

**MUNICIPAL SOLID WASTE MANAGEMENT SYSTEMS,
TECHNICAL STANDARDS,
TREATMENT AND DISPOSAL,
CAPACITY -BUILDING (CHINA'S AGENDA 21)
US/CPR/96/150**

Report of the evaluation mission*

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LIST OF ABBREVIATIONS USED

CAUES	China Association of Urban Environmental Sanitation (See Annex 4)
CAUC	China Academy of Urban Construction (See Annex 4)
CICETE	China International Centre for Economic and Technical Exchanges, MoFTEC (UNDP direct counterpart)
CTA	Chief Technical Advisor (Mr Rudolph Walder)
ESETRC	Environmental Sanitation Engineering, Technology and Research Centre (direct project counterpart, supported by CAUC See Annex 4)
IESETR	Institute of Environmental Sanitation Engineering, Technology and Research, CAUC (Annex 4)
IRD	International Relation Department, MoC (See Annex 4)
MoC	Ministry of Construction (See Annex 4)
MSW	Municipal solid waste (not including industrial waste)
MSWM	Municipal solid waste management (All activities relating to the storage, collection, recycling, treatment and disposal of MSW)
NPD	National Project Director
SEPA	State Environmental Protection Bureau
SWM	Solid waste management (See MSWM)
UDD	Urban Development Department, MoC
UNIDO	United Nations Industrial Development Organisation
w/m	working months (of consultancy time)

1 INTRODUCTION

This evaluation is conducted in compliance with UNIDO policy of mandatory evaluation of large technical co-operation projects. As such, it is foreseen in the Project Document. The evaluation exercise was discussed and agreed upon at a meeting of relevant UNIDO staff and the donor held at UNIDO Headquarters on 29 May 2000.

The purpose of this in-depth evaluation is to enable the stakeholders of the project to take informed decisions on future orientation of the project and to learn lessons from experience for planning new projects in the field of municipal solid waste management. Detailed Terms of Reference are attached (Annex 1).

It is a joint evaluation of the key stakeholders: - the donor, the Government of China and UNIDO. Each of them nominated its own representative in the evaluation team, which thus consisted of the following members:

- Mr. Adrian Coad, team leader, on behalf of the Swiss Government (SECO) as donor;
- Mr. Luo Bin, team member, on behalf of the Government of China;
- Mr. Jaroslav Navratil, team member, on behalf of UNIDO.

The field mission in China took place between 16 and 31 October 2000. Within this period the Evaluation Team interviewed project staff (both local and the CTA), the management of ESETRC and the Institute of CAUC, Government bodies (MoC,) and a number of other persons from organisations related to the work of the project. (A list of organisations visited and persons interviewed is in Annex 2). Three full working days (23-25 October) were spent in two of the five Demonstration Cities (Zhangzhou, Guangzhou) interviewing Urban Environmental Sanitation Bureaux and their organisations, and visiting their facilities and on-going programmes. Both in Beijing and in the two cities, the evaluation team visited laboratories strengthened or established by the project and verified the status of other equipment delivered by UNIDO. During all interviews and visits, the Evaluation Team met with the full support of the organisations concerned. In this context the visits to the two cities deserve the particular appreciation of the Evaluation Team.

At the end of the field mission, on 30 October 2000, the draft evaluation report was discussed in detail with the UNIDO Project Manager, Deputy National Project Director, CTA and UNIDO expert Mr. Schläpfer. Clarification of issues raised during the discussion is to a great extent reflected in this final report.

2 INSTITUTIONAL FRAMEWORK, RELEVANCE AND DESIGN

2.1 Institutional framework

The Public Administration Reform of 1998 reduced the staffing of the Ministry of Construction in the field of urban construction including MSW management but the allocation of Government responsibility for the problem area of municipal solid waste management among several central organisations remained unchanged, still with MoC. Yet there have been some changes in the institutional framework within which the project is set, as discussed in the following paragraphs.

First, however, it should be explained and understood that the Environmental Sanitation Engineering and Technology Research Centre (ESETRC), which is subordinate to the MoC, is only a legal title to carry out some activities - it is not a real organisation with human and financial resources.

To carry out assignments given by MoC, the ESETRC may use the human and other resources of various organisations but in practice it uses primarily the Institute of Environmental Sanitation Engineering, Technology and Research (IESETR –subsequently referred to as the “Institute”) which is part of the China Academy of Urban Construction (CAUC). CAUC has approximately 120 staff, of which 70 are professional. Approximately 70 % of the budget is earned through contracted services for various clients, 15% through lease of premises, and the remaining 15% is a subsidy from MoC. The Institute has approximately 25 professional staff (including some part-time employees). All of them are employees of CAUC, as the Institute does not have its own legal identity. Similarly, all contracts, financial management, recruitment and general administration are handled by CAUC. Annex 4 shows an attempt to represent the organisational structure.

Whilst the Director of the Institute (currently Mr. Xu Wenlong) reports to the Vice President of the CAUC (currently CAUC has no President), the Vice President of CAUC is at the same time the Director of ESETRC. Thus, when the Institute staff are working on an ESETRC task, they have two managers.

Changes have occurred in the relationship between CAUC and MoC. CAUC is gradually becoming more independent, which implies a decreasing subsidy from MoC and the necessity of becoming more commercial- and client-oriented. As far as the Project is concerned, it implies more difficult access to the MoC budget.

Internal management and organisational structures within CAUC have also been under review for some time, and a new system is under preparation. Such processes bring about uncertainty for some staff, and in this case there may have been an effect on their motivation and willingness to take decisions. All these changes are not conducive to the project but in spite of these changes the implementation of the Project has continued.

2.2 Relevance

Management of municipal solid wastes is an urgent environmental priority for China, particularly in the cities, of which there are over 660. There is a strong awareness of this need amongst some decision-makers, as evidenced by the interest in this field and cases of large budget allocations for upgrading disposal operations. In many cities the situation is aggravated by shortage of suitable sites for disposal operations. Public opposition to siting of incinerators and landfills adds to the difficulties faced by planners.

China has set high environmental standards and is interested in adopting sophisticated technologies for achieving these standards. Unfortunately, in many cases the operational performance of incinerators and landfills is not sufficient to meet the standards and objectives. As a result, there is great benefit in

learning from the experiences of industrialised countries that have been developing such technologies during recent decades. Therefore there is a need for training and information dissemination using all available means. Information is needed by decision-makers and by engineers and scientists.

City leaders need independent advice, rather than guidance from particular companies whose primary interest is in their own commercial success rather than the suitability of the solutions they propose. The Project is able to offer such independent advice.

Sophisticated technologies (whether incineration, composting or leachate treatment at sanitary landfills) need good laboratory support. This support has two aspects:

- equipment that can measure parameters – sometimes at very low levels – quickly and reliably, and
- trained staff who know how to collect representative samples, analyse them, and interpret the results.

The project has met both of these needs at CAUC and in the Demonstration Cities.

As MSWM developments in China gather momentum, there is an increasing need for the types of support offered by the Project.

2.3 Project Design

The Immediate Objective of the project (to strengthen capability of the municipalities to better manage MSW) should be achieved through a combination of institutional capacity building, policy advice and demonstration of advanced MSW management systems and technologies in five cities. Capacity building is aimed at central organisations (Outputs 1 - 4 and 6) as well as MSW management organisations in the cities (Output 5). Policy advice is covered by Output 7, and demonstrations at city level by Output 5.

The strategy is sound and very challenging. Involvement at city level is a commendable strategy, since it helps to anchor other project outputs in the realities of the current situation, and can be expected to lead to examples of good practice, if investment is available and the local will is present to implement the recommendations of the Project. The Project is not long enough to support the entire implementation process of major capital improvements, but there is scope for implementing improvements in planning, and operational and management procedures.

The project design reflecting this strategy is sophisticated, complex and detailed. In general the links between inputs, activities, outputs and purpose follow a *means-to-end* logic, but the Development Objective has a component (“to reduce the generation of solid waste”) which does not have any roots in the project design. No assumptions have been formulated in the project document.

The project document turned out to be too ambitious primarily for the following reasons:

- financial resources and time were not sufficient to produce all the outputs;
- some outputs or activities were too sophisticated;
- implied assumptions about implementation of advanced MSW systems and technologies in the cities held true only partly; project design relied too much on development activities of other partners without possibility of influencing them.

In view of the above it was necessary, in the course of implementation, to amend the project document by dropping or changing some outputs or activities, in particular:

- Output 4 (the expert system) - dropped
- Output 3 (the technology database) - amended
- Activities related to industrial and hazardous waste (which are outside responsibility of MoC – part of Output 7) - dropped

- Review of detailed technical and financial analysis of projects in the Demonstration Cities (not commensurate with resources – part of Output 5) - amended
- Advice on projects for which the documentation is only in Chinese (such as the feasibility study for incinerator in Zhangzhou) and on projects which were not implemented, such as the brick plant in Quingdao (part of Output 5) - dropped
- Assessment of polluted areas (not commensurate with resources - part of Output 7) - dropped
- Co-operation with the UNDP project on MSW Management Reform, the implementation of which had not started at the time of this Mission (part of Output 5) – not started.

As regards the expert system, the evaluators are not aware of any expert system for disposal that is available anywhere, (though one is available for selection of collection vehicles). Such an expert system would depend on high quality local data being available – users of expert systems often look for any data and enter whatever is available without checking whether it is reliable, so that in such cases an expert system can lead to wrong conclusions (*Garbage in = garbage out*). Rapid changes in technologies could make the software out-of-date in a short time. Furthermore, selection of disposal options requires calculations and assessments that are very site-specific, so the amount of time that might be saved by an expert system is small, in comparison with the total task of preparing a disposal option. It is likely that the useful information in such an expert system could be presented in a four-page brochure.

The database on MSW technology (Output 3) implies a very large input of work. The evaluators do not know of any such database in existence in industrialised countries. Such a database would require a very large input from a senior waste management expert in order to edit the material because there is much contradictory and inappropriate information which would need to be screened out. The training manuals would provide much of the technical information that might be on such a database, and it is a common view that the printed page is more accessible for large volume reading than the computer screen.

Apart from changes in the project document as mentioned above, the evaluators have also made comments on the MSW Composition Database as specified in the project document. Waste management specialists differ in their views of the value of such a database. Macro-level strategies do not depend on such data. To use such data for assessing progress (for example in waste reduction or increasing collection coverage) requires that the data be reliable and consistent, and such data are so expensive to collect that it is generally only feasible to collect it for a carefully-selected and proportionately very small sample. These data are very important for the design of some treatment alternatives, and so should always be collected in an intensive effort which is closely linked to the design of the process in each particular location. It is therefore debatable whether the database on waste quantities and composition can be justified in the form proposed in the Project Document.

Finally, there is an implied assumption in the logic of the Project Document that the China's waste management problems can best be solved by the application of technology that is used in industrialised Europe. (It may be that a modified approach that makes greater use of manual labour would be more appropriate in China because of lower wage rates for unskilled labour and the importance attached to employment generation.) This assumption may or may not be valid, or may be valid in only the largest and most developed cities of China.

3. IMPLEMENTATION

3.1 Budget and expenditures

Formulation of the Project started in 1994. The Project Document was signed in December 1997, the green light for financial obligations was given in January 1998, and the actual fieldwork started in July 1998. In the course of implementation, a number of budget revisions were made to adjust the budget to the changing needs.

Table 1 shows the original budget, the most recent amendment to the budget, and the expenditure up to the end of September.

Budget revisions reallocated some funds (approximately USD 150,000) in favour of personnel budget lines (for both international and national experts) at the cost of in-service training, study tours, subcontracts and equipment.

As of 30 September 2000, actual expenditures amounted to 70% of the total budget in relation to the estimate of approximately 80% for the production of outputs. Given the planned project duration of 3 years, the implementation in budgetary terms is on time.

Compared to the average of 70%, the rates of expenditures relating to some budget lines have been lower - particularly in the case of fellowships and in-service training - and higher in the case of international experts. Preparatory work for nine fellowships has been finalised so that a large part of this budget line will be consumed soon.

3.2 Delivery of UNIDO inputs

3.2.1 International experts

The project provided the services of 14 experts, all of them on short term or split missions, including the CTA. This made management and administration of this input rather demanding. The number of w/m will exceed the target set in the project document. Already at this stage the project has delivered more than the planned total level of 40 w/m. Generally the performance of experts was ranked high or satisfactory. In one case the expert's report was not produced as required, so that the contract with this consultant was discontinued.

The time input for the CTA was set at 50% of the Project period, and the arrangement has been that he has been in Beijing for periods of three months, with gaps of three months. During each three-month period he must make all arrangements and provide support for the short-term specialists, and visit each of the five Demonstration Cities, in addition to the many other tasks. This has proved to be a heavy load. In addition he has been obliged to undertake certain duties, such as reviewing reports, during times when he has been away from China and not paid by the Project.

3.2.2 National experts

As of September 2000, the project had recruited 14 national experts, most of them on contracts allowing for split assignments over a longer period of time. This made it possible to use their services according to the needs of the project. The planned input of 76 w/m is

Table 1 Original and revised budgets and expenditures

Budget line		Original Budget	Latest Revised Budget ¹	Total expenditures ²
11-99	Project Personnel	790,000	912,616	726,206
13-00	Secretarial Support	15,000	15,000	6,868
15-99	Project Travel	30,000	30,000	12,234
16-99	Other Personnel Costs	18,000	27,000	7,826
17-99	Short-term National Consultants	114,000	131,233	63,183
19-99	Personnel	967,000	1,115,845	816,317
29-99	Contracts	95,000	75,000	25,824
31-99	Fellowship	150,000	150,000	-
32-99	Study Tours	116,000	65,267	65,267
33-99	In-service Training	100,000	51,800	1,790
39-99	Training	366,000	267,067	67,057
49-99	Equipment	560,000	538,073	491,565
59-99	Miscellaneous	50,000	42,011	15,012
Project Total:		2,038,000	2,038,000	1,415,775

¹Budget revision K

²Expenditures as of 30/9/2000

likely to be achieved (so far 67 w/m have been used). With a few exceptions (initial technical translation of the Manual) the national experts performed well or satisfactorily.

3.2.3 Study tours

A one-month study tour to Switzerland, Austria and Germany was organised for 11 managers and experts from MoC, ESETRC and the five cities. The study tour was very intensive, comprehensive and precisely organised. The only recommendation for improvement related to the choice of countries: all three countries visited are considered the leaders in MSW management and similar in their approaches. (After considerable discussion these countries were chosen because they were perceived as the best in the world with regard to MSWM standards and performance. As a policy it was decided to emphasise disposal routes that incorporate incineration, rather than promoting landfilling without treatment.) One participant commented that an additional visit to a country with less advanced MSW management systems (and waste composition and weather closer to Chinese conditions) would have been useful.

3.2.4 Fellowships

Due to a misunderstanding, the fellowship programme became slightly delayed, but preparatory work for nine fellowships has been finalised and the programme will be implemented soon. The evaluation mission observed that some of the candidate fellows do not understand or speak English well. This may considerably reduce the effectiveness of this input and cause annoyance on the part of the training organisations. Some proposals to solve this problem are suggested in Chapter 6.

3.2.5 Equipment

The project has procured almost 100 items of equipment in the amount very close to the allocation in the revised budget (close to USD 500,000). Most of the equipment is laboratory equipment but the delivery also included some office equipment and equipment for training purposes (including a video set). There were administrative problems in the procurement of some equipment and books and in one case a wrong piece of equipment was procured (which has still to be replaced). In general, the equipment is up-to-date and adequate for the purpose of the project.

3.3 **Delivery of the counterpart inputs**

According to the Project Document, the counterpart inputs for the whole Project period should amount to USD 1,217,300. According to the Director of CAUC, the counterpart inputs to the Project consist of the following components:

Input of MoC as counterpart to the project

- 40,000 Yuan at the beginning of the Project
- about 80,000 Yuan annually for the Institute

Input of CAUC (or the Institute) for the Project

- 500,000 Yuan directly used in the Project
- 1,000,000 Yuan for the laboratory
- 300,000 Yuan for the office
- 800,000 Yuan annually for the staff.

Taking 2.5 years as current duration of implementation, the above inputs represent in total approximately 4 million Yuan (approx. USD 500,000). This is considerably less than what was indicated in the Project Document. To some extent the discrepancy is due to the fact that some of the counterpart inputs were priced too high in the Project Document. On the other hand, some of the numbers indicated above may also be priced high. Therefore, it is important to quantify the inputs in physical terms. The counterpart actually provided newly reconstructed rooms for the laboratories, adequate rooms for offices, laboratory and office furniture, national professionals to take part in study

tours, and a number of qualified personnel for project-related activities both from MoC and the municipalities. The most significant discrepancy is in the provision of qualified personnel. The project document envisaged 12 counterpart staff in Beijing alone (not including the NPD and the Deputy NPD). Sixteen staff are said to have been involved in the project for different time periods with an average time input equivalent to 8 full-time staff. This is difficult to verify but even this number of 8 full-time staff is below the planned level particularly when considering that the number includes the NPD and the Deputy NPD.

Of particular importance is the fact that the NPD is not in a position to work full time on the Project. It appears that this is because the Institute must earn the majority of its income from consulting, so that a lower priority must be given to activities that do not generate income. This has consequences on project management as explained in Section 3.6.

Another difficulty was caused by the lack of a Director of the CAUC, before Mr Zhang Hong Fu took over as Vice President in May 2000. (There is currently no President.) Before his appointment there was, to some extent, a leadership vacuum.

3.4 Co-operation of UNIDO experts and counterpart staff

Main activities of the project consisted of

- training counterpart staff (including some staff of the Sanitation Bureaux or their organisations in the five cities),
- developing tools (the most important being the Training Manual),
- preparing the national strategy,
- designing and operationalising databases and modern means of information dissemination, and
- providing direct technical advice to the management of the five cities.

All these activities required a high degree of interaction between UNIDO experts and counterpart staff. Furthermore, the preparation of national strategy in a working group requires close co-operation of organisations which are not under the authority of MoC.

In general, working, as well as personal, relations between the international experts and counterpart staff are reported as good. The evaluation team observed an excellent relationship between the international trainer, national trainer and the counterpart trainees during laboratory training. However, cases of lack of motivation of the counterpart staff or other co-operating organisations were also reported, demonstrated through late arrivals at or absence from some training courses, slow implementation of assignments given by international experts (particularly during their absence), no response to a request for comments in writing on the draft national strategy, etc. The international staff seems to have exercised considerable “push” to get things done. Partly it can be explained by staff constraints on the counterpart side and the necessity for Institute staff to devote their time to income-earning activities first. Difficulties in relationships may have resulted partly from the counterpart’s feeling of a low level of ownership of the project – that is, feeling of the counterpart staff that the project is “their” (i.e. the expatriates’) project rather than “our” (i.e. belonging to the Chinese) project. Some comments by counterpart staff referring to “the need to consider more Chinese conditions” or “introducing foreign experiences which cannot be applied” also support this view.

3.5 Co-operation with other organisations or programmes

There are a number of organisations and programmes dealing with MSW management. Several of them were requested to participate in the Project’s working group on national MSW strategy. Some of them have participated actively in its work (such as the China Association of Resources

Comprehensive Utilisation), but others have participated less frequently and less actively. The absence of SEPA from the working group on national strategy is disquieting.

Among the on-going development co-operation programmes touching MSWM, the UNDP/GEF/SEPA landfill gas recovery project is the most relevant one for co-operation with this project. (In particular, co-operation with the training centre in Anshang may be useful for ESETRC.) The CTA tried to establish links with that project but did not find any willingness on the other side. The UNDP/CICETE project "Capacity Development for Municipal Solid Waste Management Reform in China", - which was highlighted for co-operation in the Project Document - has been approved and the consultants have been identified, but that project had not yet effectively started at the time of this Mission.

3.6 Project management

The Project is executed by UNIDO, so that responsibility for UNIDO inputs and activities rests with the UNIDO Project Manager. On the Chinese side, the project is managed by the National Project Director (NPD). However, the institutional framework within which this function is set is rather diffuse. The NPD reports to MoC which – according to the project document - is the host country implementing agency (i.e. the counterpart). Within MoC, the Department of International Relations (IRD) is the formal representative of the Project. IRD has, however, entrusted some counterpart functions to the Urban Development Department (UDD) of MoC. During the period since the Project was formulated there has been a reduction in the number of waste management experts at the Ministry of Construction. The extra workload for the remaining staff is likely to have made it very difficult for senior MoC staff to devote the amount of time that they would wish to the Project.

In practice, the implementation activities were delegated to ESETRC. However, as described in Section 2.1, ESETRC is a virtual centre, just a legal title that is used to carry out certain functions, using staff and facilities from various organisations, primarily from the China Academy of Urban Construction (CAUC) and its department called Institute of Environmental Sanitation, Engineering, Technology and Research. As the NPD is a staff member of this Institute of the Academy, which is becoming increasingly independent from MoC, the decision-making, reporting and accountability relations between ESETRC, CAUC/Institute and MoC are complex and not very transparent.

Conversion of inputs into outputs requires close co-operation of both parties. To support the process UNIDO nominated a part-time (split missions) Chief Technical Adviser (CTA) who advises both the National Project Director and UNIDO Project Manager.

The CTA is a great help for the UNIDO Project Manager in discharging her executive functions. Their working contacts are frequent. They are distinguished by mutual recognition of personal professional competencies and resolution in handling problems to achieve results. Support to executive functions, however, requires administrative work. In this context the CTA expressed critical remarks about some UNIDO procedures (particularly related to local procurement). For a significant part of the Project there was no Director at the Beijing UNIDO Office, and this made the administrative workload of the CTA more difficult.

As the NPD could not devote a sufficient amount of his working time to project management, this function has actually been discharged by the Deputy NPD, a capable junior ESETRC professional. However, since he is not high in the management structure of the Institute, he is neither in a position to manage other employees, nor is he perceived as having an equivalent status to the CTA. Under such circumstances the CTA gets involved in discharging executive functions, which involves considerable administrative work for him and, in turn, the risk of marginalisation of the local management. In other words, as a result of the complexity of national management and the other commitments of the NPD, the CTA has felt obliged to take on more administrative and managerial functions than is normal in such projects, and more than was envisaged at the formulation stage. The CTA has felt obliged to do

this in order to achieve the outputs listed in the Project Document, for which he feels responsible. (Distributing the draft strategy paper is one example of the tasks which should have been managed and handled by local management, but instead were directed by the CTA.) These factors have contributed to a lower sense of national ownership for the Project, and an excessive workload for the CTA.

As required by the Project Document, a Steering Committee was established. The Steering Committee met twice. The second meeting in 1999 was preceded by one-day conference on MSW management, and this proved to be a good arrangement. The Project Progress Report was used as an input to the meeting. The Steering Committee meeting itself was chaired by MoC and attended by most members, including the UNIDO Project Manager and representatives of the cities. Review of the project status in formal statements was smooth.

4. RESULTS

4.1 Production of outputs

Output 1: Capacity of ESETRC strengthened

Current status: 95 % completed.

As explained in Chapter 2.2, ESETRC is just a legal title that is used for conducting certain activities. To do so it uses staff of the Institute of the same name which is a part of CAUC. However, for practical reasons and consistency with the Project Document, ESETRC is sometimes conceived as identical with the Institute, but in real terms the project inputs have strengthened the Institute.

Before the Project started, the Institute had approximately 20 core staff, now it has about 25 core staff and a number of part-time staff (all professionals). It is considered to be the best-qualified group of professionals in China for designing MSW projects, in particular landfills and composting plants. In the last 10 years it prepared designs, including drawings, for 15 landfills, 18 composting projects and five incinerators, and also a number of feasibility studies on incinerators and research projects. The management and some staff convey a feeling of self-confidence and do not seem to be concerned about actual and potential competition. However, more and more organisations are getting involved in MSWM. Most of the design work for landfills is now being carried out by provincial organisations, so that the share of the Institute in this market is estimated at 10-15 %, mostly for medium and small cities.

There are plans to enhance the position of the Institute by making it a source of nation-wide information on MSW and providing specialised laboratory services. In this context the support of the UNIDO project is appreciated. The results of strengthening the Institute by the Project can be assessed as follows:

Professional staff: The Project trained four professionals of the Institute in MSW management and in training methodology and communication techniques both through lectures, on-the-job training and one study tour. Whilst knowledge of MSW management was upgraded, the training and communication techniques were new to the four trainers, although they had previously worked as trainers on courses conducted outside the Project. In addition, several other staff members (3-5 per session on average) of the Institute attended technical lectures given by international experts so that a certain segment of the professional staff of the Institute were exposed to modern MSW technologies and processes. A refresher training course is planned before the end of the Project.

Management. Two staff from the Institute attended a one-week training programme in strategic management which was organised by the Project as an additional activity (not foreseen in the Project Document).

Tools. The Project produced a comprehensive Training Manual on MSWM. Already in the current form it can serve as a valuable source of information and support to conferences and training on MSW management, including university training. It is definitely the most prominent specific output of the project. Its wide dissemination and use in China are highly desirable. Many of the Chapters could be considered for publication (subject to the approval of the authors and after adding complementary information on Chinese experiences). The Manual will again be used in the forthcoming refresher course.

A video presentation entitled “Happy Low Waste City” has been produced to explain to decision-makers and the public about the importance of good treatment and disposal of waste, and about ways of resource recovery from wastes. This is a relevant and powerful tool which has been made to a very high standard. The Team understands that it has been broadcast in some areas, and that 15 copies have been sent to selected organisations related to MoC, and one to the studios

of the State Education Commission. It is understood that the presentation was broadcast to a section of Zhangzhou as part of the promotion of the concept of separate collection.

Laboratory. Under the Project new laboratory premises, furniture and equipment have been provided and installed. To become a fully-fledged first class MSW laboratory only one piece of equipment – a portable gas analyser - is required. The laboratory staff received practical training so that the laboratory has a very good capacity to carry out analysis for MSW related tasks.

Office and training equipment. As ESETRC was sufficiently endowed with office equipment prior to the Project start, the Project support was limited to a few PCs and some training equipment. The equipment delivered by the Project is being used.

Training services of the Institute. With the support of international experts the project conducted a training course of 3 weeks duration for approximately 30 people from the partner cities. Trainers (trained by the Project) estimated that they delivered lectures adding to a total duration of 1-3 days each.

Members of the Institute staff have, for some years, conducted training on MSW issues, either for the Association of Urban Environmental Sanitation (CAUES) or as CAUC. Such training events usually lasted 3-5 days and were attended by up to 200 people. They are organised approximately once or twice a year. However, as the organisers of training are allowed to charge fees only to recover their costs plus a very small margin, organisation of training courses is not a lucrative commercial operation. On the other hand, training brings visibility to the Institute. Thus there is some interest of the Institute to conduct training courses.

Other services of the Institute. The project upgraded the design services of the Institute through training and making the Training Manual available in Chinese. There is potential for increasingly offering laboratory and information dissemination services.

Output 2 MSW Composition data base

Current status 95% completed

A database has been prepared using *Access* software. It is currently stored on one computer at the Institute. In addition to data on waste generation and composition, the database has provision for storing general data on each of the five Demonstration Cities, and financial information. Provision is made for storing data for each year, and for using it to plot graphs showing trends and for calculating projections of waste quantities in the future.

The database contains most of the main data components for one city (Mianyang), and only some items for other cities.

At this stage, forecasts using this data do not appear to be useful because data are available for only a few years and there seems to be an error in the program for using population figures to make projections of waste quantities. Such “bugs” in the program can easily be remedied before the end of the project. There also appeared to be some contradiction between the values for the Chinese version and those for the English version.

Some data that is held at the Institute in connection with other projects has not been entered into the database.

The Evaluation Team recommends that this Output be regarded as a low priority. It recommends that the software be checked for any “bugs” so that it is ready for use at a later date when conditions favour its use.

Output 3 MSW technology data base

Current status 100 % completed – if the collection and inputting of data are excluded.

As discussed in Section 2.3, it has been agreed that this database should be limited to information about suppliers of goods and services related to waste management, in China and abroad. The database has been prepared on this basis, again using *Access* software. Companies are categorised according to ten fields. There is also space for entering information about reference projects which can be used to assess the experience of the companies which are listed. The numbering system that is used corresponds to the system used for brochures in the ESETRC library. The database is currently stored on one computer at ESETRC, but it could later be made available on the Internet site (Output 6). Since the main focus of the database is technology transfer, the firms listed are from overseas, so the database is not available in Chinese.

So far, data from 29 foreign companies have been entered. Some efforts have been made to bring the database to the attention of more companies and to invite them to supply their own details.

The Evaluation Team supports the reduction of this Output (in comparison with the very ambitious goals indicated in the Project Document) as has been agreed by Project management.

Output 4 Appropriate expert system

For reasons such as those discussed in Section 2.3, it was decided by Project management not to devote resources to this Output, and this decision has the support of the Evaluation Team.

Output 5 MSW management and operations strengthened and demonstrated

Current status 75% completed

The CTA made five visits to the Demonstration Cities, sometimes accompanied by a specialist consultant. During these visits he assessed the situation in each city, and offered advice in connection with their plans and operations. The cities sent trainees for the general training course (conducted in three cities) and the laboratory training in Beijing. Planning support and advice was given regarding the development of laboratory facilities and equipment was provided for one laboratory in each Demonstration City, according to its needs. Professionals from these cities were sent on a study tour to Switzerland, Germany and Austria, to learn about modern SWM practices in these locations.

As mentioned in Section 3.2.2, the CTA's workload involved in visiting these five cities, both in travelling, in meetings and in site visits, has been high, considering that the CTA is in China for only 50% of the Project period.

The Evaluation Team visited two cities (Guangzhou and Zhangzhou), and were very impressed by the appreciation of the inputs of the Project. In particular, the study tour and the laboratory support (equipment, advice and training) were highly appreciated, and the Training Manual was seen as a very useful tool. Whilst the advice of the CTA was not always followed, he is clearly highly regarded and appreciated. Association with the project has raised the status and profile of waste management activities in these cities, with the useful side effect that more financing is available from local governments.

Fellowships are being planned to give one professional from each city the opportunity of longer-term (4 month) exposure to modern technologies and management in Europe. There is some concern about the knowledge of English of some of the candidates; this might require a modification in the original concept. It is expected that most of the Fellowships will start in early 2001.

Regular contact with the Demonstration Cities helps to keep the Project in touch with the real situation in China, though it is understood that there are great ranges of conditions to be found in the cities of China.

The demonstration value of improvements in the Demonstration Cities has already been seen in the large number of visitors at the Comprehensive Waste Treatment Site at Zhangzhou, where there have been some useful inputs from the Project. The video presentation *'Happy Low Waste City'* draws on some good examples from these cities.

Output 6 Information dissemination

Status 60% completed

Progress with this Output has been along the lines of the Project Document. Existing methods of dissemination (which are not outputs of the Project) include:

- a quarterly newsletter which is mailed by ESETRC to over 1000 institutions including environmental sanitation departments in cities, research institutions and enterprises. The contents of this newsletter include policies, standards and information on developments.
- the China Association of Urban Environmental Sanitation (CAUES), which organises training and seminars and operates a web site, and
- various Internet sites (listed in Annex 3).

As part of the Project, a web site is being prepared at the Institute. The preparation of the site has been undertaken by a local consultant under contract, and Institute staff have been providing information to be presented on the site. It is understood that the site is due to be fully operational by mid November 2000. The consultant has been retained to provide a low level of intermittent operational support as necessary. Information can be added to the site by an Institute staff member.

The Project has supported the process of negotiating national membership of the International Solid Waste Association (ISWA). As a result the Institute will receive regular news and research publications from ISWA, be kept informed of conferences and other meetings, and be eligible to take part in Working Groups. A large Chinese delegation attended the ISWA Annual Conference in Hong Kong in October 2000.

Output 7 National strategy paper

Current status: 70 % completed

This is potentially an important output - particularly for MoC - and at the same time a very difficult one to produce because it requires participation of a number of Government organisations which are involved in MSW management.

Outside the Project, a policy document has been prepared by the MoC, SEPA and the Ministry for the Economy and Trade. This policy was published in the ESETRC newsletter. When preparing their input to the policy document, MoC made also use of the drafts prepared under this Output.

In the early days of the Project, a widely recognised expert was engaged to assist in the development of a strategy, but unfortunately he was not able to provide the required reports and output, and so his contract was terminated. A second international expert was engaged, but unfortunately little time remains for his input. He prepared a draft paper, entitled *Policy and Strategy Considerations for Municipal Solid Waste Management*, after his first mission in June 2000. This paper outlines the process of formulation of a strategy, and reviews problems that should be addressed by a strategy, and appropriate solutions.

A core working group (comprising four Institute staff, one representative of the China Association of Resources Comprehensive Utilisation, the CTA and the international expert) and an extended working group (with an additional 12 professionals) were established to analyse the current situation. These groups played an important role in guiding the expert concerning the local situation, but the consultant remarked that so far “Efforts to involve competent representatives of other ministries and entities” had not been successful. A key component of the strategy should be how the various organisations, responsible for different functions and types of waste, can work together. Unfortunately some of these organisations showed little interest in the working group, in some cases sending as representatives individuals with only distant links to the sponsoring organisation.

The draft paper was sent out to working group members for comments, but no comments on this draft had been received by the time of the Evaluation Mission, which was after the announced deadline. However, the second input of the international strategy expert in November 2000 may generate increased interest in this Output.

4.2 Achievement of the purpose/immediate objective (effectiveness)

The Immediate Objective of the Project is to strengthen the capability of municipalities within China to better manage municipal solid waste. Whilst the Project is not yet completed, it is possible to make some assessment about the achievement or likelihood of achieving this purpose.

If the findings of the visit to the two Demonstration Cities apply also to the other three cities, then one can conclude that the purpose has already been to a great extent achieved in the Demonstration Cities. Their capabilities to manage MSW have been strengthened, particularly in the fields of planning and monitoring (laboratories). Technical know-how and capabilities to conduct awareness-raising campaigns and planning have also been strengthened. The capability to organise and supervise proper management of operations of sanitary facilities such as landfills still needs to be upgraded.

As regards other cities in China, the purpose can be achieved in the longer term through the widespread training and information dissemination activities of the Institute and through adoption of a national MSW strategy. This is yet to come.

4.3 Contribution to the development objective (impact)

The Development Objective is to improve practices in the handling and treatment of municipal solid wastes in China (and thereby to reduce the health risks and environmental damage associated with the current practices). This is a long-term goal, influenced by many factors, to which this project can only contribute. Some changes of practices can be observed in the Demonstration Cities which are implementing various projects and programmes in the sanitary fields (separate collection, new landfills, gas recovery, etc.). The Project contributed - through advice, a study tour and training - to the implementation of some of these programmes. Waste management professionals have also been encouraged to think of MSWM in a more integrated way.

It is too early to expect an observable impact on a national scale. This will depend on the achievement of the purpose in other cities, as explained in Chapter 4.2.

4.4 Sustainability

The apparent sustainability of individual outputs varies.

Output 1: Capacity of ESETRC strengthened

Trainers: One trainee with good qualifications and training results left the Institute altogether. Another one with good qualifications (a mechanical engineer, with experience in research and design of incinerators and landfills, actually one of the top professionals in the institute and the one who received the highest ranking as a trainer by the trainees during the June 2000 training course) is preparing for a one year study in Germany so that he can participate in training activities of the Institute only after his return. (However, once back in the Institute, he would become a highly valuable member of the team.) Thus currently only two trainers trained by the project are within the Institute and so able to carry out its training activities to disseminate the know-how acquired through the Project. This number in itself does not represent a critical mass for executing a training function. Fortunately the Institute claims to have up to 10 other staff capable of providing training. Some of them attended the technical lectures so that they also may be partly prepared to make use of the Training Manual for training purposes. The refresher course is expected to strengthen this capacity and thus support its sustainability.

It is not clear why the training in teaching techniques was limited to four engineers when there are more trainers in the Institute. A significant proportion of the training methodologies that were taught related to teaching in small groups, and to methods that are much more effective in transmitting understanding than the conventional lecture. However, the dependence on fees paid by participants, the restriction on the magnitude of the fee that can be charged, and the need for the Institute to cover its costs, all result in the need for large groups of trainees on courses, for which some of the small group teaching methods cannot be used effectively. This may constrain future application of some aspects of the training skills developed by the project.

Training Manual: There are good chances to sustain its use but active measures need to be taken to support its dissemination and application. This tool has been highly appreciated.

Laboratory: The laboratory is new, therefore currently there is low demand for its services. It is apparent that the Institute's design engineers themselves will not generate a sufficient workload for the laboratory. The laboratory has the capacity to service any MSW monitoring needs of the Beijing conurbation (within feasible transport distance). If adequately promoted, it could sell services also to clients outside the scope of MoC authority.

Video: The video presentation has a current and relevant message. The sustainability of its impact requires that resources are devoted to ensuring that it is seen by the right people, and to backup up by discussion or support material. Much of its potential impact may be lost if it is simply mailed to a number of organisations.

Output 2 MSW composition data base

A continuous record of reliable data is needed for forecasting waste quantities for the lifetime of a project. However, there appears to be no immediate effective demand for the information that will be stored on this database – designers of waste treatment facilities need more detailed information, and they need to be confident of its accuracy. There are some doubts about the accuracy of the information – both the small amount of information that has already been loaded into the database, and other data available in two city reports. These doubts arise for three reasons:

- i. No information is available concerning the methods by which the data have been collected, so caution about the accuracy remains;
- ii. The figures themselves appear unlikely – such as round figures (such a 7 or 200) for weights of waste, and identical percentage increases for four consecutive years;

- iii. Payments to waste management services appear to be based on estimates of waste quantities, so there is a disincentive to measuring quantities in case the actual figures are lower and income is reduced. In one case where a weighbridge was available, the team was told that the vehicles are often not weighed, and the drivers' experience is said to provide a sufficiently reliable estimate of each load.

If the data are inaccurate or suspect, there is no reason to spend time and money entering this information into a database.

The waste quantities that were available showed some unexpected features which tend to undermine confidence in their accuracy, but local investigations would be necessary to determine if this suspicion is justified. Some of the design staff of ESETRC indicated that they did not place much confidence in the reliability and usefulness of the data that were stored.

A significant problem is the reluctance of cities to provide data – even though the only cities being asked for data are participating in the Project. The precise reasons for their reluctance are not known. Guangzhou said that it would send some of its data to the Institute, but seemed unwilling to send all available waste data. It is not foreseen that payments will be made to cities for providing data, but the MoC may instruct the cities to supply it. However, this does not solve the problem of uncertainty about accuracy.

Another consideration is the time needed to input the required information, and how this work could be funded after the end of the Project. The data are not used by the staff of the Institute, so there is no apparent reason for them to process and keep the data, unless they are paid for doing this work. So far the Ministry of Construction has not been asking for information from the database.

These aspects threaten the sustainability of this Output.

Output 3 MSW technology data base

There is some concern about the sustainability of this Output, because of the apparently low level of interest shown by the waste management industry, and because of the costs of keeping the database up-to-date. However, if interest increases, it may be seen as a vehicle for advertising, and companies listed in the database may be willing to pay a fee for this opportunity of contacting potential customers. However, to use the database in this way requires commercial skills and marketing, and it is unlikely that the Institute's engineers are sufficiently skilled and motivated in this area to ensure the success of such an advertising venture. Contacts with companies outside China require that Chinese customers have a reasonable knowledge of English.

Output 5 MSW management and operations strengthened and demonstrated

The Evaluation Team were able to discuss the Project with officials from only two cities, but it was clear in both cases that the Project outputs were perceived as useful, and so it is reasonable to expect on-going benefit from the Project in these cities. There is already a network of MSWM specialists in China, and site visits to waste treatment installations are not uncommon, so it is realistic to expect that positive impacts of the Project will be felt in other cities in the coming years.

Output 6 Information dissemination

Web sites need resources to be kept up-to-date. Two possible sources of finance for the on-going maintenance of the web-site are

- the Institute, if it believes that the site can be effective in promoting its capabilities and winning income-generating work; and
- subscriptions, if cities and enterprises believe that it is worthwhile to become a subscriber in order to have access to the information on the site.

These two alternatives would lead to very different web-site concepts, in terms of content and management.

There are several other web sites that provide information related to MSWM, and it appears that MoC favours all information being on one web-site, rather than scattered across several. It is not clear which web site should have this status of being the unique provider, and how this site would be financed.

The Institute is in competition with other organisations and enterprises for design work and studies in the field of MSWM, and so would be reluctant to provide information which could help potential competitors. There is thus a tension between the CAUC Vice President's desire that the ESETRC become an information centre, and the need for the Institute to keep a competitive advantage over its rivals.

Output 7 National strategy paper

The lack of involvement of national level agencies in the preparation of the strategy document suggest that they see it as one of several inputs into the process of preparing a national strategy rather than the final process for preparing the strategy. However, this does not signify that this Output will not be useful or important, and it is likely that it will play a useful part in the evolution of the existing policy and the eventual development of a national strategy.

Preparations of the tenth Five Year Plan are being made, and it is likely that the deliberations of the Strategy Group could provide some ideas that will be useful for the preparation of this Plan.

Cities have been instructed to prepare their own strategies; the Team was shown the very impressive strategy prepared by Guangzhou, but other cities are lagging behind. The strategy document that is being prepared by the Project could be very useful to the cities as they work to produce their individual strategies, particularly because of the logical approach and the degree of detail that is being incorporated.

5. CONCLUSIONS

5.1 General assessment

The Project progressed as planned and will be completed within the planned duration. The main tasks for the future are completion of the national strategy paper, using the outputs and taking steps to improve their sustainability.

The major outputs of the Project have been well received and have already had a useful impact in the counterpart Institute, in the Demonstration Cities, and beyond. The main concern of the Evaluation Team about the Project is the relatively low level of apparent national ownership. This is probably the result of the institutional changes that have occurred since the formulation of the Project, resulting from the reduction of staffing at the Ministry of Construction and the requirement of the counterpart Institute to generate its own income. Consequently the CTA has taken on a role different from that originally envisaged, in order to achieve the Project Outputs on schedule. The workload of the CTA has been very heavy, because of the number of outputs, the need to visit five cities, and the unforeseen administrative and management duties.

The development of solid waste treatment technology, operation and maintenance systems, and enforcement mechanisms in Europe has taken many decades. The process of development has involved many steps. In some situations in China huge jumps - instead of many steps - had already been planned before the start of the Project. For example Zhangzhou is jumping from open dumping and burning to a very complex treatment and disposal system. Many development experts advocate stepwise or incremental development rather than great leaps, as being the way to achieve sustainable improvements. The reasons why the Project is vigorously advocating the World's most advanced systems are laudable and understandable, and because China is undergoing such radical and rapid development in other fields, it may be that China is the exception to the general rule that advocates stepwise development. The Project presents a bold programme, and one that will need hard work, a large human resources development programme, and perseverance.

5.2 Particular aspects

Relevance

Development co-operation in MSWM remains relevant as upgrading MSWM is becoming an increasingly important policy objective, particularly in the densely populated geographical regions of China. Projects in this field are also important for UNIDO, as technical co-operation services in this field are an established component of UNIDO service modules.

Project design

The concept and strategy of combining institutional capacity building, policy advice and demonstration of advanced MSW management systems and technologies in five cities is sound, rational and very challenging. The project design is sophisticated and complex but it turned out to be too ambitious primarily for the following reasons:

- financial resources and time were not sufficient to produce all the outputs;
- some proposed outputs or activities were rather sophisticated;
- expectations about implementation of advanced MSWM systems and technologies in the cities held true only partly; project design relied too much on development activities of other partners without possibility of influencing them.

Furthermore, effective demand for the database outputs remains questionable.

Implementation

In view of the above it was fully justified to reduce the scope of the project by dropping some of the Outputs or activities (such as the expert system, categorisation of polluted areas of China, hazardous waste). Direct advisory services to the Demonstration Cities had to be reduced or amended both due to inadequate project resources and due to delays or non-implementation of investment plans in the cities.

Institutional changes (discontinuation of organisational links of CAUC to MoC) were accompanied by more difficult access of the Project (CAUC/Institute) to MoC funding and the complexity of national project management. While MoC remained the official counterpart, the NPD was from an organisation not directly reporting to MoC.

National management of the project is further constrained by the fact that the NPD cannot devote his time fully to the project, and also by on-going reforms within CAUC.

In spite of the above constraints, implementation of the amended project proceeded swiftly so that actual Project duration will match the planned duration. This, however, was achieved due to the "pushing" of project activities by the CTA and international experts, which in turn contributed to low feeling of project ownership by national project staff in the Institute of CAUC.

In the two Demonstration Cities that were visited, the feeling of ownership is much stronger mainly due to the fact that the project supports and fits in with their on-going programmes. Technical and conceptual advice by the CTA and his devotion to the Project are highly appreciated, particularly in those cities.

Outputs

The capacity of the Institute and the Demonstration Cities has been strengthened by the Project in a number of fields (laboratory facilities and skills, training given to some of the staff, supported by the Training Manual, enhancing of training skills, design work and information dissemination). The level of strengthening, however, varies as summarised below.

- Both the Institute and the institutions in the Demonstration Cities value particularly highly the upgrading of their laboratories and the training in practical skills provided by the Project. In the case of the fully-fledged laboratory of the Institute, the demand for its services is yet to be generated.
- The most prominent single tool developed by the Project is the Training Manual. It has the potential to become a recognised reference and training tool in China.
- Information dissemination, apart from training and advisory activities, has been approached in three ways – by the preparation of two databases and a web site. The databases currently hold very little information, and the web site is still under development. Of these the web site appears to have the greatest potential use, provided that resources can be found to maintain it after the end of the project.
- Upgrading of knowledge has been through training (formal and informal sessions during the visits of international experts and the course conducted in three cities). It is not possible to assess the effects of this training on the work of the organisations represented, but it is reasonable to expect a significant development of capacity as a result of these inputs.
- A draft national strategy paper was prepared which was to some extent used by MoC when preparing the Ministry input for a MoC-SEPA policy paper on waste management technology. However, the draft still needs further elaboration to customise it to the needs of its user (primarily the MoC).

Effectiveness

The immediate objective (strengthening the capabilities of municipalities in China to better manage MSW) was achieved in the Demonstration Cities. Improvement in other cities in China can be expected in the longer term through services of ESETRC and implementation of national strategy.

Impact

Impact at the city level has also so far been limited to some changes in the Demonstration Cities (as a result of advice by the CTA as well as application of new knowledge acquired through study tours and training).

Considering the share of inputs allocated for activities in the Demonstration Cities, the visibility of UNIDO and the Donor in the cities that were visited is very high.

Sustainability

Sustainability of project outputs varies. There is a good potential for sustaining and further upgrading the capability of the laboratories and of the training and designing functions. In all these cases dynamic sustainability (further upgrading of the developed capabilities) will depend on continuing work (learning by doing). The sustainability of the web site, and of the databases - which currently hold very little information - is, however, less likely.

6. **RECOMMENDATIONS**

6.1 **National Project Management**

Ensure stronger national project management which would have sufficient time to discharge the management function and have regular meetings with the CTA. This could be achieved either through a higher commitment of the NPD's time to the Project or through more active participation of either the Director of CAUC or of the Institute in the management process. It is hoped that concrete proposals can be presented to the Steering Committee for the transfer of administrative and management tasks from the CTA to the NPD.

It is also recommended that the following steps be taken in relation to the specific Outputs of the Project.

Training Manual

Establish a working group of national experts and potential users of the Training Manual in order to make necessary revisions of style and content, and to make recommendations regarding how it should be presented and disseminated. This working group should include national waste management experts with experience in design, operation and research. Proposed amendments to the Manual should be reviewed by the original authors.

Training

ESETRC should investigate ways of increasing its training work. Opportunities and constraints should be identified, and training in teaching methodologies should be provided to other ESETRC staff who would be involved. Training events should be used to promote the Training Manual and the expertise of the ESETRC.

Laboratory

Undertake a survey of potential users of the ESETRC laboratory, and suggest ways of increasing its use for work done by other organisations. It would also be useful to examine the need for the establishment of a reference laboratory and, if the need exists, investigate how the ESETRC laboratory could be given this status.

Demonstration cities

A plan should be prepared for disseminating information about useful experiences in the demonstration cities. This might include

- taking measurements and recording operational data for collection and disposal systems (such as on-site composting in a separate collection scheme);
- developing and publishing sample calculations for system design (such as the benefits of using transfer stations for long hauls to disposal sites);
- descriptions, sample calculations and results for complex measurements in a particular city (such as calorific value determinations);
- descriptions and operating procedures for treatment systems,
- promoting and organising study tours to see successful plants and systems in action.

Such calculations and descriptions could be much more detailed and practical than examples found in textbooks.

Databases

Informal enquiries about the need for information on suppliers should continue, and if a real demand exists, the commercial opportunities should be explained to organisations that might wish to operate such a database. The China Environmental Protection Industry Association may be a suitable candidate, because this organisation already produces a list of Chinese waste management industries and service providers at intervals of two to three years.

Video “Happy Low Waste City”

The National Project management should develop a strategy for increasing the impact of this video programme. This might include working with staff in the Demonstration Cities who are concerned with communication and awareness-raising. Another alternative could be to develop a training pack (including suggestions for activities and supplementary information) which could be used in conjunction with the video.

The policy of simply sending videos to organisations should be investigated, to see whether the video is being used, and what impact it is having.

Efforts should be made to get the video shown on national television, not just local stations.

Web site

The current work of preparing the structure of the web site should continue, but efforts should be made to develop a concept and identify a future owner for the site. Since the Ministry of Construction and the China Association of Urban Environmental Sanitation both have web sites for disseminating information on MSWM, there is now less need for the site that has been developed by the Project. The option of using the site for promoting the ESETRC should be considered by the national Project management.

If the development of the site is to be continued, a supplementary text-only version of the site should be developed because of the long delays experienced by many Internet users in China. (If there is a web site without graphics, the time to access the site will be reduced, but the full graphics version should also be available for those with good Internet access.)

Strategy

A method of dissemination of the strategy document should be found, so that it can be disseminated widely to the cities as they prepare their own individual strategies. The ESETRC newsletter is one potential vehicle.

6.2. For discussions at the next Steering Committee

In the remaining period of the project and in any follow up project, consolidate what has been achieved and do not spend resources on outputs the use of which is doubtful. The next meeting of the Steering Committee, in addition to reviewing recommendations to the National Project Management mentioned above, should be presented with proposals for diverting resources from some outputs so that they can be used for consolidating others. In outline, the following steps are recommended:

Demonstration cities

Since the activities and plans of the five Demonstration Cities differ widely, the National Project Director should prepare a plan for reducing or ceasing the input to cities where little is being done so that efforts can be concentrated on cities where there is most need for advice and support.

Databases

After checking for, and remedying, any “bugs” in the forecasting logic for the “composition” database, further support for the two databases from the UNIDO budget should be withdrawn unless there is a clear demand for the information held on the databases and financing is made available.

Video “Happy Low Waste City”

The Steering Committee should consider whether to switch some project funding to the promotion of this video presentation and to the development of supporting materials.

Web site

The Steering Committee should reconsider the importance and objectives of the web site.

Strategy

The work on the strategy should continue but a stronger guidance by the future user (MoC) of the strategy paper and more intense participation of SEPA in the working group are needed. To ensure maximum national ownership of the strategy paper, the working group should be guided by a representative of MoC. Alternatively, regular consultations of the international experts with MoC on the scope, contents and format of the paper are recommended. To produce a customised strategy paper may take longer than originally planned but such an approach should be preferred to delivering a paper within a short period of time which would have little chance of use.

Consideration should be given to including senior managers from the Demonstration Cities in the strategy working group or in a review panel for the draft document, because their experience combines the practical aspects of MSWM with a knowledge of planning and management.

6.3 Fellowship programme

Because of concern about the standard of English of some of the proposed fellows, consideration should be given by UNIDO to the following options:

- Fellows could be given intensive training in English before they start the programme. If this were done in a European location it would help them to adjust to living in Europe, and provide a more intensive learning environment. The benefits would be of help to the fellows long after they return to China. The extra expense may require a reduction in the scope or length of the fellowship programme.
- The programme could be adjusted so that fellows are always in groups of two or three, with each group having someone who is more capable in English.
- The programme could be restructured to be more like a study tour for those whose English is inadequate, so that an interpreter can be provided for the group that need this support.
- Ability in English is a key factor in the selection of fellows, so inadequacy in language skills should be regarded as a criterion for rejection of a candidate.

6.4 Suggested further activities

The evaluation team had little time to visit operational disposal sites, but the two that they visited indicated that it would be useful to provide guidance on the operation of landfill sites. One option for such an input would be to prepare a video that explains the basic principles of landfill operation and shows examples of good landfilling procedures. The video could be supported by printed material. This information would be useful for inspectors as well as operations managers, and is urgently needed in other countries also.

The Provincial administrations have responsibilities for monitoring and enforcing standards and legal requirements. It is recommended that the roles, capacities and resources of some of the Provincial administrations be investigated to determine how a future project could provide support at this level, and to propose whether it is appropriate that further responsibilities be given to them.

7. LESSONS LEARNED

Some of the most successful outputs of the Project are those which have supported existing activities, rather than setting up new activities. The Project should not seek to be the initiator or the driving force, but a support for what is already being done. This again touches on the question of ownership – the decisions being made by the national managers. Of course the Project must take every opportunity to provide guidance and information, but the Project should be seen as a support and a resource, and not the leader. The preparation of tools (such as the Training Manual and the Video) is an exception to this rule, since they can be prepared with a degree of independence, without interfering with the roles and responsibilities of local management.

When planning project outputs in human resources development, it is important to train significantly more national staff than will ultimately be needed, because of employment mobility, departures for future training, and other factors which take trained individuals away from the sphere of a project. At the time of the review mission, less than six months after the training, only two of the four trainees were available to do the work that they had been trained for, suggesting that it would have been advisable to train six to eight people to fill four positions.

Development co-operation in MSWM needs to consider that problems of MSWM should be handled in their complexity. Improved capability to design landfills or other facilities is only one prerequisite for satisfactory solution of MSWM problems. Strengthening managerial and technical capabilities to operate such facilities, and upgrading inspection activities may be equally important for achieving ultimate purpose of improved MSW treatment.

National experts should be selected in close collaboration with the national project management.

There needs to be a high degree of flexibility regarding the project outputs, particularly at a time of rapid institutional change, and when there is a significant time delay between the preparation of the Project Document and the start of the implementation. In such cases it is especially important that the programme and scope of a project be reviewed and adjusted at review meetings in close and detailed consultation with the counterpart and other stakeholders. Ownership is vital for the sustainability of the outputs, and one requirement to ensure that the counterpart feels a sense of ownership is a strong feeling of responsibility for the decisions that are made in planning a project and at review meetings.

In-depth evaluation

**Municipal solid Waste Management Systems, Technical Standards
and Capacity Building in China**

US/CPR/96/150

TERMS OF REFERENCE

1. THE PROJECT

Executing Agency: UNIDO
 Implementing agency: Ministry of Construction (MOC), Beijing
 Funding agency: State Secretariat for Economic Affairs, Bern (SECO)
 Project document signed: December 1997
 Estimated starting date: January 1998
 PAD issued: 9 January 1998
 Planned duration: 36 months
 Total UNIDO budget (excluding support costs): USD 2038000
 Total Government inputs: USD 1217300
 UNIDO expenditures as of 31 July 2000: USD 1215000

Objectives and outputs as specified in the project document:

Development objective:

“...to reduce the generation of solid waste and to improve practices in the handling and treatment the municipal solid waste (MSW) and thereby to reduce health risks and environmental damage associated with current practices.”

Immediate objective:

“To strengthen the capability of the municipalities within China to better manage MSW, through direct support to selected demonstration cities as well as through strengthening of the MOC at the central level. This will increase its capability to develop appropriate strategies and provide advice to the municipalities in planning MSW management and operations on an on-going basis.”

Outputs:

- 1 Strengthened capacity of the Environmental Sanitation Engineering and Technology Research Centre (ESETRC) to undertake technical analysis for optimising process performance, to give practical guidance on resource recovery and to provide training in various aspects of MSW management and operations
- 2 MSW composition database on the quantity and composition of MSW generated in China
- 3 MSW technology database containing up-to-date information on MSW collection, handling, treatment and disposal technologies, including equipment suppliers and published research findings
- 4 Expert system for selecting the most suitable treatment technology for any specific situation

- 5 MSW management and operations in selected pilot municipalities (5) strengthened and used for demonstration and training purposes
- 6 Solid waste information networks supported to facilitate effective exchange of information
- 7 National strategy paper outlining medium and long-term strategies for MSW management.

The project is primarily a nation-wide capacity building project in the field of MSW management which should contribute to implementation of Agenda 21. Capacity building should be carried out primarily at MOC and its organizations as well as other organizations dealing with MSW as explained in the project document. Through strategy formulation, training, demonstration and access to information the capacity building process should reach large municipalities in China.

The project does not emphasize on activities aimed at constructing MSW treatment plants: facilities in the selected pilot municipalities either existed or were under planning/construction at the time of project preparation:

Mianyang: plans for a sanitary landfill and an integrated treatment plant with composting, incineration, recycling and recovery of plastic materials

Guangzhou: three landfill sites, plans for separation, incineration and composting

Qingdao: a new sanitary landfill site selected; to include a brick-making plant utilising ash; discussion on a biogas plant

Zhangzhou: site for a sanitary landfill selected; integrated plan including incineration and composting

Changzhou: composting and incineration, to be extended; selected by the State Planning Commission as a pilot city under Agenda 21.

All the five municipalities expressed interest to participate in the project.

2 THE IN-DEPTH EVALUATION

2.1 Purpose, scope and method

2.1.1 Purpose

The purpose of this in-depth evaluation is to enable the Government bodies, UNIDO and the donor to take decisions on future orientation of the project and to learn lessons from experience for planning new projects in the field of municipal solid waste management.

The evaluation is conducted in compliance with UNIDO policy of mandatory evaluation of large technical cooperation projects as specified in UNIDO/ DGB(P).72. It is foreseen in the project document. Conducting of the evaluation was discussed at a meeting of relevant UNIDO staff and the donor at a meeting held at UNIDO on 29 May 2000.

2.1.2 *Scope*

In-depth evaluation is an activity in the project cycle which attempts to determine as systematically and objectively as possible the relevance, efficiency, effectiveness, impact and sustainability of the project. The evaluation will assess the achievements of the project against its objectives, including a re-examination of the relevance of the objectives and of the project design. It will also assess to what degree the assumptions/risks as identified in the project document held true/occurred and identify other factors that have facilitated or impeded the achievement of the objectives. While a thorough review of the past is in itself very important, the in-depth evaluation is expected to lead to detailed recommendations and lessons learned for the future.

In particular the evaluation will address the following issues:

Relevance

-Do the problems in MSW identified and addressed by the original project document still exist? If so, does their alleviation still require external support?

-Have there been significant changes in the institutional framework? Are the project partners (counterparts) and target beneficiaries still relevant? Should a different institutional setting of the project be considered?

-Have other programmes evolved which may duplicate this project? Is the project coordinated with and linked to similar programmes and projects in the country?

-In view of the experience from implementation, is the project design still adequate? Are the outputs realistic? Can the project purpose be achieved?

-Is there a need to consider gender issues?

-Is it relevant to consider other social issues? (employment, regional development)

-Is it relevant to consider technical cooperation among developing countries?

Efficiency

-How have the UNIDO inputs been delivered (quantity, quality, timeliness)

-How have the Government inputs been delivered (quantity, quality, timeliness)

-How have the inputs been used? Are the people who participated in training/study tours still associated with the project? Is the expert advice followed up? Is the equipment used for the purpose for which it was procured?

-What is the status of Outputs (main activities/milestones completed)? Are the results commensurate to expenditures?

-How has the project been managed (frequency and role of the Steering Committee review meetings, cooperation between CTA and the National Project Director, intensity and role of UNIDO backstopping, monitoring by the UNIDO field office).

Effectiveness

-Is the project likely to achieve its purpose (immediate objective)? Which implies:

-Is MOC and the subordinate organizations (in particular ESETRC) likely to strengthen their technical, managerial, advisory, information and training capabilities in the field of MSW and make use of this capacity? Is it likely that the outputs produced by the project (including the technology database, the search system, etc.) will be used by the partner organizations and their clients (other municipalities, R&D and consulting bodies)? Can such advisory, information and training services be at least partly cost-recovering?

-Are the five pilot municipalities likely to implement their plans and make their experience available for demonstration purposes?

-Has a network been formed? If so, has any exchange of information been recorded? If not, is there any evidence of interest in the network?

-Are there plausible indications that the MSW Management Strategy will at least partly be translated into policy instruments?

Impact

-What has been /will be the environmental impact resulting from implementation of measures/plans of the five pilot municipalities influenced by the project?

-Is it likely that the capacities developed by the project will influence MSW management in other municipalities in China? If so, what type of impact is most likely?

Sustainability

-Are the partner organizations likely to continue to exist/operate (maintain their role in the institutional framework) ?

-Are the MSW-management capacities developed/strengthened within those organizations likely to sustain or even further develop after completion of the project (professional and managerial competence, financing, demand)

2.1.3 Method

The following steps will be carried out by the evaluation team:

- briefing by CTA
- studying documentation at the project office in Beijing
- visits of partner organizations including some of the pilot municipalities
- interviews of staff of partner organizations and other staff associated with the project (such as participants at study tours)
- visits of other organizations cooperating or competing with the partner organizations (including NEPA)
- visits of (potential) target beneficiaries (users of services developed by the project), such as municipalities, Sanitation Centres, Environmental Protection Bureaus
- consultations with the UNIDO office

The plan of visits will be prepared and proposed to the evaluation team and arrangements for the visits will be made by the National Project Director.

After completion of interviews and consultations the team will present the main findings, conclusions and recommendations at a meeting of stakeholders in the country. If appropriate and agreed upon with the Project Manager, the Head of Branch and the donor, a similar presentation will be conducted at UNIDO Headquarters.

Although the mission should feel free to discuss with the authorities concerned all matters relevant to its assignment, it is not authorized to make any commitment on behalf of UNIDO or a donor.

2.2 Composition of the evaluation team

The evaluation team will be composed of the following:

One nominee of the donor (with background in MSW management), who will act as team leader

One nominee of the Government (with knowledge of the institutional framework and policies)

One nominee of UNIDO (with background in evaluation methodology)

These members of the evaluation team should not have been directly involved in the designing or implementation of the project.

2.3 Timetable

16 – 31 October	field mission, including presentation of main findings
including:	
23-24 October	visit of project site at Zhengzhou
25-26 October	visit of project site at Guangzhou
7 November	submission of the draft report to the Project Manager for comments

Final report: three working days after receipt of the Project Manager's comments.

If no comments are submitted by the Project Manager within five working days, the draft report will be submitted as final.

Under a separate arrangement the team leader may be requested to present the final report to the Steering Committee of the project on 30 November 2000.

2.4 Report

The evaluation report should follow a standard structure as outlined by the UNIDO Office of Internal Oversight and Evaluation.. In order to ensure that the report considers the views of the parties concerned and is properly understood and followed up by them it is required that:

- the main conclusions and recommendations are presented to and discussed with the development partners and the UNIDO office in the field;
- the draft report is presented for comments to the Project Manager prior to finalization of the report.

As the report is the product of an independent team acting in their personal capacities, it is up to that team to make use of the comments made by the parties involved and to reflect them in the final report. However, the evaluation team is responsible for reflecting any factual corrections brought to their attention prior to the finalization of the report.

The final report is to be submitted in 3 hard copies and the full text on a diskette (in Word or WordPerfect) to the Office of Internal Oversight.

List of Persons Met

Beijing

Department of Urban Development, MoC

Lu Yingfang, Director, Urban Environment Management Division

Tao Hua, Assistant Counsel

Institute of Environmental Sanitation Engineering, Technology & Research (IESETR), and the China Academy of Urban Construction(CAUC)

Zhang Hongfu, Vice President, CAUC

Xu Haiyun, Vice Director, CAUC

Xu Wenlong, Director

Zhang Jinfeng, Deputy Director and NPD

Li Qingsong, Deputy NPD

Kong Zhendong, Engineer

Wu Zheping, Engineer

Yang Wubin, Engineer

Cao Liyun, Assistant Engineer

Xie Congguo, Student at Tsinghua University

UNIDO and project staff

Mayra Sanchez-Osuna, Senior Industrial Development Office

UNIDO Project Manager)

Rudolf E. Walder, Chief Technical Advisor

Daniel Schläpfer, Expert

Ma Jian, National Consultant

Li Yonghong, Programme Officer, UNIDO Beijing

UNDP

Victoria Gyllerup, Programme Officer

World Bank

Mats Andersson, Sector Coordinator

CICETE

Ma Yiwei, Programme Officer

Beijing Center for Physical Chemical Analysis

Liu Qing, Associate Professor

China Association for Urban Environmental Sanitation (CAUES)

Jiu Jingyuan, Secretary-General

China Association of Resources Comprehensive Utilization

Fu Hongjun, Senior Economist

Economics and Trade Commission

Fang Difan, Director, State Internal Trade

Zhangzhou

Urban Construction Committee
Kang Xishun, Vice Director

Urban Solid Waste Treatment Company
Hong Jicheng, Director General
Xie Shibing, General Manager

Jiulonglin Solid Waste landfill headquarters
Wang Xihe, General Supervisor

Environmental Sanitation Department
Li Rongxi, Engineer

Longcheng District Environmental Sanitation Department
Chen Yatong, Engineer

Xiangcheng District Environmental Sanitation Institute
Li Zhanlin, Engineer

Xiacheng District Environmental Sanitation Department
Zhen Qinghe, Director
Wu Shuqing, Engineer

Guangzhou

Environmental Sanitation Research Institute
Zhang Yuqing, Party leader
Lei Zehui, Department Director
Zhou Zhaoyang, Department Director
Li Hui, Department Director
Ye Xiaomei, Engineer
Yao Wenyuan, Engineer
Chen Guikui, Engineer
Yuan Weifang, Engineer

Guangzhou City Appearance & Environmental Sanitation Bureau
Liang Jiachi, Director
Si Chengxian, Assistant Bureau Chief

**Web sites covering Environmental Protection &
Environmental Sanitation in China**

1. China Urban Environmental Sanitation Industry (Mechanics) Information
2. General Office, State Environmental Protection Bureau
3. Information Centre, State Environmental Protection Bureau
4. China Environmental Protection Industry
5. China Environmental Science Research Institute

Partial Organisation Chart for the Ministry of Construction

