current assets} / \text{current liabilities}$) or quick ratio ($\text{quick assets} / \text{current liabilities}$) But, in the case of TES4, the amounts of receivables and payables are huge, so that turnover ratios of receivables and payables should be adopted as the control index to determine the appropriate level of receivables and payables and their balance.
- 4) Self-financing ratio: $(\text{Operating cashflow} - \text{distributed income including debt service}) / \text{tangible fixed assets}$

This is a control index to determine external dependence for capital investment to be used to suppress excessive borrowing against internal finance.

- 5) Debt service ratio: $\text{Net cash flow} / \text{total of repayment of principal and interest}$

This is an index to determine how much the generated cash flow covers the repayment of principal and interest in order to determine the solvency.

Out of the above indices, regarding iv) and v), those indices have not shown any problem because a large amount of borrowing has not been done so far, partly due to immature financial and capital markets of the country. However, it will be necessary to set those indices to control liabilities for increasing the fund requirements for measures for aged deterioration.

In setting the above indices, it is essential to have company-wide discussions with the management as the center.

(5) Major Deviations of Financial Statements from IAS

There are deviations of TES4's financial statements from IAS as mentioned in the previous section, and the current practice of preparation of financial statements follows the guidance by the

EA, which has not allowed TES4 to prepare its financial statements in its own way. It is necessary to adopt an accounting method more conformable to IAS as a profit-making company.

And, the accounting method cannot be altered at the discretion of a company and it will be necessary to have coordination with the supervisory authorities, business accounting bodies and the tax authorities. The financial statements of TES4 should be audited once by a certified public accountant and adjustments should be made based on the related bodies.

(6) Financial Management Organization

Reorganization should be made with a view to profit control beyond the collection of accounting data now more than ever. In order to enable the Planning Department to execute profit control, the Accounting Department should be made responsible for the overall control of the budget and be granted the power to approve reallocation between expense items and the use of contingency. By doing so, the Accounting Department will be able to monitor the progress of the budget execution of each department and to grasp the fund requirement and make coordinations. Even in this case, each department should remain responsible for department profit control and cost control. In addition, the Accounting Department should be in charge of non-operating profit and loss, the fund budget and capital budget. It is necessary to conduct reassignment and training of its staff.

plant throughout the year, increasing the commendation frequency to 4 to 6 times per year can be considered a campaign for the whole company. And each company member can propose comfortably examples that were solved by originality and creativity in the work place, provide an occasion for proposing ideas and aim at improvement in an employee's independent and autonomous volition.

At TES4, since there are many points to be improved with respect to the safety control aspect and the quality control aspect, even if there is volition of a proposal, there will be no difficulty in excavation of an issue.

Moreover, since there is also a lack of people with the skills to commit the above ideas to paper, it may be necessary to establish a system for good correspondence such as a scriven system. Furthermore, it is necessary to install a proposal system promotion secretariat for setting up the above-mentioned types of systems, to elect a promotion committee from each section and to develop management that unites the whole company, including the president with general employees.

Furthermore, to expand the above system, system improvement should be carried out by small-group activities, such as the 5S campaign and zero-defects campaign, and should raise independent and autonomous talented staff to deploy the improvement proposal system, making it possible for all members to participate.

5) Reexamination of performance evaluation

In view of the wage system (salary and bonus), incentive scheme and penalty system, which is currently being activated in TES4, the self-evaluation of each employee's activities has been estimated by short-term achievements only, and the results have a great effect on the monthly salary. And with the demerit system, employees' actions tend to become conservative and constructive opinions are not easily obtained.

Although, evaluation on a short-term basis is naturally required from the management aspect of the company, in terms of stoking the need for an effective economic solution in TES4, it is necessary to manage the evaluation system of each section's activity and the self-evaluation of each employee's activity on a long-term basis.

In addition, it is necessary to establish a workplace environment, which is freely accessible and highly motivated, and it should be achieved by an improvement proposal system and the management by objective system, in which all employees can consciously and positively participate in TES4 management.