Part III

ACTION PLAN ON
INSTITUTIONAL AND FINANCIAL CAPACITY

CHAPTER 1 INTRODUCTION

The institutional and financial capacity of Vodovod was studied and assessed in Phase 1 of the Study. A summary of the study along with the goals for capacity development (CD) of the respective areas are presented hereunder. The Action Plan will provide the methods for undertaking CD activities in order to fill the gap between the goal and the present status. Contents of this part III is also referred to in parts I and II and contents of the three parts may differ from one another. This is because the contents of parts I and particularly III are modified/updated taking into consideration of the information and analysis after each CD was conducted. However, intention of this part remains effective.

1.1 Background of the Study

1.1.1 Sector Administration

Under the draft Law on Waters (under revision as of June 2008) the administration of water supply and sewerage sector is vested in the two ministries, namely, (i) Ministry of Environment and Physical Planning (MEPP), and (ii) Ministry of Transport and Communications (MTC). The MEPP is responsible for, among other things, planning the development of the sector as a whole, providing drinking and wastewater quality standards, and supervising the performance of water utilities. The MTC assumes the financing (including budget allocation) role of the development activities in the sector, and the provision of design criteria for the water supply and sewerage facilities. The MEPP also assumes the authority of developing and exploiting water resources as a whole including licensing of water right not only for city water uses but also for irrigation purposes, and the construction of hydrological facilities such as dams and canals.

Under the current Law on Waters, the MTC provides long-term sector development plans. Such function will be transferred to the MEPP under the draft Law. It is unclear, however, whether or not the expertise needed for such works has been acquired by the MEPP.

As for the administration of the water supply and sewerage sector, municipalities were not formerly entitled to plan, design and construct water supply and sewerage facilities by themselves since all such facilities were constructed by the government, and transferred to respective municipalities after completion for their operation. Nation-wide water rates are also set for the sector as a whole. In accordance with the Law on Local Self-Government (revised in June 2005), however, municipalities are authorized to directly undertake water supply and sewerage projects. They are also entitled to borrow funds or obtain grant money from either domestic or overseas sources. Some municipalities have obtained external funds and started building water supply or sewerage facilities. Water rates can independently be set by each municipality. The same rule shall apply to Skopje City. At the moment (as of June 2008), however, it is not yet determined which will be the executing agency and the borrower for the present project if the funds are provided by a loan, the government or the Skopje City. Although the self-reliant rule has been practiced for the operation of water supply and sewerage utilities, Vodovod has no right to set the water and sewer service rates, which are decided by the City council of Skopje.

1.1.2 Sector financing

Historically the City and Municipalities have been undertaking water supply and sewerage projects with a combination of their own capital resources and government fund. The completed facilities are operated by the municipality or a public enterprise if existing. After Macedonia's independence, a couple of water supply and sewerage projects have been implemented in other municipalities with grant assistance extended from international lending agencies. Since external grant assistance is normally small in amount, it cannot meet the capital requirement for large projects. The government intends to promote the financial self-reliance of municipalities (city) and public utilities. Nonetheless, it is still uncertain whether or not the above sector financing practice continues in the future.

1.1.3 Capacity of Vodovod

(1) Organizational System

Vodovod is a statutorily and financially independent body. The General Director of Vodovod is appointed by the council of the City. He repots to the City council on Vodovod's performance. Vodovod is not basically entitled to have subsidies or transfer of budget for its operation from the City.

The organization of Vodovod is large with a staff size of 1,120 as of end of March 2008, namely, 6.8 employees per 1,000 households, which is compared with similar water utilities elsewhere in a market-oriented economy like Japan (1.0 to 1.5 employees per 1,000 households). However, the Vodovod considers that it is not so overstaffed compared with other Balkan countries, and that it is not easy to reduce the staff size since Vodovod has many labor intensive site works for which mechanization and automation have been insufficient.

Vodovod has all the divisions (Sectors) and sections required to perform day-to-day operations. The scope of works and lines of order of the Sectors are rather complicated even though there appears to be no significant duplications. For example, (1) water intake, transmission and treatment are operated by Sector Exploitation and Maintenance of facilities (O&M); (2) distribution mains are maintained by Sector Water Supply; (3) pumping stations by Sector O&M; (4) leakage detection by Emergency & Information Center; (5) leakage repair by Sector Water Supply, (6) acceptance of applications for installation of services by Sector Technical Affairs and Development, (7) installation of services, replacement and repair of water meters by Sector Water Supply and so forth. Another example of this intricacy: after the construction of sewerage facilities by the City or one of the municipalities, Sector Sewerage assumes the duty of maintenance of the sewers while design of new (minor) sewers and repair of the existing sewers are performed by Sector Technical Affairs & Development; and the sewage pumping stations are operated and maintained by Sector O&M. All in all, the capacity of Vodovod may become more functional if it would administratively streamline the above activities.

The organizational structure and major activities of the Sectors of Vodovod are illustrated below:

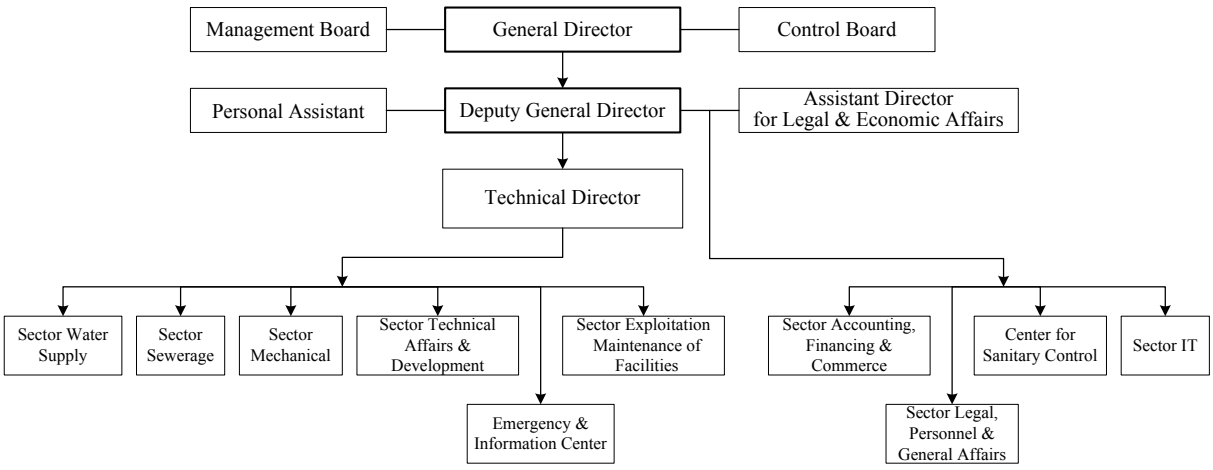

Figure 1.1 Organizational Chart of Vodovod

(All the Sectors) [Total No. of staff members of Vodovod: 1,120 as of end of March 2008]

(a) Sector Water Supply [Total No. of staff members: 181]

Main scope of work of the Sector: (i) Maintenance of transmission and distribution mains; (ii) Replacement of old mains; (iii) Repair leakage on water mains*; (iv) Installation of services; (v) Installation and replacement of water meters; (vi) Operation of meter repair shop. *Information on the locations of leaks is brought by Emergency and Information Center and Sector Technical Affairs and Development.

☆ Issues related to the Sector; (i) Despite its name "Sector Water Supply", it only practice the maintenance of water mains whereas the water intake facilities, water transmission and distribution pumps and service reservoirs are operated and maintained by other Sector (Sector Operation and Maintenance of Facilities, hereinafter referred to as Sector O&M). (ii) Water mains are superannuated and malfunctioning. As a result, the physical water losses are estimated at more than one third of water production. (iii) When Skopje City conducts design of water distribution network, the Sector furnishes the City with design criteria, and examines the design work performed by the City. However, the Sector does not participate in the actual planning and design work.

(b) Sector Sewerage: [Total No. of staff members: 122]
Main scope of work of the Sector: (i) Maintenance of sanitary and storm sewers (including cleaning); (ii) Repair thereof; (iii)Installation of sewer services (connections)

☆ Issues related to the Sector; (i) The same problem as Sector Water Supply as to the design of sewers; (ii) There are quite a few illegal or unauthorized sewer connections made by individuals and businesses; (iii) Shortage of equipment used for the operation such as mini-trucks and robot TV camera to inspect the inside of sewers; (iv) Staff's lack of experience

(c) Sector Mechanical [Total No. of staff members: 116]
The main scope of works of the Sector: (i) Storage, maintenance and deployment of heavy construction and transportation work; (ii) Cleaning of sewers by large work machines*; (iii) Procurement of heavy machinery. *Machinery owned by Vodovod: sewer clearing high pressure tankers, middle-sized power shovel, trailer etc.

☆ Issues related to the Sector; (i) Shortage in trencher, backhoe, multifunctional sewer cleaning machine, multifunctional earthwork machine; (ii) Shortage of experienced staff; (iii) All the machines are old and difficult to maintain.

(d) Sector Technical Affairs and Development [Total No. of staff members: 40]
The main scope of work of the Sector: (i) Planning and design of minor facilities (Major facilities are designed by Skopje City); (ii) Acceptance for installation of customer services for water and sewer services (connections); (iii) Cost estimates of work to be sublet; (iv) Preparation of the wok plan for the next year

☆ Issues related to the Sector; Slow development of DB for water mains and sewers

(e) Sector Operation and Maintenance of Facilities (Sector O&M) [Total No. of staff members: 282]
Main scope of work of the Sector: (i) O&M of water intake facilities and water treatment (chlorination) plant, and water and sewage pumping stations; (ii) O&M of the WWTP (after completion of the Project); (iii) Maintenance of electrical and mechanical facilities; (iv) Maintenance of structures, buildings and offices; (v) Development of the SCADA system and related facilities; (vi) Security and fire protection services

☆ Issues related to the Sector; (i) There is an urgent need to replace some superannuated pumps. (ii) Purchase of spare parts is difficult by financial reasons (This situation is being improved due to the improvement in the Vodovod's financial position due to the rate hike made in 2007); (iii) Instrument for flow measurement, etc. is needed to purchase; (vi) Low level of automation; (v) Shortage of experienced personnel for development and O&M of the SCADA system; and means of data generation, analysis and communications are underdeveloped; (iv) Lack of the complete O&M manuals of facilities.

(f) Sector Accounting, Financing & Commerce [Total No. of staff members: 246]
Main scope of work of the Sector: (i) General accounting; (ii) Budgeting and disbursement control; (iii) Billing and collection of water and sewerage charges; (iv) Asset Management; (v) Banking; (vi) Processing of accounts receivable and payable.

☆ Issues of the Sector: (i) Although financial tables are prepared, their style is somewhat different from the international standard; (ii) Balance sheets for the purpose of reporting to the City council are provided by means of filling out a table in hand-writing; no spread sheet software is used; (iii) Not all accounting and asset management routines are computerized.

(g) Sector Legal, Personnel and General Affairs: [Total No. of staff members: 64]
Main scope of work of the Sector: (i) Prosecution for non-paying customers; (ii) Prosecution for illegal connections; (iii) Personnel management including recruitment, discharge or promotion (demotion) of staff.; (iv) Clerical work management; (v) Workplace management.

☆ Issues of the Sector: (i) In cases of court solution, Vodovod has to pay certain amount (400 MKD or so) of charges to the court. However, the resources of Vodovod are not sufficient to do so. (ii) Vodovod does not practice a system of performance evaluation of its personnel. However, promotion and demotion are decided by Sector Heads.

(h) Sector IT [Total No. of staff members: 26]
Main scope of work of the Sector: (i) Acquisition of operational and asset-related information; (ii) Processing of data and preparation of a database; (iii) Printing of bills for water and sewer service charges; (iv) Development and installation of communications network; (v) Setting-up of common use environment of the database.

☆ Issues of the Sector: (i) Sector IT at present only collect (a) Personnel data from Sector Legal, Personnel and General Affairs, and (b) Meter reading and billing data from Sector Accounting, Finance and Commerce. The system of data collection and compilation is not firmly established in terms of hardware as well as software. No data and information is gathered from the management and other Sectors than the Personnel Division and the Customer Division. Thus the contents of the database are rather limited. The database is not commonly accessible from staff. Nonetheless, this condition is expected to be improved since there is a plan to upgrade the database and communication systems.

(i) Emergency and Information Center [Total No. of staff members: 26]
Main scope of work of the Sector: (i) Water leakage detection; (ii) Emergency information services; (iii) Emergency repair work mainly for services.

☆ Issues of the Sector: (i) The contents of the DB: (a) Personnel; (b) Customer register, meter reading data and billing data; (ii) The basic plan on information management is yet to be established; (iii) The communication network for sharing of data and information has not fully been provided. (iv) The capacity of hardware for storage, analysis and distribution of data and information is insufficient. (v) The relationship between Sector IT and Sector O&M, which operates the SCADA system, is weak.

(j) Center for Sanitary Control [Total No. of staff members: 19]
Main scope of work of the Sector: (i) Sanitary control of drinking water; (ii) Surveillance of sewage quality

☆ Issues of the Sector: (i) Modern analytical instruments are available. However, there is a shortage of fully experienced staff for the handling of the instruments, which affects the efficiency of the work and reliability of the obtained data.

(2) Financial Performance

The Vodovod's financial performance varies from year to year. From 2002 to 2006, the total annual revenue fell in the range from 699 million MKD to 821 million MKD. The total expenditure amounted to 715 million to 887 million MKD. For 2002 to 2004 the balance of operating revenue and expenses resulted in surplus ranging from 10.0 million MKD to 67.7 million MKD. In 2005 and 2006 large deficits of 138 million MKD and 173 million MKD occurred. Vodovod states that such deficits were met with accumulated retained earnings from the previous years. However, the total income increased on a large scale to 1,219 million MKD in 2007 owing to a large (98%) rate hike of 2007, which .turned the balance surplus of 76 million MKD. About 92% of the total revenue was generated from water and sewer service sales. The largest item of the total expenditure was salaries and wages, which averaged at 39% in 2006 and 30% in 2007.

Assets used for water supply and sewerage have not regularly been evaluated for their working condition, economic lives and reevaluated values. Based on such reevaluation, proper depreciation would have been practiced, and major repair or replacement should have been proactively planned and executed. As a result, most facilities are in very bad condition and malfunctioning. All the same, Vodovod now can attend to its assets more properly since its financial position began to improve owing to the major rate hike of February 2007. Asset management must be incorporated with a long-term financial plan including tariff setting.

The income statements for 2002 to 2007 and the balance sheets for 2005, 2006 and 2007 are tabulated in Table 1.1 and Table 1.2, respectively.

Table 1.1 Income Statements of Vodovod

Unit: thousand MKD

		2002	2003	2004	2005	2006	2007
1	Total Income	753,652	821,241	758,482	748,943	698,718	1,219,396
1.1	Revenue from Selling Services	**696,980**	**733,504**	**696,997**	**681,876**	**663,448**	**1,179,577**
1.2	Revenue from Financing	215	1,228	1,967	58,841	29,785	34,037
1.3	Other Income	56,456	86,509	59,518	8,227	5,484	5,781
2	Total Expenses	741,934	743,865	715,211	887,165	871,970	1,143,632
2.1	Total Tangible Expenses	**131,570**	**111,759**	**111,445**	**108,798**	**115,394**	**133,476**
2.2	Depreciation	144,779	157,981	154,959	169,805	168,046	168,485
2.3	Intangible Expenses	106,855	116,128	107,971	161,244	129,955	159,384
2.4	Gross Payment of Salaries	339,757	335,340	327,657	329,962	339,127	346,955
2.5	Dismissal of Uncollectible Receivable Accounts (Non-paid Bills)	2,371	15,777	6,545	116,975	118,699	334,332
2.6	Expenses from Interest Rates	16,602	6,879	6,633	379	748	1,000
Gross Income		11,718	77,377	43,271	-138,222	-173,252	75,764
Tax		1,741	9,669	4,802			43,857
Income after Tax		9,977	67,708	38,469			31,907
Loss					138,222	173,252	

Source: Vodovod

Table 1.2 Balance Sheets of Vodovod

Unit: thousand MKD

ASETTS				EQUITY AND LIABILITIES			
	2005	2006	2007		2005	2006	2007
Fixed Assets in Operation		5,886,040	5,901,972				
Minus Accumulated Depreciation		3,417,626	3,582,816	Equity	2,275,374	2,275,374	2,276,193
				Contributions	1,097,779	959,768	786,516
Net Fixed Assets	2,605,973	2,468,414	2,319,156	Revaluation Surplus	241,439	241,439	241,439
				Operational Surplus	-138,222	-173,252	31,907
Work in Progress	5,547	6,695	6,620				
Cash and Bank Deposits	50,022	19,419	327,146	Total Equity	3,476,370	3,303,329	3,336,055
Accounts Receivables	1,573,610	1,259,460	1,355,816				
Inventories	92,594	108,144	114,527	Long Term Debt (Net)	0	0	0
				Accounts Payables	671	1,442	62,641
Total Current Assets	1,721,773	1,393,718	1,804,109	Prepayment	7,680	11,071	10,949
				Current Maturities	843,025	546,290	713,621
Total	**4,327,746**	**3,862,132**	**4,123,265**	Total Current Liabilities	851,376	558,803	787,211
				Short Term Debt	0	0	0
				Total Liabilities	851,376	558,803	787,211
				Total Equity-Liabilities	**4,327,746**	**3,862,132**	**4,123,266**

Source: Vodovod

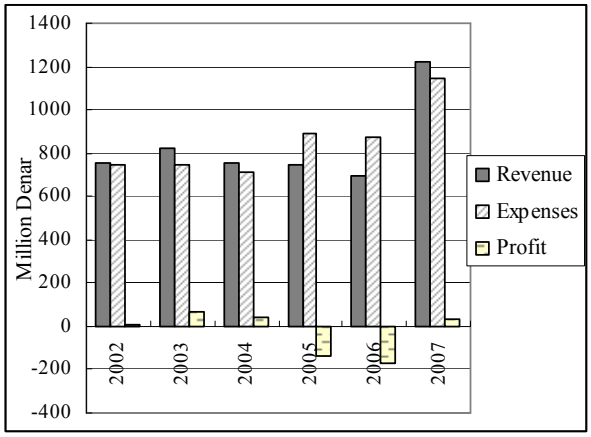

Figure 1.2 Vodovod Financial Position

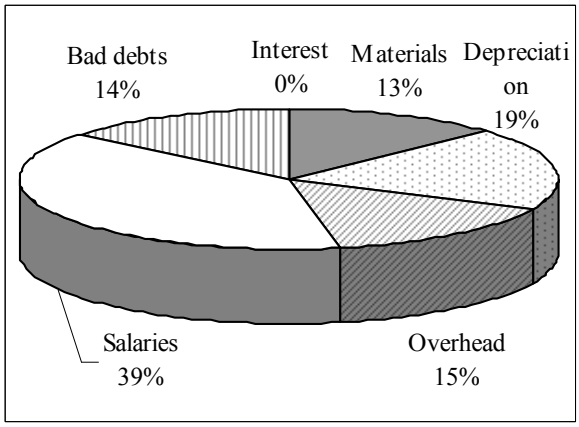

Figure 1.3 Expenses Items (2006)

(3) Present condition of facilities

Vodvod possesses spring sources with 4,000 l/s of yield, and seven deep wells with a total yield of 1,450 l/s as the supplementary source, 924 km of water transmission and distribution mains (laid mainly in 1960s-70s and oldest ones built in 1900s), 552km of sanitary sewers and 193km of storm sewers mainly laid in 1960s-70s. The population served is 503,000 persons with 168,000 services (customers). From the consumer's point of view, who enjoys 24-hour service with very clean water without interruption except for some elevated part of the service area in summer, Vodovod's physical operation appears to be sound. The tap water is safe and customers are satisfied with the available water quantity and quality.

Troubles with services (connections) are rather quickly attended by Vodovod's staff. On the other hand, most facilities, especially water mains, service pipes, sewers and pumping stations, are old and defective, and in urgent need of repair or replacement. Physical water loss probably amounts to more than one third of the production. Although the sewer network, mostly constructed in 1960s-70s, covers almost the entire area of Skopje City, the sewers are damaged or clogged at many locations. The collector sewers are insufficient in length and capacity. Since there is no WWTP, all the sewage and industrial wastewater are drained onto the Vardar River with no treatment. As the storm sewer network is also insufficient, low-lying parts of the City's roads are flooded at the times of heavy rain.

There is an urgent need to construct a WWTP and refurbish main sewers.

The Law on Waters obliges the consumers to pay the cost of water since it has an economic value. Notwithstanding, the recovery rate (rate of actually paid amount to the total of billed water charges) of water charges has been improving, but still remains low at 80%. Public awareness is needed to be raised through education and water charge exemption or public subsidies are needed for low income families in this regard. Water meters are read every two months; and a water bill containing water charges and sewer service charges are issued every month. The customers pay the bill through a bank or directly to one of Vodovod's regional offices. Water charges and sewer service charges are separately computed based on water consumption and the uniform unit prices.

(4) Information management

The level of information management practice is still low. The database, operated by Sector IT, only covers the areas of personnel information and customer data including meter reading, billing and collection. In future, information from all the Sectors should be incorporated in the database. Sector IT is going to redefine its terms of reference, and prepare a plan on upgrading of hardware and software in regard to the information management system.

1.2 Strategic Goals for Improvement

(1) Organizational structure

As for the organizational structure of Vodovod, the following may be useful to consider:

a) The terms of reference of each Sector and its divisions should be clearly redefined
b) If possible, mutually related activities should be organized into one Sector
c) There may be a need to reform the organizational structure. Efforts must be made to acquire as many competent personnel as needed while consideration must be given in future to a reduction in staff size if there are any areas which have redundant staffing.

* The preset terms of reference (TORs) of the Sectors and their staff are illustrated at the end of this section in contrast with the desirable TORs for the future.

(2) Financial management

a) The collection rate of water and sewer services charges should be improved to 90% at least.
b) Long-term projections should be made for personnel expenses, energy cost, repair cost, maintenance cost, overhead, depreciation and capital costs so that they form a firm base for the rate policy.

(3) Rate policy

a) The need for revision of the rate should regularly be checked since the Vodovod's financial environment changes year by year including various cost components, e.g., energy cost, salaries and wages, cost for renovation of the IT system and so forth.
b) Consumer's support or understanding is essential in the course of setting the new rate. In between Vodovod's proposal of a new rate and its deliberation in the City council, Vodovod can appeal to the public for the need of the new rate through consumer dialogues including the establishment of a rate council and public hearing.

(4) Staff recruitment and training

The Vodovod's present staff size is considerably large. After the completion of the Project Vodovod should manage the utility which will augment in terms of not only quantity but also quality while keeping the operating and personnel costs at the minimum. Vodovod needs to set goals for setting its staff sizes in each trade with classification for level of competence. Therefore, Vodovod is required to recruit competent personnel, reposition staff with specific expertise or redundant personnel to a new division and train them to fit to the forthcoming new technologies related to the Project and adjust to the renovated operating environment.

(5) Improvement in the O&M system

A water supply and sewerage utility has to have refined O&M manuals for each division of Sectors. For example, an O&M manual for the sewer maintenance division of Sector Sewerage may be consisted of the following:

a) Upkeep of sewer database: Drawings (plan, section and profile) of sewers are to be regularly updated. The sewer drawings shall contain location, elevation, size (diameter, etc.), section length, material, etc. and location, depth and size of manholes. A separate book may be needed to record the history of sewer repair.
b) Upkeep of pumping station database: Drawings (location, plan and section) of pumping stations are to be regularly updated. The drawings shall contain specification of pumps and motors. A separate book may be needed to record the history of pump repair and replacement.
c) Instructions on how to maintain sewers: (a) method of sewer and service connection inspection; (b) method of sewer and service connection repair; and (c) method of sewer cleaning.
d) Instructions on how to maintain pumps, motors and switchgears: (a) inspection method of pumps, motors and switchgears; (b) repair method for repairing pumps, motors and switchgears, (c) instruction on how to deal with unexpected power failure and other disasters; (c) how much and how to stockpile spare parts and materials required for pumping station maintenance.

It is also needed to prescribe the man-power needed for O&M divisions with essential qualification and experience of the staff members.

(6) Reduction in non-revenue water (NRW)

It is absolutely needed to identify where from and how much water losses are occurring.
Vodovod needs to review whether or not the following conditions have been achieve so as to control the water losses at a satisfactory level;

a) Updating of the record (DB) (property[material, diameter, location, length etc.], drawings etc. of water mains are regularly done;
b) Improvement in customer cadastre (DB) has been undertaken;
c) Sufficient number of staff members are exclusively in charge of leak detection;
d) Transfer of leakage detection technology has been made;
e) Illegal connections have been detected;
f) Accuracy of water meters is checked regularly, and defective meters are replaced.
g) Appropriate budgeting is made for replacement of superannuated water mains.

The following are the existing terms of reference (TORs) of Vodovod and those of a water utility serving in a market-oriented economy for comparison. Vodovod's TORs are extracted and sorted from the Book of Regulations of Vodovod. In Macedonia the style of businesses are traditionally different from those of market-oriented businesses. The Book mainly describes the TORs of Sector directors, technical directors, and managers to achieve their vested functions; in contrast, TORs of each Sector and its divisions are very rarely mentioned. Although it is not easy to compare these two styles, the TORs of Vodovod are classified and categorized, as much as possible, for the ease of comparison. In the illustration, the third column shows the present TORs; and the fourth (right-hand side) column describes TORs needed for Vodovod for the future. Although the present TORs of Vodvod cover almost all its activities, they appear incomplete in various aspects when compared with the TORs to be possessed by a market-oriented public utility.

Table 1.3 TORs of Vodovod (Present and Proposed) for Sector, Sewerage

Sector / Div.	Present	Future
Sector, Sewerage		
General Affairs Div. (Director and Technical Deputy Dir.)	(1) Prepare an annual work plan and be responsible for realizing the plan (Director, O&M Sector)	(1) General affairs of the Sector; [correspondence, document filing, management of office appliances and record of Sector's activities] (2) Budget planning and execution for sewerage (network) operation; (3) Designation of contractors to be assigned for jobs of the Sector; (4) Public relations on sewerage services; (5) Training and retraining of staff; (6) Survey of customer satisfaction;
Management Div. (Technical Deputy Dir. and Documentation Technician)	(1) Managing the activities related to facility registry (Manager, Cadastre Div., Technical);	(1) Study and coordination of sewerage operation; (2) Management, and preparation of register of fixed assets; (3) Logistics of material, tools and equipment;
Planning and Design Div. (Technical Deputy Dir. and Area Managers)	(1) Preparing the annual work plan (Engineer, O&M); (2) Land survey (Cadastre Div., Technical Affairs);	(1) Basic planning of sewerage operation; (2) Preparation for emergency cases related to storm drainage (e.g., flooding); (3) Preparation of DB for sewers, pumping stations and WWTP including drawings and related documents;
Construction Div (Area Managers.)	(1) Supervision of construction and reconstruction of structures within the electro-mechanical field	(1) Establishment and operation of site offices; (2) Preparation of construction site; (3) Installation and uninstallation of customer services; (4) Repair and replacement of sewers; (5) Replacement of pumps and switchgears; (6) Technical evaluation of PQ and bids; (7) Supervision of construction work; (8) Work evaluation, quantity survey and processing of invoices from contractors
Sewer O&M Div. (Area Managers)	(1) Inspection of services (service connections) and sewers (Area Office); (2) Installation, maintenance and removal of services (do); (3) Repair of sewers (do); (4) Purchase plan for basic means and tools (Engineer, O&M); (5) Logistics of tools, materials and equipment (Warehouse Keeper, O&M); (6) Operation of pumping stations; (7) Inspection and maintenance of pumps; (8) Security control and fire-fighting of buildings, equipment and employees (Security Manager, O&M);	(1) Operation of sewers; (2) Cleaning of sewers; (3) O&M of pumping stations(➔Sec. O&M); (4) Logistics of material, tools and equipment for O&M of sewers; (5) Control of work place safety; (6) Security control of pumping stations; (7) Hygienic safety of personnel;
WWTP O&M Div. (None)	(None)	(1) Operation of wastewater treatment facilities including pump units and generators; (2) Operation of sludge treatment facilities; (3) Surveillance of condition of facilities; (4) Maintenance of structural, mechanical and electrical facilities; (5) Logistics of materials, tools and equipment for O&M; (6) Control of work place safety; (7) Hygienic safety of personnel; (8) Security control of wastewater treatment facilities;

Table 1.4 TORs of Vodovod (Present and Proposed) for Sector, Water Supply

Sector / Div.	Present	Future
Sector, Water Supply		
General Affairs Div. (Director and Technical Secretary)	(1) Managing all the administrative and technical documentation of the Sector[44]*; *The number in [ ] denotes for the reference number in Book of Regulations.	(1) General affairs of the Sector; [correspondence, document filing, management of office appliances and record of Sector's activities] (2) Upkeep of area office buildings; (3) Budget planning and execution for water distribution operation; (4) Designation of contractors to be assigned for jobs of the Sector; (5) Public relations on sewerage services; (6) Training and retraining of staff; (7) Survey of customer satisfaction;
Management Div.. (Technical Deputy Dir)		(1) Study and coordination of water service operation; (2) Management, and preparation of register of fixed assets; (3) Logistics of material, tools and equipment;
Planning and Design Div. (Technical Deputy Dir. and Area Managers)		(1) Basic planning of water service operation; (2) Preparation of DB for sewers, pumping stations and WWTP including drawings and related documents;
Construction Div (Area Managers.)	(1) Collection and realization of services completed[45];	(1) Preparation of construction site; (2) Installation and removal of customer services; (3) Repair and replacement of water mains; (4) Replacement of pumps and switchgears; (5) Technical evaluation of PQ and bids; (6) Supervision of construction work; (7) Work evaluation, quantity survey and processing of invoices from contractors;
Water Supply O&M Div. (Area Managers)	(1) Inspection of water mains routes; (2) Operation and maintenance of water supply network[46]; (3) Inspection and maintenance of services[47]; (4) Installation of new customers and removal of services of default and illegal customers[46]; (5) Replacement of water meters [46]; (6) Logistics of materials, tools and work protection means[50];	(1) Operation of distribution mains; (2) Flushing of water mains; (3) Logistics of material, tools and equipment for O&M of sewers; (4) Control of work place safety; (5) Security control of pumping stations; (6) Hygienic safety of personnel;
Water Meter Maintenance Div.	(1) Quality control of repair of water meters[51]; (2) Receipt and storage of defective and repaired meters [52]; (3) Recording of meter storage, repair and deployment[52];	[Meter Repair Shop] (1) Stock piling of defective meters; (2) Purchase and logistics of meter repair parts; (3) Cleaning of meters; (4) Assembly of meters with new or cleaned parts; (5) Calibration and adjustment of repaired meters; (6) Stock piling of repaired meters; (7) Maintenance of cleaning and calibration tools and equipment; (8) Preparation of meter repair DB;
Water Meter Repair sec.	(1) Repair and calibration of meters[53];	
Water Meter Calibration sec.	(1) Repair and calibration of meters[57];	

Table 1.5 TORs of Vodovod (Present and Proposed) for Sector, O&M

Sector / Div.	Present	Future
Sector, O&M		
General Affairs Div. (Director and Technical Secretary)	(1) General affairs; (2) Preparation of an annual work plan; (3) Administrative and technical documentation of the Sector; (4) Cathodic mains protection;	(1) General affairs of the Sector; (2) Budget planning and execution for water supply and sewerage operation; (3) Designation of contractors to be assigned for construction jobs of the Sector; (4) Training and retraining of staff;
Management Div. (Technical Secretary)	(1) Programming annual procurement of basic means and tools; (2) Logistics of the reserves, tools, basic means and equipment; (3) Fire protection activities and upkeep of fire-fighting equipment; (4) Security and hygienic control of facilities, buildings and personnel; (5) SCADA;	(1) Study and coordination of water supply and sewerage operation; (2) Study on actual capacities and economic lives of facilities; (3) Processing of compensation for land acquisition, damage caused by sewerage construction; (4) Building and maintenance of DB for water supply and sewerage facilities ➔Sector Technical; (5) Installation and operation of SCADA system;
Planning and Design Div. (Manager, Design & Ecology Dev. Div.)	(1) Projection of water demand; (2) (Based on (1)) preparation of new or augmented activities for the following year;	(1) Basic planning of water supply operation; (2) Basic planning of sewerage operation; (3) Plan of facility depreciation based on their economic lives; (4) Preparation for emergency cases related to storm drainage ➔Sector Sewerage or City Department;
Construction Div.	(1) Supervision of construction and installation of civil structures and electro-mechanical facilities; (2) Supervision of construction and reconstruction of structures within the electro-mechanical field [72] (➔Not by Sec. O&M);	(Is Sector O&M in charge of facility construction?)
Water Supply O&M Div. (Section for operation of pumps)	(1) Accuracy and security control of the plant, water supply facilities, chlorination and the quality of drinking water; (2) Operating pumps and chlorinators; (3) Inspection and maintenance of pumps; (4) Patrol of water mains routes; (5) Preparation of monthly reports on pumping and chlorination and work orders for all the operators in the pump stations;	(1) Inspection and maintenance of water intake facilities; (2) Inspection and maintenance of chlorination plant; (3) Inspection and maintenance of service reservoirs; (4) Operation of pumping stations; (5) Inspection and maintenance of pumping stations; (6) Study on actual capacities and economic lives of pumping facilities; (7) Preparation for emergency cases related to major failure of mains;
Sewerage O&M Div. (Section for operation of pumps)	(1) Operation of pumps; (2) Inspection and maintenance of pumps; (3) Recording of power consumption by pumps;	(1) O&M of pumping stations; (2) Study on actual capacities and economic lives of pumping facilities; (3) Preparation of DB for pumping stations and chlorination plant including drawings and related documents; (4) Control of work place safety; (5) Security control of pumping stations ➔Sec. Legal, Personnel; (6) Hygienic safety of personnel (do)

Table 1.6 TORs of Vodovod (Present and Proposed) for Sector, Technical Affairs and Development

Sector / Div.	Present	Future
Sector, Technical Affairs and Development		
General Affairs Div. (Dir., Technical Sec.)	(1) Preparation of investment programs (Preparation and Investment Div.); (2) Preparation of annual work plan[71]; (3) Annual programming for purchase of basic materials, tools and equipment[72]; (4) On-the-job training by senior staff; (5) DB by digital and hardcopy	(1) General affairs; (2) Budget planning and execution for the Sector's activities; (3) Training and retraining of staff; (4) Preparation of DB for water supply and sewerage facilities;
Management Div.	(1) Registry of facilities (Cadastre Div.); (2) Registration of facility ownership (do);	(1) Management planning of water supply and sewerage activities; (2) Project planning;
Planning and Design Div. (Preparation and investment Div.)	(1) Designing structural projects such as catchments, pump stations, reservoirs, and hydrophores: (2) Participating in development programming; (3) Giving opinions on urban planning; (4) Organizing conservation activities for natural and living environment; (5) Preparation of investment programs; (6) Land survey (Cadastre Div.); (7) Examination and authorization of designs to be prepared by Skopje City	[Water supply] (1) Basic planning of water supply system; (2) Design of pumping stations and chlorination plant; (3) Design of water distribution facilities (service reservoirs, and distribution network); (4) Plan and design of replacement of water mains, pumps and chlorination plant facilities; [Sewerage] (1) Basic planning of sewerage system; (2) Design of sanitary and storm sewers; (3) Plan and design of replacement of sewers, pumps and STP facilities;
Construction Div.	(1) Preparation and supervision of construction work [21]; (2) Supervision of service connection installation[22] including quantity survey; (3) Tendering ➔Sector A/C, Finance;	(1) Tendering, technical evaluation and contracting of construction jobs to be undertaken by contractors; (2) Supervision of construction work;
Service Connection Div.	(1) Receipt of services application; (2) Making orders for water and sewer services installation to an Area Office, Sector Water Supply;	(Why not to directly apply to Sector Water Supply?)

Table 1.7 TORs of Vodovod (Present and Proposed) for Sector, Accounting, Finance and Commerce

Sector / Div.	Present	Future
Sector, Accounting, Finance and Commerce		
General Affairs Div. (No separate General Affairs Div.)	(1) Provision of insurance programs for assets; (2) Payment of insurance premiums;	(1) Provision of application rule for accounting system; (2) Provision of regulations on the acquisition and disposal of land and other tangible and intangible assets; (3) Rules for contract of jobs by private entities; (4) Compensation to employees due to official injuries; (5) Logistics of office supplies, appliances, and other goods; (6) Procurement, registration and disposal of immovable;
Accounting Div.	(Tariff collection) (1) Tariff collection[212]; (2) Recording of bills paid and their amounts; (Financial planning) (3) Long- and short-term programming of Vodovod's activities; (4) Collection and processing of statistical data; (5) Data collection from Sector Technical on investment activities [197]; (6) Financial documentation on structural investment to be registered for ZPP; (Accounting and book keeping); (7) Payment against invoices; preparation of financial tables; (8) Receiving and liquidating documents from all the Sectors and external ones; (9) Processing commercial papers [invoices, debit notes, payment orders etc.]; (10) Assessing depreciation of assets; (11) Accounting of fixed assets including purchase, depreciation, revaluation, and sales; (Logistics) (12) Accounting of logistics at warehouse; (General) (13) Proposing new improved ways of activities; (14) Book keeping on VAT; (15) Inventory control of materials, tools and equipment (stationery, fittings, gas and diesel, spare parts etc.	(Tariff collection) (1) Billing, collection of water and sewer service charges, register of receipts, and disposal of accounts receivable; (General accounting) (1) Cash ledger management; (2) Bank accounts control; (3) Payments against invoices; (4) Control of expenses for social, health and life insurance; (5) Tax (income, VAT etc.) handling; (6) Money transfer between bank accounts; (7) Control of cash, bank deposits and commercial papers; (8) Liquidation of accounts payable; (9) Liquidation of accounts receivable; (10) Control of borrowings and investments; (11) Accounting on logistics (store management); (12) Preparation of income statements, cash flow and balance sheet; (13) Settlement of annual budget; (14) Procurement – pre-qualification (PQ), tendering and evaluation, and contract making with contractors; (15) Acquisition and sale of assets; (16) Payment to contractors; (17) Registration of acquired facilities; (18) Asset management including entries and write-off of assets; (19) Assessing facility depreciation based on their economic lives; (20) Inventory control of consumable supplies, materials and equipment; (21) Control of movables and real estate; (22) Preparation of annual accounting report; (23) Construction of DB on A/C and related activities; (24) Preparation of mid- and long-term plans for revenue and expenditures;
Finance Div.	(Purchase and investment) (1) Procurement; (2) Recording investment activities;	(1) Planning of fund requirements for Vodovod's overall activities; (2) Budget planning and its execution;

Sector / Div.	Present	Future
	(3) Accounting on Vodovod's activities; (4) Opening and upkeep of new accounts for suppliers; (5) Book keeping on invested assets; (Banking) (6) Bank transactions including transfers; (7) Recording receipts and payments for contractors and suppliers;	(3) (Year-end) Settlement of the budget; (4) Handling of subsidies and contributions;
Remuneration and Benefit Div.	(1) Preparation and maintenance of payrolls; (2) Computation of remuneration of sick, maternity etc. leaves[215]; (3) Provision of pension programs and computation of pension fund; (4) Payment of salaries and allowances[214]; (5) Payment of pension;	(1) Staff register; (2) Provision and maintenance of payrolls; (3) Application of staff performance evaluation; (4) Payment of salaries and wages; (5) Payment of travel expenses and related cost; (6) Payment of retirement money; (7) Payment of pension; (8) Collection of income tax on salaries and its payment to the tax office;
Commercial Div.	(1) Implementing investment programs including announcement of procurement[218]; (2) Preparation of interest lists on invoices, bills and debit notes paid; (3) Preparation and issuance of notice of disconnection of default customers; (4) Reconnection of the same after payment; (5) Preparation and implementation of law suits against default customers; (6) Book-keeping on law suits;	(1) Setting of water and sewer service rates; (2) Provision of water supply and sewer service codes; (3) Provision and maintenance of customer DB; (4) Meter reading; (5) Issuance of water and sewer service bills; (6) Collection of bills; (7) Customer installation charge handling; (8) Sewerage service charge affairs; (9) Recording transactions; (10) Examination of quantitative irregularities in meter readings;

Table 1.8 TORs of Vodovod (Present and Proposed) for Sector, Legal, Personnel and General Affairs

Sector / Div.		Present	Future
Sector, Legal, Personnel and General Affairs			
	General Affairs Div. (No separate General Affairs Div.)	(1) General administration of Vodovod (including Board of Directors and Audit Board)[256]; (2) Recording employees' job-related activities and behaviors including duty hours and leaves[276]; (3) Provision of security measures in the Vodovod's premises [276]; (4) Recording of Vodovod's properties[262];	(1) Application and revision of Vodovod's organization; (2) Handling of official documents of Vodovod; (3) Rule of announcement within Vodovod; (4) Rules of duty travels and their expenses; (5) Procurement of office supplies and appliances; (6) Maintenance of electrical, communication, fire-alarm, water supply and drainage, heating and air-conditioning facilities; (7) Property damage and fire insurance of buildings and other properties; (8) Maintenance and repair work of buildings, offices, guard houses, etc. (9) Upkeep of automobiles, air-conditioners etc.; (10) Statistics of Vodovod's general activities;
	Legal Div.	(1) Handling of court cases related to payment of debts [258][264]; (2) Guiding Vodovod's personnel on legal matters[do]; (3) Realization of complaints and court decisions[262]; (4) Launching the proceedings for assigning land[262]; (5) Appeals for disruption of work discipline in Vodovod ; (6) Delivery of court decisions for enforced payments	(1) Provision of code of water supply and sewer services; (2) Provision of corporate ethical codes;
	Personnel Div.	(1) Recording of all the personnel data; (2) Provision of HR policy [267]; (3) Application of instructions from job ad; (4) Health insurance[do]; (5) Administration of pension funds[do]; (6) Inspection of facilities for hygienic and safety protection of personnel [268]; (7) Inspection of equipment (gas mask etc.) for the same[do]; (8) Proposition of cases of injury on duty[do]; (9) Professional training of personnel including courses and seminars[269]; (10) Providing leisure and recreational activities[do]; (11) Management of the welfare policies [270];	(1) Term of General Director; (2) Regulation on the staff size; (3) Regulation on recruitment and dismissal of staff; (4)-1 Provision and revision of TORs of Sectors, Div., and Sections; (4)-2 Provision of job descriptions of personnel; (5) Regulation on salaries and wages including salary scales; (6) Pension system programming and pension payment; (7) Rule of performance evaluation; (8) Rules on promotion and demotion; (9) Staff training; (10) Rule of business hours; Rule of holiday; (11) Rule of social security and fringe benefits; (12) Hygienic and security control of personnel; (13) Rule of staff compensation for injuries on duty; (14) Rule of free access to information; (15) Protection of personal information;

Table 1.9 TORs of Vodovod (Present and Proposed) for Center for Sanitary Control

Sector / Div.	Present	Future
Center for Sanitary Control		
General Affairs Div. (Director)		(1) General affairs of the laboratory; (2) Annual budgeting for the Center; (3) Planning of water quality surveillance of sewage and treated sewage; (4) Logistics of materials, agents, tools and equipment; (5) Preparation of DB on testing activities and water quality; (6) Safety and hygienic control of the personnel;
(Head of the center)	Sanitary surveillance of facilities of Vodovod;	(1) Review of EU and Macedonian Water Quality Standards/Guidelines; (2) Water sampling; (3) Testing of sewage and treated sewage; (4) Calibration and maintenance of equipment and instruments;
Sampling Unit (Sanitary Inspector)	(1) Daily sampling of drinking water and wastewater; (2) Inspection of facilities (chlorinators etc.) for water conditioning;	(1) Provision of strategy for water quality surveillance including sampling and testing objects, methods of testing, data reliability survey etc.; (2) Programming of sampling of drinking water and wastewater;
Microbiological Laboratory	(1) Microbiological analyses of drinking water and wastewater;	
Chemical laboratory for Drinking Water	(1) Chemical analyses of drinking water and wastewater[289]; (2) Maintenance of equipment and apparatus[290];	
Chemical laboratory for Wastewater	(1) Chemical analyses of wastewater [291]; (2) Maintenance of equipment and apparatus[293];	

The above was prepared as a discussion material "TORs for Divisions of the Sectors - Present Status and Future Needs" at the CD workshop (See 2.3 below) as examples of TORs, which did not contain TORs of all the Sectors of Vodovod.

1.3 Principle for Action Plan

To achieve CD of Vodovod in the areas of institutional and financial operations, Vodovod has to make efforts so as to fill the gap between the goal for capacity development and the present status. However, it will not be easy to fill the gap at once. Some activities can easily be carried out while others can only be undertaken over a long period of time or in repetition. On the other hand some actions must be given a high priority for its implementation whereas others may have somewhat lower priority.

As to the setting of Strategic Goals and the themes of the A/P, discussions between the C/P (Vodovod's Deputy General Director and his staff, in group or independently) and the Study team were held more than 15 times during the Phase 1 period (October - November 2007 and February 2008) and Phase 2 period (May-June 2008). It was agreed that CD activities should be conducted in the following six areas, that CD activities in particular three areas (See below) be carried out by means of a workshop or a seminar to be conducted by the Study team, and that CD activities for the remaining three areas should be undertaken by the chiefs of Sectors related to the areas at appropriate timing in future.

The areas for which CD is needed are tabulated below:

(1) Human resources and management
(2) Improvement in the O&M system
(3) Improvement in financial operation
(4) Renovation of organizational system
(5) Improvement in rate policy and process of rate setting
(6) Reduction in non-revenue water (NRW)

CHAPTER 2 FORMATION OF A/P

2.1 Areas for CD, Activities Required and Objectives

The A/P is formed with proposed actions needed for CD in the six areas mentioned earlier in the Chapter 1 of this report. The objects of CD are also proposed. CD activities on "1. Human resources management", "2. Improvement in the O&M system" and "3. Improvement in Financial Operation" listed below were conducted.

Table 2.1 Action Plan

Areas for Capacity Development	Activities Required	Objects of CD
1. Human resources management	(1) Identification of Vodovod's good corporate cultures. How to enforce such cultures. (See Reference-1: CD related to Human resources management in Volume: Attachment for more details.) (2) A study on human resources requirements during and after completion of the Project (3) Provision of a plan on recruitment and repositioning of personnel and training thereof as required to undertake activities which will increase quantitatively as well as qualitatively during Project implementation and after completion. (4) Optimization of the staffing in each Division in terms of not only staff size but also qualification of staff. Examination of the possibility of reducing staff size or repositioning of staff if there is any overstaffing. (5) A review of the present system of human resources development (training) and proposal of any possible improvement. (6) Evaluation of the present system of staff performance evaluation as a proper base for promotion and repositioning. Proposal of a proper staff performance evaluation and reward system to retain competent staff and give incentives to them to stay with Vodovod.	Deputy General Director; Assist. Gen. Dir. for Legal & Economic Affairs; Assist. Gen. Dir. for Technical Affairs; all Directors; Manager, Personnel Div.; staff in charge of training
2. Improvement in the O&M system	(1) A review of technical terms of reference of Sectors and their sections related to the O&M of facilities; Examination of the TORs if they are suitable for activities to be performed in the new corporate environment. (2) Examination if there are any areas for improvement in O&M including a review of O&M manuals. (3) Review of the logistics system and proposal of a possible change (purchase, storage, deployment and disposal etc. in the most effective timing) are needed. (4) A study on preventive maintenance and planned facility replacement.	Assist. Gen. Dir. for Technical Affairs; Dir., Sector Exploitation, Maintenance of Facilities and his selected staff; Directors of all other Sectors except for Sector A/C, Finance & Commerce and Sector Legal, Personnel & General Affairs
3. Improvement in Financial Operation	(1) Examination of possible measures to raise water and sewer service charge collection rate (improvement in the efficiency of billing and collection of water charges). (2) (Operation side) Preparation of a long-term budget plan with estimates of revenues and expenditures including ones for the period after the completion of the Project. Measures for reduction in operating cost shall be practiced (e.g., pump delivery pressure control to avoid unnecessary high pressure during low demand time zones). (3) (Capital side) Preparation of a long-term investment plan with cost estimates of major replacement of facilities and those of the Project. (4) Revaluation of assets in terms of economic lives and actual capacities of facilities and equipment. (5) Trial calculation of depreciation based on economic lives of assets. (6) Proposal of budgeting for proactive repair and replacement of facilities.	Director, Sector Accounting (A/C), Financing & Com. Sector; all Managers of the Sector; and incumbent staff of accounting and finance
4. Renovation of the operating system	(1) Documentation of terms of reference of Sectors and their Divisions from administrative point of view. . (Refer 1.2 above for TORs to be provided in future.) (2) Redefinition of such terms of reference if there are any areas which are redundant or insufficient, especially when considering	General Director; Deputy General Director; Director, Sector Legal, Personnel & General Affairs, all Managers of the Sector; Directors of all

Areas for Capacity Development	Activities Required	Objects of CD
	the need for new activities or higher grade of handling methods. (3) Examination of what organizational reform is needed to deal with the additional administrative requirements during and after completion of the Project.	other Sectors
5. Improvement in rate policy and process of rate setting	(1) Proposal of a system of public participation, including public hearing and a rate council on the water and sewer service rate. - The concept of selecting stakeholders who participate in the hearing. - The process and materials of implementing such a hearing - Main theme and method of presentation. (2) Proposal of measures to raise "willingness-to-pay". - Examination of measures for public relations to be taken by Vodovod: (i) newspaper ad, (ii) TV commercial, (iii) posters, etc. - Contents of such message: the purpose, cost and benefits for them of a new project so as to understand about the need for the project and have better motivation to pay their bills.	Deputy General Director; Assist. Gen. Dir. for Legal & Economic Affairs; Assist. Gen. Dir. for Technical Affairs; Dir., Sector A/C, Financing & Commerce; and staff of Commerce Division
6. Reduction in non-revenue water (NRW)	(1) Proposal of the management of water mains DB (property [material, diameter, location, length etc.], drawings etc.) (2) Examination of the customer register (DB) including property of the services (connections); A proposal on how to improve it. (3) Proposal of alternative methods of transfer of leakage detection technology. (4) Review of the set-up for leak detection operation (including the number of personnel and equipment), and their future needs, (5) Establishment of a proactive budget plan for replacement of old water mains.	Assist. Gen. Dir. for Technical Affairs; Dir., Sector Exploitation, Maintenance of Facilities; Dir., Sector Water Supply and his staff; and Dir., Emergency & Information Center and his staff

CHAPTER 3 IMPLEMENTATION OF WORKSHOPS (CD ACTIVITIES)

3.1 Objective Areas

Considering the effectiveness, available resources and timing, CD activities on the following three areas are recommended to be undertaken during the Study period. It is also recommended for Vodovod to carry out CD activities in the other areas in the course of Project implementation and operation.

(1) Human resources management
(2) Improvement in the O&M system
(3) Improvement in Financial Operation

3.2 Implementation Schedule of CD

CD activities are recommended to be undertaken in the following time schedule:

Table 3.1 Implementation Schedule of CD (1)

No.	Area of CD	Schedule
1.	Human resources management	During Ph.2 Study period: Implemented on 23 June 2008
2.	Improvement in the O&M system	During Ph.2 Study period: Implemented on 15 Sept. 2008
3.	Improvement in Financial Operation	During Ph.2 Study period: Implemented on 26 Sept. 2008
4.	Renovation of the operating system	Over the period of 2009-2010
5.	Improvement in rate policy and process of rate setting	Over the period of 2011-2012
6.	Reduction in non-revenue water (NRW)	All through the present time and future

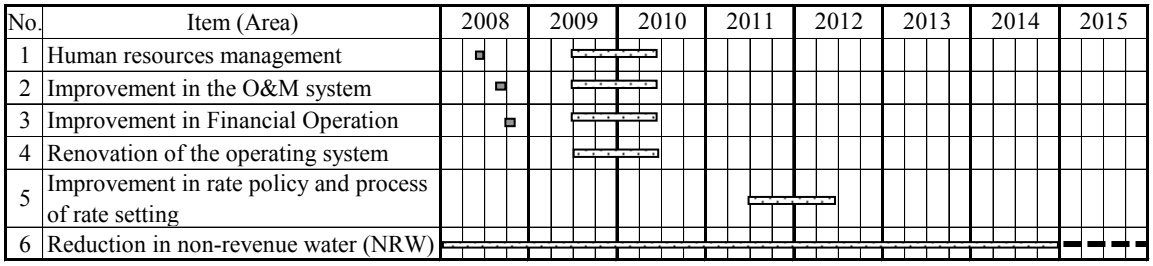

Figure 3.1 Implementation Schedule of CD (2)

3.3 Workshops

3.3.1 Workshop on CD for Human Resources Management

A workshop entitled "Capacity Development related to Human Resources Management" as one of CD activities was conducted. The venue, date and time, and attendees (including the objects) of the workshop are as follows:

Venue: Main conference room at Vodovod
Date and time: 23 June 2008; 9:00-12:00
Attendees: Deputy General Director, Vodovod*; Assistant General Directors, (do)**; Sector Directors ***; C/P side liaison officer (Ms. Sanja Spirovska); Messrs. Nishio and Sasa from JICA Skopje office; 5 members of the Study Team: Total 19
*Mr. Slobodan Dimitrievski; **Mr. Nikola Gjorevski, Technical Deputy General Dir.; Mr. Borce Nairov, Ass. Dty. Tech. Gen. Dir.; Mr. Darko Donevski, Ass. Legal General Dir.
***Mr. Bojan Ristovski, Dir., Sector Emergency & Information; Ms. Ilinka Sazdova, Sanitary

Control Center; Mr. Zharko Ivanovic, Dir., Sector O&M; Mr. Zlatan Ikonomov, Dir., Sector Technical Dev.; Mr. Sasha Atanasov, Dir., Sector Sewerage; Mr. Mihail Kalcovski, Acting Dir., Sector IT
Handouts: 1) CD on Human Resources Management (Appendix 3.1, Part III (AP/IF)
2) TORs for Divisions of the Sectors - Present Status and Future Needs (See 1-2 above)

The purpose of the workshop was to give important knowledge to the executive staff of Vodovod that the personnel are running the utility, so it is essential for the utility to establish firm corporate cultures, that each Sector and division should have functional TORs of divisions and their personnel, and that the personnel should be positioned in the suitable post through practices of their performance evaluation.

Contents of the Workshop

(1) SWOT

When considering reform of a corporation or human resources development, it is important to recognize the existing culture of the corporation. As a result the "strength" and "weakness" of the corporation are to be evaluated. The strength should be given more opportunities to grow whereas the weakness should be reduced or eliminated to prevent it from bringing about threats. Vodovod possesses such good corporate culture as (1) It has historically realized water service with stable service with enough quantity and quality, which leads to consumers' confidence to Vodovod; (2) Salaries of the staff is good, and their loyalty to their employer is strong; (3) There is a sense of unity between the management and the staff of Vodovod and so forth. On the other hand, there are bad corporate cultures such as (1) Extensive water losses have poorly been attended; (2) No wastewater treatment is undertaken resulting in the pollution of the river; (3) TORs for Sectors and their division are not firmly established etc.

(2) Principles of Human Resources Management

It was presented that human resources management shall be carried out based on the following principles so as to cultivate good corporate cultures and reduce the bad ones;

a) Recognition of the existing corporate cultures
b) Evaluation of the existing organizational structure
c) Understanding of important means for human resources development and management, e.g., employment policy, staff positioning, staff performance evaluation system, etc.
d) Method of performance evaluation
e) Review of the salary structure
f) Recommendation for structural renovation

(3) Items of discussion at the workshop

a) Recognition of the existing corporate cultures

The good and bad corporate cultures as stated above are reviewed. Attendants of the workshop agreed with the need for them to understand the corporate cultures. When an idea to enact a water supply day as a means of consumer awareness was introduced, Deputy General Director stated that Vodovod has experience to publish its PR materials such as teaching material for school children to understand about the recycling of water in the natural environment.

b) Review of the existing organizational structure

There are very strong lines of order leading from General Director ➔ Deputy General Director ➔ Technical Director ➔ Sector Directors. On the other hand, job descriptions for divisions in each Sector are not clearly defined. These points are acknowledged by the participants. Then it was pointed out that there is no general affairs division in each Sector even in Sectors which possess almost 300 staff members. It was commented that a general affairs division each sector may be necessary to do coordination among divisions. Deputy General Director

mentioned that Vodovod is making efforts to make slim its operation, and that establishment of such a division was contradictory to such an effort.

c) Important means to be applied for human resources development (Strategy of staff recruitment, staff positioning, performance evaluation etc.)

It was pointed out that, when planning staff recruitment, it is important to first find persons who could take leadership of the division they belong; develop a personnel DB; establish salary systems by trade and rank; exercise staff performance evaluation; and reflect the outcome of such evaluation to promotion, repositioning and salary. The fact was also touched upon that Vodovod's Sectors hold much larger staff compared with similar organizations operated in a market-oriented economy. In response, the Vodovod side stated that the staff size is not determined by Vodovod itself, but Skopje City, the mother body of Vodovod, and that in effect Vodovod is not prepared to do outsourcing of its activities, for example, water quality analysis, security patrol etc. so it is difficult to reduce the staff size quickly. It was also mentioned that, although only OJT training has been performed in each Sector, a system of systematical training should be established.

d) Method of performance evaluation

Presentation was made on how to carry out performance evaluation including the preparation of the performance evaluation form consisting of (1) trades and positions (manager band candidates, clerks and technical personnel), (2) their names, age, experience with the present employer, (3) present position, (4) points marked for each evaluation factor; (5) evaluation criteria; (6) method of synthetic evaluation, (7) how to reflect the evaluation to the new salaries etc. The Vodovod side stated that they have not been practiced such systematic performance evaluation, but that they would like to make reference to such a method in future.

e) Review of the existing salary structure

Vodovod at present does not have established salary systems for each trade and position of the staff. Hence presentation was made on a "basic plus performance based salary" system to be considered in future.

f) Recommendations on the reform of the organizational structure

At present the scopes of work of the Sectors of Vodovod are considerably complex. For example,(1) water intake, transmission and treatment are operated by Sector O&M; (2) distribution mains are maintained by Sector Water Supply; (3) pumping stations by Sector O&M; (4) leakage detection by Emergency & Information Center; (5) leakage repair by Sector Water Supply, (6) acceptance of applications for installation of services by Sector Technical Affairs and Development, and (7) installation of services, replacement and repair of water meters by Sector Water Supply. It was proposed that the future integration of such activities in the same area into one single Sector may be beneficial. It was also pointed out that no major reduction in staff size would be realized unless recruitment of competent personnel, reform of the organization, mechanization and automation, employment of IT technology would be practiced; and that such measures would consume sizeable money and a long period of time.

(4) Conclusions and recommendations

Any schemes of human resources management cannot be successful unless the corporation can clearly indicate to its staff what the corporation is aiming to do; and how it makes its staff carry out their activities to achieve such an aim. Therefore, the importance of the organizational system and TORs of the corporation and its staff, methods of performance evaluation, principles of reform of the system etc. were discussed. The following are the issues to be solved in future:

a) Vodovod shall undertake organizational renovation and human resources management while aiming at proliferating the existing good corporate cultures, and at the same time reducing the bad cultures.
b) Simplification of operation, which is highly complex at present as seen above, is desirable

when Vodovod undertakes the renovation of its organizational system.

c) Leaving from the egalitarianism, Vodovod shall consider practicing performance evaluation of the Sectors and their divisions as well as individual staff in future.

It will take some more time to see what improvement Vodovod has made as to human resources management since the CD activities were carried out just recently.

3.3.2 Workshop on Improvement in the O&M system

A workshop on "Improvement in the Operation and Maintenance (O&M) system" as one of CD activities was carried out. The venue, date and time, and attendees (including the subjects of CD) of the workshop are as follows:

Venue: Main conference room of Vodovod
Date and time: 15 September 2008; 9:30-12:30
Presenter: JICA Team (Mr. K. Tomono)
Attendees: General Director, Vodovod*[1]; Deputy General Director, Vodovod*[2]; Assistant General Directors, (do)*[3]; Sector Directors*[4]; C/P side liaison officer (Ms. Sanja Spirovska); Mr. Sasa from JICA Skopje office; 5 members of the Study Team: Total 19
*[1]Mr. Igor Arnaudov; *[2]Mr. Slobodan Dimitrievski; *[3]Mr. Bois Nachkov, Ass. Gen. Dir.; Mr. Darko Donevski, Ass. Legal General Dir.; *[4]Mr. Bojan Ristovski, Dir., Sector Emergency & Information; Ms. Ilinka Sazdova, Sanitary Control Center; Mr. Zharko Ivanovic, Dir., Sector O&M; Mr. Zlatan Ikonomov, Dir., Sector Technical Dev.; Mr. Sasha Atanasov, Dir., Sector Sewerage; Mr. Mihail Kalcovski, Acting Dir., Sector IT
Handout: "Operation and Maintenance of Sewerage Facilities" (Appendix 3.2, Part III (AP/IF)

(1) Principle of Organization for Operation and Maintenance (O&M)

The principle of organization for O&M of pumping facilities and the wastewater treatment plant (WWTP) was presented. When considering the organization for O&M, required classification of activities, positioning of staff, commission of jobs, and measures against emergency cases were described as follows:

a) Items of O&M activities for Sewerage

Activities related to O&M of sewerage are classified below:

1) General affairs
2) Execution of budget plan
3) Management of assets
4) Setting sewerage rate
5) Guidance on how to install drainage facilities
6) Monitoring of industrial wastewater discharge and instruction for improvement
7) O&M of sewer network
8) O&M of pumping stations and the WWTP
9) Control of water quality
10) Management of registers of facilities
11) Activities for environmental conservation
12) Activities related to sewerage facilities
13) Other activities

Contents of the above items are tabulated as follows:

Table 3.2 Classification of Jobs related to O&M of Sewerage Facilities

Item of Job	Principal Jobs
1. General affairs	(1) Enactment of the sewer service code (2) General affairs (3) Personnel management (4) Payroll and salary matter (5) Budget planning and execution (6) Accounting (7) Social security and welfare (8) Public relationship etc.
2. Execution of budget Plan	(1) Purchase and logistic management of materials and supplies (fuel, chemicals, and consumables) (2) Contract making of construction jobs assigned (3) Contract of other jobs assigned
3. Management of asset	Management of fixed assets, and their maintenance
4. Setting sewerage rate	(1) Investigation of customers, and estimate of sewer service charges (including estimate of water consumed) (2) Collection of the charges (3) Investigation of unpaid charges
5. Guidance on how to install drainage facilities	(1) Guidance for installation of Drainage facilities and flush toilets, and their inspection
6. Monitoring of industrial wastewater discharge and instruction for improvement	(1) Installation of pre-treatment facilities (2) Guidance to factories for O&M of such facilities (3) Inspection of factories on the regulation of wastewater quality
7. O&M of sewer network	(1) Planning and supervision of inspection and survey of the sewer network (2) Planning and supervision of cleaning and dredging of sewers (3) Planning and supervision of repair and improvement of sewers
8. O&M of pumping and the WWTP	
1) Operation	(1) Planning of sewage and sludge treatment activities (2) Planning of operation of mechanical facilities of pumping stations and sewage treatment plant (3) Planning of transportation and disposal of grit, screenings, sludge cake, and incineration ashes, if any (4) Cleaning and upkeep of buildings, horticulture etc (5) Recording and maintenance of the activities of pumping stations and the WWTP (6) Action instruction and operation in emergency cases
2) Inspection and maintenance	(1) Preparation of inspection and maintenance plan and procedures of mechanical and electrical equipment (2) Inspection and maintenance of mechanical and electrical equipment
3) Repair and improvement	(1) Planning, design and implementation of repair and improvement work
4) Capacity evaluation	(1) Testing (measurement) of performance of pumps and electrical equipment compared with the original specification (2) Evaluation of the actual capacity of pumps and electrical equipment including estimate of their economic lives
9. Control of water quality	(1) Planning of water testing, survey, study etc. (2) Quality testing of sewage and sludge (3) Testing of activated sludge (4) Testing of industrial wastewater (5) Compiling and analysis of data and preparation of a report (6) Preparation of instructions on O&M (7) Adjustment and calibration of water quality instruments
10. Management of registers of facilities	(1) Preparation and keeping of facility registers (DB) (2) Updating and access services of the registers (3) Management of drawings and documents (general plans, profile with hydraulic levels, plans of drainage areas, wiring diagrams, piping diagrams etc.)
11. Activities for environmental conservation	(1) Planning and implementation of testing of ambient atmosphere (2) Measurement of noise and vibration (3) Measurement of odor (4) Water quality testing of the river where treated sewage is discharged
12. Activities related to sewerage facilities	(1) Announcement of the commencement date of services (2) Permission for connection by other sewer network (3) Request for enactment of the sewerage code and other regulations needed for the operation (4) Collection of O&M charges from the proprietors of other sewer networks with connection to this system (5) Flow measurement

Item of Job	Principal Jobs
13. Other activities	(1) Report to the supervising agencies of the government (2) Examination of work place safety and hygienic protection and their improvement (3) Application for occupation of public areas for O&M jobs (4) Survey and research on sewerage (5) Conducting tour of the facilities of visitors (citizens) (6) Activities for promotion and public education etc.

b) Present Organizational Structure

As a base of discussion, present organizational structure of Vodovod was reviewed. A General Director heads Vodovod with a Deputy General Director, two Assistant General Directors and a Technical Director to assist him. For decision-making the Director consults with a Management Board and a Control (Audit) Board. There are eight Sectors and two centers including Sector Sewerage, which handle day-to-day activities of Vodovod.

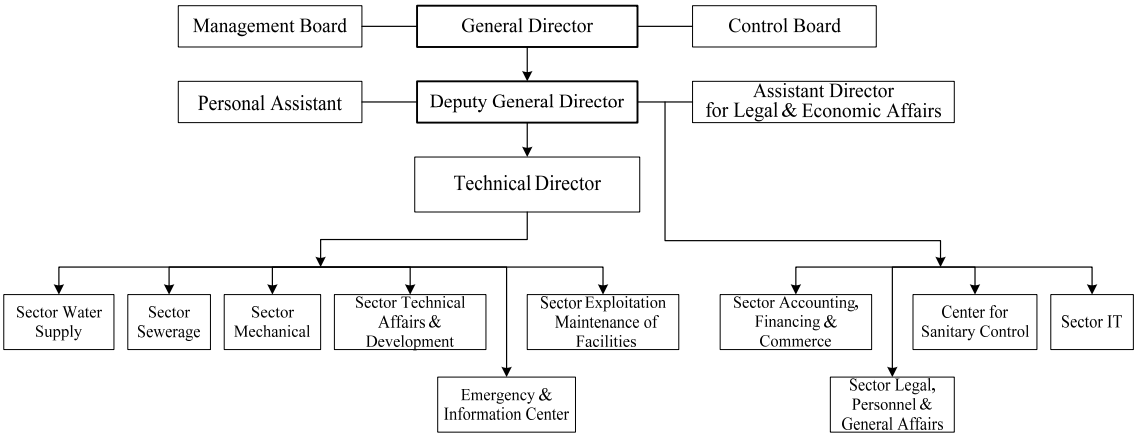

Figure 3.2 Organizational Structure of Vodovod

The presenter commented that the total staff size was 1,120, which seemed to be significantly large compared with other examples in market-oriented economies. A counter comment was made that reduction in the staff size was difficult since Vodovod still had labor-intensive activities, and that it had been retarded in mechanization and automation.

Sector Sewerage is only responsible for the O&M of the sewer network. The organization of the Sector is shown in Figure 3.3. The organization of the Sector is characterized not with a job-oriented structure but with a personnel-oriented structure. Pumping stations for both sewage and storm water are operated and maintained by Sector Exploitation and Mechanization of Facilities (Sector O&M)(See Figure 3.4). The presenter pointed out that the staff size of the Sector was as large as 282. The Vodovod side explained that the Sector had a large number (about 100) of security guards for the facilities. The pumping stations are operated by the Division for Capacity Exploitation; and maintained by the Division for Electro-Mechanical Maintenance.

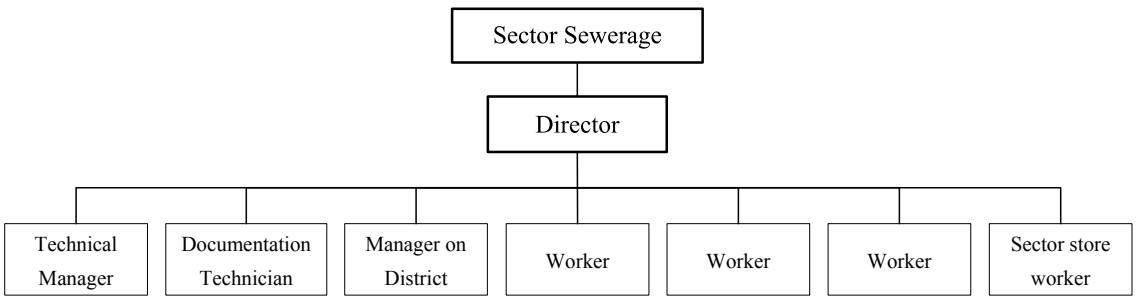

Figure 3.3 Organization of Sector Sewerage

(2) Proposed organization for O&M of WWTP

There is no division for O&M of the WWTP in any Sector of Vodovod. It is recommended that a new Sector is created for O&M of the WWTP, which is to be placed directly under Technical Director. The presenter showed a proposed organization of the Wastewater Treatment Sector as follows:

Table 3.3 Proposed Organization of Sector Sewerage

Division / Section	Job
Director	
Administration Division	
General Affairs Section	Personnel and other general matters
Warehouse Section	Receipt and deployment of material and tools
Security Guard Section	Security and sage guard of the WWTP
Operation Division	
Sewage Treatment Sector	Operation / patrol / inspection / report
Sludge Treatment Sector	Operation / patrol / inspection / report
Maintenance	
Building Maintenance	Inspection and repair
Mechanical Section	Regular check and upkeep
Electrical Section	Regular check and upkeep
Laboratory	
Water quality control / Sludge consistency control	Water quality / sludge analysis / record / report / direction for operation

The Sector consists of four Divisions, i.e., Administration Div., Operation Div., Maintenance Div., and Laboratory. Manning with around 40 staff members will be required for the Sector. Deputy General Director of Vodovod commented that Administration Div. would not be necessary since Sector Legal, Personnel & General Affairs and Sector Accounting, Finance and Commerce took care of administrative activities of Sector Sewerage.

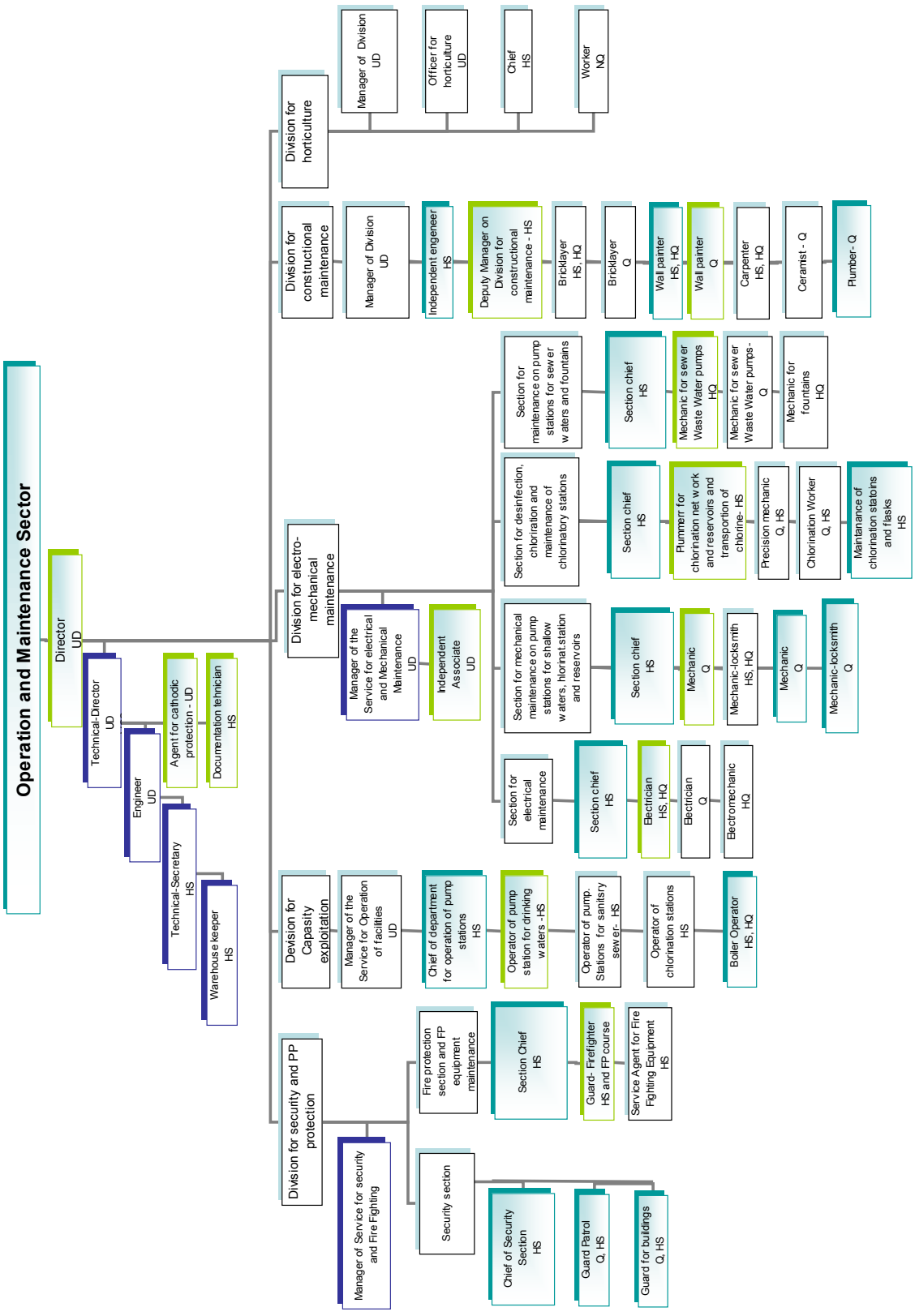

Figure 3.4 Organization of Sector O&M

The next issue was the positioning of Sector Sewerage in Vodovod. The presenter proposed three alternative organizational structures of Vodovod which include Sector (Division) Sewerage (See Figure 3.5, Figure 3.6 and Figure 3.7).

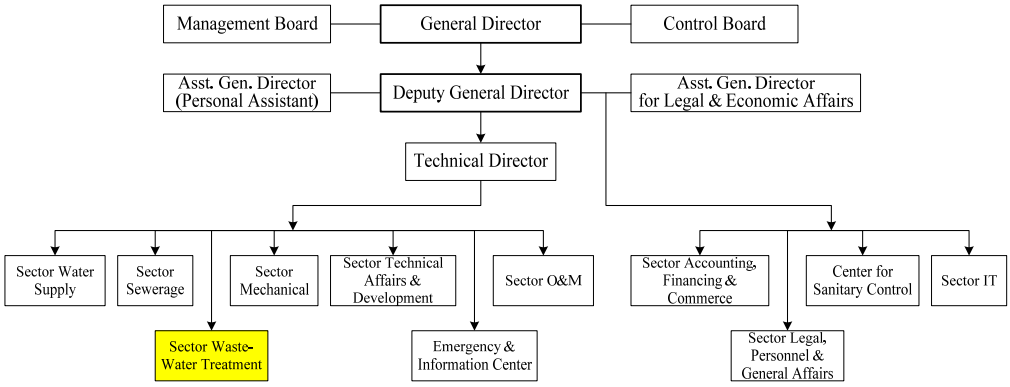

Figure 3.5 Proposed Organizational Structure of Vodovod – Alternative 1

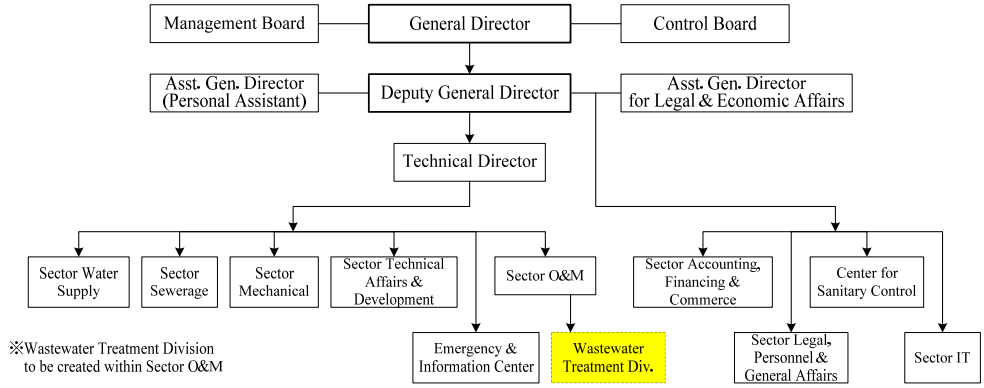

Figure 3.6 Proposed Organizational Structure of Vodovod – Alternative 2

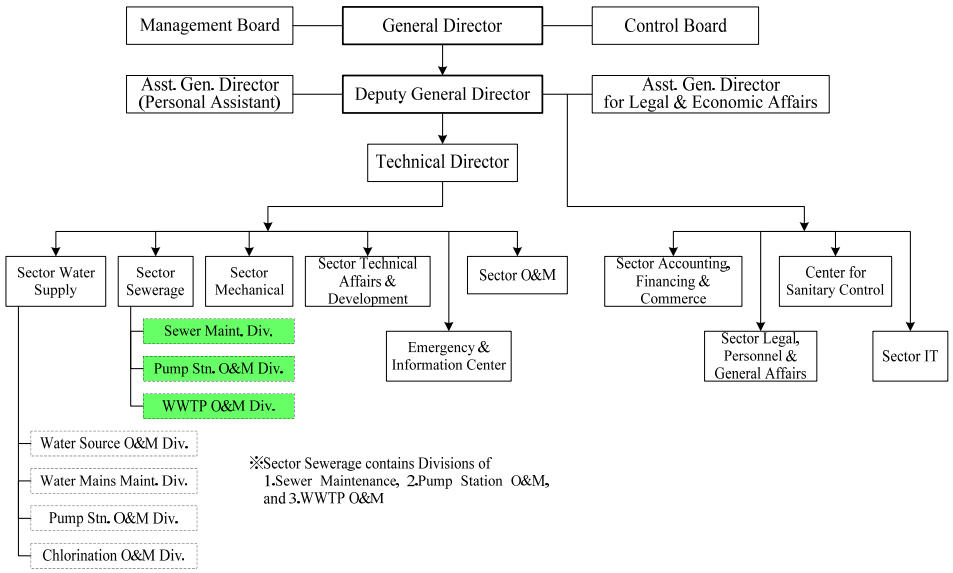

Figure 3.7 Proposed Organizational Structure of Vodovod – Alternative 3

Under the scope of Alternative 1, Sector Sewerage will only be responsible for the operation of the WWTP whereas Sector O&M handles the maintenance of the WWTP. Under Alternative 2, a new division for the operation and maintenance of the WWTP will be installed within Sector O&M. Under Alternative 3, Sector Sewerage will be renovated to contain not only the O&M of sewer network but also the O&M of the pumping stations and the WWTP.

The merit of Alternative 1 is that there will be some transfer of personnel from other Sectors to the new Sector Sewerage, but the required change in the organizational structure of Vodovod will be minimal. The demerit of Alternative 1 is that only facility operators are stationed in the WWTP without technical resources for maintenance at hand. So the maintenance personnel have to travel from work stations in the city every day for about 10 km; coordination between the operation side and the maintenance side, especially, for the urgent repair needs.

Alternative 2 has a merit that only a minor change in the line of order will be required within Sector O&M since the new wastewater treatment division is created within the Sector. The demerit is that the addition of the new division will add further complexity to the existing organization which is already highly complicated. What is more, Sector O&M will become too large to efficiently be managed after the addition of the new division.

The merit of Alternative 3 is that all the maintenance as well as operation functions are organized just within the same Sector, so all the activities required for the WWTP will efficiently be coordinated. Its demerit is that the O&M personnel stationed at the WWTP shall exclusively be assigned for the plant, so it is inappropriate for them to attend the pumping stations in the city as well.

As to Alternative 3, it is natural to renovate Sector Water Supply as well so as for the Sector to acquire functions for not only maintenance of water mains but also O&M of drinking water pumping stations. As a result, the function of Sector O&M will only be limited to the maintenance of buildings and structures of Vodovod. The workshop attendants from the Vodovod side expressed their tentative inclination to accept Alternative 3 with reservation for further consideration.

(3) Experience in other countries on organization for sewerage works

For reference to workshop attendants, organizational charts for sewerage works in Beograd and Yokosuka City were introduced (See Figure 3.8 and Figure 3.9).

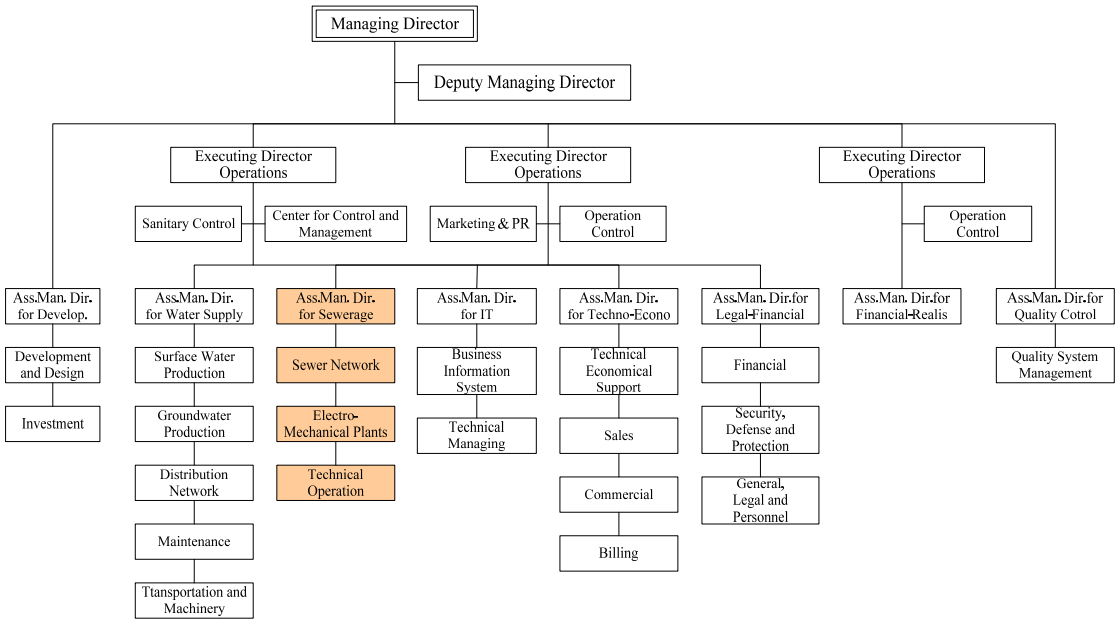

Figure 3.8 Organizational Structure of Vodovod i Kanalizacija, Beograd

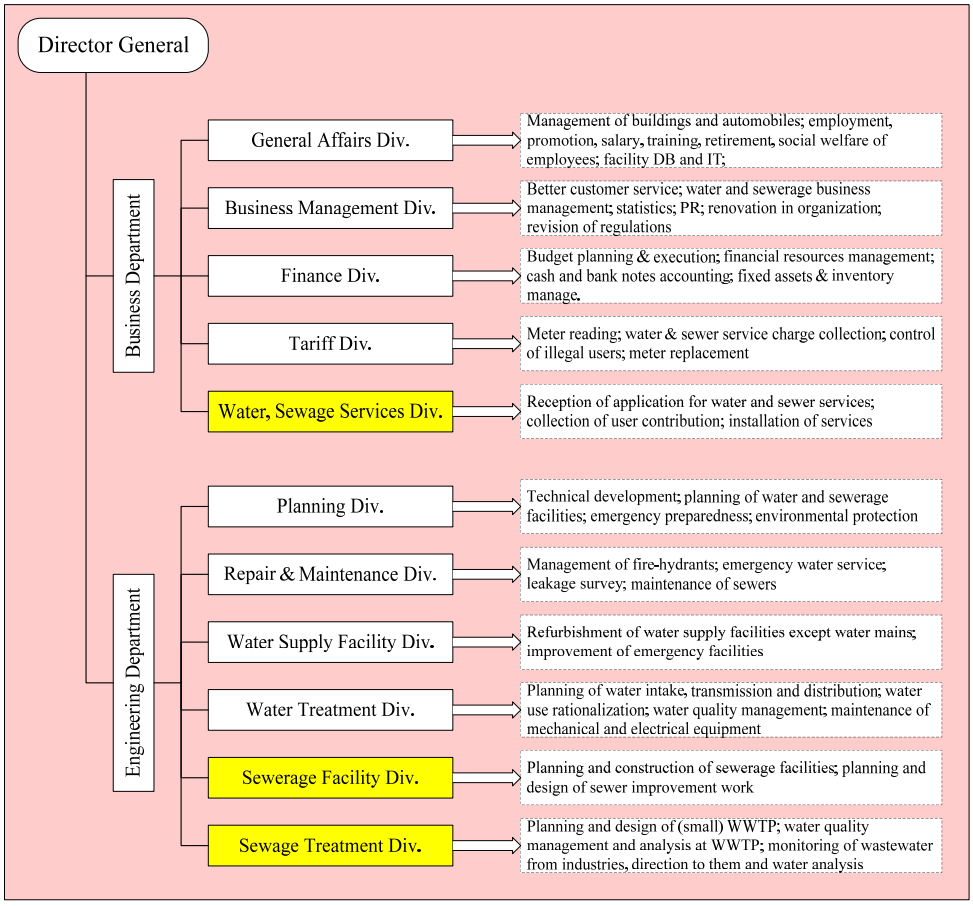

Figure 3.9 Organization of Sewerage Works, Yokosuka, Japan

3.3.3 Workshop on Improvement in Financial Operation

A workshop entitled "Improvement in Financial Operation under the Project" as one of CD activities was conducted. The venue, date and time, and attendees (including the subjects) of the workshop are as follows:

Venue: Auditorium of the City Hall
Date and time: 26 September 2008; 9:30-12:30
Attendees: City Council members*[1]; Representatives from Skopje City*[2]; General Director, Vodovod*[3]; Deputy General Director, Vodovod*[4]; Sector Directors*[5]; NGO representative*[6]; 5 members of the Study Team: Total 45
*[1]Blagoj Chorevski, and other nine members of Skopje City Council; and Dimce Smilevski and 20 other representatives from Skopje City Hall;
*[3]Mr. Igor Arnaudov; *[4]Mr. Slobodan Dimitrievski;
*[5]Mr. Bojan Ristovski, Dir., Sector Emergency & Information; Mr. Zharko Ivanovic, Dir., Sector O&M; Mr. Zlatan Ikonomov, Dir., Sector Technical Dev.; Mr. Sasha Atanasov, Dir., Sector Sewerage; Ms. Olivera Stevanoska, Dir,, Sector Accounting & Finance; Ms. Srevranka Stojkovska; Mr. Stojance; *[6]Ms. Stance Cvetanovska, Environmental NGO
Handout: "Improvement in Financial Operation under the Project" (Appendix 3.3, Part III (AP/IF))

(1) Background

The background of the workshop was presented to give outline perspective of the Project to the workshop attendants. It was stressed that The Project, which will provide a wastewater treatment plant (WWTP) and main collectors (sewers), will form a very large component of the Vodovod's sewerage system. At first the present sewerage system of Skopje was presented. Then the scope and cost of the Project was explained as follows:

Table 3.4 Existing Condition of Sewerage System

Item	Quantity	Remark
Population Served	450,000	80% of total population 560,000
Sewerage Service Area	6,074ha	
Total Length of Sanitary Sewers and Storm Sewers	746,567m	
Length of Sanitary Sewers	539,869m	
Length of Storm Sewers	206,869m	
Length of Old Sewers (before 1966)	294,500m	
Length of New Sewers ('02 – '06)	34,210m	
Number of Pumping Stations (Sanitary Sewerage)	8	
Number of Pumping Stations (Storm Water)	2	

Table 3.5 Scope and Cost of the Project

	Scope of the Project	Cost
1.	Trunk Sewers: Diameter 1,000 – 1,800 mm Length 9.3 km	
2.	Wastewater Treatment Plant: Capacity: 166,000 m^3/day Wastewater treatment facility Sludge treatment facility	
3.	Project cost (provisional): Local Cost Component: ('000 Euro) Foreign Exchange Component: ('000 Euro) Total: ('000 Euro) Total: ('000 MKD)	 80,822 29,602 110,424 6,850,000

The Project cost is compared with the amount of the fixed assets of Vodovod.

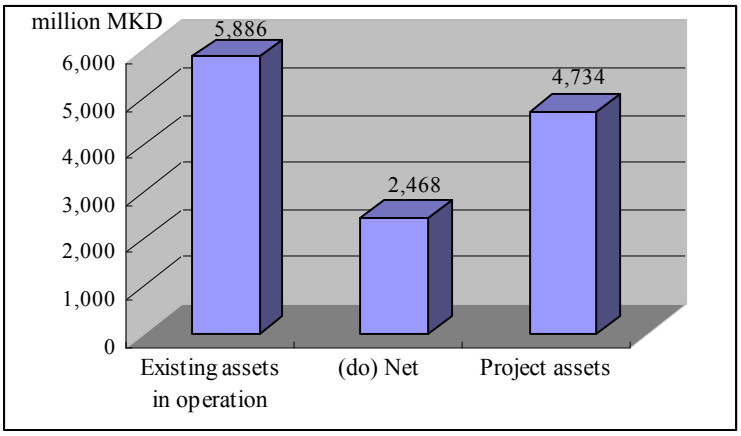

Figure 3.10 Vodovodo's Old and New Asset

It was pointed out that the Project cost will be 80% of the existing total fixed assets of Vodovod.
(The amount of the Project cost indicated in the Figure does not contain physical and price contingencies.)

(2) Current Financial Position of Vodovod

a) Financial Tables

It is important to know whether or not the present financial position of Vodovod is healthy prior to the examination of the Project. The financial position is generally represented by the income statement and the balance sheet. Those financial tables are illustrated below:

Table 3.6 Income Statements of Vodovod (2005-07)

Unit: thousand MKD

		2005	2006	2007
1	Total Income	748,943	698,718	1,219,396
1.1	Revenue from Selling Services	**681,876**	**663,448**	**1,179,577**
1.2	Revenue from Financing	58,841	29,785	34,037
1.3	Other Income	8,227	5,484	5,781
2	Total Expenses	887,165	871,970	1,143,632
2.1	Total Tangible Expenses	**108,798**	**115,394**	**133,476**
2.2	Depreciation	169,805	168,046	168,485
2.3	Intangible Expenses	161,244	129,955	159,384
2.4	Gross Payment of Salaries	329,962	339,127	346,955
2.5	Dismissal of Uncollectible Receivable Accounts (Non-paid Bills)	116,975	118,699	334,332
2.6	Expenses from Interest Rates	379	748	1,000
Gross Income		-138,222	-173,252	75,764
Tax				43,857
Income after Tax				31,907
Loss		138,222	173,252	

Source: Vodovod

Table 3.7 Balance Sheets of Vodovod (2005-07)

Unit: thousand MKD

ASETTS				EQUITY AND LIABILITIES			
	2005	2006	2007		2005	2006	2007
Fixed Assets in Operation		5,886,040	5,901,972				
Minus Accumulated Depreciation		3,417,626	3,582,816	Equity	2,275,374	2,275,374	2,276,193
				Contributions	1,097,779	959,768	786,516
Net Fixed Assets	2,605,973	2,468,414	2,319,156	Revaluation Surplus	241,439	241,439	241,439
				Operational Surplus	-138,222	-173,252	31,907
Work in Progress	5,547	6,695	6,620				
Cash and Bank Deposits	50,022	19,419	327,146	Total Equity	3,476,370	3,303,329	3,336,055
Accounts Receivables	1,573,610	1,259,460	1,355,816				
Inventories	92,594	108,144	114,527	Long Term Debt (Net)	0	0	0
				Accounts Payables	671	1,442	62,641
Total Current Assets	1,721,773	1,393,718	1,804,109	Prepayment	7,680	11,071	10,949
				Current Maturities	843,025	546,290	713,621
Total	**4,327,746**	**3,862,132**	**4,123,265**	Total Current Liabilities	851,376	558,803	787,211
				Short Term Debt	0	0	0
				Total Liabilities	851,376	558,803	787,211
				Total Equity-Liabilities	**4,327,746**	**3,862,132**	**4,123,266**

Source: Vodovod

The presenter mentioned that the accounts receivable was markedly large. Hence the distribution of asset items were compared with those experienced for the city of Akita in Japan.

Table 3.8 Assets Components Compared – Skopje and Akita City

Unit: %

Item	Skopje	Akita City
Fixed Assets in Operation	152.4	144.4
Minus Accumulated Depreciation	88.5	49.2
Work in Progress	0.2	0.2
Net Fixed Assets	63.9	95.2
Cash and Bank Deposits	0.5	3.8

Item	Skopje	Akita City
Accounts Receivables	32.6	1.0
Inventories	2.8	0.1
Total Current Assets	36.1	4.8
(Net) Total Assets	100.0	100.0

The "Accounts receivable" for Vodovod, which is as large as 32.6%, is compared with that for Akita City, which constitutes only 1.0% of the total assets.

b) Financial Indicators

The financial position is also examined with other useful financial indicators comparing '06 & '07 experience with Nagoya and Akita cities.

(i) Operating ratio

In 2006 the operating ratio was 76.8%, which shows that the operating revenue was far short to cover the operating expenses. In 2007 the ratio rose to 103.7% indicating that the revenue barely covered the expenses. These indicators are compared with those of Nagoya City and Akita City in Japan (Figure 3.11).

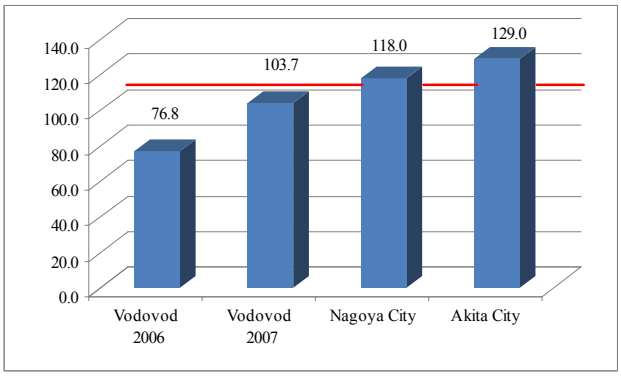

Figure 3.11 Operation Ratio

(ii) Salary-water sales revenue ratio

This ration was as high as 51.1% in 2006, but came down to 29.4% in 2007. The former figure is very high compared with those of Nagoya City and Akita City. The latter figure is comparable to figures for the two cities in Japan (Figure 3.12).

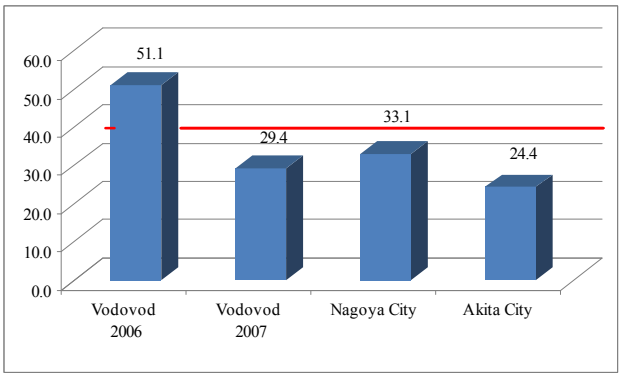

Figure 3.12 Salary-Water Sales Revenue Ratio

(iii) Revenue water ratio

The revenue water, the water volume for which water charge was actually recovered, was 66.6% in 2006. These figures are very low compared with the values in Nagoya City (92.6%) and Akita City (88.2%) (Figure 3.13).

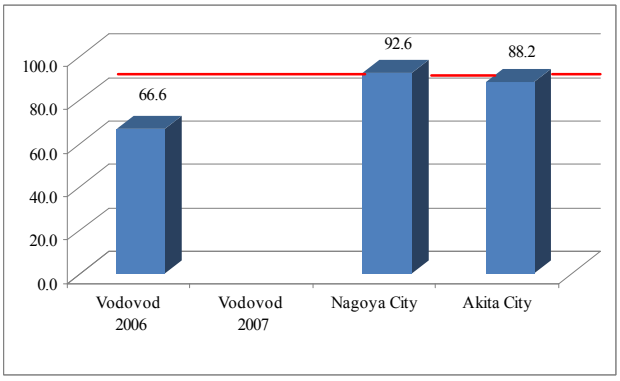

Figure 3.13 Revenue Water Ratio

(iv) Liquid ratio

The liquid ratio, the ratio of liquid assets to liquid liabilities, was 191% and 229% in 2006 and 2007 respectively. There was a considerable improvement in Vodovod's ability to liquidate its quick liabilities. (Figure 3.14)

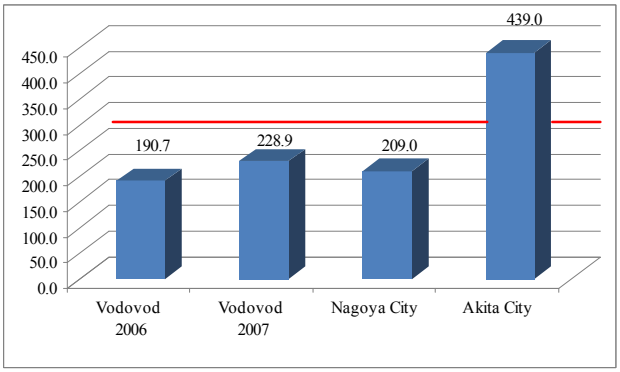

Figure 3.14 Liquid (Acid) Ratio

(v) Fixed asset ratio

The fixed asset ratios, fixed assets/(owned capital + retained earnings), of 71.0% and 74.7% are considered to be significantly small compared with the experiences in Nagoya City and Akita City. (Figure 3.15)

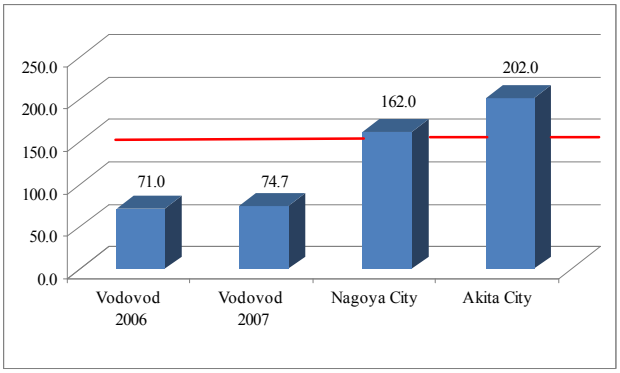

Figure 3.15 Fixed Asset Ratio

(vi) Number of staff/1,000 customer meters

The number of customer meters per staff was 152, which is quite low compared with that in Nagoya City or Akita City. "Number of staff per meter" is the inverse of the former. (Figure 3.16 and Figure 3.17)

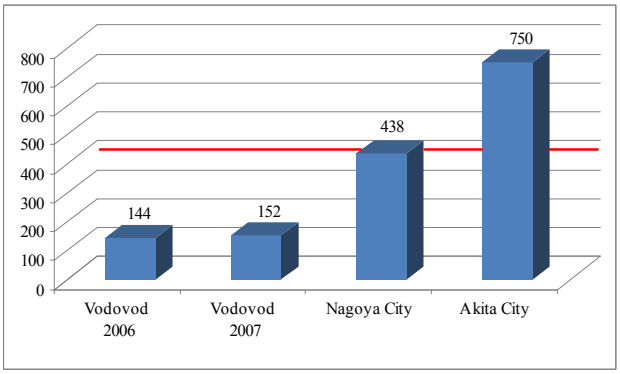

Figure 3.16 Number of Meters per Staff

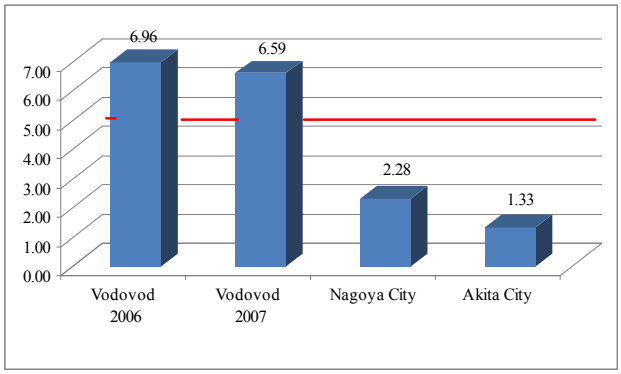

Figure 3.17 Number of Staff per 1,000 Meters

(3) Improvement in Financial Operation

It was pointed out that there would be two ways for improving financial operation, namely, (a) an increase in revenue and (b) a decrease in outlays.

a) Increase in water and sewer service revenue

- Increase in the number of customers:
  (i) Water supply: now almost 100%: There will be little room for an increase.
  (ii) Sewer: The number of customers will increase from the present level at 80% to nearly 100% in future.
- Increase in unit consumption per customer: The use of more water-consuming appliances at homes will cause an increase in water consumption.
- Reduction in uncollectible water bills: The bill collection rate stands at 81% in 2005-2007 average. This rate is significantly low even though Vodovod has been making efforts to improve it.
- A hike in water and sewer service rates: This is an issue if a rate hike be implemented. However, there is certain room for the present rates to be increased since the present level of water and sewer service charges amount to about 3.2% of average household disposable income.

b) Reduction in expenses

- Reduction in energy cost: ('06: 8.4%),e.g., Increase the pump efficiency.
- Rational procurement of spare parts, etc. (1.3%)
- Outsourcing of security services (0.9%)
- Outsourcing of PR costs (2.8%)
- Reduction in personnel costs : Not easy at present. It will become possible when Vodovod's physical operation has been mechanized and automated, and outsourcing of activities has been available.
- Partial or entire omission of depreciation: It may be acceptable if Vodovod can assume to receive grant assistance for replacement of facilities in future as well. It is not recommended from the viewpoint of the general accounting rule.

(4) Project Financing

It was presented that there would possibly be four financing sources for the Project as follows:

a) Fund sources[1]:

Table 3.9 Fund Sources

	Type	Repayment Term	Grace Period	Interest rate
EU fund: EIB	Loan	20 years	0 year	4.00 %
Japan fund: JICA	Loan	40 years	10 year	0.75 %
EU fund: IPA fund	Grant	-	-	-
Government	Grant	-	-	-

[1] The terms of lending of the respective lending institutions are those which were prevailing at end 2007.

b) Alternative financing methods

There are various scenarios with alternative financing methods as follows:

(i) Factor of fund source combination

(a) EIB fund: 90%, 50% or 0% of the total Project cost

(b) JICA fund: 80%, 50% or 0%

(c) IPA fund: 10% or 0%

(d) Government fund: 100%, 10% or 0%

(ii) Factor of cost recovery

Operation and maintenance (O&M) costs: 100%

- The Vodovod's present financial position is considered to be good enough to recover 100% of O&M irrespective of financial scenarios, so the alternative with 50% O&M cost recovery is only used.

(iii) Capital cost (as depreciation): 100%

(iv) Factor of rate increase: 20%

(5) Financial Evaluation

The result of financial evaluation of the Project was presented using above financing scenarios. For this purpose, income statements forecast and cash flow statements forecast were made.

Assumptions are made for: (1) domestic water demand to rise 1% p.a. for 2008-2015 and 0.9% p.a. for 2016-2020 and flat thereafter; (2) industrial water demand to grow 1.1% p.a. for 2008-2015 and 1% p.a. for 2016-2020 and flat thereafter. The expenditures are assumed to rise 3 to 5% p.a. for 2008 and 2009; and 2 to 3 % for 2010 to 2015 depending on the nature of the expenditure items. Depreciation of the Project assets is added to the expenditure from 2017 when the Project is expected to be operational.

The results of evaluation with representative Scenarios are shown below:

Table 3.10 Scenario 1

Scenario 1				
Lending agency	EU (EIB) fund	IPA fund (grant)	JICA	Government (grant)
Funding share (%)	90	0	0	10
Interest (%) / term (yr) / grace (yr)	4.0/20/0	-	0.75/40/10	-
Condition	Tariff increase (%)		20	
	Depreciation (%)		100	

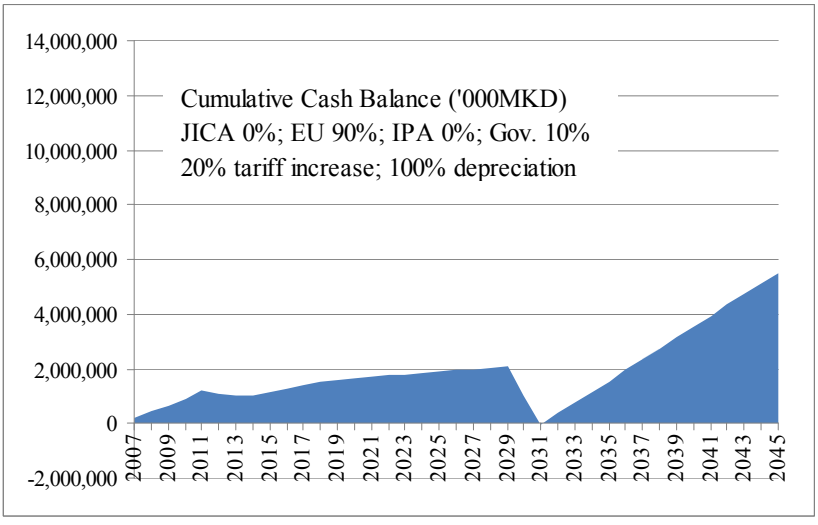

Figure 3.18 Cash Balance (Scenario 1)

Table 3.11 Scenario 2

Scenario 2				
Lending agency	EU (EIB) fund	IPA fund (grant)	JICA	Government (grant)
Funding share (%)	50	0	50	0
Interest (%) / term (yr) / grace (yr)	4.0/20/0	-	0.75/40/10	-
Condition	Tariff increase (%)		20	
	Depreciation (%)		100	

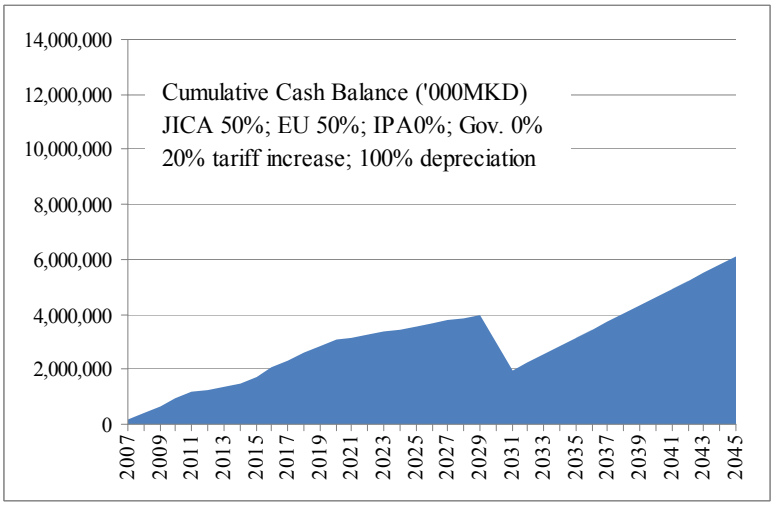

Figure 3.19 Cash Balance (Scenario 2)

Table 3.12 Scenario 3

Scenario 3				
Lending agency	EU (EIB) fund	IPA fund (grant)	JICA	Government (grant)
Funding share (%)	0	10	80	10
Interest (%) / term (yr) / grace (yr)	4.0/20/0	-	0.75/40/10	-
Condition	Tariff increase (%)		20	
	Depreciation (%)		100	

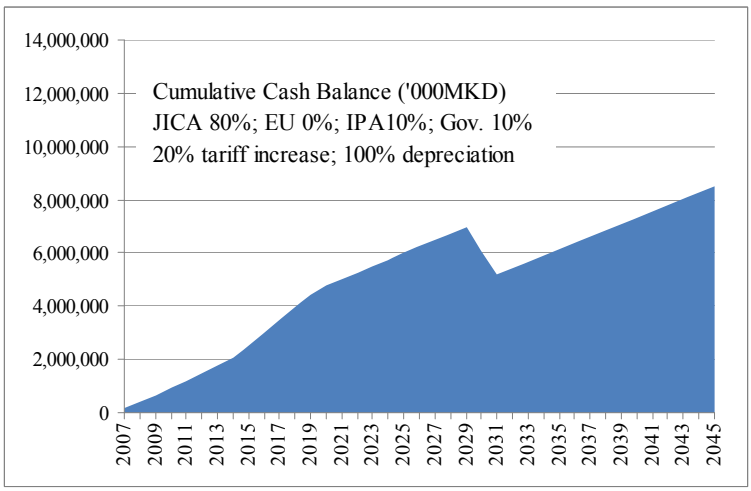

Figure 3.20 Cash Balance (Scenario 3)

Table 3.13 Scenario 4

Scenario 4				
Lending agency	EU (EIB) fund	IPA fund (grant)	JICA	Government (grant)
Funding share (%)	0	0	0	100
Interest (%) / term (yr) / grace (yr)	4.0/20/0	-	0.75/40/10	-
Condition	Tariff increase (%)		20	
	Depreciation (%)		100	

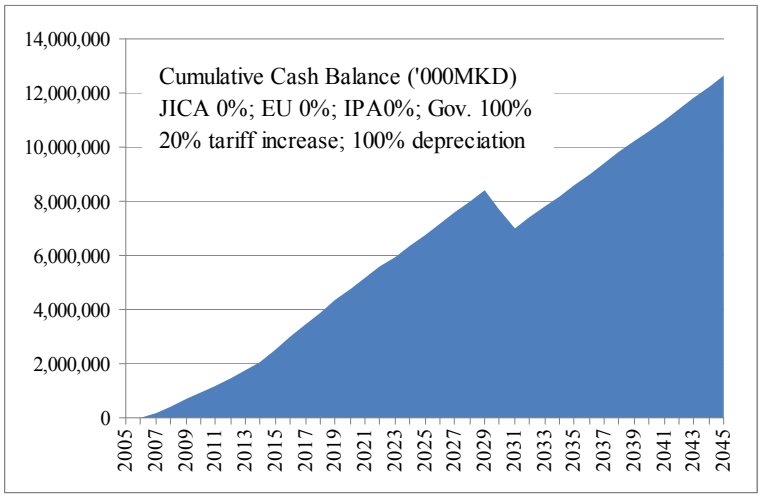

Figure 3.21 Cash Balance (Scenario 4)

The Project will be financially viable with all he scenarios with a tariff increase of 20% from the present level since the cumulative net profits (retained earnings) are always positive almost towards the end of the Project life, and the cash flow will also be in surplus except for Scenario 1, which will have minor fund deficit after the time of reinvestment for the replacement of mechanical and electrical equipment to be made in 2030 and 2031.

A financial analysis was also made for the Scenario with a tariff increase by 15%. However, the Scenario is not feasible since the deficit on the operating side is too large.

The total present value (PV) of the loan repayments are illustrated for the discount rates of 10% and 8% respectively as follows (Figure 3.22 and Figure 3.23).

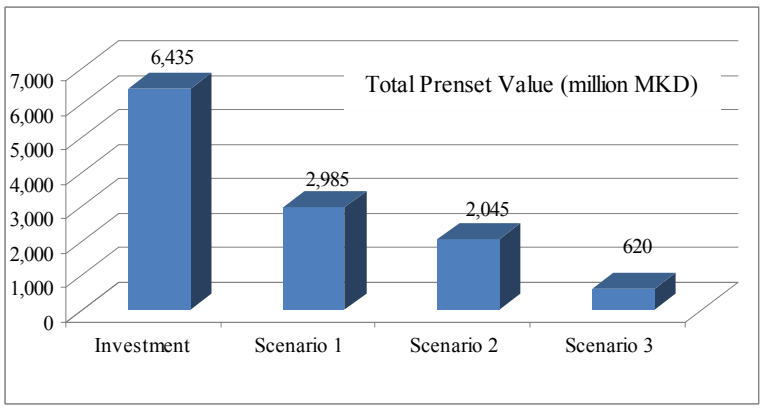

Figure 3.22 Total of Discounted Repayments at 10%

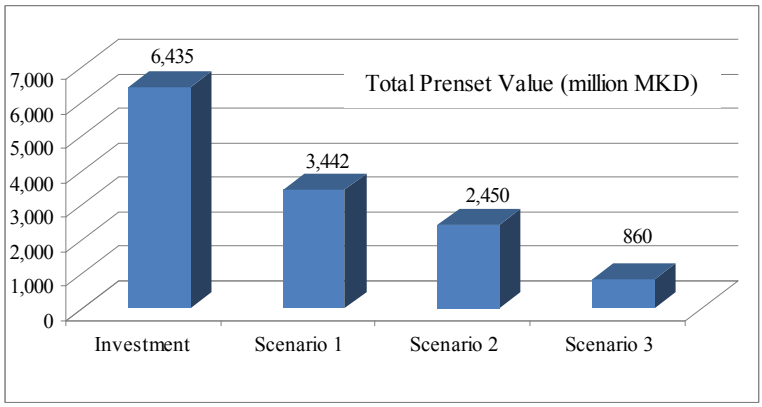

Figure 3.23 Total of Discounted Repayments at 8%

(6) Recommended Scenario with the proposed water supply and sewerage tariffs

The presenter concluded that the Project would have the biggest financial benefits when it was financed with a JICA loan for 80% of the Project cost and grant assistance from IPA fund and/or the government for 20% of the cost.

Given this, recommended Project funding scenario is scenario 3 (JICA loan 80%, IPA fund 10% and government grant 10% with 20% tariff increase).

There were comments on the above presentation.

a) Comments of General Manager of PE "Vodovod i Kanalizacija" as his opening remarks on the Workshop:

Thank you for the opportunity to speak. I'd like to thank the Study Team led by Mr. Kazufumi Momose for all they have done and I hope that after this workshop any points that we might not understand concerning this Project will be clarified and if you have any questions, I would encourage you to ask after the presentation. This Feasibility Study on the WWTP has reached a key phase, that is discussing the feasibility of the WWTP, not only from a technical aspect but also from a financial aspect, which is the most important and difficult aspect for us. I hope that this workshop will allow the study team to find the right solutions for the many issues they face, as well as us as a public enterprise which will have to manage this WWTP in the future. Let us follow these topics with exceptional attention. Thank you very much.

b) Comments and questions from participants after the Workshop

(i) A Counselor (unnamed) in the Skopje City Council: What is the rate of water loss in Nagoya and Akita?
Mr. Tomono: The water loss for Nagoya is about 8%, and for Akita is about 12%.

(ii) Ms. Dragica Miloshevska, Counselor in the Skopje City Council and President of NGO "Women's Action": Does the industry in Japan use drinking water from the public water supply or do they use water intended for technical use?
Mr. Tomono: In Japan, drinking water is used in the food industry etc., but for other industry, for example, the steel and car industry, industrial water supply is used. In larger cities, there is an independent industrial water supply system, separate from that of drinking water.

(iii) General Manager of PE "Vodovod i Kanalizacija": I would like to ask two questions. The first question is whether the assumed rate hike of 25% is concerning the price of drinking water or does it also include sewerage services? And my second question is whether the simulation based on 100% coverage of the city of Skopje with sanitary and storm water sewerage?
Mr. Tomono: We assumed a rate hike of both water supply and sewerage service rates combined. The answer to the second question is that we are assuming an almost 100% coverage of the city water supply, and a progressive coverage of 80% to nearly 100%, in

some 10 to 12 years of the city with sanitary and storm water sewerage network.

(iv) General Manager of PE Vodovod i Kanalizacija: In the scenario where JICA is financing 80% of the Project, and the rest by IPA and Government funds, is the tariff hike of 25% based on 100% collection rate or the 80% collection rate is considered as you previously mentioned in your presentation?

Mr. Tomono: We assumed that there will be certain improvements in the collection rate, so the rate for 2008 is 85% and for the following years is 90%.

(v) Ms. Dragica Miloshevska, Counselor in the Skopje City Council and President of NGO "Women's Action": Does the organization that you represent, as well as you personally and as an expert believe in the capacity of PE "Vodovod i Kanalizacija"? And will the organization that you represents work towards lobbying and promoting the realization of this Project, having witnessed how need of the citizens of Skopje for such a facility.

#Mr. Tomono: I would distinguish two types of capacity, technical and financial. First of all PE "Vodovod i Kanalizacija" has sufficient technical capability with sufficient amount of qualified technical resources. As for the financial capacity, presently the PE's financial position is very good, among other things they are now introducing the international practice of accounting. I would also say that their PR is quite good and even in realizing the large tariff increase of last year, so they have shown their administrative ability to deal with both technical and financial problems.

As for the second question, I think that PE "Vodovod i Kanalizacija" is the only organization who can run and handle this wastewater treatment project. I believe no other organization is capable of that.

Part IV

ACTION PLAN ON
INDUSTRIAL WASTEWATER MANAGEMENT
AND WATER QUALITY MONITOIRNG

CHAPTER 1 INTRODUCTION

Considering the current water quality and the estimated water quality of the Vardar River in the target year of 2020, presented in the Basic plan, it is realized that it would be indispensable to consider industrial wastewater management/treatment along with municipal wastewater treatment in order to improve water quality of the Vardar River. In this part of the Report, Action Plan (A/P) for industrial wastewater management and water quality monitoring system is described.

To prepare A/P, the assessment of capacity necessary for industrial wastewater management and water quality monitoring system was conducted in Phase 1 of the Study. A summary is presented hereunder.

Industrial wastewater management will be implemented in Macedonia through adoption of IPPC (Integrated Pollution Prevention and Control) system.[1] Accordingly, the goal of the A/P will be how to promote and implement IPPC system strictly and appropriately. Also, the A/P will provide methods to undertake capacity development (CD) activities in order to fill the gap between the goal and the present status.

1.1 Basic Policy for Formulation of Action Plan

(1) Firstly, the capacity and requirement of the implementing agency is assessed. Based on the result of assessment, A/P is formulated with strategic goal to achieve vision and mission of the implementing agency.
(2) Out of the various activities formulated in A/P, some plans are selected as CD programs to be implemented (or upon discussion) jointly with C/P (Counter Part) (MEPP: Ministry of Environment and Physical Planning and City of Skopje) considering timeframe of the Study, their effectiveness, urgencies, etc.
(3) Development of A/P with due consideration of already implemented projects by other donor agencies and future plan prepared by Macedonian side.

1.2 The Strategic Goal for Industrial Wastewater Management

The Strategic Goal for Industrial Wastewater Management is to implement IPPC system properly and effectively.

1.3 Necessary Action Plan

The summary of A/Ps for proper industrial wastewater management through implementation of IPPC system includes the following main items.

A/Ps are categorized into two groups; Those to be implemented by administrative office (Ministry of Environment and Physical Planning, Government, City of Skopje, etc.) and those to be implemented by enterprises.

The following activities should be implemented by administrative office;

(1) Establishment of legislative system
(2) Improvement/Establishment of data reliability
(3) Capacity development of environmental inspector
(4) Grasping accurate industrial wastewater generation and quality

[1] Full implementation of IEP (Integrated Environmental Permit) system based on IPPC system is to start in 2015. Industrial wastewater is regulated by Adjustment Plan until 2014. Deadline of the submission is decided by IPPC category. The end of June 2008 is the submission deadline for all enterprises categorized in IPPC system. Most of the enterprises have submitted and been waiting for the evaluation by MEPP and public hearing.

(5) Classification and decision on industrial wastewater discharged to sewers
(6) Study on collective and individual treatment
(7) Preparation of guidelines on industrial wastewater treatment
(8) Establishment of financial assistance system
(9) Construction of hazardous industrial waste disposal landfill
(10) Consideration of certified pollution controller system
(11) Utilization of local consultants, institutions and associations
(12) Preparation of concrete materials for public relation

The following activities should be implemented by the enterprises;

(13) Establishment of pollution control management system
(14) Establishment of pollution controller association to exchange information
(15) Measures to grasp quality and quantity of industrial wastewater
(16) Positive cooperation with environmental inspector
(17) Construction of industrial wastewater treatment plant
(18) Reporting on the environmental management activities

1.4 Summary of Capacity Assessment and Action Plan

This part presents summary of capacity assessment and A/P for the items listed in Section 1.3

(by Administrative Office)

1.4.1 Establishment of legislative system

(Capacity Assessment)
To regulate industrial wastewater quality, it is important to define and establish discharge water quality standard to sewer or other water body. New Law on Waters as the background of the regulation has been revised and is scheduled to come into effect in 2010. By the time, Ministry of Environment and Physical Planning is scheduled to enact wastewater discharge standard to water body, to review pre-treatment standard to discharge industrial wastewater into sewer for each industry with the considerations of BAT Reference under IPPC system and the situations of each water body.

(Action Plan)
Substances which show toxicity to biological treatment in municipal wastewater treatment should be reduced up to the acceptable criteria for biological treatment by industries' own pre-treatment plant before discharging effluent to sewers. Although the pre-treatment criteria can be decided by the City of Skopje or Vodovod as principle, it is also related to IEP (Integrated Environmental Permission) system.
The draft of these regulations has been under preparation with the cooperation of EU consultants.

It is recommended that establishing strict standards from the start is not favorable.

To meet quality criteria according to BAT Reference, R.O. (Reverse Osmosis), which is used to produce pure water or NF (Nano filter-low pressure R.O.) will be necessary in industrial wastewater treatment, and that of hazardous substances, in particular. To adopt the criteria from the start will require the enterprises a huge investment and operation and maintenance system. To start the process, therefore, realistic standard should be established, considering not only BAT references but also technical and financial capacity including O/M and analysis capacity of the enterprises, and so on.[2]

Discharge water quality standard to sewers or other water body and industrial waste identification

[2] It will be more realistic to set up the goal criteria and implement with adjustment criteria and a certain period of adjustment.

standard should be regulated and its implementation should be started by 2012 at the latest. Without proper definition of effluent discharge standards for all parameters, IPPC system will not be properly implemented because of the absence of background law for inspection.

1.4.2 Improvement/Establishment of Data Reliability

Data reliability is the most fundamental issue in all technical environmental management studies. Without establishment of data reliability, the projects for the establishment of monitoring system, for river management, waste/wastewater reuse/recycle or disposal, inspection woks by inspectors, etc. will not have desired effects.

(Capacity Assessment)

To secure data reliability, the followings were evaluated;

(1) Analysis standard for industrial wastewater and waste identification procedure

Currently, analysis standard for municipal and industrial wastewaters is not well established in Macedonia. For analysis, each laboratory refers and uses some literatures from overseas; basically ISO. However, ISO's use was evaluated to be not sufficient to analyze complicated industrial wastewater quality.

Without development and establishment of analysis standard of industrial wastewater quality, the data by different laboratories may cause problems and confusion in complicated industrial wastewater quality analysis. Waste identification procedure is also not yet standardized in Macedonia.

(2) Manuals

Preparation of manuals is necessary to train newcomers and to be followed as a guideline for analysis procedures in order to secure data reliability.

Manuals to be prepared should include, but not limited to, the following main items:

- Sampling procedure
- Pre-treatment of samples at the sampling points
- Sample storage procedure
- Pre-treatment before analysis by analyzer
- Analysis procedures for each parameter by preparing flow charts with the explanation of principle of the procedure.
- Preparation and management of reagents
- Correction procedures of analyzers
- Concept of handling data: data accuracy including effective numerical figures
- Data compiling and data issuance management

In MEPP central laboratory, manuals including these items exist under the guidance of EU project. However, analysis procedure described therein is very general. It does not emphasize the main points that should be paid attention to during analysis, the information on hindering substances, the necessity of pre-treatment before using analyzers and so on. The manuals are hard to read and understand because they are written only by sentences, not by flow charts of analysis procedures. In addition, the manuals on TOC (Total Organic Carbon) analyzer and GC-MS (Gas chromatography- Mass spectrometer) are not available anymore. These two analyzers are not used now.

(3) Accredited laboratories

Data reliability is the most fundamental to evaluate the environmental problems. For this purpose, the existence of internationally accredited environmental analysis is very important like the one included in ISO 17025. The MEPP central laboratory has tried to obtain ISO 17025 through the Element MT5, "Strengthening Environmental Management, FYR Macedonia" (June 2005 to June 2007) Project by EU. However, it has not received the ISO yet.

According to the report, analysis accuracy of TOC, alkalinity, and nitrate in clear water was satisfactory. However, the central laboratory does not have reference weights and a reference thermometer needed to ensure traceability of mass and temperature measurements.

In addition, to solve the systematic problems of the central laboratory, the followings are pointed out;

- A qualified quality manager must be employed.
- Minister, not the manager of the central laboratory, be personally responsible for laboratory budget and hiring of staff.

Furthermore, the report recommends the central laboratory the followings;

- The central laboratory prepare a plan for adding more parameters and matrices to the quality system and seek accreditation for these.
- Obtaining and retaining suitable staff particularly where more complex analysis like gas chromatography is involved.

Inspection acquisition of ISO 17025 will be conducted by the Accreditation Institute of Macedonia which has become an official member of EA（European co-operation for Accreditation）in November 2007.

Evaluation of water quality monitoring system is given in Appendix 1, Part IV (AP/IW).

(Action Plan)

(1) Preparation of a draft industrial wastewater analysis standard

Analysis procedures of industrial wastewater are not simple and there are many key points to pay attention to in analysis because the composition of industrial wastewater is much complicated than drinking water or surface water. For example, before analyzing BOD in industrial wastewater, there are several things to check such as amount of oxidizing agent, pH, reducing agent, salt and seeding is necessary. There are no descriptions of these key points in the currently available manual. Therefore, more detailed analysis procedures should be studied and prepared as a draft of standard including some alternatives by referring to ISOs and JIS (Japanese Industrial Standard) K0102.

In Japan, JIS K0102 is used for industrial wastewater analysis along with the procedures defined by the Ministry of Environment which is almost the same procedures as JIS K0102. JIS K0102 is also useful for surface water and wastewater and other polluted water because it is considered one of the good references to understand the principles of each analysis procedures, to understand why the pre-treatment is necessary, why the reagent of certain amount is added, and so on.

It includes some optional procedures for analysis of each parameter. This implies that the laboratory can choose analysis procedure of each parameter according to the analyzers and pre-treatment equipment available in that laboratory after confirming accuracy of the procedure.

In the analysis report, analysis result, the chosen procedure and analysis low limit should be clearly described. JIS K 0102 has been revised referring to ISO. However, the concept of detailed description has not changed.

The Accreditation Institute of Macedonia clearly stated that using JIS is no problem in obtaining ISO17025. However, considering the situation in Macedonia where ISO procedures have been used in analysis, manual with more detailed analysis procedure should be prepared based on ISO procedures by referring to JIS K0102.

- A draft of waste identification procedure should also be prepared.

The method of treatment and disposal of solid waste depends on result of leachate test. However,

there is no detailed description of analysis for the leachate test such as solvent, ratio of solid and solvent, how to extract substances with solvent, analysis standard, parameters, and so on. Water quality of leachate changes depending on solvent used. Pure water is used in Japan and EU for general analysis, except hazardous organic chroride substances and organic solvents; acid solution of pH 3 adjusted by acetic acid is used in USA (except the case of analyzing organic solvents), considering acid rain and the similar condition of landfill where pH tends to be low (acid side) due to decomposition of mixed waste with domestic raw waste, which shows high concentrations of metals than in the case of using pure water. And dissolved concentration of some metals vary depending on the ratio of the space of the bottle to be shaken in case of using the Japanese procedure. At least these items should be studied and regulated as a draft of the standard to avoid analysis errors among laboratories as much as possible.

These works should be carried out with the initiative of MEPP central laboratory[3], considering the followings;

- It is no doubt that MEPP shall have the initiatives in environmental problems,
- MEPP central laboratory has a lot of experiences of analyzing industrial wastewater,
- All necessary analyzers are equipped including ICP that is used for analyzing various kinds of metals simultaneously and GC- Mass spectrography that could be used for analyzing effectively organic compounds like pesticides, once it is accustomed to handling these equipments with theoretical and deep knowledge of applications.

(2) Preparation and modification of manuals with training at laboratory

The goal of the A/P for MEPP central laboratory is to obtain ISO 17025 and to be recognized as an internationally accredited official laboratory in Macedonia, in particular, in industrial wastewater analysis. For that, MEPP central laboratory should prepare kinds of manuals described previously.

The main aim of preparing manuals is to secure enough quality control to issue analysis result certificates. Training is to confirm the low limit, standard variation and so on defined in the chosen analysis procedure by using standard solution and real industrial wastewater in order to improve analysis skills, knowledge, problem finding and problem solution ability. The manuals will be modified, if necessary. EU used clear water to confirm quality control in analysis of limited parameters. There are many points to pay attention to in the analysis procedure of the parameters in industrial wastewater, which is much different from the analysis procedure of clear water. A fair length of time is necessary to prepare manuals and confirmation of the low limit, standard variation and so on defined in the chosen analysis procedure.

(3) Installation of Pollution Control Facilities

In analysis process, many kinds of reagents are used. Even the "Clean Analysis" produces wastewater and exhausted gas including hazardous substances. Although installation of pollution control facilities depends on the regulation by MEPP, they should be installed for own activities as the responsibility of the laboratory to monitor environment.

Before installation, the followings are necessary;

- Study additional space necessity for pre-treatment equipment of analysis, storage room for new reagents required for analysis of additional parameters
- Study of exhausted gas quality and quantity from analysis process and exhausted gas treatment facility; treatment process, cost
- Study of wastewater quality and quantity from analysis process and wastewater treatment facility; treatment process, cost
- Installation of pollution control facilities

[3] MEPP central laboratory has no legal priority at present. However, the state inspector takes samples during inspection if necessary, and MEPP central laboratory analyzes them. The results are used for inspection and supervision. The roles of inspector are regulated in Law on Environment.

1.4.3 Capacity Development of Inspectors

IPPC system covers comprehensively an environmental prevention plan of water, air, soil pollution, and so on.
Installations classified in IPPC Directive are required to get IEP (Integrated Environmental Permit). Seventy one (71) factories in Macedonia, which are categorized A, have already finished the applications so far out of which only two companies have got the permission., These are FE-NI and SILMAK, both steel manufacturing companies but located out of the study area.

(Capacity Assessment)
Based on the IEP, an inspector inspects each installation. At present, there are 14 state inspectors to inspect category- A installations. MEPP considers the final number of state inspectors to be thirty one (31). The number of inspectors is extremely low to monitor all categorized installations.
In addition, capacity development is necessary for inspectors considering the following points;

- Only two inspectors participated in the seminar by REC (Regional Environmental Center)-Budapest and BERCEN-ECENA[4] and in CARDS 2004 to understand IPPC system. The text books distributed are only conceptual, not concrete.
- The Department of Inspector, MEPP does not have training manuals to understand IPPC system and only conducts seminars to other members. Even then, they seem to be only conceptual, not including appropriate technical and practical details.
- The backgrounds of the inspectors are different.
- The qualification to become inspector is not strict.
- They are lacking practical experiences and knowledge.
- Inspection sheet is complicated to fill up and use.

(Action Plan)
Although there are state (for A categorized installations) and local inspectors (for B categorized installations)[5], capacity development for state inspectors should be implemented urgently regarding the following aspects;

- Concept of cleaner production and some concrete studies,
- Prevention of groundwater and soil pollution,
- Noise and vibration management
- Meaning of hazardous substances regulation
- Industrial wastewater and air pollution control,
  - Principle of treatment for each regulated parameter,
  - Design concepts of treatment facilities of industrial wastewater and polluted soot,
  - Industrial waste treatment and disposal, reuse, recycle,
  - Operation and maintenance of the above facilities
  - Outline of analysis for each parameter
- Emergency measures by industry for environmental accident,
- Establishment of database on State Environment Inspector,
- Others as required

1.4.4 Grasping Accurate Industrial Wastewater Generation and Quality

(Capacity Assessment)
Self-monitoring of industrial wastewater quality and quantity is the principle in IPPC system. Considering the fact that data is very limited[6], active monitoring works are strongly required with the

[4] ECENA (Environmental Compliance and Enforcement Network for Accession) is the successor of BERCEN (Balkan Environmental Regulatory Compliance and Enforcement Network).
[5] Refer to Appendix 3.5, Part I (B/P): Type of Industry to classify A and B under IPPC in Progress Report.
[6] Basically, MEPP central laboratory analyzes the samples only requested from enterprises. Accordingly the data are absolutely insufficient.

cooperation of inspectors and MEPP central laboratory, however, MEPP central laboratory does not prepare the monitoring plan for each installation.

The Study Team estimated pollution loads of BOD and SS to plan and design municipal wastewater treatment plant and to estimate total loads to the Vardar River by using the very limited data and referring to actual data in Japan and so on. This estimation should be confirmed/modified by actual data as much as possible in order to ensure accuracy of the estimates.

(Action Plan)
Measuring quality and quantity of industrial wastewater is the most basic factors in industrial wastewater management. Only waiting for data from enterprises will not be enough to grasp actual pollution load from each enterprise/installation[7]. The administrative office should actively try to accumulate data of industrial wastewater. Firstly, the installations which are discharging hazardous substances are the targets. The target installations should include the ones not classified by IPPC system such as hospitals, universities, institutes, etc., which also discharge toxic pollutants.

It is expected that some amount of data will be accumulated by the time of completion and commissioning of municipal wastewater treatment plant, say around 2016 through this voluntary activity of inspectors and MEPP central laboratory. To implement, the followings points should be considered;

- Preparation of inspection and monitoring schedule of each installation with the parameters and frequency with the cooperation of inspector and MEPP central laboratory,
- Study of necessary equipment for inspection,
- Securing budget for the activity,
- Data compiling and database management.

To implement this activity, financial resources for regular monitoring of industrial wastewater is necessary. Administrative office should prepare self-finance resource to implement regular monitoring and to accumulate the data to use.

1.4.5 Classification and Decision on Industrial Wastewater Discharged to Sewers

(Capacity Assessment)
With very limited information and data, the Study Team classified industrial wastewater of fifty (50) installations surveyed during the Study into two groups; one is to discharge effluent into sewer after pre-treatment and another is to discharge effluent into water body directly after own treatment plant. This work is not done by administrative office.

(Action Plan)
After enactment of laws and regulations, preparation of a draft of analysis standard for each parameter and grasping accurate industrial wastewater generation and quality from each installation by accumulation of data, each installation should be classified into two (2) groups; one with potentiality of discharging to sewers and another to water body directly with its own treatment facilities. Since the one with potentiality of discharging to sewers reflects the volume of municipal wastewater treatment plant, the classification and decision should be carefully made.

The points to be considered for categorization of installations are as follows;

- Inorganic wastewater:

It should preferably be discharged to water body directly after treatment by its own treatment facility. Discharging wastewater with low concentration of BOD to sewer is not advantageous to the enterprise

[7] Data by self-monitoring by the company can't be trusted. And the guidelines being used for self-monitoring is too old. Refer to 3.3.

such as steel related companies because the enterprise will be required to install facilities to remove hazardous inorganic substances and low concentration of organic volatile substances. In some cases, the facilities to remove the hazardous inorganic wastewater will meet the standards of BOD and SS of direct discharge of their industrial wastewater to water body.[8]

Although it depends on the ratio of municipal and industrial wastewater, it is basically not advantageous from the view point of municipal wastewater treatment plant also, to allow large amount of wastewater with low concentration of BOD to enter sewer. Biological treatment is generally used in municipal wastewater treatment. Allowing large amount of wastewater with low concentration of BOD to enter sewer leads an increase of quantity but decrease of concentrations of organic matters and nutrients which are necessary in biological treatment; which will lead to a high capacity and cost of treatment plant.

- Organic wastewater: basically to sewer after pre-treatment, if necessary

For organic wastewater the followings should be considered.

- The discharge quantity rate to municipal wastewater generation
  A large amount of industrial wastewater with high BOD leads to a bigger investment and O/M costs of municipal wastewater treatment plant and pre-treatment maybe required.
- The ratio of N (nitrogen) and P (phosphorus) to BOD
  Biological treatment needs a certain ratio of N and P to BOD The minimum ratio is said as 3: 0.6: 100.
- Even organic wastewater, if it contains hazardous substances exceeding the defined standard for discharge to sewer, the facilities are required to remove them before discharging the effluent into sewer.

Also the followings should be considered;
- Discharge standard to sewer or water body
- Enterprise's willingness to pay for sewerage service
- Sewerage plan: discharge pipe rearrangement is necessary
- Enterprise's will of own treatment plant construction plan
- Industrial wastewater management capacity of enterprise: O/M and monitoring

1.4.6 Study on Collective or Individual Treatment

(Capacity Assessment)
Since the data is very limited, it is difficult to conduct the study.

(Action Plan)
The possibility of collective or individual treatment to discharge the effluent into a water body should be studied for the industrial wastewater that is evaluated not appropriate to discharge into public sewer system.

Table 1.1 shows qualitative comparison of the two systems.

[8] Inorganic industrial wastewater mainly contains hazardous substances and low concentration of organic volatile substances. BOD level is low. It is possible to reduce BOD, SS and nutrients such as nitrogen and phosphorus up to the discharging criteria directly into water body by coagulation, sedimentation, and filtration. These are used to remove hazardous substances in inorganic industrial wastewater. Even in the case where further removal of BOD is required, simple treatment will be available. In the case where activated carbon is used to remove low concentration of volatile organic substances, it will reduce soluble BOD up to the level of discharging criteria directly into water body.

Table 1.1 Advantage and Disadvantage of Collective and Individual Treatment

	Advantage	Disadvantage
Collective treatment	・ Treatment is not difficult where there is similar quality of industrial wastewater or industrial wastewater from similar factories like in industrial zone. ・ Possible to reuse of waste liquid, treated effluent, treat waste and reuse of sludge	Transportation from each factory to collective treatment plant is a problem. (by pipe, tank lorry, etc.)
		Decision making is necessary to construct industrial zone or collective treatment plant
Individual treatment	No need to consider transportation cost	Need separate pipe and treatment plant by production process in a factory
		O/M is not easy, design of quality and quantity adjustment tank is the key.

It is essential to mention that relocations of installations to industrial zone will need land use plan, land acquisition, EIA and IEP in case of collective treatment for the industrial wastewater which has similar water quality.

1.4.7 Preparation of Industrial Wastewater Treatment Guidelines

(Capacity Assessment)
There is no industrial wastewater treatment guideline available at present.

(Action Plan)
To plan and design industrial wastewater treatment plant, industrial wastewater treatment guidelines should be prepared.

The guidelines should include the followings;
- Discharge quality of each parameters and quantity in each industrial category
- Treatment guideline of each parameter; unit process, the limit of unit process
- Design and O/M of the treatment process
- Sludge treatment and disposal
- Reuse or recycle of treated industrial effluent and sludge
- Experiment procedure for design and O/M of the treatment process

In treatment of industrial wastewater, the following should also be considered;

- Use of industrial waste:
  Waste acid with rich metals such as iron, zinc, etc, which was used for surface treatment in steel related factories and does not include a lot of chelating agents can be used as a coagulant
- Recycle and reuse of sludge
- Metal refinery or steel manufacturing installations with air pollution control facilities would be necessary to recycle valuable substances or reuse sludge. Start discussion with these companies on this issue.

1.4.8 Establishment of Financial Assistance System

(Capacity Assessment)
There are some ideas of financial assistance to enterprises such as use of IPA fund, tax reduction or exemption, donors' grant, use of accumulated fines, but there is neither concrete plan nor financial assistance system for industrial wastewater treatment facility.

(Action Plan)
To encourage the enterprises to promote IPPC system, it is necessary for the enterprise to really feel that introduction of CP (Cleaner Production) brings about strengthening international competition, improvement of interest and value of the enterprise more than investment. Therefore, financial

assistant systems not only by donation from foreign countries but also domestic and international financial assistance system with low interest, tax reduction system should be established urgently along with the enforcement of the fine system to illegal enterprises.

1.4.9 Construction of Hazardous Industrial Waste Disposal Landfill

(Capacity Assessment)
There is no industrial waste landfill established yet.

(Action Plan)
Water treatment facility produces sludge as a by-product. When the wastewater contains hazardous substances, generated sludge contains concentrated hazardous substances as well. Accordingly, the system to treat industrial hazardous substances in each industrial installation should be established through an IPPC system. Then, to secure treatment and disposal of hazardous sludge safely industrial wastewater management should be established.

In general, if the hazardous substances in leachate are within the limits of the parameters regulated by the law, the sludge may be able to be reclaimed in a controlled industrial waste landfill. However, the actual nature of leachate form the landfill is more complicated than the result by analysis procedure.

Therefore, special landfill (shield type) is necessary for the sludge containing hazardous substances. To plan and design the landfill, waste identification procedure should be determined and structure design guideline of the landfill should urgently be prepared. According to the design guideline, the landfill should be constructed.

1.4.10 Consideration of Certified Pollution Controller System

(Capacity Assessment)
There is no direct expression of pollution controller in the Law. However, there is a sentence that suggests the presence of the pollution controller in section (5) of~~,~~ the Article 23, Law on Environment, which states that, in order to acquire accreditation for assessment of technology, the technological line, product, semi-finished product or raw material, legal entities and natural persons should have at least one employee with a university degree in the area of technology, metallurgy, chemistry or environment and with minimum of three years of professional experience in the relevant field, as well as appropriate technical conditions and devices, equipment and premises. The employees stated in this article have lots of responsibilities to prevent kinds of pollution and risks.
Furthermore, the enterprises are required to prepare the environmental management system as the organization to get the permission of IEP. From these facts, the similar system will be necessary as pollution controller system in Japan.

(Action Plan)
The certified pollution controller in Japan, who needs to pass the strict examination by the Government of Japan as principle; requires wide range of knowledge and techniques of law and regulation, principles of wastewater treatment process, design and O/M of treatment facilities, analysis of parameters and the measures of accidental case of pollution, etc.. His/her obligation is not limited to pollution control nowadays. With the experiences at site, he/she participates in improvement of manufacturing process; change of chemicals, etc. and in cleaning production or recycle or reuse of water and raw materials and technology innovation in cooperation with production and/or quality controller.

The introduction of this kind of system would be useful in finding capable personnel in pollution prevention and environmental management, capacity strengthening and finally will be to enterprise's interest. In Japan, the number of pollution controllers also shows the company's status in environmental management.

Furthermore, Article 38, in Law on Waste, Waste Manager states "The authorization for performing the activity of a waste manager shall be obtained after passing an exam taken before a Commission established by the Minister managing the body of the public administration responsible for the affairs of the environment.". Similar system of pollution controller shall be considered.

1.4.11 Utilization of Local Consultants, Institutions and Associations

(Capacity Assessment)
EU has been implementing capacity development programs in many fields for MEPP by using local consultants, institutions and associations. However, the information exchange among these agencies seems to be insufficient. As a result, knowledge of environment is insufficient.

(Action Plan)
It is necessary to organize regular workshops about EU projects under the initiatives of MEPP for information exchanges for the local consultants, institutions and associations which have joined and/or are joining EU projects to accomplish comprehensive understanding about environmental issues. These organizations which have wide range of knowledge of environmental issues will become very useful in practical implementation of IPPC system.

1.4.12 Preparation of Concrete Materials for Public Relation

(Capacity Assessment)
The main role of the Public Relation Department of MEPP is to report information actively and publicly for enlightening and raising awareness of people and enterprises about environment. However, materials and amount of information are insufficient to enlighten and educate people and enterprises.

(Action Plan)
Public Relation Department of MEPP should collect and prepare the concrete materials and information on industrial pollution control to raise awareness of people and enterprises.

The following materials and information should be collected and prepared at least;

- Model studies of implementation of CP, BREFs (BAT reference) with specifications of the facilities, cost estimation, investment recovery period, etc., to encourage enterprises/factories to implement CP and/or invest on CP facilities.
- What and why are they prohibited to discharge to sewer, why to prohibit oil and grease to sewer, for example and how to avoid.
- Information on financial assistance system to invest on CP facilities
- How to save and use water efficiently in households and factories/enterprises
- Environmental damages or risks to human life; why are the hazardous substances risky to human life or environment
- How to decide the limit value of harmful substances in drinking water
- Introduction of research and studies related to environmental matters by Macedonian institutes/universities including the report of new technology of BAT, CP, industrial wastewater treatment
- List of institutions and consultants related to EU projects and their activities
- List of projects by donors or international organizations and activities
- Introduction of the enterprises/factories' environmental management

(by Enterprise)

1.4.13 Establishment of Pollution Control Management System

(Capacity Assessment)
As mentioned previously, although pollution controller's roles are very important in industrial wastewater management, among 50 industries surveyed during the Study, only 20 % installations have pollution controller. Of the twenty-one (21) factories that have ISO 9000 or 14000, more than half of them do not have any pollution controller.

(Action Plan)
Apart from national certified pollution controller system mentioned previously, each enterprise should start the following activities;

- Firstly, to arrange full-time pollution controller,
- Secondly, to make a plan to reduce pollutants and energy consumption,
- Thirdly, to review raw materials and manufacturing process.

To accomplish these objectives, the material balance sheet should be prepared voluntarily in order to be accustomed to quantitative management as the first step to CP.

1.4.14 Establishment of Pollution Controller Association to Exchange Information

(Capacity Assessment)
National CP center[9] says that some enterprises participate in CP activities and exchange information through workshops and visiting installations of each other.

(Action Plan)
The activity should be expanded by full- time pollution controllers. It would be useful for them to know and exchange information on management and technology to reduce pollutants by similar or different type of industries. The pollution controller shall consider if the management and technology used by other enterprises shall meet his/her enterprise situation or not. From time to time, the most appropriate technique for environmental improvement should also be developed in the enterprise by trial and error.

1.4.15 Measures to Grasp Quality and Quantity of Industrial Wastewater

(Capacity Assessment)
As described previously, self-monitoring is the principle in industrial wastewater monitoring in quality and quantity. As a matter of fact, there are many factories which never analyze even pH. Some factories have data; however, only a few parameters are analyzed.
Most of the industrial units discharge their industrial wastewater directly into sewer and, that seems to make it more difficult to grasp quality and quantity of each industrial wastewater.
At present, there is no enterprise having equipment to measure industrial wastewater generation. Accordingly, all the surveyed installations mentioned their generated wastewater amount based on estimation and hence lack accuracy.

(Action Plan)
To grasp quality and quantity of industrial wastewater, the following measures, which are also required in IPPC system, should be installed;

[9] It is reestablished in 2007 and is supported by UNIDO, in Faculty of Mechanical Engineering in Skopje University. It has been conducting simple F/S of energy savings only following BAT references. It seems that this center is not good at industrial wastewater management.

- A pit to take samples for quality analysis, and a weir to measure wastewater generation, etc.
- Continuous flow meter and auto-water quality analyzer in case of large factories.

Furthermore, wastewater pipe rearrangement to separate process wastewater from cooling water, which can be separately discharged either to sewer or water body.

These measures will be necessarily required, considering that most of the installations will be required to construct pre-treatment or full treatment facilities to discharge their treated industrial effluent to sewer or water body directly. These facilities are also required to measure discharge quantity and quality.

1.4.16 Positive Cooperation with Environmental Inspector

(Capacity Assessment)
Seeing the result of Industrial Survey conducted during the Study, in many cases the installations replied more detail than the similar survey conducted before. However, the obtained information are not yet sufficient to know their exact activity and situation such as information on raw materials, sub-materials, chemicals being used, products, by-products, waste, etc..

(Action Plan)
Data on raw materials that are considered not risky to environment are not necessarily required to inform to administrative office under the IPPC system. However, they may become risky during manufacturing processes and in case of accident. Accordingly, the enterprises should positively provide accurate information to inspectors and consultants as much as possible for active contribution to environment. Accumulation of this information may lead to development of another BAT.

1.4.17 Construction of Industrial Wastewater Treatment Plant

(Capacity Assessment)
Of the fifty (50) surveyed industries, only nine (9) industries have their own treatment plants including simple oil separator. Other industries do not have any treatment facilities. Most of them discharge their wastewater to existing public sewerage system and a few discharge directly to the Vardar River.

(Action Plan)
Installations which are required to install pre-treatment or full treatment of industrial wastewater or to improve the existing treatment facility should construct or improve their industrial wastewater treatment plant to meet the discharge standard to sewer or the Vardar River directly.

1.4.18 Reporting on the Environmental Management Activities

(Capacity Assessment)
Reporting/publishing environmental management activities to public through the homepage in web-site brings about enterprise's good reputation and the interests of investors. There seems no enterprise practicing this.

(Action Plan)
Enterprise should report on or publish their environmental management activities regularly for the reason mentioned above and to enhance information exchange of environmental management. It will stimulate the improvement of environmental management of other enterprises, which will bring about quicker promotion of IPPC system.

CHAPTER 2 FORMULATION OF ACTION PLAN (A/P)

2.1 Trend of Assistance of Donors in the field of Industrial Wastewater Management

Prior to development of A/P, trends of assistance of donors in the field of industrial wastewater management were studied to avoid the duplication of assistance.

The projects as shown in Table 2.1 and Table 2.2 List of Industrial Hot Spots [10] have been implemented or are planned in municipal wastewater management. The study of industrial wastewater treatment will be started in the near future; however, only one study for Ohis (Chemical Industry)[11] is listed up. There is no donor to implement this project.

Table 2.1 Trend of Assistance of Donors in the Field of Wastewater Treatment

Title	Donor	Donor Budget	National Contribution	Currency	Donor Budget in EUR	Period (from-to)
Wastewater Treatment Plant in Gevgelija	Greece	2,000,000.00	To be defined	EUR	2,000,000.00	09.03.2004 - 2007

Table 2.2 List of Industrial Hot Spots

Title of the Project	Value of the Project (million Euro)	Provided resources (Budget / Funds / other) (million Euro)	Status of the Project	Other comments
Wastewater treatment system for the City of Skopje (three wastewater treatment plants)	57.71	4 .0	Pre-feasibility study	Main design has not been done
Wastewater treatment plant for the City of Veles	13.76	0.0	Feasibility study	
Wastewater treatment plant for the City of Bitola	7.32	0.0	Feasibility study	Main design under development
Wastewater treatment plant for the City of Prilep	9.19	0.0	Feasibility study	Main design has not been done
Construction of combined wastewater treatment plant in the village of Stenje, Prespa Lake	0.17	0.0	/	

Source: Second NEAP

2.2 Action Plan, Activities Required and Objects, etc

Table 2.3 shows the summarized A/P described in detail in Chapter 1 in order to secure industrial wastewater management based on the IPPC system.

The table also shows the item of A/P, activities, and main object of the activities, time schedule and CD (Capacity Development) programs during the study (June-October 2008)

2.3 Implementation schedule of Action Plan

Implementation schedule of A/P was consulted with MEPP and was decided (Figure 2.1). The key point is that real IEP system shall start in 2015 and the industrial wastewater management of factories is to be monitored according to the system.
The most critical matter is construction of disposal landfill of hazardous industrial waste. According

[10] The projects in Table 2.2 are only plans and, donors are not decided.
[11] Most of production lines are not in operation. There are industrial wastewater treatment facilities but they are not functional.

to Article 80, Law on Waste, the Government shall construct disposal landfill of hazardous industrial waste. It is a must to implement appropriate industrial wastewater management and it should be completed by 2015, the starting year of real IEP system.

Most of former state companies, on the other hand, are forced to stop operation due to lack of financial resources to run and are finding domestic or foreign purchaser of them; however they are facing that production facilities are old and even the factories having existing industrial wastewater treatment facility are lacking of knowledge and practice in operation and maintenance of the facilities. It means that they will have the difficulty to implement IPPC or IEP system according to the proposed Implementation Schedule without the change of awareness.

As for A-category operation permission by adjustment plan under IEP system, only FENI (Fe-Si Alloy producing company) and SILMAK (Fe-Si Alloy producing company) got the operation permission by Adjustment Plan at the time of October 2008 on condition that further F/S on industrial wastewater treatment plant should be submitted by September 2008; however, it is still the stage of selection of consultants to conduct F/S as of October 2008. Both of the companies are not located within the study area.

As for B-category operation permission by adjustment plan under IEP system within Skopje City, two companies got the permissions. They are, however, still not effective because these companies can't pay the bank for the insurance of environmental emergency like remediation.

Other enterprises have not yet obtained IEP by Adjustment Plan. Some companies which submitted the application of IEP even in 2006 have not yet started negotiation for Adjustment Plan. It seems that starting negotiation with MEPP is not easy under the condition that new Law on Waters has just been passed by the parliament and secondary laws and regulations are not yet enacted.

However, IPPC system actually just started. It is expected that the system implementation will be accelerated.

2.4 The Urgent and Most Fundamental Action Plan

Among the items of A/P, the urgent and most fundamental A/Ps are;

(1) Preparation of laws and regulations related to industrial wastewater and industrial waste management
(2) Establishment of Data Reliability
(3) Capacity development of Environmental Inspectors

Among the three items, item 1 is conducted by Macedonian side with the EU consultants.
CD on items 2 and 3 are urgently required; however, it needs some time to complete. Accordingly, the follow-up technical cooperation project is necessary, aiming at:

- CD of state environmental inspectors to understand and practically supervise the IPPC system, preparation of manuals, establishment of database system and training other staffs members, including local inspectors
- CD of MEPP central laboratory to assist to obtain ISO17025 to secure quality control and train other laboratories. To get ISO 17025 is listed in the action plan of Ministry of Environment and Physical Planning.[12]

[12] European Agency for Reconstruction; Annex 5 Vision 2008 The Roadmap of the Ministry of Environment and Physical Planning, Strengthening the Capacity of the Ministry Agency for Environment and Physical Planning

Table 2.3 A/P, Activities, Main Object of the Activities, Time Schedule and CD Program during Study Period (June－October 2008)

Item of A/P	Activities Required	Main Objects of Activities	Time Schedule (year)	CD Program during Study Period (June-October 2008))
By Administrative Office				
1. Enactment and enforcement of laws and regulations related to industrial wastewater and industrial waste management	(1) Preparation of discharge standards to water body or public sewerage system (2) Preparation of analysis procedure of waste identification (3) Preparation of technical guidelines on industrial wastewater treatment or disposal of sludge	MEPP, EU consultants	2012	Concept is described in 1.4.1. Explained the cases in Japan by the seminar "Environmental Law System in Japan"
2. Establishment of Data Reliability	(4) Preparation of a draft of analysis standard for industrial wastewater and waste identification procedure (5) Preparation and modification of manuals with training at laboratory (6) Installation of Pollution Control Facilities (7) To obtain ISO17025	MEPP central laboratory	2011	Concept is described in 1.4.2. Explained the concept by the seminar "Certified Environmental Analyst System in Japan"
3. Capacity Development of Inspectors	(8) Preparation of training manuals to monitor IEP 1) Cleaner production and some concrete studies 2) Prevention of ground water and soil pollution 3) Noise and vibration management 4) Meaning of hazardous substances regulation 5) Industrial wastewater and air pollution control - Principle of treatment for each regulated parameter, - Design concepts of treatment facilities of industrial wastewater and polluted soot, - Industrial waste treatment and disposal, reuse, recycle, - Operation and maintenance of the above facilities - Outline of analysis for each parameter - Emergency measures by industry for environmental accident (2) Establishment of database on State Environment Inspector, (3) Modification of inspection sheet (4) Others as required	State and local inspectors	2011	Concept is described in 1.4.3. Explained the concepts of (1) 2), 4), 5), 6) by the seminars "Environmental Law System in Japan", "Industrial Wastewater Treatment" and "An Experience of Toxic Industrial Waste Treatment"

Item of A/P	Activities Required	Main Objects of Activities	Time Schedule (year)	CD Program during Study Period (June-October 2008))
4. Grasping accurate industrial wastewater generation and quality: Strengthening of monitoring	(1) Preparation of inspection and monitoring schedule of each installation with the parameters and frequency with the cooperation of inspector and MEPP central laboratory (2) Study of necessary equipment for inspection (3) Securing budget for the activity (4) Data compiling and database management	State and local inspectors, MEPP central laboratory	2014	Concept is described in 1.4.4.
5. Classification and decision on industrial wastewater discharged to sewers	(1) Study on; - The discharge quantity, rate - The ratio of N (nitrogen) and P (phosphorus) to BOD - Discharge standard to sewer or water body - IEP of each installation - Enterprise's willingness to pay for sewerage service - Sewerage plan: discharge pipe rearrangement is necessary? - Enterprise's will of own treatment plant construction plan - Industrial wastewater management capacity of enterprise: O/M and monitoring	MEPP, Vodovod, City of Skopje, Enterprise	2013	Concept is described in 1.4.5.
6. Study on collective or individual treatment	Comparison of advantage and disadvantage of both concepts	MEPP, City of Skopje, Enterprise	2014	Concept is described in 1.4.6.
7. Preparation of Wastewater Treatment Guideline	(2) Study on discharge quality of each parameters and quantity in each industrial category (3) Preparation of industrial wastewater treatment guideline - Unit process, the limit of unit process - Design and O/M of the treatment process - Sludge treatment and disposal - Reuse or recycle of treated industrial effluent and sludge - Experiment procedure for design and O/M of the treatment process - Use of industrial waste: (3) Study on reuse of waste acid with rich metal, not to include a lot of chelating agents	State and local inspectors, enterprise	2010	Concept is described in 1.4.7. (1) Refer to Appendix 3.8, Part I (B/P) (2) Explained the concept by the seminar "Industrial Wastewater Treatment" (3) Explained the concept by the seminar "An Experience of Toxic Industrial Waste Treatment"

Item of A/P	Activities Required	Main Objects of Activities	Time Schedule (year)	CD Program during Study Period (June-October 2008))
8. Establishment of Financial Assistance System	The study on incentive both for enterprises and investors and implementation	MEPP, City of Skopje, Government	2012	Concept is described in 1.4.8 Introduced the examples in Japan by the seminar "Environmental Law System in Japan"
9. Construction of Hazardous Industrial Waste Disposal Landfill	(1) Study on the landfill structure, in particular, shield type of landfill (2) Construction of hazardous industrial waste disposal landfill	MEPP, City of Skopje, Government	2015	Concept is described in 1.4.9 Explained the concept by the seminar "Environmental Law System in Japan"
10. Consideration of Certified Pollution Controller System	Study on pollution controller system and the role in environmental management in Japan	MEPP, Government	2010	Concept is described in 1.4.10 Explained the concept by the seminar "Environmental Law System in Japan"
11. Utilization of Local Consultants, Institutions and Associations	Organize the regular workshops for information exchange to understand comprehensive understanding about environmental issues.	MEPP, Local consultants, Institute, Associations, University, Donors	2014	Concept is described in 1.4.11
12. Preparation of Concrete Materials for Public Relation	The following materials and information should at least be collected. (1) Model studies of implementation of CP, BREFs (BAT reference) with specifications of the facilities, cost estimation, investment recovery period, etc., (2) What are prohibited to discharge to sewer, why are they prohibited, (3) Information of financial assistance system to invest on CP facilities (4) How to save and use water efficiently in households and factories/enterprises (5) Environmental damages or risks to human life; why are the hazardous substances risky to human life or environment (6) How to decide the limit value of harmful substances in drinking water (7) Introduction of research and studies related to environmental matters by Macedonian institutes/universities including the report of new technology of BAT, CP, industrial wastewater treatment,	MEPP Public Relation Department, donors' agencies, local consultants, institutions, universities, enterprise	2014	Concept is described in 1.4.12 Introduced the cases in Japan about (2), (3), (4), (5), (6), (10) by the seminar "Environmental Law System in Japan" and "Industrial Wastewater Treatment"

Item of A/P	Activities Required	Main Objects of Activities	Time Schedule (year)	CD Program during Study Period (June-October 2008))
	(8) List of institutions and consultants related to EU projects and their activities (9) List of projects by donors or international organizations and activities (10) Introduction of the enterprises/factories' environmental management			
By Enterprise				
13. Establishment of pollution control management system	(1) Arrange full-time pollution controller, (2) Make a plan to reduce pollutants and energy consumption by preparing material balance (3) Review raw materials and manufacturing process.	Enterprise	2010	Concept is described in 1.4.13 Introduced the cases in Japan about (2), (3), (4), (5), (6), (10) by the seminar "Environmental Law System in Japan" and "Industrial Wastewater Treatment"
14. Establishment of pollution controller association to exchange information	Exchange information on environmental management	Enterprise	2010	Concept is described in 1.4.14
15. Measures to grasp quality and quantity of industrial wastewater	(1) Installation of a pit to take samples for quality analysis, and a weir to measure wastewater generation, etc. (2) Installation of continuous flow meter and auto-water quality analyzer will be necessary in case of large factories (3) Pipe separations by process wastewater and cooling water to discharge to sewer or water body directly	Enterprise	2012	Concept is described in 1.4.15 Explained the concept by the seminar "Industrial Wastewater Treatment"
16. Positive cooperation with environmental inspector	Positively provide accurate information to inspectors as much as possible	Enterprise, Inspector	2014	Concept is described in 1.4.16
17. Construction of Industrial Wastewater Treatment Plant	New construction of pre-treatment or full-treatment or remodeling the existing industrial wastewater treatment facility	Enterprise	2014	Concept is described in 1.4.17
18. Reporting on the Environmental Management Activities	Regularly reporting on the environmental management activities	Enterprise, MEPP Public Relations	2014	Introduced some examples in Japan by the seminar "Environmental Law System in Japan"

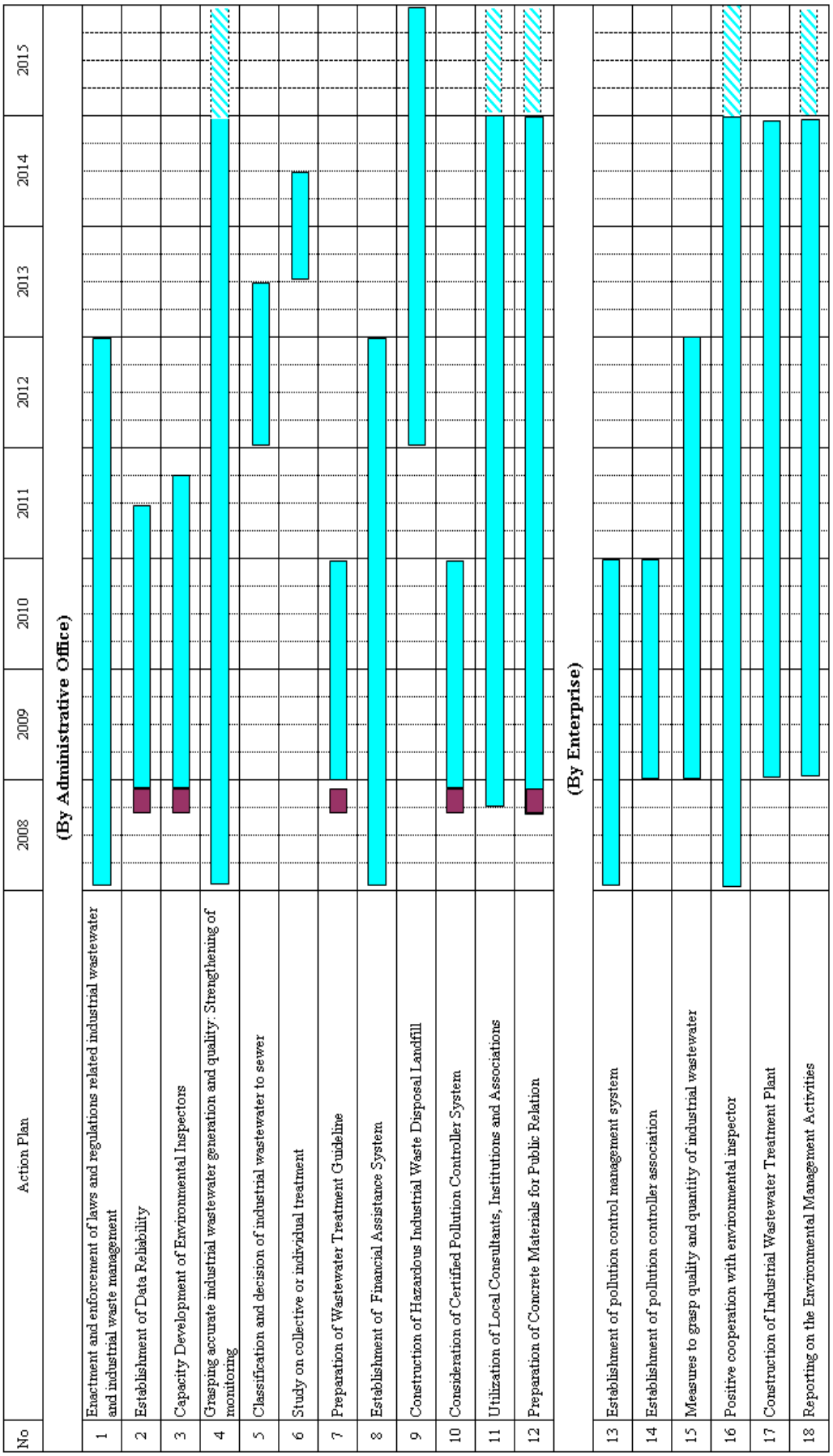

Figure 2.1 Implementation Schedule of A/P and Activities for Industrial Wastewater Management.

CHAPTER 3 IMPLEMENTATION OF WORKSHOP AND OTHER CD RELATED ACTIVITIES

CD related activities during the study period are as followings.

3.1 Seminar

Four seminars related to industrial wastewater management and water quality monitoring were held during the study. Contents of seminars by Power Point are shown in Appendix 3, Part IV (AP/IW).

The contents of the seminars were carefully selected based on capacity assessments on current industrial wastewater management including water quality monitoring. They will be of great help to implement IPPC system.

The seminar consists of four (4) parts. They include not only industrial wastewater treatment methods but also what to include and decide in environment-related laws and regulations, etc; what to pay attention to in order to secure accuracy in industrial wastewater quality analysis, how to reduce pollution loads, sludge recycle procedures, structures of industrial waste disposal sites, etc, introducing own experiences and concrete examples.

3.1.1 An Experience of Treatment of Liquid Toxic Waste

A seminar entitled "How to approach environmental problems- An Experience of Treatment of Liquid Toxic Waste" was held on June 18, 2008.

Place: City hall of the City of Skopje
Time and date: 9:30 – 13:00, June 18, 2008
Attendances: Local consultants, enterprises, etc, the total number was over 40.

The presentation, entitled "An Experience of Toxic Industrial Waste Treatment" was about the project a study team member, in charge of industrial wastewater management and monitoring system, involved in for 3.5 years more than 25 years ago as a Project Manager and ended failure in some parts. However, the study team member learned a lot from this project regarding how we should pay attention to in considering and solving environmental problems.

The contents of the seminar included:

(1) Background of the project

- IMO (International Maritime Organization) added to regulate dumping industrial waste into the ocean including Cu (copper), Zn (Zinc) and F (Fluoride). Development and construction of treatment plant to cope with the new regulation was required urgently.
- The concentrations of the three substances changed from mg/l to 100,000 mg/l in order.
- Impossible to treat these three substances by only simple neutralization or the patented processes due to high concentration of ammonia, chelating agents, surfactants and so on.
- In addition, fluoride compounds in the wastes from semi-conductor production companies often include Boron-Fluoride complex which is used for solder and in electrolytic solution for plating and can't be treated by only adding aluminum or ferric compounds with lime.

(2) The Objectives of the Project

- To develop a new treatment system and to construct a new plant to meet the new regulation of (IMO) with easy operation,
- To discharge the treated effluent to the sewer as much as possible,
- To combine wastes in the treatment process as much as possible.

(3) What to proceed

- Analysis of each waste for classification
  a) Research and development of individual pre-treatment procedures before using analyzers
  b) Comparison and trial of other analysis procedures
  c) Analysis of other parameters not regulated
- Classification of waste
  a) Classified into ten categories
  b) Three treatment lines as ocean dumping, water treatment and solidification
- How to average the quality
  a) Stored the liquid waste which was delivered regularly and rather stable in quality and quantity in a big volume tanks. Mix the liquid waste with other ones which were delivered irregularly, stored in small tanks and had a big fluctuation of quality and quantity more than three times. Then the quality of wastes was averaged.
- Development of treatment process
  a) Trial and error
  b) Decided the ratios of liquid wastes for easy operation and got a good performance of filter press which was used for dehydration after first neutralization of the mixed liquid wastes
- Construction of treatment plant
  a) Trial and error
  b) Industrial liquid waste, water treatment and air pollution prevention facilities
- Formulation of Operation Manual
  a) Management manual from receiving to carrying treated waste and liquid effluent to the ocean, sewer and landfill, Check items and procedures
  b) Education of the drivers to deliver wastes
  c) Refusal criteria of receiving industrial liquid wastes: This activity led to segregation of wastes and cleaner production by waste discharger. Introduced the technological innovation of cadmium and lead free in semi-conductor producing companies and B-F was reduced drastically.
  d) Countermeasures to prevent risk in mixing wastes
- Intermediate Evaluation of the developed treatment process
  a) The treatment process was appropriate from the view of the criteria for dumping waste (filtrate) into the ocean, discharging to sewer and disposing to landfill at that time
  b) Basically the treatment system consisted of the reaction by combination of wastes including alkali waste and only purchasing polymer, sulfuric acid for water treatment process and lime for solidification
  c) The number of operators and maintenance workers reduced from 50 to 10.
  d) Possible to discharge 60 % of treated effluent to municipal wastewater treatment plant adjacent to the company, but limited the discharge amount due to high concentration of salt (100,000 mg/l).
- Further Study
  a) R & D of Biological Treatment

  Showed it is possible to discharge all filtrate to wastewater system after diluting it by three times of industrial water and half years' biological treatment experiment. (Inlet BOD：6,000mg/l、effluent BOD：600mg/l)

  After the study team member left the company, his subordinates proved his experiment and constructed biological treatment plant with the facilities to remove nitrogen and phosphorous.
  The process consists of the followings.
  Dilute inlet filtrate with the quality of BOD, SS, T-N, T-P of 6,000, 20, 6,000, 100 mg/l, respectively, three times by industrial water, ammonia stripping, UASB (Upflow aerobic sludge blanket), oxidation and decomposition of pyro-phosphate and remained ammonia, coagulation/sedimentation. As the result, the quality of the effluent liquid discharging to wastewater system was BOD, SS, T-N, T-P of 600, 30, 40, 8 mg/l, respectively.

There was no quality deterioration even by a lot of salt inflow (50 ton/day) from the company into the municipal waste treatment plant that had been rehabilitated in order to increase the treatment capacity.
Moreover, some kinds of peculiar bacteria that are not found in the literatures were found in the UASB in the company and some of the universities and companies were interested in to apply the bacteria to other plants. Although there is no report of the application of it to another plant, he could not help feeling the power of nature.

b) Estimation of Leachate Quality of Landfill
At that time, there were no regulations of copper, zinc and fluoride in disposing waste to landfill. Initial leachate quality in a small-sized experiment showed much higher figures than he expected. From the result, he had to evaluate that the treatment process they had developed was only absorption of hazardous substances on lot amount of iron oxides that came from neutralization of ferric and ferrous liquid wastes which were used for scale removing in steel related companies and concluded that continuing landfill would cause serious environmental problems. The sludge contained 15 % of zinc and 30 % of copper; on the other hand, he recommended that the sludge be delivered to a mining refinery company as the valuable raw material. The company willingly accepted it.

- Conclusion and Recommendation

What to be learned from the Project;

a) Analysis
   - Understand the principles of the analysis procedure and characteristics of analyzer,
   - Official standards are not always adopted to waste analysis. Sometimes other analysis procedure will be better,
   - Establish the best pre-treatment procedure by yourself,
   - Use the analysis results to improve the situation like plan –do –see.

b) Treatment
   - Don't be satisfied by developing the system only to meet the criteria. Open your eyes to another field. The system you developed should be evaluated from all directions.
   - Use the power of nature but don't be too much confident of it.

c) Approach to environmental problems to be solved
   - To solve environmental problem, wide variety of knowledge is required. The knowledge covers the fields of chemical, chemical engineering, mechanical, electrical, civil, geological, biological, etc. Therefore, men or women from many fields should be involved in it.
   - There is a limit in the ability for treating the complex of industrial waste only by one company with only chemical procedures. Cooperation of other companies that use heat like steel industry or chemical industry companies should be considered. Carbonization and melting process were introduced in the seminar.
   - Cooperation of proper waste management by discharging company and treatment company is a must for good performance of treatment system.
   - Construction materials, machine and equipment should be considered carefully. Industrial waste with such high concentration of salt and erosive waste would very easily erode construction materials, machines and equipment.

- Introduced the AICAD project in Kenya. He was dispatched by JICA for the instructions of operation and maintenance of water supply and wastewater system in the university and how to separate and store wastewater from the laboratories and hospital in the university. In particular, explained the guidance of how to estimate water quality by simple microscope, showing pictures. Ended the seminar, saying that observation of the world of microorganism by using simple and cheap microscope (less than 200 USD, usually 80 USD) will lead you to the world of mystery of nature and you will be more interested in nature and environmental protection.

The participants seemed to be satisfied with the contents of seminar based on a really implemented project that include the process of how to develop the treatment system, construction of treatment facilities by trial and error, preparation of operation management manual, what to learn from the project that seems to end in failure at some parts and how to approach environmental problems to be solved. The participants listened to attentively and took notes. The seminar ended in success. The questions and answers were focused on treatment of wastewater sludge and industrial waste produced during solid-liquid separation in Japan.

3.1.2 Environmental Law System in Japan

Place: City hall of the City of Skopje
Time and date: 9:30 – 12:30, October 1, 2008
Attendances: Local consultants, enterprises, Ministry of Environment and Physical Planning, City of Skopje, University, etc, the total number was over 40.

Introduced issues which will become a reference for enactment and implementation of concrete laws and regulations in environmental management in Macedonia, with the introduction of the cases in Japan.

The contents of the seminar included:

(1) Background of enactment of pollution control law
- Introduction of Minamata and Itai Itai diseases, food chain, Compensation of the two diseases

(2) Environmental law system in Japan
- Seven pollution control laws
- EIA system
- Pollution control manager system
- Financial assistance system
- Sewerage law, Waste Disposal and Public Cleansing Law, etc.
- The roles of Ministry of Environment, other Ministries, local municipality including water quality monitoring

(3) Financial assistance system for pollution control
(4) Water pollution control law, specified facility
(5) Unified discharge criteria
(6) Pollution control manager system, roles of pollution control manager and senior pollution controller
(7) Classification of water pollution control manager
(8) Required knowledge for first class water pollution control manager
(9) The relation of pollution control manager system and ISO 14001
(10) Examples of environmental management reports
(11) Current environmental issues in Japan
(12) Strengthening water quality standard
(13) Pollution reduction rate by industrial category by water reuse
(14) Importance of removal of nitrogen and phosphorus
(15) Water pollution indicator
(16) Pre-treatment facility and an example of pre-treatment criteria in sewerage law
(17) The current situation of recycle of urban and industrial waste
(18) Industrial waste generation and recycle rate by industry and kind of waste
(19) Measures of waste recycle
(20) Identification of inorganic industrial waste, remarks, disposal criteria, identification procedures in other countries and difference in the result of leachate test
(21) Disposal method of organic waste

(22) Structures of controlled and shield-type landfills
(23) Others

3.1.3 Certified Environmental Analyst System in Japan: How to secure accuracy in analysis

Place: City hall of the City of Skopje
Time and date: 13:00 – 15:45, October 1, 2008
Attendances: Local consultants, enterprises, Ministry of Environment and Physical Planning, City of Skopje, University, etc, the total number was over 40.

To secure analysis accuracy is the most fundamental issue in environmental management.
Introduced certified environmental analyst system in Japan and attentions to be paid in analysis of industrial wastewater quality from the practical experiences of the member in charge of industrial wastewater management and water quality monitoring.

The contents of the seminar included:

(1) Background of certified environmental analyst system in Japan
(2) The knowledge and roles of certified environmental analyst
(3) Measurement law system in Japan
- Ultimate purpose, direct purpose, approach and concrete activities
- Institutes to secure measurement certification business and concrete roles and activities
- Key points of measurement law: Specified measuring instrument, verification and periodic inspection system
- Acceptable error of vessel for measuring volume (Mess cylinder, mess pipette, mess flask, mess burette)

(4) Environmental measurement certification business
- Parties not necessary registration as a measurement certification business
- Specified measuring instruments used for certification of noise/ vibration level or concentration
- Classification of environmental measurement certification business
- On-site inspection before and after registration

(5) Required documents for registration of environmental measurement certification business
- Example of analyzer, facilities and equipment for measurement of concentration and specified concentration of water or soil
- Business regulation

(6) Example of minimum limit of determination and significant figure
(7) Example of certificate
(8) Problems of Current Measurement Law and countermeasures
(9) Traceability system
(10) Accuracy management in environmental measurement
- Internal and external accuracy management
- Attentions in using measurement instruments
- Attentions in measurement of industrial wastewater quality

It was too short to tell enough the topics above because 3.1.2 and 3.1.3 were conducted in one day.
There were no questions by the attendants in particular; however, they showed their interests on the contents. Some of them said that the seminars were very interesting and meaningful because practical and concrete figures and tables were used.

3.1.4 Industrial wastewater treatment

Place: City hall of the City of Skopje
Time and date: 9:30 – 12:30, October 16, 2008
Attendances: Local consultants, enterprises, Ministry of Environment and Physical Planning, City of Skopje, University, etc, the total number was over 40.

As a part of industrial wastewater management, held the seminar of industrial wastewater treatment covering wide variety of topics with the practical experiences of the member in charge of industrial wastewater management and water quality monitoring.

The contents of the seminar included:

(1) Planning of Wastewater Treatment
- What to be studied to plan industrial wastewater treatment
- Outline of load reduction measures and some examples
- How to determine the tank volume to make the average of water quantity and quality
- Counter flow cleaning

(2) Procedures to plan and design industrial wastewater treatment plant
(3) Experimental procedures of industrial wastewater treatment and experiment equipment
- Organic and inorganic industrial wastewater

(4) Highlights of industrial wastewater treatment
- HDS (high density solid) method
- Removal of Nitrogen and Phosphorus by Biological Treatment
- Membrane bio-rector
- Others

(5) Flow rate measurement
- Flow rate measurement at open channel: Instrument, principal, measurement range, head loss, remarks, accuracy, etc.
- Flow rate measurement in pipe Instrument, principal, measurement range, head loss, remarks, accuracy, etc.
- Examples of measuring flow rate at open channel and in pipe

(6) Biological treatment
- Classification, principal, characteristics

(7) Performance evaluation procedure of industrial wastewater treatment facility
(8) Effects of oil on sewer system
(9) Treatment of heavy metals
- Treatment processes of industrial wastewater including chelating agents, in particular with some examples

(10) Waste treatment and recycle
- Example of recovery of heavy metals and current problems
- Eco-cement
- Eco-town

(11) Treatment of hazardous substances and remarks
(12) Analysis of hazardous substances based on water pollution control law in Japan with remarks
(13) Characteristics of dehydrator

(14) Others:
- Remarks in designing wastewater treatment plant and operation and maintenance, etc.

More than seventy (70) people attended the seminar, which shows their interests in industrial wastewater treatment and waste handling.

On the other hand, it was too short to explain sufficiently such a wide range of topics. Experiments are absolutely necessary to plan and design wastewater treatment facility and how to use the results to plan and design depends on practical experiences. Wastewater treatment technique should be evaluated not only from the performance of the effluent but also from sludge treatment and disposal, EIA, etc. In addition, some treatment processes and designs referred from a literature without experiments often bring about the troubles in actual operation and are not considered as appropriate from view point of EIA.

There is no organization which can conduct appropriate treatment experiment in Macedonia. In this regard, practical and steady assistance of detailed experimental procedures, result analysis, design of industrial wastewater treatment will be needed.

3.2 Mini-Presentation

The study team gave a presentation at CP (Cleaner Production) Center in Faculty of Mechanical Engineering in Skopje University on June 3, 2008 to explain the project, emphasizing that establishment of industrial wastewater management is the priority to construction of wastewater treatment plant in Skopje.
About twenty five (25) persons participated in the presentation, including two professors from the university, local consultants and enterprises who are members of the activity of CP Center.
Questions and answers were concentrated on the sludge treatment and disposal and pollution controller system in Japan. Two steel related companies out of Skopje City requested the presenter to visit their factories to instruct industrial wastewater treatment.

3.3 Site Survey of Factories' Industrial Wastewater Management

The Study Team visited five (5) companies with state inspectors on June 16 and June 19, 2008 to confirm IEP application documents (still Adjustment Plan) and industrial wastewater management.

Table 3.1 Summary of Industrial Wastewater Management Survey at Site

Industrial Category	IPPC classification	Main Products	Existence of Industrial wastewater	Industrial wastewater process	Comments of management system
Metal processing	B	Contactor, breaker, relay	Yes	Oxidation of cyanide, neutralization of metal and sedimentation	Analysis by outsourcing. Automatic treatment system is out of order. Input chemicals manually. Lack of knowledge of principles of industrial wastewater treatment and of facility management
Organic chemical industry	A	Detergent, Acryl fiber, PVA, paint, cosmetics	Yes	Neutralization and sedimentation, oxidation ditch	Factory is almost not operational. Industrial wastewater and sludge treatment facility are not functional.
Steel manufacturing	A	Thick steel plate	Yes	Simple sedimentation tank	High concentration of oil and scale. Settled sludge with oil is disposed of inside the factory. No flow meter. Analysis by outsourcing. Lack of knowledge of facility management
Organic chemical industry	A	Purification of organic chemicals,	Yes	Neutralization and sedimentation	Self-monitoring but simple analysis like pack-test. Partial flume exits but no measurement of flow. Lack

Industrial Category	IPPC classification	Main Products	Existence of Industrial wastewater	Industrial wastewater process	Comments of management system
		cosmetics, raw material of medical supplies, Development and fixing solution for X ray film, paint, tea			of knowledge of principles of industrial wastewater treatment and of facility management
Meat processing	B	Salami, ham, bacon	Yes	Oil separator	Analysis by outsourcing, Lack of understanding of installation of industrial wastewater treatment facility. Waste segregation is conducted.

- As a general impression, enterprises are lacking of the principles of industrial wastewater treatment and facility management.
- Most of IEP applications are prepared by local consultants; however, some cases where water quality analysis estimation or results apparently seem to be wrong are found. For example, COD value is three-digit number with one digit number of BOD value or nitrogen of 0 in meat processing.
- In an organic chemical industry, they say conducting self-monitoring; however, they don't have spectrometer but use a simple color former test kit and know the results by comparing the color with the standard colored paper without pre-treatment. In addition, color former agents are out of date.
- From these facts, analysis results by self-monitoring and outsourcing are doubtful. Accordingly, standard analysis procedure and accuracy control procedure should be established urgently. Without reliable analysis, IPPC system would not be fixed. Inspectors also seem not to have enough knowledge of instructing the meaning of partial flume or industrial wastewater treatment. These concrete consultations could not be obtained by conceptual capacity development programs.

3.4 Distribution of materials

I, in charge of industrial wastewater management and monitoring system, distributed the following materials to be considered necessary to raise environmental awareness of the people and enterprises to MEPP public relation department, etc.

(1) PR DVD introducing waste management in Tokyo Metropolitan Government -English version: MEPP Public Relation Department, Faculty of Civil Engineering of Skopje University, City of Skopje
(2) PR DVD introducing recycle of waste in Yokosuka Recycle Center-English on superimpose: MEPP Public Relation Department, Faculty of Civil Engineering of Skopje University, City of Skopje
(3) JIS K0102 (Analysis of Industrial Wastewater), English version: MEPP Public Relation Department, MEPP central laboratory, City of Skopje, PE, HydroMett
(4) Seminar material "An Experience of Treatment of Liquid Toxic Waste", "Industrial Wastewater Management in Japan-1 Environmental Law System in Japan"、 "Industrial Wastewater Management in Japan-2 Certified Environmental Analyst System in Japan", "Industrial Wastewater Treatment", Power Point-English version, Macedonian version, narration-English version: MEPP Public Relation Department, Faculty of Civil Engineering of Skopje University, Faculty of Mechanical Engineering of Skopje University, City of Skopje, PE, HydroMett, those who want among the participants of the seminars, etc.
(5) VCD introducing CEAF (COMMUNITY ENVIRONMENTAL AWARENESS PROGRAM) activity in the Environmental Improvement Project in Ho Chi Minh City, Vietnam, funded by

ADB. I edited the contents through the discussion with TV staff and it was broadcasted in TV in Ho Chi Minh City: MEPP Public Relation Department, Faculty of Civil Engineering of Skopje University, City of Skopje

(6) Manuscript of CP (Cleaner Production) for next seminar: Faculty of Mechanical Engineering of Skopje University

(7) VCD for education and enlightening of cover soil in waste landfill which I edited by my company's expense in the project-Integrated Waste Management in Havana City, Cuba- by JICA- narration is deleted for the man in charge to narrate himself, with English explanation: MEPP Public Relation Department, Faculty of Civil Engineering of Skopje University, City of Skopje

(8) VCD for education of measurement of waste by potable truck scale I edited by my company's expense in the project-Integrated Waste Management in Havana City, Cuba- by JICA- narration is deleted for the man in charge to narrate himself, with English explanation: MEPP Public Relation Department, Faculty of Civil Engineering of Skopje University, City of Skopje

Notes
(1), (2), (7), (8): MEPP Public Relation Department is doing PR activity of waste management by EU's assistance; however, it seems to be lack of concrete materials.
(3) To compliment ISO which is used and, to assist preparation of more detailed analysis procedures
(4) As a reference for the people who are interested in environmental issues but could not attend the seminar
(5) As a reference of the procedure for environmental education by bottom-up process.
(6) To confirm if CP center already finished similar seminar. If so, it will be skipped from the next seminar. There is no reaction from the center.
As for (1), (2), (7), (8), as Faculty of Civil Engineering of Skopje University has been preparing F/Ss (Feasible Studies) for municipal waste landfill, they are very pleased with the materials and plan to use them for students' education.
MEPP Public Relation Department, on the other hand, seems not to be active. It should collect materials and information for education and raising awareness of the people and enterprises actively and disclose them actively. Capacity development program shall include the program for this organization.