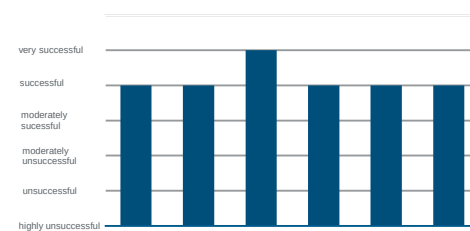


Ex-post evaluation

Municipal waste disposal programme, PR China

Title	Municipal Waste Disposal Programme – Waste incineration Nangong/Beijing		
Sector and CRS code	Waste management / disposal 14050		
Project number	BMZ No. 1999 65 526		
Commissioned by	BMZ – German Federal Ministry for Economic Cooperation and Development		
Recipient/Implementing agency	PRC/City of Beijing – Beijing Municipal Administration Commission (BMCUM)		
Project volume/Financing instrument	EUR 44.65 million mixed financing (EUR 22.44 million budget funds, EUR 22.21 million KfW market funds)		
Project duration	2004–2017		
Year of report	2024	Year of random sample	2020

Overall rating:
successful



Objectives and project outline

At outcome level, the use of modern disposal technology should contribute to environmentally compatible waste disposal in the catchment area of the plant. At impact level, the objective was to contribute to proper waste management and thus to the protection of the environment and resources, in particular in cities in the PRC, as well as to the prevention of methane emissions.

The project included the construction of a modern incineration plant for municipal waste with a capacity of 1,000 tonnes per day, including a steam turbine, power generator and grid feed-in to use the energy from the solid waste.

Key findings

The project has been successful overall, even very successful when considered individually

- The project is impressive in terms of technical and efficiency criteria. It achieves the targets convincingly and regularly takes top position in the city's ranking of the now 12 waste incineration plants.
- The project achieved a noticeably high level of development effectiveness. Project-executing agencies such as the supervisory authority emphasise the high value as a demonstration facility and the great learning effect for the partners.
- The project builds on previous projects in the waste sector and supplements DC's previous exposure to PRC.
- However, the executing agency disclosed weaknesses in the overall strategic design of waste management, in particular with regard to the interaction of waste management measures and facilities and the impact on the overall system.
- The financing of the disposal system is largely based on grants. The user fees only cover about 10% of the costs of the disposal system. They have not been adjusted since the 90s, although modernising the waste management system has led to significantly higher costs.
- The impacts defined to achieve the overall objective were only formulated qualitatively at the PA; no follow-up was carried out. The greenhouse gas reduction effects are significantly lower than expected.

Conclusions

The project made a significant contribution to the environmentally compatible disposal of municipal waste in the catchment area of the plant.

The impact hypotheses are conclusive, and the impacts are highly likely to occur, but have not been monitored or quantified.

The political will to make waste disposal more environmentally friendly was decisive for the success of the measure. In principle, this should be a prerequisite for FC projects in the waste sector.

Individual investments are rather untypical for DC projects in the waste management sector. Relevant sector aspects and framework conditions were not addressed.

Ex-post evaluation – rating according to OECD-DAC criteria

Overview of sub-ratings:

Relevance	2
Coherence	2
Effectiveness	1
Efficiency	2
Impact	2
Sustainability	2
Overall rating:	2

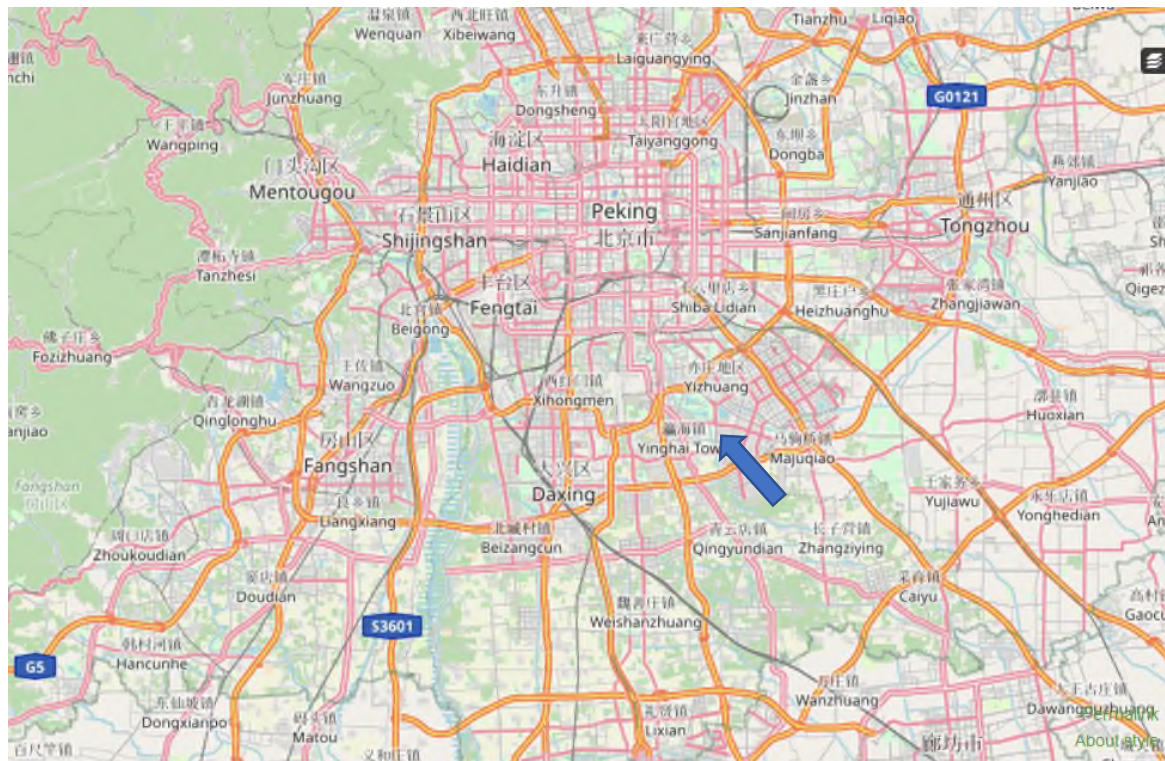
Project summary

The FC project included the construction of an incineration plant for municipal waste in Beijing (Nangong district) with a capacity of 1,000 tonnes per day. The facility was intended to contribute to orderly waste management and thus to the protection of the environment and resources in cities in the PRC and to the prevention of methane emissions. Programme funds were used to finance the construction and equipment of the plant and consulting services to support the project-executing agencies in the implementation of complex technical and organisational tasks, including awarding contracts for operations to private sector companies. The direct target group was the population living in the neighbourhoods connected to the facility, while the population of Beijing indirectly benefited from the project.

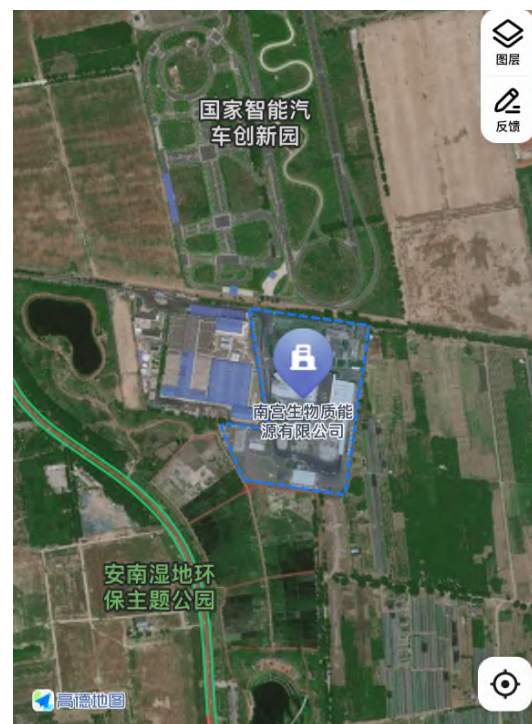
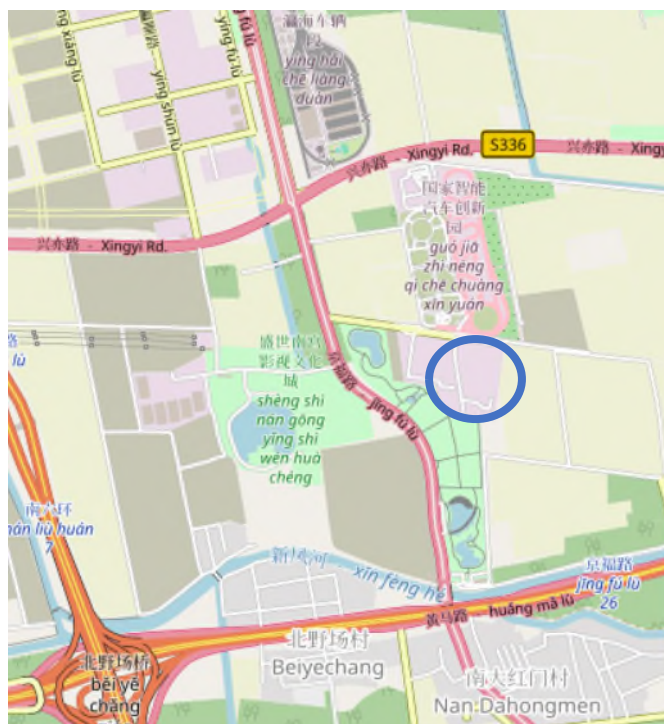
Breakdown of total costs

In EUR million	Investment (planned)	Investment (actual)
Investment costs (total)	79.56	84.72
Counterpart contribution	24.56	41.10
Financing	55.00	44.65
<i>of which BMZ budget funds</i>	<i>27.36</i>	<i>22.44</i>
<i>of which KfW market funds</i>	<i>27.64</i>	<i>22.21</i>

Map/satellite image of the project country including project areas)



Karte hergestellt aus OpenStreetMap-Daten | Lizenz: Open Database License (ODbL)



Source: <https://www.openstreetmap.de/karte/#https://map.baidu.com> Accessed 7 January 2024

Rating according to OECD-DAC criteria

Relevance

1. *Alignment with policies and priorities*

At the time it was designed, the project addressed a core problem of waste management in the PRC, namely the largely unsorted disposal of municipal waste, which led to high levels of pollution in soil, ground water, air and strain on the climate and resulted in high land use. At the time of the project appraisal, more than 80% of municipal waste was largely deposited unsorted in landfills, and only approx. 2% of the municipal waste generated was disposed of in incineration plants. Of the municipal waste landfills that existed nationwide at the time, only about one tenth could be classified as environmentally friendly. The few proper landfills were often overloaded before the end of the planned service life due to the increasing waste volumes.

Against this background, the State Planning Commission, whose tasks have been transferred to the current “National Development and Reform Commission” (NDRC), in consultation with the former leading Ministry of Construction and the State Environmental Protection Agency SEPA, issued new guidelines for waste management in September 2002 which included the following key points:

- quantitative targets for environmentally sound waste management under the tenth five-year plan (by 2005);
- waste prevention and recovery as the primary objective of waste management – solid waste as a resource;
- economic orientation of waste management: gradual introduction and effective collection of waste fees to cover operating costs, taking into account the polluter pays principle;
- systematic cooperation with the private sector through to concessions and BOT models;
- granting of government subsidies (e.g. provision of landfill sites, reduction of electricity tariffs, budget allocations in the event of non-cost-covering revenue);
- restriction of government tasks to regulatory and supervisory functions.

The municipal administrations or the municipal districts (district administrations) are responsible for waste disposal on the basis of central government laws and regulations. With the White Paper, the city of Beijing had laid out an initial rough framework for integrated waste management. Waste disposal was of high importance to the municipality, as it had committed itself to environmentally friendly waste disposal by 2008 as part of the Olympic application, to reach a recycling rate of 30% (in the Olympic village 50%) and to conduct separate waste collection in half of all municipalities. Fifteen new facilities were to be built in the city in order to increase the disposal capacity to 12,500 tonnes per day by 2008 and to manage the increasing volume of waste (including three modern landfills, four incinerators and two transfer stations).

The framework for the development of a modern waste management system was laid down with national policy guidelines and the first, albeit still incomplete, programmes from urban management. The project was designed in line with these partners' policies and programmes, but only from a technical point of view. Other aspects of importance for the development of a modern waste management system, which were also identified in the partners' policies and programmes, and the associated sectoral aspects and framework conditions of importance for the project and their interdependencies with the incineration plant were not addressed:

- Waste prevention and recycling as the primary objective of waste management / solid waste as a resource: What strategies and measures were planned for this? Were these realistic and what impact do they have on the capacity requirements of the waste treatment and disposal facilities? Although “overdimensioning plants due to uncertainties in the estimation of waste generation and composition” was identified as a risk, no further investigations were based on this.
- Did the waste recovery measures take into account the interests of vulnerable groups, in particular informal waste collectors? What information was available on the informal sector of waste management?
- Waste fees were not cost-covering and were levied with low efficiency. What concepts, strategies and implementation plans were available for the proposed “successive introduction and effective collection of waste

fees to cover operating costs in accordance with the polluter pays principle” or how, by whom and by when should these be drawn up?

- The municipal environmental protection bureaus were responsible for the supervision of compliance with environmental and technical guidelines. In practice, however, this supervision was rather negligent at the time of the PA, as the environmental authorities were (and are) located in the same urban management systems that also operate waste disposal. The resulting conflicts of interest hindered the enforcement of the laws. How should compliance with the project’s environmental and emission standards be ensured?

The feasibility study represented purely technical plant (preliminary) planning, which would have provided a sufficient basis for commercial financing of the project but excluded important sectoral aspects for a development measure. In particular, the plant’s social and environmental impacts and the interaction of the plant with other elements of the waste management concept were not studied. It would have been desirable to address the aforementioned aspects as part of a complementary measure or through closer cooperation with TC. Even though it may seem difficult or even inextricable in the context of the partner country to want to influence the design of the framework conditions through the project, these aspects should have at least been monitored and the executing agency should have been obliged to report on progress in the aforementioned areas.

2. Alignment with needs and capacities of persons concerned

The project’s target group was the population in the catchment area of the cities included in the programme. In the case of Nangong, this is the total population of the city of Beijing (at the time approx. 13.8 million) and in particular that of the southern districts (approx. 2.5 million), whose waste production was to be partly disposed of in the Nangong waste incineration plant. The project was intended to contribute to the development of a waste management system with modern technologies and thus to the protection of the environment and resources.

The overarching objective “Contribution to improving the protection of the environment and resources” should be achieved at several levels: through (i) avoidance of climate-damaging methane gas from waste that is heat-treated and not directly landfilled, (ii) reducing regional and local environmental impacts on water and soil; and (iii) substituting primary energy sources by using the exhaust heat from combustion to generate electricity. The programme objective “Contribution to proper waste management with modern technology” is considered to have been achieved when the population of the cities included in the programme has access to environmentally sound waste management facilities. This was intended to counteract the negative environmental impact of strong economic growth and industrialization, as the associated increase in waste volumes posed a significant burden on the environment and urban hygiene. It was rightly stated that proper waste disposal is not only a prerequisite for public health and environmental protection, but also directly linked to sustainable economic development and urban development in accordance with environmental law.

The concept was aligned with the needs and capacities of the parties involved and those affected and correctly identified the core problem. It was rightly assumed that the project would benefit the population as a whole. However, there was no further specification of parts of the population and their needs and capacities. The presumably lessening impacts on the people living in the vicinity of the landfill site used to date for the disposal of the waste, the standard of this landfill site and the resulting environmental impacts were not considered, nor were the potential negative impacts of the planned incineration plant on the people living in the planned site area, as well as the residents of the landfill site on which the residues from the incineration were to be deposited.

Disadvantaged and vulnerable groups and their needs and capacities were also not considered. The project documents do not contain any information or discussion regarding the possible impact on informal material collectors, their function, working methods and organization, information on age structure, income and gender. Although an informal sector does not exist in China according to official sources, its existence was confirmed both by observations made during the evaluation mission and in discussions with practitioners. According to the available information, it is not expected that the project would have had significant gender impact potential due to a different design.

The design of the project and the underlying impact logic were self-contained and suitable for solving the core problem. The construction and commissioning of the incineration plant were intended to create and use capacities for proper waste management with modern technologies (outcome). This was intended to avoid the deposit of the waste treated there in a landfill site and the resulting environmental impact, especially on water, soil and climate (impact). At the same time, the energy potential contained in the waste should be used to generate elec-

tricity and thus contribute to resource conservation (impact). Although plausible from a technical and organisational perspective, the impact logic is very one-dimensional and has hidden significant sectoral aspects (see above). The target indicators refer solely to the performance of the plant, the organization of disposal and plant monitoring; a holistic approach cannot be identified.

Although the target system was generally plausible and comprehensible, there is no specification for the review at the overall target level (e.g. to which landfills was the waste deposited, in what condition was it? What environmental impacts were present) and quantification (e.g. comprehensible calculation of the expected greenhouse gas savings). These should be determined more precisely during the course of the further preparation of the project, but no qualified valuation is available for the assumed impacts.

When designing the project, it was assumed that the waste incineration plant alone already makes a sufficient contribution to a proper waste management system. However, waste management facilities are always embedded in a disposal system, so an assessment requires knowledge of the facility's function in the disposal concept and interaction with the other components of the disposal system. At the time, it was highly probable that no excess capacity would be created with the realisation of the plant and that the plant was undoubtedly necessary. In view of the desired increase in recovery and, above all, in view of the risks of insufficient calorific values of the waste discussed in the PP, as well as the expected sharp increases in disposal costs, a simulation of various scenarios with different plant configurations would have been desirable and helpful. In this respect, the concept can be assessed as appropriate from today's perspective, but at the same time as not sufficiently precise.

4. Reaction to changes/adaptability

The project was adjusted in the course of its implementation due to changed financial framework conditions. It was initially designed as a programme for which EUR 72 million had been committed as composite financing during intergovernmental negotiations. The Nangong waste incineration plant was the first measure for which EUR 55 million was reserved from the composite financing. The remaining funds were expected to be used for a second waste incineration plant. The committed funds were reduced to EUR 55 million as part of the following intergovernmental negotiations. The loan funds were to be used to finance plant equipment and units as well as consulting services. Costs for land acquisition, groundwork and construction measures were borne by the executing agency. Since significantly more plant components were now produced in China, the costs for plant equipment had decreased compared to the cost estimate at the PA, so that only EUR 44.65 million of loan funds were ultimately required for the project. On the other hand, the basic and shell construction costs had increased significantly since the PA. Furthermore, expenditure on land purchases and compensation for local residents was significantly higher than expected at the PA. The executing agency has therefore had to significantly increase its own share. Despite only moderate cost increases overall, significant adjustments had to be made to the financing concept.

Rating summary

The relevance of the project was clear at the time of the project proposal. It supported national policy guidelines and the City of Beijing's programme to build a modern waste management system. The project's design was essentially aligned with the partners' policies and programmes. In view of the sharp increase in waste volumes, there was no doubt at the time that there was a need to build numerous waste incineration plants. However, the project design, impact logic and indicators were limited to the technical aspects alone. Significant social aspects (especially impacts on informal recyclable material collectors) and economic aspects (coverage of the costs, fee structure and polluter-pays principle) as well as the function of the incineration plant in the disposal concept and interdependencies with other waste management measures, in particular for the prevention and recovery of waste, and their effects on waste quantities and properties (especially calorific values) were not addressed for the project. At global and impact level, the reduction of greenhouse gas emissions remains a very important goal, to which the project makes a significant contribution. We rate the relevance of the project as successful overall.

Relevance: 2

Coherence

5. Internal coherence

German DC's exposure to the urban environment in the PRC is concentrated in the energy, transport, waste water and environmental management sectors. The programme was part of the focus area "Drinking water, water management, wastewater and waste disposal" and corresponded to the new orientation framework of German DC with the PR China. The project was directly linked to the completed "Waste Disposal Beijing" project (BMZ No. 1993 66 055), within the framework of which five modern waste disposal plants were built, including the Nan-gong composting plant adjacent to the waste incineration plant.

GIZ was indirectly involved in the project by advising the SEPA State Environmental Protection Administration on the environmentally friendly design of the policy. Cities were able to participate through the "Environmentally Friendly Urban Planning – Municipal Environmental Management" programme. However, there is no project-related cooperation or synergies between the two projects.

The project fully complies with the international norms and standards to which German Financial Cooperation adheres, in particular the demanding EU directives on the fight against environmental pollution in general and the incineration of municipal waste in particular.

6. External coherence

With the project, German support for China on its way to a modern, environmentally friendly and resource-efficient waste management system was meaningfully continued and further developed. The project is in line with China's national strategy for waste management, which includes increasing incineration, especially in the country's cities. The partner's strong own efforts are also evident in the high counterpart contribution, which ultimately amounted to almost 50% of the investment costs. The project significantly raised the standard of waste management in the associated districts of Xicheng, Dongcheng and Daxing.

The project was financed by the Chinese government and German FC. Other donors were not involved. In addition to FC, the World Bank and ADB in particular were also active in waste disposal as part of comprehensive urban development programmes. ADB had drawn up a national sector strategy and a study on private sector participation in the waste industry, which served as an orientation framework for the FC project.

Rating summary:

The project fits meaningfully into German and international cooperation with the PRC focusing on "drinking water, water management, wastewater and waste disposal" and makes a significant contribution to environmental and resource protection as well as climate action. It is a useful addition to DC's previous commitment in the waste management sector and builds on previous projects. In doing so, demanding international norms and standards are applied. Closer coordination with TC would be desirable, especially in order to better address the sectoral framework conditions that are important for the project. We rate the coherence as successful.

Coherence: 2

Effectiveness

7. Achievement of (intended) goals

The programme objective (outcome level) defined during the project appraisal was to contribute to proper waste management with modern technology, in particular in the catchment area of the cities included in the programme. The programme objective was considered to have been achieved if the city of Beijing had a state-of-the-art waste incineration plant with a capacity of 1,200 t/d, which reduces the regional and local environmental impact on air, water and soil and generates additional energy. Performance criteria have been defined as indicators.

- The plants are at 80% capacity at the latest two years after commissioning and at 100% capacity at the latest five years after commissioning.

- There is compliance with the nationally prescribed emission standard (GB 18485–2001) and the EU emission standard for municipal waste incineration plants (Directive 2000/76/EC) after the start-up phase.
- Disposal or recycling of the ash and the residues from exhaust gas cleaning takes place in an environmentally compatible manner on the basis of approval by the responsible Environment Protection Bureau (EPB).
- The plants generate at least 12MW of electricity after the start-up phase, based on a plant size of 1,200 t/d and a calorific value of the waste of 7,100 kJ/t, and this energy is used.

The target achievement at outcome level is summarised in the table below:

Table: Target achievement outcome

Indicator	Status during PA	Target value PA/EPE	Actual value at final inspection (optional)	Actual value at EPE
(1) Utilisation 80%/100%	n/a	80% after two years, 100% after five years	100% utilisation	100% values fully achieved
(2) Emission standards	n/a	Full compliance	100% compliant	100% values fully achieved
(3) Environmentally sound disposal of waste materials from incineration	n/a	Full compliance	100% compliant	100% values fully achieved
(4) Electricity generation and energy use	n/a	12MW / 100% utilisation	> 16MW / 100%	> 16MW / 100% Indicator achieved

8. Contribution to goal achievement

The target indicators (outcome) were all exceeded. This is noteworthy insofar as the technically installed combustion capacity is 1,000 t/d, whereas this was still stated as 1,200 t/d in the programme proposal and in the intergovernmental negotiations. The difference is explained by the different measuring points. While the furnace capacity, which is essentially determined by its dimensions, is 1,000 t/d, an average of 1,250 t/d is still delivered and recorded by the scale. Depending on the season and moisture in the waste, between 50 and 300 m³/d of free water is extracted from the solid waste bunker and treated. The targets in terms of plant throughput and power generation are significantly exceeded.

The updated and stricter exhaust emission limits of both the Chinese (currently GB18485-2014) and European regulations (currently 2010/75/EU) are also significantly below limits in all parameters and are only used to around 10–25%. The utilisation rate is higher only for nitrogen oxide emissions, which are generally more difficult to comply with, but these emissions are also safely within the limit values. The plant is operated in a very transparent manner, the emission measurements are published online and can be viewed by anyone on the Internet. The operator organises an open day once a week, so that anyone can understand the internal processes. This has contributed to a noticeable increase in trust in the technology and the qualification of the operator. The initial protests during the planning phase have largely settled. The number of complaints is at a very low level. It is usually residents who express concern about odour or noise pollution.

The disposal of the residues from waste incineration, in particular the residues from flue gas scrubbing and filter dust, which are classified as hazardous waste, could not be examined by the evaluation team's visual inspection during the evaluation mission, as these are disposed of in corresponding treatment plants and at a special waste landfill in Inner Mongolia. However, the statements made by both the executing agency and the environmental monitoring authority are plausible and do not raise any doubts as to the achievement of the project objective in this respect.

The electrical power generated by the plant was higher than 16MW (in relation to the full number of annual hours) in all years, significantly exceeding the required minimum value of 12MW. If you compare the amount of electricity generated to the actual operating hours, the electrical output is even more than 18MW. Approximately 15% of the generated electricity is needed to cover the internal consumption of the combustion plant, and the surplus electricity generated is fed into the grid, thus contributing to reducing the use of fossil fuels and thus reducing greenhouse gas emissions.

The power generation could be even higher if two sets had been installed instead of just one steam turbine and one generator. In the event of failure or maintenance work on these units, the energy generated during combustion must be released unused into the atmosphere via the steam condensers. From today's perspective, designing the incineration plant with three incineration lines and two sets of steam turbines and generators would have been more effective and would have enabled both higher plant availability and higher power generation. However, the investment costs would then also have been estimated to be around 10–15% higher.

Despite the significantly higher costs compared to the previous form of waste disposal, access to the facility is guaranteed for all residents of the connected districts. The costs exceeding the revenues of the facility are covered by subsidies from the city. Differentiation of target achievement according to age, income, gender, ethnicity, etc. is obsolete and would not make sense.

The commitment, expertise and qualification of those involved in the planning and implementation process were decisive for the outstanding results within the project. Since the project was intended to be of a demonstration nature, the project-executing agency had put together a dedicated project team that dealt exclusively with the project. In addition, the consultant and the system suppliers contributed a great deal of expertise. In the internal city ranking, the plant regularly occupies a top position among the 12 waste incineration plants in Beijing.

Beyond the project, there is a clear political will to modernise environmental protection in general and waste management in particular, with priority in the cities of the country, and to make it environmentally friendly. China has chosen partners as consultants and supporters that it considers to be world leaders, primarily from Germany. The clear prioritisation makes the environment and waste sector attractive to academics and opens up career opportunities, so that many highly trained professionals are now working in the sector. The specialist discussions held during the evaluation mission demonstrated the high level of expertise of the partners.

9. Quality of implementation

The executing agency BMCUM, Beijing's municipal waste company, had initially taken little care of the project during its course and assigned the related tasks to the commissioned consultant. This impaired control and led to delays in decision-making processes. The project-executing agency carried out the preparation and planning of the plant as well as the competitive bidding and supervision of works with the support of international/German consultants. The project-executing agency emphasised the high quality and professionalism of the consultants and the great learning effect for the Chinese partners involved.

The system has been installed correctly and in accordance with the technical requirements. The quality of the construction services and installations corresponds to the Chinese standard and was rated as satisfactory in the final inspection. The operating and emission values as well as the process sequence suggested that the system was functioning properly. The supervision of works by the German consultant contributed to an acceptable quality of the plant, which has repeatedly called for improvements. Project-executing agencies such as the supervisory authority emphasise the high benefits as a demonstration facility, both with regard to the technologies used and the project implementation, and emphasise the great learning effect for the partners involved.

10. Unintended effects (positive or negative)

No unintended effects were identified. It is positive to note that the project apparently had no negative effects on the informally active recyclable material collectors. The collection of recyclable materials takes place in a virtually parallel system to public waste disposal and is controlled by private collectors and waste dealers. Concerns arising during the development of the evaluation concept that the low calorific values of the waste would hinder these activities by the municipality have not been confirmed.

Rating summary

In summary, the project's effectiveness is rated as very successful. The outcome-level targets were achieved in an impressive manner, and the incineration plant is still in very good condition six years after the start of continuous operation. The operating values and emissions are better than expected. The executing agency and the public operating company make a very competent impression, and the system monitoring by the supervisory authority is perceived as credible and serious. The discussion partners were cooperative and answered the essential questions in a professionally qualified manner. We rate the effectiveness of the project as "very successful".

Effectiveness: 1

Efficiency

11. Production efficiency

The project implementation initially experienced significant delays. The partners' original intention to complete the facility by the 2008 Olympics in Beijing was soon obsolete, as the loan agreement was not signed until December 2007. There were also delays in the approval by the NDRC, the invitation to tender and awarding of the consulting services (March 2009) as well as the detailed planning, invitation to tender and awarding of the construction and supply services, so that five and a half years had passed between the financing agreement and the awarding of the main delivery lot. Another major reason was difficulties in acquiring land (it was industrial land) and compensating local residents. The previous lack of experience of the Chinese planners involved with such technically sophisticated waste treatment systems also played a role. However, these initial difficulties were overcome through intensive consulting.

Even the actual construction work did not go as quickly as planned. The implementation period, i.e. from the award of the consulting services to commissioning, was over eight years, initially planned for around four years. However, the delays did not result in any significant increases in costs overall. The significant increases in construction costs were largely offset by significantly lower costs for the plant's equipment. This was mainly due to the fact that significantly more plant parts could now be manufactured in China than was expected at PA. Significant additional costs compared to the design were incurred when acquiring land and compensating residents, for which approx. EUR 5.7 million was spent by the executing agency.

At around EUR 7.6 million, consulting costs accounted for around 9% of the total costs and were therefore still reasonable, which is noteworthy due to the significantly longer implementation period and the extensive transfer of management tasks to the consultant.

Production costs are moderate in international comparison for waste incineration plants with around EUR 230 per tonne of annual throughput. The costs of comparable Chinese plants are of similar magnitude, so that a high overall production efficiency can be attested. There are now 12 waste incineration plants in Beijing, which allow a meaningful comparison. Further plants that are somewhat more cost-effective are being designed. This is due to the fact that most of the components are now available from Chinese production and do not need to be imported. In principle, the costs of waste incineration in Beijing, as in other megacities in China, are higher than in less densely populated regions, mainly due to higher land costs and higher wages for the employees in the plants.

12. Allocation efficiency

Although the treatment costs are comparatively high, with an estimated over EUR 50 per tonne of solid waste¹ – measured by gross domestic product – there is no doubt about the need for the plant. Other forms of waste disposal are not feasible in the densely populated metropolitan area of Beijing, as well as in other major cities of the

¹ The executing agency was unable to provide precise cost calculations. The value represents an approximation based on the available information on costs and empirical values. The capital costs related to plant throughput alone are around EUR 30–35/t, i.e. over 60% of the total costs, which is a typical proportion for waste incineration plants. The operating costs are approximately EUR 20–25/t (estimate based on the operator's information). The operator's revenues from the remuneration for the electricity fed into the grid, the sale of scrap metal and the delivery fees amount to around EUR 25–30/tonnes of solid waste. Since the capital costs of the incineration plant are borne by the city of Beijing, the operator achieves a considerable surplus. However, this only applies to the operation of the plant; the costs of the waste disposal system (including e.g. collection, transport, sorting, transshipment, landfill, fermentation) are largely covered by subsidies.

country, due to their considerably larger surface requirements and the possible odour emissions in an urban context. Even before the project was implemented, transport costs to the increasingly remote landfills increased sharply. The few proper landfills were overloaded due to the constantly increasing volumes of waste, and their capacities were exhausted.

There are no realistic alternatives for achieving the intended effects for the incineration plant considered here. However, for Beijing's waste management system as a whole, the question arises as to whether the previous plans for the expansion of waste incineration plants are actually still necessary to the extent required. Efforts to increase the separate collection and recovery of waste have intensified in recent years. Dry recyclable materials are traditionally separated and returned to the economic cycle via established private sector recycling chains. Organic waste, which accounts for the largest share of municipal waste, is being collected more separately since a corresponding regulation was adopted in 2020. Kitchen waste, which mainly comes from restaurants and canteens, is processed in special fermentation plants. Initial approaches to collecting kitchen waste from residential areas are also being implemented. However, no information could be provided on the scope of these activities, the collection rates and the costs of collection and treatment.

The increased efforts to separate collection and recovery since 2020 are increasingly having an impact. It is estimated that around 30% of the collected waste is now sent for recycling. The collection and recovery rates could probably be increased if the municipality also provided financial incentives for waste producers in addition to intensive public relations work. However, this requires the waste fees, which have not been adjusted since the late 90s, to be raised and designing the fee system accordingly. Although the biological treatment of the separately collected kitchen waste and, in particular, the restaurant and canteen waste is not expected to be significantly cheaper than waste incineration, the costs of waste incineration could be reduced as a result of lower water contents in the delivered waste and thus more constant calorific values and more stable incineration processes as well as higher electricity yields. More extensive scenario analyses would have to be carried out for the technical and financial optimisation of the disposal system.

Rating summary

With regard to production efficiency, more cost-effective alternatives are generally not identifiable. Considering the City of Beijing's waste management system as a whole, although there are doubts about the allocation efficiency with regard to the further expansion plans for waste incineration plants, the allocation efficiency of the project under consideration here can be assessed as high given its large direct contribution to environmental, resource and climate protection, which enjoys a high level of importance in Chinese policy. Overall we rate the efficiency of the project as "successful".

Efficiency: 2

Impact

13. Overarching (intended) developmental changes

Target achievement at the impact level can be summarised as follows.

Impact target achievement table:

Indicator	Status at PA	Target value at PA	(Optional) actual value at final inspection	Actual value at EPE
(1) Avoidance of climate-damaging methane emissions	Not calculated	Approx. 24,000 t/a methane corresponding to approx. 504,000 t/a CO ₂ eq	650,000 t/a CO ₂ eq (incorrect calculation)	Approx. 275,000 t/a CO ₂ eq (estimate) Partially achieved
(2) Reduction of regional and local environmental impacts	Not specified and not quantified	Not specified and not quantified	Not specified and not quantified	Contribution to reduction (not quantified) is made

(3) Substitution of primary energy through power feed-in	0	100% utilisation	100% utilisation	100% utilisation Indicator achieved.
--	---	------------------	------------------	---

14. Contribution to overarching (intended) developmental changes

The impact logics are plausible and the objective has been qualitatively achieved with a high probability at impact level. However, the indicators were only formulated qualitatively or roughly quantitatively at the PA. The avoidance of climate-damaging methane gases, the reduction of regional and local environmental impacts and the substitution of primary energy sources by using the exhaust heat from combustion for electricity generation should be identified in more detail during the project preparation phase. However, apart from statistics on the amounts of electricity generated and fed into the grid, the project-executing agency was not able to make any calculations or provide expert information on the effects achieved. Methods and procedures for determining greenhouse gas emissions appear to be foreign to the project-executing agency. The project documents also do not contain any references to qualified investigations in this regard.

The following findings on the impact indicators result in detail:

Indicator 1: Avoidance of climate-damaging emissions

The expected avoidance of GHG emissions was apparently calculated on the basis of the composition of the collected (raw) waste, i.e. without taking into account the treatment in the upstream plants. In the incineration plant, however, only the fractions >80 mm separated in the upstream sorting/screening plants and the residues from the composting plant are burned. Their methane formation potential on the landfills is significantly lower than that of the organic fraction (15–80mm), which is apparently included in the calculation. This is still deposited after the composting process, but the remaining methane-forming potential of this fraction is significantly lower as a result of the biodegradation that takes place. According to an approximate estimate, the actual GHG reduction from combustion is only about 200,000 t/a CO₂eq. Added to this are the emissions saved by substitution of primary energy, which amount to around 75,000 t/a CO₂eq with an emission factor of 531 g/kWh (2022).²

Indicator 2: Reducing regional and local environmental impacts

There is no concrete information in the project documents on which landfills the waste now treated in the incineration plant previously used for disposal, what properties this waste had, what condition these landfills were in before and after commissioning of the incineration plant, whether there were indications or concrete measurements of the environmental impacts from these, whether people live in the vicinity of these landfills and have been affected, whether these were vulnerable groups, etc. Even if carrying out more extensive environmental impact studies would probably have been disproportionate in the context of a waste incineration project, the executing agency could have been required to report on the findings available to it.

Indicator 3: Primary energy substitution

The executing agency has submitted detailed balance sheets on the amounts of electricity generated, the plant's own consumption and the amounts of electricity fed into the grid. The plant's own consumption amounts to around 15% of the electricity generated, with around 120–140 million kWh being fed in per year in the last three years. The GHG avoidance achieved in this way thus amounts to around 70,000–80,000 t/a CO₂eq.

The waste management sector in China has developed very well over the past 15 years. The country is now able to develop its waste management system independently and in a qualified manner. Expertise is widely available, the institutions are established and qualified, comprehensive regulations are in place, professionally qualified training is provided. The waste management facilities visited during the evaluation mission all presented themselves in very good condition, were clean and did not cause any perceptible pollution of the environment due to dust, odour or noise. The very positive impressions from the mission coincide with information and reports from

² Carbon intensity China – <https://www.statista.com/statistics/1300419/power-generation-emission-intensity-china/>

expert third parties, which attest to China's overall significant progress in waste management over the past 15 years or so. Meanwhile, according to statistics from the Chinese environmental authorities, more than 80% of the residual municipal waste generated is disposed of in modern waste incineration plants and biological treatment plants. Numerous manufacturers of plants and components for waste treatment plants have been established in China over the past 15 years and have now reached a very high level, often in cooperation with German companies. The FC-financed projects set a benchmark and contributed to China achieving a high level of environmental technology in the waste management sector. China is pursuing this path with great success.

However, it would be presumptuous to attribute the "major leap forward in Chinese waste management" to the FC-financed projects alone. Rather, this is due to the clear political will of the Chinese government to end the environmentally harmful forms of waste disposal. China has chosen partners as consultants and supporters that it considers to be world leaders, primarily from Germany. The waste incineration plant in Nangong is a good example of this. Although the plant implemented as part of the evaluated project was neither the first nor the only plant of this type in Beijing – there are now 12 waste incineration plants, further plants are being planned – project-executing agencies such as operators and supervisory authorities emphasise the great benefits as a demonstration plant both with regard to the technologies used and the project implementation and the high learning effect for the partners involved.

Rating summary

The project has undoubtedly made a positive contribution to the overarching development policy changes. Unfortunately, however, it was not possible to specify the expected effects at impact level during the course of the project implementation and to develop methods to quantify them in consultation with the executing agency. The setting of demanding environmental benchmarks confirmed by the partners and the learning effect during project implementation, including the procedures used in the invitation to tender, award of contracts and supervision of works, are very positive. The project's positive contributions to the overarching development policy changes are offset by the failures in the specification of the indicators or their measurement. We therefore rate the impact as successful.

Impact: 2

Sustainability

16. Capacities of persons concerned

The plant is still in very good condition six years after the start of continuous operation. The operating values are above expectations, the emissions are significantly below the permissible limit values. The executing agency and the public operating company make a very competent impression, and the system monitoring by the supervisory authority is perceived as credible and serious. The discussion partners were cooperative and answered the questions in a professionally qualified manner.

The operator's revenue consists of the sale of the electricity fed into the grid and the scrap iron contained in the incineration ash, as well as delivery charges. The revenues are sufficient to ensure the sustainable operation of the plant, including necessary maintenance and repair work that is carried out in a timely manner. Although higher expenses are to be expected as the system ages due to wear and tear, the surpluses achieved are also sufficient according to approximate calculations.

The operating company is not subject to instructions and can operate the system according to economic criteria. Salaries are above the level in administration, making it possible to attract and retain qualified personnel, which means that a continued high level of management can be expected.

While the revenues of the operator of the installation enable sustainable operation, the fees charged by waste producers, which would have to cover the other tasks, in particular the collection and transport of solid waste, are absolutely insufficient. The operation of the waste management system in Beijing requires permanent subsidies from the city. This results in sustainability risks, which only affect the project indirectly.

17. Contribution to support for sustainable capacities

According to the partners, the project contributed to the development of expertise and the establishment of a high environmental standard. All interview partners highlighted the important role of international partners in the design, competitive bidding and construction implementation. Both the documents created as part of project preparation and planning and the incineration plant itself serve as examples and are used as templates for comparable projects. It is considered one of the “best performers” not only in Beijing, but throughout the country.

With regard to the acquired knowledge, the project has visible lasting positive effects. The level of knowledge and qualification of the partners, both at the executing agency and at the operator and supervisory authority, is convincing and gives rise to expectations that they are able to develop the incineration plant and the waste management system in a meaningful and qualified manner. This is also confirmed by the modernisation measures carried out at the existing waste disposal plants – in the area of the executing agency, especially the composting plant and the transfer stations.

The executing agency disclosed significant weaknesses in the calculation of the greenhouse gas savings achieved by the project. The agency is obviously not familiar with the impact logics and methods of determination. It was only able to correctly quantify the reductions achieved by the substitution of primary energy. This is all the more surprising and regrettable as the prevention of climate-damaging methane emissions was a central objective and essential rationale for the project's implementation.

18. Durability of effects over time

While the project can be expected to be highly sustainable from a technical point of view, the partners have developed a high level of resilience in terms of personnel and institutions and demonstrate strong ownership, risks are apparent due to the context of the measure. The executing agency disclosed weaknesses in the overall strategic design of waste management. Currently, waste management policy is mainly to replace outdated technologies with modern waste management facilities, especially incinerators. Although measures are being implemented to increase utilisation and considerable successes are also achieved, these measures are more likely to be implemented in isolation alongside each other. Less consideration seems to be given to the impact on the overall system. This results in sustainability risks for the project. This is particularly the case if separate collection and recovery proves to be successful, especially in private households, and is used to a greater extent. Nevertheless, the city of Beijing continues to drive forward the building of waste-to-energy plants, although there are already trends for excess capacity. The executing agency was therefore advised to intensify and evaluate the activities to develop and implement suitable measures and instruments for separate collection and recycling in order to obtain better planning data and decision-making bases for the actual residual waste treatment/incineration capacities required.

Sustainability risks also exist in financial terms. The user fees only cover approximately 10% of the costs of the disposal system, according to approximate calculations. They have not been adjusted since the late 90s, despite the fact that modernising the waste management system has led to significantly higher costs. The costs are covered by the general tax revenue of the city of Beijing. This not only entails risks for the sustainable financing of environmentally sound waste management, but also reduces the disposal company's ability to set financial incentives for the promotion of waste prevention and recovery through the design of the fee system. Although the “polluter pays” principle is stipulated in China's waste policy, it is not currently being applied. So far, the government and the city have mainly borne the costs of investment. In the case of BOT (build-operate-transfer) projects, subsidies are paid on the usage fees. The implementation of modern waste management systems leads to increasing cost burdens, which may constrict the financial leeway of urban budgets and puts this practice into question in the future.

Rating summary

The assessment of the project's sustainability is ambivalent. As excellent as the project's technical assessment is, the sustainability risks identified in the context of the measure diminish the result. Nevertheless, we rate the project as “successful” from a sustainability perspective.

Sustainability: 2

Overall rating: 2

We rate the project as “successful” overall. The project objectives at impact level were exceeded and achieved efficiently. An even better result is prevented by the environmental conditions as well as the omissions in the design and project implementation, where the technical aspects have been placed too high on the agenda.

Contributions to Agenda 2030

The objectives of the programme are aligned with the global, regional and country-specific policies and priorities of the partners and the Federal Ministry for Economic Cooperation and Development (BMZ). The project contributes to the achievement of global development goals (Sustainable Development Goals – SDGs) for improving water quality by reducing pollution and protecting water-related ecosystems (SDG 6), to sustainable urban development by reducing the environmental impact of cities (SDG 11) and to combating climate change by reducing methane emissions from landfills that are particularly harmful to the climate. The PRC ratified the Paris Agreement on Climate Change in 2015, confirming its climate targets announced in 2015. The German FC commitment to wastewater and waste management is part of the area of “Environmental Policy, Protection and Sustainable Use of Natural Resources”. It is also in line with the development policy priorities of the German Federal Government and the partner country. The project supports the Chinese government's goals of reducing the environmental impact from landfills and land use.

Project specific strengths/weaknesses and general conclusions/lessons learned

Strengths and weaknesses of the project included:

- The project has made a significant contribution to the environmentally compatible disposal of municipal waste in the catchment area of the plant and can be assessed as very successful from a technical point of view. It fully meets the goals and needs of the partners and represents a sensible supplement and further development of the previous FC commitment in the waste sector.
- The project meets high environmental and emission standards, which have been implemented in an exemplary manner and have set benchmarks with regard to both operating parameters and project implementation.
- Failure to establish a monitoring and reporting system to capture and quantify the intended effects at impact level.
- Project preparation, implementation and support focused on the technical and organisational aspects of the project. Sectoral policy aspects – in particular social (informal sector) and resource policy (waste recovery/avoidance) – and framework conditions as well as the interaction of the incineration plant with other elements of the waste management system were not sufficiently considered.

General conclusions and lessons learned:

- A clear political will to improve the standard of waste disposal in order to reduce environmental impact and greenhouse gas emissions as well as to improve resource efficiency is a crucial prerequisite for successful, sustainable project implementation in the waste sector.
- The purpose and function of waste disposal plants, their requirements and the capacity design can only be sensibly determined on the basis of a waste management concept.
- Monitoring and evaluation are an essential part of municipal waste management systems. They mitigate the risk of creating excess capacity and misallocation of public funds and human resources.
- Informal recyclable material collectors can make an important contribution to increasing recycling rates, increasing resource efficiency and efficiently achieving waste management goals. The appropriate consideration of the interests of informal recyclable material collectors when planning waste disposal facilities within the framework of FC projects and the assessment of the impact of the planned projects on these mostly vulnerable people must be determined in advance.

Evaluation approach and methodology

Ex post evaluation methodology

The ex-post evaluation follows the methodology of a rapid appraisal, which is a data-supported qualitative contribution analysis and constitutes an expert judgement. Effects are attributed to the project considering plausibilities, based on thorough analysis of documents, facts and impressions. This includes – if possible – the use of advanced technology (e.g. satellite imagery, online interviews, geocoding). There is a follow-up on possible conflicting information, attempting to eliminate inconsistencies and to base the rating on information that – to the extent possible – has been confirmed through different sources (triangulation).

Documents:

- Internal project documents (PP, PCR, back-to-office report, reports)
- Feasibility study, consulting reports
- Presentation, Nangong Waste Incineration Plant
- Presentation, Xiaowuji Transfer Station
- Secondary specialist literature:
 - Pla, M.: Municipal Solid Waste Management in Beijing, 2015
<https://www.wiego.org/sites/default/files/resources/files/Pla-Solid-Waste-Management-China.pdf>
 - Landsberger, S.: Beijing Garbage: A city besieged by waste, 2019,
<https://www.jstor.org/stable/j.ctvhrcz2t>
 - World Bank Group: Urban and rural municipal solid waste in China and the circular economy, 2019
<https://openknowledge.worldbank.org/entities/publication/2882043a-4d59-5ffc-92b5-e0bf2548b2af>
 - Steuer, B.: Can Beijing's informal waste recycling sector survive amidst worsening circumstances? 2018, <https://www.sciencedirect.com/science/article/abs/pii/S092134491730304X>
 - Steuer, B.: Analysis of the value chain and network structure of informal waste recycling in Beijing, China; 2017; <https://www.sciencedirect.com/science/article/abs/pii/S0921344916303238>

Data sources and tools for analysis:

- Tour of waste disposal facilities in Beijing along the disposal chain
- GPS data, satellite images
- Carbon intensity in China - <https://www.statista.com/statistics/1300419/power-generation-emission-intensity-china/>

Interview partners:

- Beijing Municipal Commission of Urban Management (project-executing agency)
- Beijing Municipal Bureau of Ecology and Environment
- Beijing Municipal Finance Bureau (project-executing agency)
- China Aviation Planning and Design Institute (Group) Co., Ltd. (Operator)
- Beijing Environmental Sanitation Engineering Group Limited (Local Consultant)
- Alba Beijing (private disposal company)
- University of Rostock (consulting in China)

The analysis of project effects is based on the theory of change defined at project appraisal and documented within the impact matrix, which may be updated for the purposes of the evaluation. The evaluation report argues which factors contributed to the observed effects and why – as well as the probable extent of the project's contribution (contribution analysis). The context of the project is taken into account concerning its influence on the results. The conclusions are put into perspective regarding the availability and accuracy of the available data. An evaluation concept is the frame of reference for the evaluation.

On average, the methods offer a balanced cost-benefit ratio for project evaluations that maintains a balance between the knowledge gained and the evaluation costs, and allows an assessment of the effectiveness of FC projects across all project evaluations. The individual ex post evaluation therefore does not meet the requirements of a scientific assessment in line with a clear causal analysis.

The following aspects caused limitations for the evaluation:

The project focused largely on the technical and organisational aspects of project implementation. The executing agency apparently had (and has) little interest in the sectoral policy issues associated with the project. Even if no findings have been made for the potential negative effects of the project on vulnerable groups (informal recyclable material collectors) as part of the development of the evaluation concept, it would have been desirable to find this confirmed by interviews with representatives of the informal recyclable material collectors at the minimum. However, since according to official statements there is no informal sector in China, it was illusory to make such a request to the project-executing agency. However, the findings obtained through our own visual inspection, literature review and interviews with practitioners indicate that the work of these people and thus their income opportunities will not be negatively affected by the project.

Furthermore, documentation and reporting as well as reliable information and data bases for quantifying the impacts at impact level would have been desirable. Although this was announced in the PP, the expected reduction effects for reducing regional and local environmental impacts were not determined in more detail during the further project preparation. Even if the impact relationships were plausible and highly likely to have been achieved, the achievement of the targets would have appeared more convincing if they had been specified (at which landfills?), followed up and analysed.

There are also no reliable or comprehensible calculations available for the greenhouse gas reduction achieved by the project through the avoidance of methane emissions and the substitution of primary energy via electricity feed-in. The information requested by the executing agency on the waste streams before and after implementation of the project as a basis for a more accurate calculation of the impacts achieved was likewise not provided. Therefore, these can only be roughly estimated. In any case, they are significantly lower than those specified at PP and final inspection.

Rating methodology

Projects are rated on a six-point scale for each of the OECD DAC criteria. The scale is as follows:

- Level 1** very successful: result that clearly exceeds expectations
- Level 2** successful: fully in line with expectations and without any significant shortcomings
- Level 3** moderately successful: project falls short of expectations but the positive results dominate
- Level 4** moderately unsuccessful: significantly below expectations, with negative results dominating despite discernible positive results
- Level 5** unsuccessful: despite some positive partial results, the negative results clearly dominate
- Level 6** highly unsuccessful: the project has no impact or the situation has actually deteriorated

The overall rating on the six-point-scale is compiled by weighting all six individual criteria as appropriate to the project in question. Rating levels 1–3 of the overall rating denote a "successful" project while rating levels 4–6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally "successful" only if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("impact") and the sustainability are rated at least "moderately successful" (level 3).

List of abbreviations:

ADB	Asian Development Bank
BMCUM	Beijing Municipal Commission on Urban Management
BMZ	German Federal Ministry for Economic Cooperation and Development
BOT	Build – Operate – Transfer
CM	Complementary measure
CO ₂ eq	Carbon dioxide equivalents
DAC	Development Assistance Committee
DC	Development cooperation
EPB	Environment Protection Bureau
EU	European Union
EUR	euro
FC	Financial cooperation
FC E	FC evaluation
g	grams
GBP	Gross domestic product
GHG	Greenhouse gas
HDI	Human Development Index
Inv.	Investment
kJ/t	Kilojoule per tonne
kWh	kilowatt hour
Mio.	Million
mm	Millimetre
MW	Megawatt
n.a.	not applicable
NDRC	National Development and Reform Commission
OECD	Organisation for Economic Co-operation and Development
PA	Project appraisal
PAR	Project appraisal report
PCR	Project Completion Report
PP	Project proposal
PRC	People's Republic of China
RV	Back-to-office report
SDG	Sustainable Development Goals
SEPA	State Environmental Protection Agency
t/a	tonnes per year
t/d	tonnes per day
TC	Technical cooperation
USD	US dollar

About this publication

Responsible

FC E

Evaluation unit of KfW Development Bank

FZ-Evaluierung@kfw.de

Maps or other cartographic displays are solely for information purposes and do not equate legal recognition of borders or territories. KfW assumes no liability for the accuracy, currentness or completeness of maps provided. Any liability is excluded for damages resulting directly or indirectly from their use.

KfW Group

Palmengartenstrasse 5–9

60325 Frankfurt am Main, Germany

List of annexes:

Target system and indicators annex

Risk analysis annex

Project measures and results annex

Recommendations for operation annex

Evaluation questions in line with OECD DAC criteria/ex-post evaluation matrix annex

I

Target system and indicators annex

Objective at outcome level			Rating of appropriateness (former and current view)			
During project appraisal: Contribution to an orderly waste management system based on modern technology, in particular in the catchment area of the cities included in the programme			The project objective at impact level is appropriate for the design of the project. Even though it would have been desirable to derive the function and design of the incineration plant from a waste management concept created for the catchment area of the plant, the lean “quick and dirty” approach is convincing in the context of the high environmental and climate-damaging disposal situation at the time. From today’s perspective, the project objective at impact level is also appropriate, as the possible negative impacts identified during the EPE did not occur, even if it would have been necessary to discuss them in advance, monitor them and report on them during preparation and implementation. The indicators are based solely on technical criteria. This is appropriate, because the project is essentially a purely technical project.			
During EPE (if target modified)						
Indicator	Rating of appropriateness (appropriate; partially appropriate; inappropriate)	Rationale of appropriateness (for example, with regard to impact level, accuracy of fit, target level, smart criteria)	PA target level Optional: EPE target level	Status at PA (year)	Status at final inspection (year)	Optional: EPE status (year)
Indicator 1 (PA)	The plants are at 80% capacity at the latest two years after commissioning and at 100% capacity at the latest five years after commissioning. Appropriate	Even though the plant had 100% capacity from the start, technical defects that would have reduced throughput could not be ruled out.	80% after two years, 100% after five years	n/a	100% utilisation (2017)	100% (2023)
Indicator 2 (PA)	There is compliance with the nationally prescribed emission standard (GB 18485-2001) and the EU emission standard for municipal waste incineration plants (Directive 2000/76/EC) after the start-up phase.	The indicator complies with the partner's political objectives and the DC principles in the waste management sector.	100%	n/a	100% (2017)	100% (2023)

	Appropriate					
Indicator 3 (PA)	Disposal or recycling of the ash and the waste material from the exhaust gas treatment takes place in an environmentally safe manner on the basis of approval by the responsible Environment Protection Bureau (EPB). Appropriate	The indicator complies with the partner's political objectives and the DC principles in the waste management sector.	100%	n/a	100% (2017)	100% (2023)
Indicator 4 (PA)	The plants generate at least 12MW of electricity after the start-up phase, based on a plant size of 1,200 t/d and a calorific value of the waste of 7,100 kJ/t, and this energy is used. Appropriate	The indicator was chosen cautiously given the uncertainties about the calorific value of the solid waste. With the selected parameters regarding throughput and calorific value, a higher output would have been possible purely by calculation.	12MW / 100% utilisation	n/a	> 16MW / >100%	> 16MW / >100%

Objective at impact level						
During project appraisal: Contribution to improving environmental and resource protection						
During EPE (if target modified): n/a						
Indicator	Rating of appropriateness (appropriate; partially appropriate; inappropriate)	Rationale of appropriateness (for example, regarding impact level, accuracy of fit, target level, smart criteria)	PA/EPE target level (new)	Status at PA (year)	Status at final inspection (year)	EPE status (year)
Indicator 1 (PA)	Avoidance of climate-damaging methane gases from those quantities of waste that are thermally treated and not deposited directly in landfills. Appropriate	Thermal treatment basically reduces the formation of methane from solid waste that would otherwise be deposited in landfills. However, the determined reductions have been set much too high.	504,000 t/a CO ₂ eq (PA) 275,000 t/a CO ₂ eq (EPE)	Not determined	650,000 t/a CO ₂ eq (incorrect calculation)	275,000 t/a CO ₂ eq (estimate)
Indicator 2 (PA)	Reducing regional and local environmental impacts on water and soil Appropriate	It is generally assumed that the effect has been achieved, but this has not been specified or quantified	Not specified and not quantified	Not specified and not quantified	Not specified and not quantified	Not specified and not quantified
Indicator 3 (PA)	Substitution of primary energy sources by using the exhaust heat from combustion to generate electricity Appropriate	If the incineration plant is equipped accordingly, the generated energy can be used to generate electricity and – after deduction of the plant's own consumption – fed into the grid. In addition to avoiding methane gas emissions, it thus contributes to further reducing greenhouse gases.	100% utilisation	n/a	100% utilisation (approx. 15% internal consumption, 85% feed-in)	100% utilisation (approx. 15% internal consumption, 85% feed-in)

Risk analysis annex

All risks should be included in the following table as described above:

Risk	Relevant OECD-DAC criterion
Poor management and coordination by the project-executing agency, resulting in - time delays - cost increases	Coherence Effectiveness Efficiency
Insufficient calorific values due to high water content in the solid waste, resulting in - incomplete combustion - support firing required - higher operating costs	Effectiveness Efficiency Sustainability
Delays due to longer land acquisition procedures, compensation payments and approval procedures	Relevance Efficiency

Ex-post identified risks

All risks should be included in the following table as described above:

Risk	Relevant OECD-DAC criterion
Poor coordination with the other planned waste management measures / shortcomings in the overall strategic design of waste management	Relevance Efficiency Sustainability
Lack of covering of the costs due to non-adjusted fees / no application of the polluter-pays principle (has not occurred for the incineration plant itself, but has for the waste disposal system)	Impact Sustainability
Lack of knowledge of the impact of the measure on climate action	Impact Sustainability

Project measures and their results annex

The project implementation included the following measures:

- Building and equipping of the Nangong waste incineration plant with a capacity of 1,000 t/d, corresponding to approximately 7% of the city's waste generation. Only the portion of high-calorific solid waste that is less suitable for composting is incinerated, i.e. the screen fraction > 80mm.
- Building and equipping a generator system and power connection to use the exhaust heat for power generation with an output of 25MW and feed-in into the grid.

Originally, the construction of a second incineration plant of the same type and design was envisaged in the north of Beijing, but this would have required an increase in the funding volume. The project was initially designed as a programme for which EUR 72 million had been committed within the scope of composite financing during intergovernmental negotiations. The Nangong waste incineration plant was the first measure for which EUR 55 million was reserved from the composite financing. However, as part of subsequent intergovernmental negotiations, the committed funds were reduced to EUR 55 million, making it impossible to realise the second investment.

According to the PP, the waste incineration plant was expected to have a capacity of 1,200 t/d, but the actual furnace capacity is only 1,000 t/d. Nevertheless, an average of 1,250 t/d is delivered to the plant. Depending on the season and moisture in the waste, between 100 and 300 m³/d of free water is extracted from the solid waste bunker and treated. The solid waste pre-dewatered in this way is then incinerated.

The system has been installed correctly and in accordance with the technical requirements. The quality of the construction services and installations corresponds to the Chinese standard and was rated as satisfactory in the final inspection. The operating and emission values as well as the process sequence suggested that the system was functioning properly. The plant was also in very good condition at the time of the EPE. Operating values and emissions are still well above expectations.

As a result, the population of the southern urban districts included in the programme has environmentally friendly waste disposal facilities. The city of Beijing has a state-of-the-art, functional incineration plant with a capacity of 1,000 t/d, which reduces the regional and local environmental impact on air, water and soil and generates additional energy.

Recommendations for operation annex

No recommendations for operation were made during the final inspection.

Evaluation questions in line with OECD-DAC criteria/ex-post evaluation matrix annex

Relevance

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / 0 / +)	Reason for weighting
Evaluation dimension 1: Alignment with policies and priorities			2	0	
1.1 Are the objectives of the programme aligned with the (global, regional and country-specific) policies and priorities, in particular those of the (development policy) partners involved and affected and the German Federal Ministry for Economic Cooperation and Development (BMZ)?	What goals does the partner have for waste management? What policies, plans, strategies were/are available? What role do waste prevention and recovery play in China's and the executing agency's waste policy? To what extent were the objectives aligned with the Federal Ministry for Economic Cooperation and Development's (BMZ) "waste management sector concept" (prevention before recycling before disposal)?	Interview with project-executing agency PP, literature, technical discussions with practitioners			
1.2 Do the objectives of the programme take into account the relevant political and institutional framework conditions (e.g. legislation, administrative capacity, actual power structures (including those related to ethnicity, gender, etc.))?	What is the role of incineration in the city of Beijing's waste management concept? Is the executing agency professionally qualified? Is it institutionally well-positioned for such a demanding project? Is there independent supervision of plant operation and waste disposal?	Interview with project-executing agency Interview with supervisory authority Beijing Disposal Facility Tour			
Other evaluation question 1	Is there a separate collection system? What are the recovery rates in Beijing?	Interview with project-executing agency Disposal chain inspection, technical discussions, own observations			

	Are there any approaches/experiences/strategies for the separate collection of organic solid waste?				
Evaluation dimension 2: Alignment with needs and capacities of persons concerned			3	O	
2.1 Are the programme objectives focused on the developmental needs and capacities of the target group? Was the core problem identified correctly?	Target group: Connected population How was the target group determined? Were individual population groups (e.g. residents, poorer people) and their concerns considered?	PP, PCR, intergovernmental negotiations, reporting			
2.2 Were the needs and capacities of particularly disadvantaged or vulnerable parts of the target group taken into account (possible differentiation according to age, income, gender, ethnicity, etc.)? How was the target group selected?	What role does the informal sector play in waste collection? What is the share of public, formalised waste collection and collection by the informal sector (estimate sufficient)? Were vulnerable groups identified? Have there been studies on the informal sector and the role of women in it? Were modifications made to the project due to the resident protests? What characteristics do the residents have? Are vulnerable groups among them? What role do women play in the informal sector?	Interview with local practitioners Interview with local practitioners and own observations Scientific reports on the informal sector in Beijing (see literature list)			
2.3 Would the programme (from an ex-post perspective) have had other significant gender impact potentials if the concept had been designed differently? (FC-E-specific question)	How is the informal sector composed? Are women and people of advanced age active in it? Is information available about the informal sector?				
Other evaluation question 1	To what extent were potentially adversely affected parties taken into account in the	Interview with project-executing agency, practitioner, PP			

	design of the measure (residents of the incineration plant, residents of the landfill where the waste materials are deposited)? People in the informal sector? - e.g. because high-calorific, recyclable materials (plastics, paper, cardboard) are required for incineration?				
Evaluation dimension 3: Suitability of project concept			3	O	
3.1 Was the design of the programme appropriate and realistic (technically, organisationally and financially) and in principle suitable for contributing to solving the core problem?	What alternatives have been observed? Has the interaction with other elements of the waste management system, especially the existing composting plant, been taken into account? What strategies have been considered to deal with expected low calorific values and high water content in the solid waste?	Feasibility study, PP, intergovernmental negotiations, PCR Interview with project-executing agency			
3.2 Is the programme design sufficiently precise and plausible (transparency and verifiability of the target system and the underlying impact assumptions)?	What arrangements have been made with the executing agency to monitor and quantify the impacts? Has a complementary measure been considered? Have methods to be used to determine the methane gas reductions been agreed (e.g. KfW climate calculator)?	PP, operational unit interview			
3.3 Were the selected indicators and their value allocation appropriate in their entirety (select one of the following to answer: indicators and value allocation were appropriate / partially appropriate / inappropriate)? The rationale is differentiated according to indicators in Appendix 1. (FC-E-specific question)	Were the impacts quantified at impact level? How were the methane/greenhouse gas reductions determined and monitored? (How) have the impacts on reducing regional and local environmental impacts on water and soil been identified and quantified?	PP, Log Frame, reporting			

3.4 Please describe the results chain, incl. complementary measures, if necessary in the form of a graphical representation. Is this plausible? As well as specifying the original and, if necessary, adjusted target system, taking into account the impact levels (outcome and impact). The (adjusted) target system can also be displayed graphically. (FC-E-specific question)	How does the measure fit into the city of Beijing's waste management concept? How is the priority of preventing and recovering solid waste taken into account? Were social, environmental and economic aspects taken into account in the design?	PP			
3.5 To what extent is the design of the programme based on a holistic approach to sustainable development (interplay of the social, environmental and economic dimensions of sustainability)?		PP, reporting, FC reports			
3.6 For projects within the scope of DC programmes: is the programme, based on its design, suitable for achieving the objectives of the DC programme? To what extent is the impact level of the FC module meaningfully linked to the DC programme (e.g. outcome impact or output outcome)? (FC-E-specific question)	What alternatives have been observed? Has the interaction with other elements of the waste management system, especially the existing composting plant, been taken into account? What strategies have been considered to deal with expected low calorific values and high water content in the solid waste?	Feasibility study, PP, intergovernmental negotiations, PCR Interview with project-executing agency			
Evaluation dimension 4: Reaction to changes/adaptability			2	O	
4.1 Has the programme been adapted in the course of its implementation due to changed framework conditions (risks and potential)?	What measures have been taken to respond to the local protests?	Interview with project-executing agency			

Coherence

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / 0 / +)	Reason for weighting
Evaluation dimension 5: Internal coherence (division of tasks and synergies within German development cooperation):			2	0	
5.1 To what extent is the programme designed in a complementary and collaborative manner within German development cooperation (e.g. integration into DC programme, country/sector strategy)?	What agreements were made with the GlZ advisory programme that was carried out in parallel? To what extent were aspects of overall waste management planning and sustainable financing included in the design?	Interview with operational department			
5.2 Do the instruments of German development cooperation dovetail in a conceptually meaningful way, and are synergies put to use?	What is the connection between the project and the predecessor project "Waste Disposal in Beijing" (BMZ no. 1993 66 055)?	Interview with project-executing agency			
5.3 Is the programme consistent with international norms and standards to which German DC is committed (e.g. human rights, Paris Agreement, etc.)?	Which technical and environmental standards apply to the project? Which arrangements are important for the project? What contribution does the project make to meeting China's greenhouse gas reduction commitments under the Paris Agreement? How is the project included in Beijing's/China's greenhouse gas reduction reporting?	PP, reporting, interview with project-executing agency			
Evaluation dimension 6: External coherence (complementarity)			2	0	

and coordination with actors external to German DC):				
6.1 To what extent does the programme complement and support the partner's own efforts (subsidiarity principle)?	What significance did the support of the project by German DC have for the development of the waste management in Beijing? Would the project also have been carried out without German DC support? Would it have been done this way without German support? What could have been done differently? From the project-executing agency's point of view, what was the particular strength of the German support?	Interview with project-executing agency		
6.2 Is the design of the programme and its implementation coordinated with the activities of other donors?	Did coordination take place, in particular with the WB and ADB? Was there a sector dialogue with other donors in the sector?	Interview with operational department		
6.3 Was the programme designed to use the existing systems and structures (of partners/other donors/international organisations) for the implementation of its activities and to what extent are these used?		Reporting, interview with project-executing agency		
6.4 Are common systems (of partners/other donors/international organisations) used for monitoring/evaluation, learning and accountability?	Not relevant, no such systems known.			

Effectiveness

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Reason for weighting
Evaluation dimension 7: Achievement of (intended) goals			1	O	
7.1 Were the (if necessary, adjusted) objectives of the programme (incl. capacity development measures) achieved? Table of indicators: Comparison of actual/target	How was the achievement of the objectives measured? How was the GHG reduction potential determined?	Project-executing agency documents Final inspection report			
Other evaluation question 1	What effects does the intensification of the prevention, separate collection and recycling of waste have on waste quantities and waste properties/calorific values? What is the impact of collecting restaurant and kitchen waste separately? Does this affect plant operation? Which ones?	Interview with plant operator			
Other evaluation question 2	Are there any complaints about the operation of the system? What options do third parties have to find out about the plant and its performance?	Interview with project-executing agency, plant operator, supervisory authority			
Evaluation dimension 8: Contribution to goal achievement:			1	O	
8.1 To what extent were the outputs of the programme delivered as planned (or adapted to new developments)? (Learning/help question)		PCR, plant inspection, operator survey			

8.2 Are the outputs provided and the capacities created used?		Plant tour, operator survey
8.3 To what extent is equal access to the outputs provided and the capacities created guaranteed (e.g. non-discriminatory, physically accessible, financially affordable, qualitatively, socially and culturally acceptable)?	Are all residents connected to an orderly, regular waste collection system? How does the residents' solid waste get to the facility? How are the costs covered? What are the waste fees? Have these been increased after the commissioning of the system?	Interview with project-executing agency, plant inspection, inspection of disposal chain plants
8.4 To what extent did the programme contribute to achieving the objectives?	How are exhaust emissions monitored and controlled? How is waste disposal monitored?	Balance sheets for plant operations, implemented quantities and electricity generation 2018–2022 Interview with plant operator plant inspection
8.5 To what extent did the programme contribute to achieving the objectives at the level of the intended beneficiaries?	See above	Tour of disposal chain facilities
8.6 Did the programme contribute to the achievement of objectives at the level of the particularly disadvantaged or vulnerable groups involved and affected (potential differentiation according to age, income, gender, ethnicity, etc.)?	No objectives formulated	
8.7 Were there measures that specifically addressed gender impact potential (e.g. through the involvement of women in project committees, water committees, use of social workers for women, etc.)? (FC-E-specific question)	No objectives formulated	
8.8 Which project-internal factors (technical, organisational or financial) were decisive for the achievement or non-	Question about success factors	Interview with project-executing agency, operator, supervisory authority

achievement of the intended objectives of the programme? (<i>Learning/help question</i>)					
8.9 Which external factors were decisive for the achievement or non-achievement of the intended objectives of the programme (also taking into account the risks anticipated beforehand)? (<i>Learning/help question</i>)	Political objectives? Evaluation of the role of the donor	Interview with project-executing agency, operator, supervisory authority			
Evaluation dimension 9: Quality of implementation			2	O	
9.1 How is the quality of the management and implementation of the programme to be evaluated with regard to the achievement of objectives?		Interview with project-executing agency, operator, supervisory authority			
9.2 How is the quality of the management, implementation and participation in the programme by the partners/sponsors evaluated?		Interview with project-executing agency, operator, supervisory authority			
9.3 Were gender results and relevant risks in/through the project (gender-based violence, e.g. in the context of infrastructure or empowerment projects) regularly monitored or otherwise taken into account during implementation? Have corresponding measures (e.g. as part of a CM) been implemented in a timely manner? (FC-E-specific question)	see questions above on the informal sector and the role of women therein	Interview with operational department			
Evaluation dimension 10: Unintended effects (positive or negative)	Note: if there are no unintended consequences: → No weighting → No evaluation		1	O	

10.1 Can unintended positive/negative direct impacts (social, economic, ecological and, where applicable, those affecting vulnerable groups) be seen (or are they foreseeable)?	Are informal recyclable material collectors affected by the measure? How important is the prevention and recovery of solid waste after commissioning of the incineration plant?	Interview with project-executing agency, operator, supervisory authority
10.2 What potential/risks arise from the positive/negative unintended effects and how should they be evaluated?	To be considered depending on the actual unintended effects that have occurred	
10.3 How did the programme respond to the potential/risks of the positive/negative unintended effects?	To be considered depending on the actual unintended effects that have occurred	

Efficiency

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / o / +)	Reason for weighting
Evaluation dimension 11: Production efficiency			2	0	
11.1 How are the inputs (financial and material resources) of the programme distributed (e.g. by instruments, sectors, sub-measures, also taking into account the cost contributions of the partners/executing agency/other participants and affected parties, etc.)? (Learning and help question)	Cost table	PCR			
11.2 To what extent were the inputs of the programme used sparingly in relation to the outputs produced (products, capital goods and services) (if possible in a comparison with data from other evaluations of a region, sector, etc.)?	Is the total cost of the project reasonable? Were the investment costs reasonable? Are the running costs reasonable? How can these be assessed in comparison with comparable systems?	Interview with project-executing agency, operator Technical discussions with practitioners Values in the literature			

For example, comparison of specific costs.				
11.3 If necessary, as a complementary perspective: To what extent could the outputs of the programme have been increased by an alternative use of inputs (if possible in a comparison with data from other evaluations of a region, sector, etc.)?	How are the costs of the plant to be evaluated compared to alternatives for disposal? What alternatives would be available and how should they be assessed?	Interview with project-executing agency, operator Technical discussions with practitioners Values in the literature		
11.4 Were the outputs produced on time and within the planned period?	Costs and time schedule What were the decisive reasons for the significantly delayed implementation?	Project documentation, interview with executing agency		
11.5 Were the coordination and management costs appropriate? (e.g. cost share of the implementation consultant)? (FC-E-specific question)	Consulting cost share	Final inspection report		
Evaluation dimension 12: Allocation efficiency			2	0
12.1 In what other ways and at what costs could the effects achieved (outcome/impact) have been attained? (<i>Learning/help question</i>)	Which alternatives were considered when designing the measure? Are these realistic in the context of a megacity?	Interview with project-executing agency, operational unit		
12.2 To what extent could the effects achieved have been attained in a more cost-effective manner, compared with an alternatively designed programme?	Would the waste management system become more efficient/cost-effective by intensifying the separate collection and recycling of waste?			
12.3 If necessary, as a complementary perspective: To what extent could the positive effects have been increased with the resources available, compared to an alternatively designed programme?	What effects does the separate collection and recycling of restaurant and kitchen waste have on waste quantities and their properties/calorific values? How does it affect the overall system of waste management?			

	How should the measure be assessed from a cost perspective?	
Note: If the internal identifier PSP (Private Sector Participation; see Inpro under 1.11) was issued for the project or there is generally cooperation with private actors (commercial banks, companies, professional NGOs) in the implementation of FC (private sector as an instrument), the following evaluation question must be taken into account:		
12.4 In what respect was the use of public funds financially complementary?	No specification necessary	

Impact

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / 0 / +)	Reason for weighting
Evaluation dimension 13: Overarching (intended) developmental changes			2	0	
13.1 Is it possible to identify overarching developmental changes to which the measure should contribute? (or if foreseeable, then specify in terms of time if possible)	What is the importance and level of development of waste incineration technology in China?	Interview with project-executing agency Literature study, technical discussions			
13.2 Is it possible to identify overarching developmental changes (social, economic, environmental and their interactions) at the level of the intended beneficiaries? (or if foreseeable, then specify in terms of time if possible)	How important is orderly, environmentally friendly waste disposal for the population? How has environmental awareness developed?	Interview with project-executing agency Literature study, technical discussions			
13.3 To what extent can overarching developmental changes be identified at the level of particularly disadvantaged or vulnerable parts of the target group	What role does the informal sector play? How is the development to be assessed?	Interview with project-executing agency Literature study, technical discussions			

to which the programme should contribute? (Or, if foreseeable, please be as specific as possible in terms of time)					
Evaluation dimension 14: Contribution to overarching (intended) developmental changes			1	O	
14.1 To what extent did the programme actually contribute to the identified or foreseeable overarching developmental changes (also taking into account the political stability) to which the programme should contribute?	Has the project influenced sector development? If so, in what way? Was the project exemplary?	Interview with project-executing agency			
14.2 To what extent did the programme achieve its intended (possibly adjusted) developmental objectives? In other words, are the project impacts sufficiently tangible not only at outcome level, but at impact level? (e.g. drinking water supply/health effects)	Does the measure contribute to improving regional and local environmental and resource protection? How was the achievement of the objectives measured? How was the GHG reduction potential determined?	Interview with project-executing agency			
14.3 Did the programme contribute to achieving its (possibly adjusted) developmental objectives at the level of the intended beneficiaries?	Has the population's initial opposition to waste incineration changed?	Interview with project-executing agency			
14.4 Has the programme contributed to overarching developmental changes or changes in life situations at the level of particularly disadvantaged or vulnerable parts of the target group (potential differentiation according to age, income, gender, ethnicity, etc.) to which the programme was intended to contribute?	See above				
14.5 Which project-internal factors (technical, organisational or financial) were decisive for the achievement or	What internal success factors does the project-executing agency see?	Interview with project-executing agency			

non-achievement of the intended developmental objectives of the programme? (Learning/help question)				
14.6 Which external factors were decisive for the achievement or non-achievement of the intended developmental objectives of the programme? (Learning/help question)	ditto Executing agency	Interview with project-executing agency		
14.7 Does the project have a broad-based impact? - To what extent has the programme led to structural or institutional changes (e.g. in organisations, systems and regulations)? (Structure formation) - Was the programme exemplary and/or broadly effective and is it reproducible? (Model character)	Has the project contributed to gaining know-how from the administration/executing agency? Is the administration now competent and able to properly ensure the operation of the plant or the operator's control? Did the project contribute to gaining expertise from the supervisory authorities? Is the supervisory authority now competent and able to ensure the environmentally compatible operation of the plant and the environmentally compatible disposal of the residual materials? Does the measure have a model character? Was its impact widespread?	Interview with project-executing agency, supervisory authority		
14.8 How would development have gone without the programme? (development additionality)		Interview with project-executing agency, operator, supervisory authority		
Evaluation dimension 15: Contribution to overarching (unintended) developmental changes	Note: if there are no unintended consequences: → No weighting → No evaluation		2	0
15. 1 To what extent can unintended overarching developmental changes (also taking into account political stability) be identified (or, if foreseeable,	No specification required			

please be as specific as possible in terms of time)?		
15.2 Did the programme noticeably or foreseeably contribute to unintended overarching (positive and/or negative) developmental impacts?	No specification required	
15.3 Did the programme noticeably (or foreseeably) contribute to unintended (positive or negative) overarching developmental changes at the level of particularly disadvantaged or vulnerable groups (within or outside the target group) (do no harm, e.g. no strengthening of inequality (gender/ethnicity))?	How transparent is plant operation? Can outsiders find out about the plant and its emissions?	Interview with project-executing agency, supervisory authority

Sustainability

Evaluation question	Specification of the question for the present project	Data source (or rationale if the question is not relevant/applicable)	Rating	Weighting (- / 0 / +)	Reason for weighting
Evaluation dimension 16: Capacities of persons concerned			2	0	
16.1 Are the target group, executing agencies and partners institutionally, personally and financially able and willing (ownership) to maintain the positive effects of the programme over time (after the end of the promotion)?	How does the executing agency assess the risks of overcapacity in waste incineration?	Interview with project-executing agency			
16.2 To what extent do the target group, executing agencies and partners demonstrate resilience to future risks that could jeopardise the impact of the programme?	Does the executing agency have sufficient knowledge and tools to assess possible risks for the measure? What is the willingness of the connected population to bear the higher	Interview with project-executing agency			

	costs of waste disposal through higher fees?				
Evaluation dimension 17: Contribution to support for sustainable capacities:			2	O	
17.1 Did the programme contribute to the target group, executing agencies and partners being institutionally, personally and financially able and willing (ownership) to maintain the positive effects of the programme over time and, where necessary, to curb negative effects?	To what extent does the measure serve as a role model or example for the positive effects of environmentally friendly waste management?	Interview with project-executing agency			
17.2 Did the programme contribute to strengthening the resilience of the target group, executing agencies and partners to risks that could jeopardise the effects of the programme?	Is the executing agency able to respond appropriately to the downturn in waste for incineration due to increased recovery and to changes in the calorific value of the waste? What measures is the agency planning to take?	Interview with project-executing agency			
17.3 Did the programme contribute to strengthening the resilience of particularly disadvantaged groups to risks that could jeopardise the effects of the programme?	n/a				
Evaluation dimension 18: Durability of effects over time			3	O	
18.1 How stable is the context of the programme (e.g. social justice, economic performance, political stability, environmental balance)? (<i>Learning/help question</i>)	Is the state/city government of Beijing permanently prepared to bear the higher costs of modern waste management? Is it ready to implement gradual fee increases?				

18.2 To what extent is the durability of the positive effects of the programme influenced by the context? (<i>Learning/help question</i>)	Is the connected population willing and able to pay higher waste charges?	
18.3 To what extent are the positive and, where applicable, the negative effects of the programme likely to be long-lasting?	Results from the previous questions	
18.4 To what extent can the gender results of the measure be considered permanent (ownership, capacities, etc.)? (FC-E specific question)	n/a	