

Country: Rwanda

Project Document

Project Title Consolidated Waste Management Project in Rwanda

UNDAF Outcome(s): Outcome 2: Capacity at national, district and community levels to restore and protect ecosystems of national and global importance against potential degradation strengthened

UNDAF Output(s): Output 2.3: Technical and operational capacity of districts for the management of wastes and contaminants developed

Expected Output(s): 1) Condition of Kigali Landfill site improved
2) Method of high briquettes production realized
3) Action plans and institutional framework for national/local waste management in Rwanda established

Executing Entity: Kigali City and MININFRA

Implementing Agencies: UNDP

Brief Description

Considering the fact that Rwanda does not yet have a comprehensive Waste Management Framework and not always conducting proper waste management practices, this project aims to develop the framework and relating infrastructure to make the waste management socially and environmentally more sustainable.

More specifically, the project will implement the following four components:

- 1) Conduct a feasibility study on *Fukuoka* Method for the current Kigali Landfill Facility.
- 2) Support IRST to produce high quality combustible briquettes for contribution to both reduction of organic waste discharge to landfill sites and avoidance of in-house air pollution.
- 3) Establish waste management national and local action plans in addition to creating institutional framework to make it possible for all the stakeholders to get and work together.
- 4) Construct improved Kigali Landfill Facility.

Programme Period:	<u>2009-2012</u>
Key Result Area (Strategic Plan)	<u>Env.&Sus.Dev</u>
Atlas Award ID:	_____
Start date:	<u>Q1-2009</u>
End Date	<u>Q1-2012</u>
PAC Meeting Date	_____
Management Arrangements	<u>NEX</u>

Total resources required	<u>US\$3,150,000</u>
Total allocated resources:	<u>US\$3,100,000</u>
• Regular	<u>US\$2,500,000</u>
• Other:	
○ One Fund	<u>US\$ 600,000</u>
○ Donor	_____
○ Donor	_____
○	_____
Unfunded budget:	_____
In-kind Contributions	<u>US\$50,000 (GoR)</u>

Agreed by (Executing Entity): Eng. Albert Butare
Minister of State in charge of Energy and Water in MININFRA

Agreed by (Government): Mr. James Musoni
Minister of Finance and Economic Planning (MINECOFIN)

Agreed by (UNDP): Mr. Anthony Ohemeng-Boamah
Country Director



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o One Fund	<u>US\$ 600,000</u>
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I. SITUATION ANALYSIS

Every day, more than 100 ton of waste is brought to the landfill site in Kigali, located in Nyanza. At present, it is the only facility in Kigali that is dealing with collected solid waste. However, due to lack of proper facility and treatment skills, the gathered waste is just discarded to the site and the accumulation is creating new hills of waste. As a result, there are issues such as bad odour and methane gas explosions, and risks of garbage landslides, groundwater pollution, etc (see the photo at the Annex). Additionally, the current population of about one million in Kigali City is expected to expand to three million in the near future, and the present facility does not have enough capacity to deal with the tripled amount of waste. Due to this reason, Kigali City asked UNDP to support to conduct a feasibility study about Fukuoka Method in order to apply it to Kigali Landfill site (see the Annex). This request is based on the fact that Kigali City had a chance to learn Fukuoka Method by her official's visiting to Japan and the city has become interested in applying the technology to Rwanda. Additionally, although any detailed data are not yet available, other urban areas outside of Kigali City seem to be facing the similar situation.

Further, at present, various activities relative to waste management such as waste collection, waste selection and recycling, and waste dumping are conducted by various entities without having any harmonized institutional framework. For example, in the case of Kigali City, more than ten institutions are collecting waste, and at least several institutions are collecting organic waste to produce briquettes, but there is no official communication among the entities to make the waste management process more efficient. Further, each activity is not based on common leadership by the city. Therefore, some activities are done inefficiently and we are missing the chance to maximize reusing and recycling and minimize landfill site discharge. Again, other cities are assumed to be experiencing the same situation.

As for the briquettes, the production can play a significant role to reduce the discharge of organic waste to the landfill site (currently, more than 80% of waste at Kigali landfill site consists of organic waste). However, the present briquette production is still under development and the final products are still of low quality. Hence, the users of the briquette are facing the risk of causing respiratory diseases by inhaling fumes through imperfect combustion of the recycled material. As the briquette production has, like composting, one of the best potentials to reduce organic waste discharge to the landfill site, this low-quality issue needs to be solved and we must develop a way to process high quality briquettes and standardize the way and distribute the technology to all the producers. With this regard, IRST, national research institution, is currently conducting the relevant research but they are facing financial constraints. They have recently requested financial support to UNDP in order to make the high quality briquettes production method be realized (see the Annex).

The above situation led the Ministry of Infrastructure (MININFRA) to send a letter of support to UNDP on establishment of consolidated waste management project (see the Annex). The solid waste management is now dealt with by MINIFRA on a national policy setting level, whereas implementation of activities is under the responsibility of the respective municipalities in the country. Also, the environmental regulations concerning waste management are under the responsibility of the Rwanda Environmental Management Authority (REMA) that is working under the Ministry of Natural Resources.

II. STRATEGY

Under UNDAF, Output 2.3 states, 'Technical and operational capacity of districts for the management of wastes and contaminants developed'. With considering the requests from Kigali City, IRST and MININFRA mentioned above, this project aims to achieve Output 2.3 by conducting activities described in the following four components. The expected project duration is three years.

1) Feasibility study on *Fukuoka* Method for Kigali Landfill Facility

- The idea is to conduct a feasibility study on *Fukuoka* Method at the current landfill site in Nyanza, Kigali and investigate the adaptability of the method to renovation of the facility (and to construction of a new facility, if it is appropriate). *Fukuoka* method is a semi-aerobic solid waste treatment system invented in Japan, and the method is now standardized and applied to most landfill sites in Japan (see the Annex). Also, this method is already applied in some developing countries such as Malaysia, Samoa, and China. *Fukuoka* Method is strongly effective when the waste contains organic waste, and in this point, Kigali has a great potential of the system application as more than 80% of collected waste consists of organic waste.
- The study will be conducted by experts on *Fukuoka* Method. During the mission of the experts, relevant local institutions will be invited to join the mission and have a chance to learn the mission's technology.

2) IRST support on new combustible briquettes

- As mentioned above, standardization of high quality briquette production is of high demand. This component will support IRST technology development to produce high quality briquettes from organic waste. Once the method is established, this information will be disseminated to all the stakeholders working on briquettes production. The study result will focus on establishment of a locally available, technically and economically viable, and sustainable way for the local community to be able to produce the new combustible briquettes without any heavy financial investment or specific scientific knowledge requirement. IRST facility after the study will become the prototype of high quality briquette production system.
- Under this component, IRST will continue their research and disseminate the results.

3) Establishment of waste management stakeholders framework and the national/local action plans

- This component will support to organize workshops for waste management stakeholders in order to realize comprehensive waste management institutional framework. The workshops will also play a role to make clear who are the waste management stakeholders. The primary target is to achieve this framework setting in Kigali and at the national level. But this component will also try to expand the scope to other urban areas.
- Additionally, during the workshops, this project aims to establish concrete waste management action plans at least for Kigali City and for Rwanda at the national level. However, the action plan at the national level must include information about how to create waste management action plans (and relating policies/strategies, if necessary) in other urban areas. The action plan at Kigali City will include the point of how to run the new or improved landfill facility. Also, that action plan needs illustrate the role sharing between the three districts and Kigali City.
- This component will be coordinated by the Project Management Unit (PMU) located at Kigali City with support from consultant(s).

* This component will be conducted together with other institutions such as WHO, UNIDO, UN-HABITAT, UNESCO and the City of Mainz in Germany, which have plans to implement waste relating projects in Rwanda.

4) Construction and/or improvement of Kigali Landfill Facility

- This component will be implemented based on the recommendations made by the feasibility study of *Fukuoka* Method and possible alternative solutions, both of which need to be agreed by the Kigali City Authorities. The project will support the improvement or the (re-)construction of Kigali Landfill Facility. Before the activity implementation, the environmental impact assessment process will be taken according to the rule and regulation under the government of Rwanda.
- Also, in order to make sure that the improved facility will be operated properly, the future operators of the facility will be instructed in necessary skills to run the facility in a sustainable manner.

As stated in the letter from MININFRA, unfortunately, Rwanda does not yet have a comprehensive waste management framework. Also, there is no clear indication about importance of the solid waste management under the Economic Development and Poverty Reduction Strategy (EDPRS, 2008-12), national strategy in Rwanda. However, as we already saw on UNDAF Output 2.3, capacity development for the proper waste management is illustrated as one of important components for UN implementation. When considering the fact that UNDAF is playing a role to materialize the targets of EDPRS, this project can contribute to the realization of EDPRS goals. Additionally, Page 124 of Kigali City master plan clearly states the importance of establishing proper waste management framework, which is correlated with this project.

Kigali City is the biggest city in Rwanda, but other urban cities are also facing rapid economic development and expansion of the size. Therefore, proper solid waste treatment is a common issue at urban areas in Rwanda, and this project can bring a significant impact to improve the sanitary situation for the urban settlers. The letter from MININFRA is supporting this understanding, and urging this project development and implementation.

III. RESULTS AND RESOURCES FRAMEWORK

Intended Outcome as stated in the Country Programme Results and Resource Framework:				
Outcome 2 – Capacity at national, district and community levels to restore and protect ecosystems of national and global importance against potential degradation strengthened				
Outcome indicators as stated in the Country Programme Results and Resources Framework, including baseline and targets:				
National and local waste management action plans established and implemented (baseline: 0 establishment (2008), target: action plans established and implemented at least in Kigali City and at the national level by 2012)				
Applicable Key Result Area (from 2008-11 Strategic Plan): Environment and sustainable development				
Partnership Strategy: NEX (national execution)				
Project title and ID (ATLAS Award ID): Consolidated Waste Management Project in Rwanda - TBD after the signing of this project document				
INTENDED OUTPUTS	OUTPUT TARGETS FOR (YEARS)	INDICATIVE ACTIVITIES	RESPONSIBLE PARTIES	INPUTS
Output 1: Feasibility study on <i>Fukuoka</i> Method conducted and concrete recommendations obtained about how to apply the method to Kigali Landfill site Baseline: 0 (2008) Indicator: Receipt of recommendations by experts on how to apply <i>Fukuoka</i> Method to Kigali Landfill Facility	Targets (year 1) - The the feasibility study implemented - The study report received including concrete recommendations on the method adaptability	1 Activity Result: Reception of <i>Fukuoka</i> Method feasibility study <ul style="list-style-type: none"> ▪ Action: Contracting with the mission ▪ Action: Mission visit (implementation of the study) ▪ Action: Workshops by the experts during the mission on 1) <i>Fukuoka</i> Method and 2) tentative feasibility results report to the stakeholders ▪ Action: Reception of the recommendation report 	PMU under Kigali City	Contract with the mission - US\$100,000 (UNDP)
Output 2: IRST research continued and the method to produce high quality briquettes established and disseminated Baseline: 0 (2008) Indicator: Establishment of the method and its dissemination	Target (year 1) - The research implemented and the reliable method got close to the establishment Targets (Year 2) - The method for high quality briquettes production finalized - The research results report produced and the method to the stakeholders	2 Activity Result: Establishment of the method and its dissemination <ul style="list-style-type: none"> • Action: Contracting (i.e. creation of MoU) between Kigali City and IRST • Action: Implementation of the research by IRST • Action: Submission of the results report from IRST to PMU and its info dissemination 	IRST and PMU under Kigali City (the latter will share a responsibility of info dissemination)	Contract with IRST – US\$80,000 (UNDP) Study results dissemination – US\$20,000 (UNDP)

	disseminated (+standardization supported)			
<p>Output 3: Waste management institutional frameworks established in Kigali City and at the national level in addition to the action plans setting for the both</p> <p>Baseline: 0 (2008)</p> <p>Indicators:</p> <ul style="list-style-type: none"> - Establishment of waste management institutional frameworks - Creation of waste management action plans 	<p>Target (year 1)</p> <ul style="list-style-type: none"> - Consultant(s) for the necessary coordination and data collection recruited - Data to understand solid waste situation in Rwanda collected - Stakeholders workshops held <p>Target (year 2)</p> <ul style="list-style-type: none"> - Stakeholders workshops held and institutional frameworks and action plans drafted <p>Target (Year 3)</p> <ul style="list-style-type: none"> - Stakeholders workshops held and institutional frameworks and action plans established 	<p>3 Activity Result: Establishment of the institutional frameworks and the action plans</p> <ul style="list-style-type: none"> • Action: Contracting with consultant(s) • Action: Data collection for waste management action planning • Action: Holding workshops • Action: Establishment of stakeholders frameworks and action plans (at least for Kigali City + National level) 	<p>PMU under Kigali City (+MININFRA)</p>	<p>Contract with consultant(s) (including data collection) – US\$280,000 (UNDP)</p> <p>Holding workshops (at least ten times) – US\$60,000 (UNDP)</p>
<p>Output 4: Kigali Landfill Facility constructed/improved</p> <p>Baseline: 0 (2008)</p> <p>Indicator:</p> <ul style="list-style-type: none"> - Construction and/or improvement of Kigali Landfill Facility 	<p>Target (year 1)</p> <ul style="list-style-type: none"> - The feasibility study recommendations received <p>Target (year 2)</p> <ul style="list-style-type: none"> - Contracting with the construction firm done - The renovation and/or construction initiated <p>Target (Year 3)</p> <ul style="list-style-type: none"> - Construction and/or improvement completed - Training of facility operators done 	<p>4 Activity Result: Completion of renovation and/or construction of the facility and the operators well trained</p> <ul style="list-style-type: none"> • Action: Contracting with a construction firm • Action: Construction by the firm • Action: Hand-over of the operational skills to the future operators 	<p>PMU under Kigali City</p>	<p>Contract with a construction firm – US\$2,000,000 (UNDP)</p> <p>Training of the future operators – US\$80,000 (UNDP)</p>

IV. ANNUAL WORK PLAN

Year 1:

EXPECTED OUTPUTS <i>And baseline, indicators including annual targets</i>	PLANNED ACTIVITIES <i>List activity results and associated actions</i>	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
		Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount
<p>Output 1: Feasibility study on <i>Fukuoka</i> Method conducted and concrete recommendations obtained about how to apply the method to Kigali Landfill site</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicator: Receipt of recommendations by experts on how to apply Fukuoka Method to Kigali Landfill Facility</i></p> <p><i>Targets: 1) The feasibility study implemented, 2) The study report received including concrete recommendations on the method adaptability</i></p>	<p>1. Activity Result: Reception of <i>Fukuoka</i> Method feasibility study</p> <p>-Activity action: Contracting with the mission</p>	X				PMU under Kigali City	UNDP	Contract with experts	US\$100,000
	<p>-Activity action: Mission visit (implementation of the study – two weeks in Q1 or Q2)</p>	X	X						
	<p>- Activity action: Workshops by the experts during the mission on 1) <i>Fukuoka</i> Method and 2) tentative feasibility study results report to the stakeholders</p>	X	X						
	<p>-Activity action: Reception of the recommendation report</p>		X	X					
<p>Output 2: IRST research continued and the method to produce high quality briquettes established and disseminated</p> <p><i>Baseline: 0 (2008)</i></p>	<p>2. Activity Result: Establishment of the method and its dissemination</p> <p>-Activity action: Contracting (i.e. creation of MoU) between Kigali City and IRST</p>	X	X			IRST and PUM under Kigali City (the latter will share a responsibility of info dissemination)	UNDP	Contract with IRST	US\$40,000
	<p>-Activity action: Implementation of the research by IRST</p>		X	X	X				

<p><i>Indicator: Establishment of the method and its dissemination</i></p> <p><i>Target: The research implemented and the reliable method got close to the establishment</i></p>	<p>-Activity action: Submission of the results report from IRST to PMU and its info dissemination</p>	<p>(will be conducted in coming years)</p>						<p>Study results dissemination</p>	
<p>Output 3: Waste management institutional frameworks established in Kigali City and at the national level in addition to the action plans setting for the both</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicators: 1) Establishment of waste management institutional frameworks, 2) Creation of waste management action plans</i></p> <p><i>Targets: 1) Consultant(s) for the necessary coordination and data collection recruited, 2) Data to understand solid waste situation in Rwanda collected, 3) Stakeholders workshops held</i></p>	<p>3. Activity Result: Establishment of the institutional frameworks and the action plans</p> <p>-Activity action: Contracting with consultant(s)</p>	<p>X</p>	<p>X</p>			<p>PMU under Kigali City (+MININFRA)</p>	<p>UNDP</p>	<p>Contract with consultant(s) (including data collection)</p>	<p>US\$80,000</p>
	<p>-Activity action: Data collection for waste management action planning</p>		<p>X</p>	<p>X</p>	<p>X</p>				
	<p>-Activity action: Establishment of stakeholders frameworks and action plans (at least for Kigali City + National level)</p>	<p>(will be conducted in coming years)</p>							
<p>Output 4: Kigali Landfill Facility constructed/improved</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicator: Construction and/or improvement of Kigali Landfill</i></p>	<p>4. Activity Result: Completion of renovation and/or construction of the facility and the operators well trained</p> <p>-Activity action: Contracting with a construction firm</p>	<p>(will be conducted in coming years)</p>				<p>PMU under Kigali City</p>	<p>UNDP</p>	<p>Contract with a construction firm</p>	
	<p>-Activity action: Construction by the firm</p>	<p>(will be conducted in coming years)</p>							

<i>Facility</i> <i>Target: The feasibility study recommendations received</i>	-Activity action: Hand-over of the operational skills to the future operators	(will be conducted in coming years)						Training of the future operators	
Operation of the Project Management Unit (PMU)	-Activity action: Establishment and operation of PMU	X	X	X	X	Kigali City and UNDP	UNDP	Salaries, etc.	US\$100,000
	-Activity action: Travels by PMU staff	X	X	X	X			Travels	US\$10,000
	-Activity action: Equipment	X	X	X	X			Equipment	US\$10,000
	-Activity action: Communication	X	X	X	X			Communication	US\$5,000
	-Activity action: Miscellaneous	X	X	X	X			Miscellaneous	US\$5,000
TOTAL								US\$370,000	

Year 2:

EXPECTED OUTPUTS <i>And baseline, indicators including annual targets</i>	PLANNED ACTIVITIES <i>List activity results and associated actions</i>	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
		Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount
Output 1: Feasibility study on <i>Fukuoka</i> Method conducted and concrete recommendations obtained about how to apply the method to Kigali Landfill site <i>Baseline: 0 (2008)</i>	1. Activity Result: Reception of <i>Fukuoka</i> Method feasibility study -Activity action: Contracting with the mission	(completed in the previous year)				PMU under Kigali City	UNDP	Contract with experts	
	-Activity action: Mission visit (implementation of the study – two weeks in Q1 or Q2)	(completed in the previous year)							
	- Activity action: Workshops by the experts during the mission on 1) <i>Fukuoka</i> Method and 2) tentative feasibility study results report to the stakeholders	(completed in the previous year)							

<p><i>Indicator: Receipt of recommendations by experts on how to apply Fukuoka Method to Kigali Landfill Facility</i></p>	<p>-Activity action: Reception of the recommendation report</p>	<p>(completed in the previous year)</p>							
<p>Output 2: IRST research continued and the method to produce high quality briquettes established and disseminated</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicator: Establishment of the method and its dissemination</i></p> <p><i>Target: 1) The method for high quality briquettes production finalized, 2) The research results report produced and the method to the stakeholders disseminated (+ standardization supported)</i></p>	<p>2. Activity Result: Establishment of the method and its dissemination</p> <p>-Activity action: Contracting (i.e. creation of MoU) between Kigali City and IRST</p>	<p>(completed in the previous year)</p>				<p>IRST and PUM under Kigali City (the latter will share a responsibility of info dissemination)</p>	<p>UNDP</p>	<p>Contract with IRST</p>	<p>US\$40,000</p>
	<p>-Activity action: Implementation of the research by IRST</p>	<p>X</p>	<p>X</p>					<p>Study results dissemination</p>	<p>US\$20,000</p>
<p>Output 3: Waste management institutional frameworks established in Kigali City and at the national level in addition to the action plans setting for the both</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicators: 1) Establishment</i></p>	<p>3. Activity Result: Establishment of the institutional frameworks and the action plans</p> <p>-Activity action: Contracting with consultant(s)</p>	<p>(completed in the previous year)</p>				<p>PMU under Kigali City (+MININFRA)</p>	<p>UNDP</p>	<p>Contract with consultant(s) (including data collection)</p>	<p>US\$100,000</p>
	<p>-Activity action: Data collection for waste management action planning</p>	<p>X</p>	<p>X</p>						
	<p>-Activity action: Establishment of stakeholders frameworks and action plans (at least for Kigali City + National level)</p>			<p>X</p>	<p>X</p>				

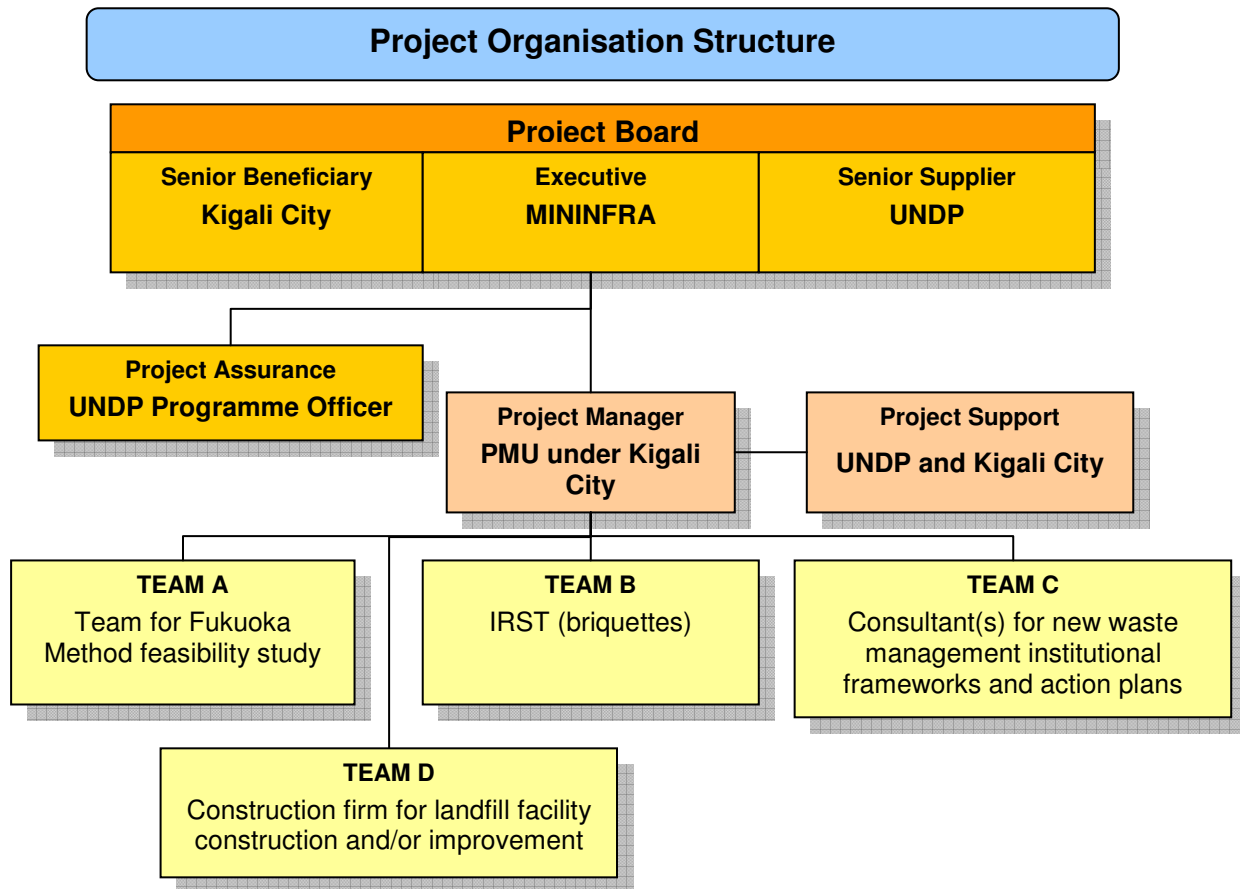
of waste management institutional frameworks, 2) Creation of waste management action plans Targets: Stakeholders workshops held and institutional frameworks and action plans drafted	-Activity action: Holding workshops	X	X	X	X			Workshops	US\$20,000
Output 4: Kigali Landfill Facility constructed/improved Baseline: 0 (2008) Indicator: Construction and/or improvement of Kigali Landfill Facility Target: 1) Contracting with the construction firm done, 2) The renovation and/or construction initiated	4. Activity Result: Completion of renovation and/or construction of the facility and the operators well trained -Activity action: Contracting with a construction firm	X	X			PMU under Kigali City	UNDP	Contract with a construction firm	US\$500,000
	-Activity action: Construction by the firm		X	X	X			Training of the future operators	
	-Activity action: Hand-over of the operational skills to the future operators	(will be conducted in the coming year)							
Operation of the Project Management Unit (PMU)	-Activity action: Establishment and operation of PMU	X	X	X	X	Kigali City and UNDP	UNDP	Salaries, etc.	US\$150,000
	-Activity action: Travels by PMU staff	X	X	X	X			Travels	US\$10,000
	-Activity action: Equipment	X	X	X	X			Equipment	US\$5,000
	-Activity action: Communication	X	X	X	X			Communication	US\$5,000
	-Activity action: Miscellaneous	X	X	X	X			Miscellaneous	US\$5,000
TOTAL									US\$855,000

Year 3:

EXPECTED OUTPUTS <i>And baseline, indicators including annual targets</i>	PLANNED ACTIVITIES <i>List activity results and associated actions</i>	TIMEFRAME				RESPONSIBLE PARTY	PLANNED BUDGET		
		Q1	Q2	Q3	Q4		Funding Source	Budget Description	Amount
<p>Output 1: Feasibility study on <i>Fukuoka</i> Method conducted and concrete recommendations obtained about how to apply the method to Kigali Landfill site</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicator: Receipt of recommendations by experts on how to apply Fukuoka Method to Kigali Landfill Facility</i></p>	<p>1. Activity Result: Reception of <i>Fukuoka</i> Method feasibility study</p> <p>-Activity action: Contracting with the mission</p>	(completed in previous years)				PMU under Kigali City	UNDP	Contract with experts	
	<p>-Activity action: Mission visit (implementation of the study – two weeks in Q1 or Q2)</p>	(completed in previous years)							
	<p>- Activity action: Workshops by the experts during the mission on 1) <i>Fukuoka</i> Method and 2) tentative feasibility study results report to the stakeholders</p>	(completed in previous years)							
	<p>-Activity action: Reception of the recommendation report</p>	(completed in previous years)							
<p>Output 2: IRST research continued and the method to produce high quality briquettes established and disseminated</p> <p><i>Baseline: 0 (2008)</i></p> <p><i>Indicator: Establishment of the method and its dissemination</i></p>	<p>2. Activity Result: Establishment of the method and its dissemination</p> <p>-Activity action: Contracting (i.e. creation of MoU) between Kigali City and IRST</p>	(completed in previous years)				IRST and PUM under Kigali City (the latter will share a responsibility of info dissemination)	UNDP	Contract with IRST	
	<p>-Activity action: Implementation of the research by IRST</p>	(completed in previous years)							
	<p>-Activity action: Submission of the results report from IRST to PMU and its info dissemination</p>	(completed in previous years)							
<p>Output 3: Waste management institutional frameworks established in</p>	<p>3. Activity Result: Establishment of the institutional frameworks and the action plans</p> <p>-Activity action: Contracting with consultant(s)</p>	(completed in previous years)				PMU under Kigali City (+MININFRA)	UNDP	Contract with consultant(s) (including data	US\$100,000

Kigali City and at the national level in addition to the action plans setting for the both <i>Baseline: 0 (2008)</i> <i>Indicators: 1) Establishment of waste management institutional frameworks, 2) Creation of waste management action plans</i> <i>Targets: Stakeholders workshops held and institutional frameworks and action plans established</i>	-Activity action: Data collection for waste management action planning	(completed in previous years)							collection)	
	-Activity action: Establishment of stakeholders frameworks and action plans (at least for Kigali City + National level)	X	X	X	X					
	-Activity action: Holding workshops	X	X	X	X				Workshops	US\$20,000
Output 4: Kigali Landfill Facility constructed/improved <i>Baseline: 0 (2008)</i> <i>Indicator: Construction and/or improvement of Kigali Landfill Facility</i> <i>Target: 1) Construction and/or improvement completed, 2) Training of facility operators done</i>	4. Activity Result: Completion of renovation and/or construction of the facility and the operators well trained -Activity action: Contracting with a construction firm	(completed in previous years)				PMU under Kigali City	UNDP		Contract with a construction firm	US\$1,500,000
	-Activity action: Construction by the firm	X	X	X	X					
Operation of the Project Management Unit (PMU)	-Activity action: Establishment and operation of PMU	X	X	X	X	Kigali City and UNDP	UNDP		Salaries, etc.	US\$150,000
	-Activity action: Travels by PMU staff	X	X	X	X				Travels	US\$10,000
	-Activity action: Equipment	X	X	X	X				Equipment	US\$5,000
	-Activity action: Communication	X	X	X	X				Communication	US\$5,000
	-Activity action: Miscellaneous	X	X	X	X				Miscellaneous	US\$5,000
TOTAL									US\$1,875,000	
GROUND TOTAL									US\$3,100,000	

V. MANAGEMENT ARRANGEMENTS



* In addition to the illustration above, all the relevant key stakeholders will have a chance to join the steering committee of the project. The committee will be held at least once a year.

* Additionally, Technical Advisory Committee (TAC) meetings will be organized to realize continuous practical-base discussions and it will be organized at least once per quarter.

* Waste management stakeholders newly found by the process of Component 3 must have a chance to join the above two meetings.

* PMU under Kigali City and IRST will produce the Memorandum of Understanding (MoU) for the component implementation. The necessary funds will be provided to IRST through PMU.

- results of capacity assessment of implementing partner

Kigali City and MININFRA: both key institutions fully understand the waste management issues in Kigali and Rwanda, but they do not have sufficient financial and technical capacity to conduct activities to solve the issues. Therefore, the Project Management Unit (PMU) will be established at Kigali City to implement the project with the following arrangement:

- One Project Coordinator (international)
- One Project Associate (national) – assistance of the project coordinator (however, during the project implementation, technical expertise of the project coordinator will be handed over to this project associate to realize national ownership. With this regard, the project associate is expected to play the role of the project coordinator at the end of this project)
- One Procurement & Finance Specialist (national)

➤ *UNDP Support Services*

UNDP will support necessary procurement processes such as recruitment of experts on Fukuoka Method.

➤ *collaborative arrangements with related projects*

This project will be conducted in strong harmonization with other activities relating to waste management. For example, the institutions illustrated below can be key collaboration partners. Specifically, the involvement of partner institutions will enrich the discussions under Component 3 of this project and will support realistic and effective institutional framework and action plans. As for the UN agencies, the joint efforts will be made to deliver the expected outputs and outcomes as one:

1. WHO – installation of small incinerators to clinics

2. UNIDO – research, offering technical training and so forth on better waste management (their technical knowledge and experiences in other developing countries and Rwanda on waste management will be applied fully for the implementation of this project)

3. UN-HABITAT – waste relating situation analysis in the Western Province

4. UNESCO – study on groundwater pollution caused by a landfill facility

5. City of Mainz in Germany – installation of a new landfill facility

➤ *a brief description/summary of the inputs to be provided by all partners*

Kigali City – ground coordination of the project + operation of PMU

MININFRA – supervising of the project + support to establish the waste management institutional framework and action plan at the national level

UNDP – financial and technical support of the project implementation

TEAM A – implementation of Fukuoka Method feasibility study at Kigali Landfill site

TEAM B – study on high quality briquettes production

TEAM C – establishment of waste management institutional frameworks and action plans for Kigali City and at the national level

TEAM D – construction and/or improvement of Kigali Landfill Facility (technical handover to the future operators of the facility would be conducted mainly by PMU and experts on Fukuoka Method (e.g. JICA training))

➤ *audit arrangements*

Auditing will be conducted based on the general auditing rules set by UNDP and the Government of Rwanda (GoR)

➤ *agreement on use of logo on the project's deliverables*

UNDP and GoR logos can be used for the project implementation as long as UNDP and GoR approve the usage respectively

VI. MONITORING FRAMEWORK AND EVALUATION

In accordance with the programming policies and procedures outlined in the UNDP User Guide, the project will be monitored through the following:

Within the annual cycle

- On a quarterly basis, a quality assessment shall record progress towards the completion of key results, based on quality criteria and methods captured in the Quality Management table below.
- An Issue Log shall be activated in Atlas and updated by the Project Assurance (and Project Manager, if possible) to facilitate tracking and resolution of potential problems or requests for change.
- Based on the initial risk analysis submitted (see annex 1), a risk log shall be activated in Atlas and regularly updated by reviewing the external environment that may affect the project implementation.
- Based on the above information recorded in Atlas, a Project Progress Reports (PPR) shall be submitted by the Project Manager to the Project Board through Project Assurance, using the standard report format available in the Executive Snapshot.
- a project Lesson-learned log shall be activated and regularly updated to ensure on-going learning and adaptation within the organization, and to facilitate the preparation of the Lessons-learned Report at the end of the project
- a Monitoring Schedule Plan shall be activated in Atlas and updated to track key management actions/events

Annually

- **Annual Review Report.** An Annual Review Report shall be prepared by the Project Manager and shared with the Project Board and the Outcome Board. As minimum requirement, the Annual Review Report shall consist of the Atlas standard format for the QPR covering the whole year with updated information for each above element of the QPR as well as a summary of results achieved against pre-defined annual targets at the output level.
- **Annual Project Review.** Based on the above report, an annual project review shall be conducted during the fourth quarter of the year or soon after, to assess the performance of the project and appraise the Annual Work Plan (AWP) for the following year. In the last year, this review will be a final assessment. This review is driven by the Project Board and may involve other stakeholders as required. It shall focus on the extent to which progress is being made towards outputs, and that these remain aligned to appropriate outcomes.

Quality Management for Project Activity Results

This table will be filled in during the project implementation together by the Project Manager and the Project Assurance.

OUTPUT 1:		
Activity Result 1 (Atlas Activity ID)	<i>Short title to be used for Atlas Activity ID</i>	Start Date: End Date:
Purpose	<i>What is the purpose of the activity?</i>	
Description	<i>Planned actions to produce the activity result.</i>	
Quality Criteria <i>how/with what indicators the quality of the activity result will be measured?</i>	Quality Method <i>Means of verification. what method will be used to determine if quality criteria has been met?</i>	Date of Assessment <i>When will the assessment of quality be performed?</i>

VII. LEGAL CONTEXT

This project document shall be the instrument referred to as such in Article 1 of the SBAA between the Government of Rwanda and UNDP, signed on February 2nd, 1977.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the executing agency and its personnel and property, and of UNDP's property in the executing agency's custody, rests with the executing agency.

The executing agency shall:

- a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
- b) assume all risks and liabilities related to the executing agency's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The executing agency agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

VIII. ANNEXES

1. Risk Analysis

Project Title: Consolidated Waste Management Project in Rwanda		Award ID:		Date: January 3 rd , 2009					
#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Mngt. response	Owner	Submitted, updated by	Last Update	Status
1	Delay of recruitment of Fukuoka Method experts	01/03/09	Operational	Risk is relatively low as the potential study implementer is already found. Probability = 2 Impact = 3	Commence the procurement procedure before signing the project document	UNDP	Toshikazu Mito	01/03/09	First identification
2	Delay of establishment of PMU	01/03/09	Organizational	PMU is the key to conduct the whole components smoothly. P = 2 I = 4	Put the advertisements as soon as possible	UNDP/Kigali City	Toshikazu Mito	01/03/09	First identification
3	Delay of recruiting consultant(s) for establishment of waste management institutional frameworks and action plans	01/03/09	Operational	The success of this component is critical to make the waste management in Rwanda sustainable. Finding suitable consultant(s) at a right timing might be a challenge. P = 3 I = 3	Put the advertisements as soon as possible	UNDP/Kigali City	Toshikazu Mito	01/03/09	First identification
4			Environmental Financial Operational Organizational Political Regulatory Strategic Other						

2. Terms of Reference:

* Gender balance must be considered when conducting the recruitments below.

<Project Coordinator>

Scope of work

- The project coordinator will be stationed in Kigali City and conduct the daily project implementation based on this project document.

Deliverables

1. Reception of *Fukuoka* Method feasibility study report from the experts
2. Reception of IRST study report on high quality briquettes production method and its dissemination to relevant institutions (and support of GoR to establish standards for the briquettes production, if possible)
3. Establishment of waste management institutional frameworks and concrete action plans for Kigali City and Rwanda at the national level (including suggestions on how to create the frameworks and action plans in other urban areas)
4. Improvement and/or construction of Kigali Landfill Facility

Qualifications

- International (note: ALD status recruited by UNDP is preferable considering the experiences required for the position)
- Masters degree in waste management or related fields
- Minimum two years of experiences in waste management field, including the fields of *Fukuoka* Method and briquettes production
- Minimum eight years of experiences in project coordination
- One to two year(s) of experiences working with UN or international organization
- One to two year(s) of experiences working in developing countries
- Fluency in English, preferably with functionality in French, too

<Project Associate>

Scope of work

- Support the Project Coordinator to conduct the daily project implementation successfully.

Deliverables

- Complete the tasks assigned by the project coordinator properly

Qualifications

- National
- Bachelor's degree in waste management or related fields
- One to two year(s) of experiences working in developing countries
- Fluency in Kinyarwanda and English, and preferably with functionality in French, too

<Procurement & Finance Specialist>

Scope of work

- Support PMU to conduct necessary procurement and financial activities.

Deliverables

- Complete the procurement and financial tasks properly under PMU assigned by the project coordinator

Qualifications

- National
- Bachelor's degree in finance or related fields
- Minimum two years of experiences in procurement and finance, preferably in the public sector
- One to two year(s) of experiences working in developing countries

- Fluency in Kinyarwanda and English, and preferably with functionality in French, too

<Fukuoka Method Expert(s)>

Scope of work

- Conduct a feasibility study on a landfill facility in Kigali. More specifically, a field visit must be carried out to analyze the current landfill site and investigate how appropriate to install *Fukuoka* Method to its improvement.

Deliverables

- Feasibility study report including a financially and technically feasible proposal on how to improve the current landfill site facility in Kigali by applying *Fukuoka* Method

Qualifications

- Masters degree in waste management or related fields
- Minimum of three years experience in the waste management field, preferably in the field of *Fukuoka* Method application and management
- Minimum of two years experience in data collection and statistical analysis
- One to two year(s) of experiences working with UN or international organization
- One to two year(s) of experiences working in developing countries
- Fluency in English, preferably with functionality in French, too

<Consultant(s) for Establishment of Waste Management Institutional Frameworks and Action Plans>

Scope of work

- With collecting necessary waste relating data, the consultant(s) will coordinate the stakeholders meetings (workshops) and lead the discussion in order to establish the waste management institutional frameworks and concrete action plans for Kigali City and Rwanda at the national level.

Deliverables

- Recommendation reports on the waste management institutional frameworks and concrete action plans for Kigali City and Rwanda at the national level based on the stakeholders' discussions and the situation analysis including collection of waste relating data (the reports must also include how to expand the results to other urban areas in Rwanda)

Qualifications (for the leader of the consultant(s))

- Masters degree in waste management or related fields
- Minimum of three years experience in the waste management field
- Minimum of two years experience in data collection and statistical analysis
- One to two year(s) of experiences working in developing countries
- Fluency in English, preferably with functionality in French, too

<Construction Firm on Improvement and/or Construction of Kigali Landfill Facility>

ToR for this firm will be decided later based on the recommendations by *Fukuoka* Method experts.

3. Landfill site in Nyanza, Kigali (Photo)



Kigali landfill site



Soil is carried to cover waste



'New garbage hill' is created every day

Kigali Airport

4. Request letters from Kigali City



*Republic of Rwanda
City of Kigali*



Ref. N° *CS/MA/07.01.07/08*

Kigali, *25.02/2008*

Mr. Anthony OHEMENG-BAOMAH
Country Director
UNDP-Rwanda
P.O Box 445 Kigali, Rwanda

Dear Sir:

RE: Requesting for support in carrying out a feasibility study for new Land fill site in Kigali City.

We would like to thank you for your continued support and look forward to further collaboration in the Year 2008. On this note, The City of Kigali is writing to kindly request for your support in securing funds for a new project; on a feasibility study for a new land fill site in Kigali City.

Kigali City is in an imperative need of a new land fill site as the existing one, located in Nyanza in KICUKIRO District, is quickly filling up.

Preliminary research has been done to find a suitable model that would help to solve this problem. We have found out that Fukuoka City in Japan has a method that we believe would be appropriate. They have good experience and knowledge in this field and we have had consultations with them and they are willing to provide support. However we need to conduct a study on the feasibility of installing this Fukuoka method facility in Rwanda.

As you are a leading UN agency concerned with the environment, we feel that you will understand our plight and we are thus requesting your financial assistance and support in implementation of this project.



*Republic of Rwanda
City of Kigali*



We would really appreciate your support and look forward to hearing from you as soon as possible for further discussions.

We thank you for your continued cooperation.

Yours Sincerely,

Dr Aisa KIRABO KACYIRA
MAYOR, CITY OF KIGALI



CC:

- Honorable Minister of Local Government, Good Governance, Community Development and Social Affairs;
 - Honorable Minister of Lands, Environment, Forestry, Water, and Mines;
 - Honorable Minister of Finance and Economic Planning;
- KIGALI**

Attachment: Brief description of current Situation

**BRIEF DESCRIPTION OF CURRENT SITUATION
AT THE NYANZA DUMP SITE:**

- The dumpsite is surrounded by residential homes and there two schools in the vicinity.
- Downstream of the dumpsite, runs Nyacyonga stream, which is used as a source of drinking water for the residents.
- There is no access control to the site thus exposing waste pickers living at the dumpsite and the public to all kinds of infectious and hazardous materials.
- The trucks used for the collection of waste do not have covers or nets and there is a danger of the waste being spilt on the way to the dumpsite
- Waste is not spread, compacted and covered with soil, thus creating favorable conditions for vectors (flies and mosquitoes) and vermin to feed and breed.
- Sewage sludge, potentially containing pathogens (faecal coliforms), is discharged at the dumpsite causing odour problems and polluting the downstream drinking water (nyacyonga stream).
- Odour problems to the dumpsite operators and near-by residents due to waste materials that have decomposed significantly prior to being collected, Malodorous wastes, sewage sludges, landfill gas (especially hydrogen sulphide) and leach ate.
- Open burning by waste pickers and Deep-seated fires from auto-combustion of methane gas. These fires should always be taken very seriously. They can create large voids invisible from the surface and can give rise to carbon monoxide in hazardous concentrations. *Dumpsite fire can generate toxic fumes injurious to health. Because of the diverse origin of wastes, from time to time hazardous materials will be delivered to waste disposal sites. Burning of these wastes may result in discharge of hazardous contaminants into the atmosphere, and possibly injury to dumpsite personnel and near-by residents.*
- There is no treatment of the dumpsite leachate currently flowing into the downstream valley. There is therefore a danger of polluting both the ground and the surface water.
- Access road to the site from the turn at the school (International Academy) needs upgrading to discourage garbage dumping along the access road to the dumpsite during the rainy season.
- Slopes of the waste are very high and there is therefore a high risk of waste slope collapse and landslides into the valley.



Republic of Rwanda
City of Kigali



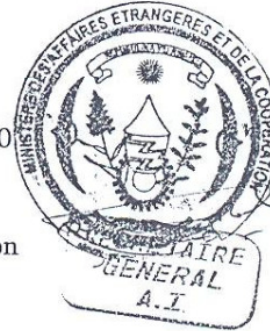
Ref. N° 04.27/07.01.07/08

Kigali, 26.1.07/2008

His worship Mr. Hiroshi YOSHIDA,
Mayor, FUKUOKA City
1-8-1 Tenjin, Chuo-ku, Fukuoka City, Fukuoka 810-8620
JAPAN

Through The Ministry of Foreign Affairs and Cooperation
KIGALI

Through Mr. Ichiro KAMOSHITA,
Minister of Environment,
Chuo-godo-chosha 5 go-kan, 1-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8975
JAPAN



Dear Sir:

RE: Requesting for expertise in carrying out a feasibility study for a new Land fill site in Kigali City.

I would like to start by wishing you a Happy and Prosperous new year 2008.

The City of Kigali is in an imperative need of a new land fill site as there is currently only one and this is quickly filling up. We are informed that your city, Fukuoka, has a method called "FUKUOKA" that would be appropriate for our city. In line with this we are interested in conducting a study on the feasibility of introducing the Fukuoka method in Rwanda.

It is for this reason that we are writing to kindly request your cooperation in this matter. We would like to kindly request you to send us experts on the Fukuoka method to support us in this feasibility study.

We are currently in discussions with United Nations Development Programme (UNDP) with regard to this study and we hope to secure funds from them for it.

City of Kigali, B.P.3527 Kigali, Tél. 250-57-2255 / 57-6967/57-5958 & Fax 250-57-3684 www.kigalicity.gov.rw



*Republic of Rwanda
City of Kigali*



We hope to hear from you as soon as possible for further discussions and we look forward to our future collaboration.

Yours Sincerely,

Dr Aisa KIRABO KACYIRA
MAYOR, CITY OF KIGALI



CC:

- Honorable Minister of Local Government, Good Governance, Community Development and Social Affairs,
 - Honorable Minister of Lands, Environment , Forestry, Water, and Mines,
 - Honorable Minister of Finance and Economic Planning,
 - Director General of REMA,
- KIGALI
- H.E The Ambassador of Rwanda to Japan
TOKYO

5. Request letter from IRST



REPUBLIQUE DU RWANDA

**INSTITUT DE RECHERCHE SCIENTIFIQUE ET
TECHNOLOGIQUE (I.R.S.T.)**

**B.P. 227 BUTARE
Tél. : (250) 530 395
Fax : (250) 530 939
e-mail : irst@irst.ac.rw
Website : www.irst.ac.rw**



Ref: DGO/2008/JBN/jbn /2.0.4....

29th October 2008

**The UNDP Representative
KIGALI-RWANDA**

Dear Sir,

**SUBJECT: REQUEST FOR FINANCIAL SUPPORT TOWARDS RESEARCH
AND DEVELOPMENT OF NEW COMBUSTIBLE FUEL FOR USE
IN COOKING**

As an institution responsible for research and development in various aspects in Rwanda, we have much pleasure to submit to you this application for financial support towards our new combustible fuel project called the "boulette project", a component of IRST programme on alternative energies.

To contribute to poverty reduction initiatives and to the achievement of one of the Millennium Development Goals, the Institute of Scientific and Technological Research (IRST) is carrying out research and development of alternative energies based on people's needs and priorities.

One of such programmes is the research on alternative cooking fuels. The objective of such project is to improve the well-being of the rural people by enabling them to use affordable and environmentally friendly cooking fuel.

The Institute of Scientific and Technological Research (IRST) is carrying out research and development of new combustible materials made from agro-industrial and organic household wastes such as coffee bean peels, rice husks and banana peels. The project output is a new combustible fuel named "boulette" and used for cooking in rural areas. The "boulette" reduces the harmful smoke, increases the heating capacity, reduces the cooking time and increases the solidity of the wastes and constitutes, therefore, a local, feasible and sustainable alternative energy for cooking purpose.

This research and development project requires measuring instruments and other research equipment as well as materials to manufacture sample cooking equipment for demonstration. The project financial needs amount to US \$ 80,000 to cover the cost of research tools and equipment, materials to manufacture sample cooking equipment, model cooking equipment and demonstration workshops.

We are, therefore, requesting a financial support of US \$ 80, 000 for our “boulette” project”.

We are looking forward to your favorable response.

Yours sincerely,



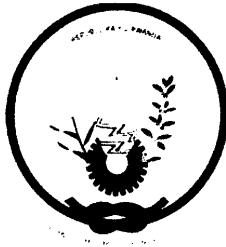
Dr. Jean Baptiste Ndwavezu
Director General

6. Request letter from MININFRA

10 1023
11/2/08

REPUBLIC OF RWANDA

Kigali, on 28 NOV 2008
Ref n° 465.13E1.62w/08



MINISTRY OF INFRASTRUCTURE
P.O Box 24, Kigali-Rwanda

Resident Representative
UNDP
KIGALI

Dear Sir,

Reference: Request for Support in consolidated Waste Management

Rwanda is aware of the importance of developing a consolidated waste management framework and of making the waste management socially and environmentally sustainable. Solid Waste Management is dealt with by the Ministry of Infrastructure on a national policy setting level, whereas implementation of activities is under the responsibility of the respective municipalities in the country. Environmental Regulations concerning waste management are to be enforced by the Rwanda Environmental Management Authority (REMA) that is working under the Ministry of Natural Resources.

Unfortunately Rwanda does not have a comprehensive Waste Management Framework until now and is therefore requesting the support of UNDP in setting it up.

Currently the city of Kigali is struggling most with waste related problems. It is transporting its waste to a landfill site in Nyanza just outside the city. This existing site is not only rapidly filling up, but it is also inadequately protected in terms of access to it, vicinity to residential areas, in terms of inexistent leachate collection or control which is hence polluting the soil, groundwater and the downstream valley. Unfortunately there are also deep-seated fires in the land fill that are lit by auto-combustion of methane gas. Beyond that, the waste slope is not protected and is at risk of sliding into the adjacent valley.

Tél : +250 58 26 19
Fax: +250 582618/21

E-mail: mininfrast@rwanda1.com
Website: www.mininfra.gov.rw

This is why we would like to request UNDP to support us in conducting a feasibility study on the improvement options of the current, or construction of a new landfill. We would like to specifically look into the option of applying the Fukuoka Method in the Kigali landfill. Depending on the outcome of this study we are also requesting UNDP in assisting us through financing the rehabilitation or new construction of the landfill following the study's recommendations.

IRST is currently working on the development of a high quality combustible briquette made from organic waste, and another project component for which we are requesting support from UNDP is future support to IRST to develop a refined technology and end-product, that will not only make use of organic waste but will also allow us to replace fuel wood for cooking.

To allow for a comprehensive waste management framework it is also crucial to establish a waste sector working group or regular stakeholder meetings. We therefore also call on UNDP to assist the setting up of a waste stakeholder framework through a waste coordination unit and stakeholder workshops.

We truly believe that a UNDP intervention in the waste sector can allow us to take a big step towards improving our waste management, starting in the City of Kigali but also on a national level. We highly appreciate the commitment of UNDP to developing Rwanda and are looking forward to a successful future cooperation in the Waste sector.

Please accept the assurances of my highest consideration.

With my sincere regards,

Dr. Albert Butare, RE
Minister of state in charge of Energy and Water



CC: - Hon. Minister of Infrastructure
- Her Lordship the Mayor of Kigali

7. Fukuoka Method



“The Fukuoka Method” (semi-aerobic landfill) attracts the attention of the world.

I. What is the Fukuoka Method?

① Development outline: Cooperation between Fukuoka City and Fukuoka University

A particular type of semi-aerobic landfill, known as the Fukuoka Method, was developed as a joint project of Fukuoka City and Fukuoka University.

In 1966, Fukuoka University began research on landfill technology to improve the quality of leachate produced. A series of experiments was carried out in collaboration with Fukuoka City over three years from 1973, under grant assistance from the former Ministry of Health and Welfare. This research demonstrated that decomposition, and therefore stabilization of waste in a landfill is enhanced in the presence of oxygen (air) due to enhanced microbial activity. In addition, the quality of leachate was improved at a much faster rate, whilst the generation of methane, hydrogen sulphide and other gases was reduced significantly.

Based on these results, landfill sites have been classified into five types according to the environment for various types of microorganisms to grow in the landfill layer under different conditions. Prof. Masataka Hanashima of Fukuoka University proposed a generic concept for “semi-aerobic landfill development”, which was first tested in the construction of Shin-Kamata Landfill by Fukuoka City in 1975. After ascertaining its positive effect on the environment, it was officially accepted as the Fukuoka Method. Since then, the semi-aerobic landfill also known as the Fukuoka Method has been adopted throughout Japan, being a recommended method in the Final Waste Disposal Guidelines issued by the former Ministry of Health and Welfare. The development of the Fukuoka Method provided the impetus for a range of research and academic activities in landfill technology, which until then had not been systematically organized. It is also contributing to the emergence of a fully recycling-oriented society in which due attention is paid to the conversion of completed landfill sites into useable land resources.



Experiment with the landfill model at Fukuoka University (1974)



The first semi-aerobic landfill in Japan (Shin-kamata Landfill) (1975)



Field experiment at Hisayama Landfill (1974)
Left: Aerobic landfill, Right: semi-aerobic landfill

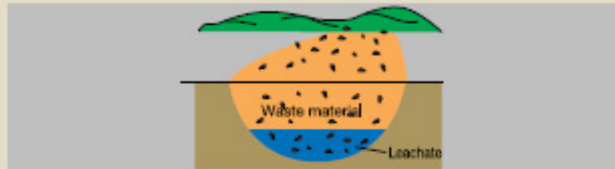
②Types of Landfill Structure

Landfill sites have been classified into five types(*), based on the microbial environments existing in the landfill layers. Under an aerobic condition of landfill layers, the level of leachate pollution is decreased and the amount of gas like methane or hydrogen is also decreased at the same time, and it's obvious that the stabilization of waste landfill at the early stage.

* Five types are Anaerobic landfill, Anaerobic sanitary landfill, Advanced anaerobic sanitary landfill(Advanced sanitary landfill), Semi-aerobic landfill and Aerobic landfill.

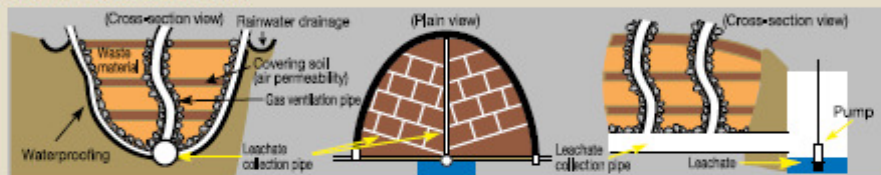
Fig-1 Classification of landfill structure (shows three main structures out of five)

Anaerobic landfill



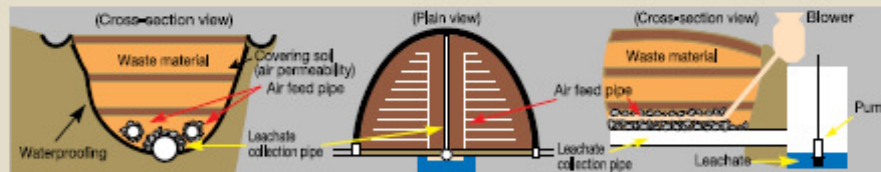
This is formed by excavating flatland, or wasting disposal into valley. It keeps flood the waste materials with water and anaerobic.

Semi-aerobic landfill



It is the structure with leachate collection pipe that is rapped around by pebbles, which has wide cross-section and its aperture area opens to the air. Inside of the landfill, moisture content is low and condition is kept aerobic by supplying air from leachate collection pipe.

Aerobic landfill



In addition to the leachate collection pipes as in the semi-aerobic design, air-pipes are constructed to pump in air into the waste layers to maximize internal aerobic activity.

×Effects of leachate collection pipes in the semi-aerobic landfill:

The leachate collection pipes offer a number of advantages:

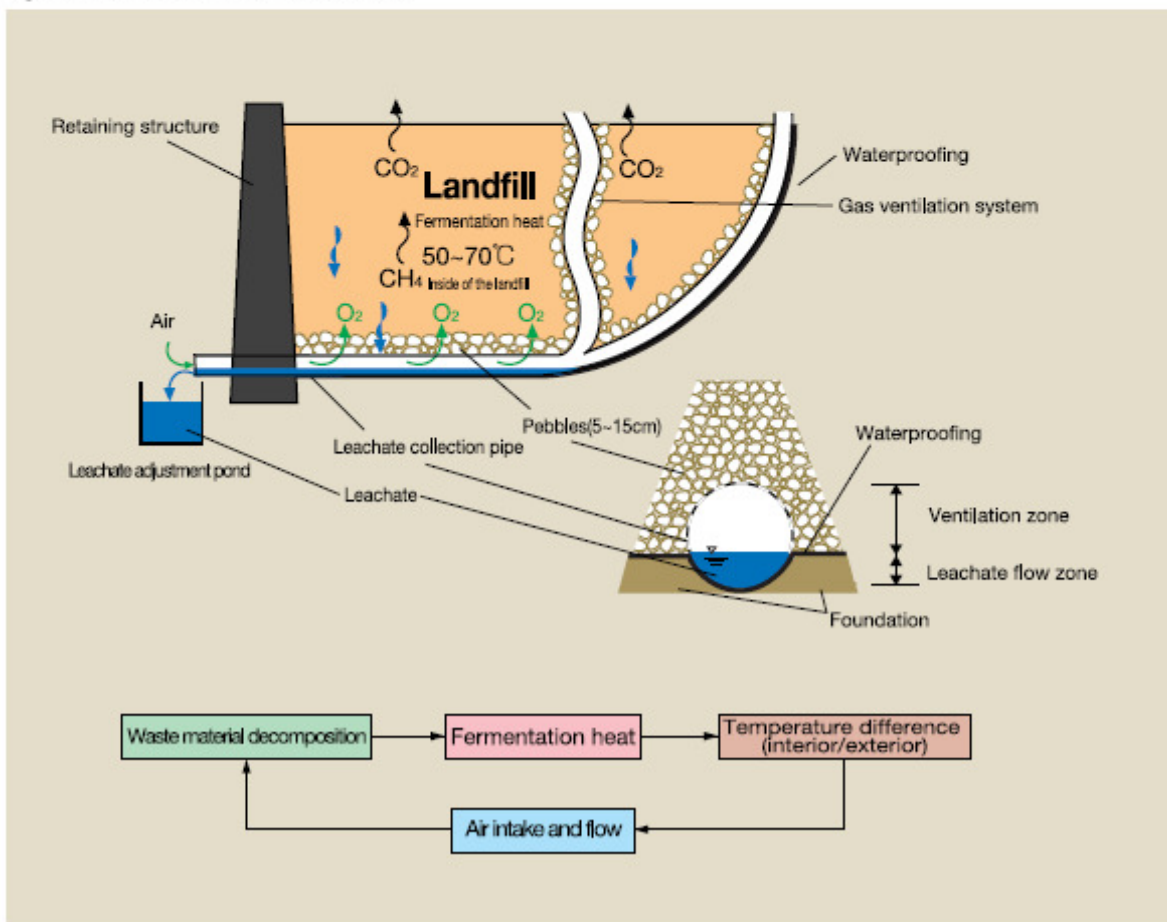
- (A) By draining out the leachate as quickly as possible, it prevents leachate from stagnating in the waste material and makes it easier for fresh air to penetrate, thereby promoting aerobic condition in the waste layers.
- (B) By promoting aerobic conditions, microbial activity is enhanced and the decomposition of waste accelerated.
- (C) By parallel usage of the collection pipes and the pebbles, the strength of the collection pipes are complemented, and water quality of leachate is improved to make air diffusion effectively at the same time.
- (D) The collection pipes are laying at 50cm above from the bottom of the landfill, and protected from clogging by parallel usage with the pebbles of 5-15cm in diameter.
- (E) By draining out the leachate rapidly, water pressure on the liner is prevented from building up, reducing the danger of seepage.

③ Semi-aerobic Landfill Mechanism

Semi-aerobic Landfill is the construction with the pebbles and the leachate collection pipe that are laid at the bottom of the landfill to drain away leachate as quickly as possible and prevent leachate inside of the layer from remaining. Also, by the generated heat from microbial activity, the heat convection arises for the difference of internal and external temperature as the result of temperature rise in the landfill, and the air (Oxygen) flows into the landfill in the reverse direction of water flow in the leachate collection pipe. Therefore, the special air blasting facility is not necessary, and it makes easier in construction, operation and maintenance.

Semi-aerobic Landfill utilizes these characteristics to prevent leachate from infiltration into foundation of the landfill. It also accelerates the decomposition of waste materials, and purifies the leachate as much as possible at the collection layers level by making air flow into the landfill through the collection pipes naturally with the fermentation heat of the landfill layers.

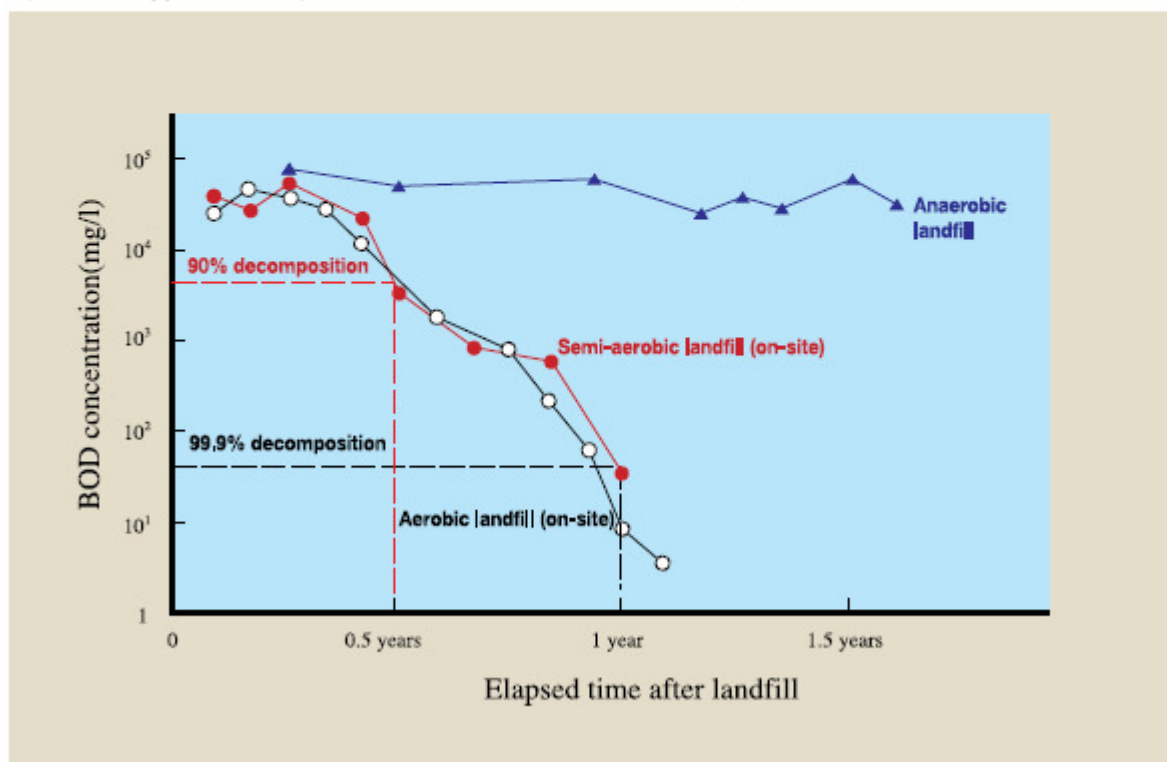
Fig-2 Semi-aerobic Landfill Mechanism



④ Advantages of the Fukuoka Method

- (A) The Fukuoka Method utilizes the self-purifying capacity inherent in nature to stabilize waste materials. As this landfill method, it requires only commonly used machinery and equipment.
- (B) The quality of leachate is improved significantly by accelerating decomposition of the waste materials. (See fig.3)
- (C) It reduces methane gas, and contributes to the prevention of global warming. (See page.7)
- (D) Early use of the completed landfill will be expected by enhancing stabilization. Appropriate review of the usage and monitoring will be needed during that period.
- (E) The Fukuoka Method is cost-effective and simple in the technology, and that allows a high degree of freedom of choice in materials.
- (F) It is easy to construct, operate and maintain. However, for the effective use of the Fukuoka Method, it is very important to understand its mechanism, management and maintenance of the landfill, and continuous monitoring for the quality of leachate.

Fig-3 Landfill type and change in leachate BOD over time (burnable waste materials)



As the ending of leachate collection pipe is opened to the air, external air enters the landfill through the collection pipe by fermentation heat of microorganism inside the landfill. This helps to maintain inside the landfill layers aerobic that results in accelerating waste materials decomposition speed and the leachate quality improvement.

8. LPAC

**Minutes of the Local Project Appraisal Committee (LPAC) meeting
Held at the OCHA Conference Room, on February 3rd, 2009**

Project: 'Consolidated Waste Management Project in Rwanda'

1. Participants at the meeting:

- 1) Reuben Ahimbisibwe, Kigali City
- 2) Tom Wheeler, Kigali City
- 3) Egide Mugwiza, Kigali City
- 4) Gerard Hendriksen, MININFRA
- 5) Vincent Gasamogera, IRST
- 6) Maximilien Usengumuremyi, MINECOFIN
- 7) Ronald Nkusi, CEPEX
- 8) Ruth Murekatete, MINIRENA
- 9) Bahati Alexander, RBS
- 10) Aimee Nshimirimana, RURA
- 11) Didier Gasasira, RURA
- 12) Jean Claude Ngabonziza, RURA
- 13) Emmanuella Murekatete, RURA
- 14) Theoneste Ndayisenga, RURA
- 15) Maggy Gatera, UNDP – Chair of the meeting
- 16) John Musemakwari, UNDP
- 17) Henri Esseqat, UNDP
- 18) Gatesi Julienne, UNDP
- 19) Toshikazu Mito, UNDP



2. Objective of the meeting:

Validation of the Project Document stated above.

3. Final comments on the project document:

Pages	Topics	Recommendations/Suggestions
2	Fukuoka Method	Adding explanation on why we try Fukuoka Method.
3	Component 1	Illustrate that relevant local institutions will be invited to join the mission of Fukuoka Method and have a chance to learn the mission's technology.
3	Component 2	1) Include a statement that the IRST study result should be practical and feasible to be applied in the Rwandan context. 2) Add a statement that IRST facility after the study will become the prototype of high quality briquette production system.
3	Component 3	1) Illustrate the point that this component has a role to make clear who are the stakeholders. 2) Point out that Component 3 also discusses how to run the new/improved landfill facility. 3) At the action planning of Kigali City, role sharing between districts and the city also must be discussed.
4	Component 4	1) The statement on possible alternative solutions about how to deal with the landfill site issue should be included.

		<p>2) Also, which option will be taken should be decided by the Kigali City Authorities.</p> <p>3) The activities of this component should be done after conducting a proper environment impact assessment.</p> <p>4) The operator of the renovated or newly constructed facility should be well trained.</p>
5-6	Output targets	The targets need to be rephrased and be differentiated from the 'indicative activities'.
7-13	Annual work plan	The plan needs to be revised to 'Year 1 to 3' instead of 'Year 2009 to 2012'.
8-13	Timeframe	Add further explanation at blank parts that the activities are completed in previous years, or will be completed in coming years.
9-13	PMU budget	It should be smaller than 15% of the total project budget.
14	Membership of the steering committee meetings and TAC meetings	It must be stated that stakeholders newly found by the process of Component 3 must have a chance to join the meetings.
21-22	ToR	Gender concern must be shown on ToR.

The LPAC meeting concluded that, upon integration of the above comments, the project was recommended for approval, and the meeting expressed that the project should be signed and implemented as soon as possible.

Reporter: Toshikazu Mito, Environment Unit, UNDP

United Nations Development Programme

III. A Checklist for Use by the Project Appraisal Committee (PAC) in their Review of Project Documents

Note: In general, please use I. Checklist for Quality Programming above as applicable in the review of draft project documents. Other key questions which relate to project document format are highlighted below.

QUESTIONS	HIGH	MEDIUM	LOW	COMMENTS
1. Cover Page (to be signed by the Government, UNDP and Executing Entity)				
a- Is the RRF consistent with the programme priorities and strategy given in Part 3?	X			
b. Does the cover page contain all elements (e.g. expected outcomes and indicators, etc.) outlined in the standard project document format?	X			
2. Situation Analysis				
a. Has a capacity assessment been conducted?	X			
b- Is the RRF consistent with the programme priorities and strategy given in Part 3?	X			
c. Does the cover page contain all elements (e.g. expected outcomes and indicators, etc.) outlined in the standard project document format?	X			
d. Does the Situation Analysis provide a convincing rationale for the proposed project?	X			
e. Is it analytical and substantiated (or hyperlinked) by data/measurable indicators?	X			
f. Does the Situation Analysis articulate the project's link to the country programme document (CPD) and Country Programme Action Plan (CPAP) in the case of harmonized countries/global programme document (GPD)/regional programme document (RPD)? Does it state the problem to be addressed (e.g. in terms of needs for capacity development) and provide a reference to the relevant outcome in the CPD+CPAP/GPD/RPD?	X			
g. Does it explain the national institutional and legal framework and the intended beneficiaries of the project?	X			Limited past info
h. Does it mention references to the findings of relevant reviews or past evaluations?		X		
3. Strategy				
a. Does the project include clear capacity development strategy, programme components, outcomes and outputs?	X			
b. Does the project include strategies, programme components, outcomes, or outputs to address gender equality and women's empowerment? Does the project have a South-South cooperation component?	X			SS cooperation is beyond this project scope
c. Does the project strategy link to the CP/GP/RP and UIIDAF to the greatest extent possible (i.e. should outline the global/national strategy including the national commitment to achieving the outcome and UIN niche)?	X			
d. Does the project strategy provide explicit links to the broader country programme and UIIDAF strategies?	X			
e. Does the strategy explain how UNDP will support policy development, strengthen national capacities, and build partnerships to ensure that there are lasting results?	X			

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QUESTIONS	HIGH	MEDIUM	LOW	COMMENTS
f. For cost sharing projects, does the project strategy describe the rationale for donor assistance and how they support the outcomes?	X			
4. Results and Resources Framework (RRF)				
a. Does the RRF reflect the desired outcome and indicators as stated in the CPD?	X			
b. Are the outputs well defined? Do they correspond to products or services delivered by the project? Does each output include baseline and indicators?	X			
c. Does the RRF include annual output targets where necessary to clarify the scope and timing of the outputs?	X			
d. Are activities defined as results that can be measured?	X			
e. Have Atlas considerations been reviewed when defining the RRF? Will the RRF be easily transferable to the Atlas project management module?	X			
5. Annual Workplan				
a. Are the outputs well defined? Do they correspond to products or services delivered by the project? Does each output include baseline and indicators?	X			
b. Are activities defined as results that can be measured?	X			
c. Have Atlas considerations been reviewed when defining the AWP? Is the AWP output/activity structure consistent with the Atlas project setup?	X			
6. Management Arrangements				
a. Does the section on management arrangements explain the roles and responsibilities (including clarification on the accountability for resources) of the parties in carrying out, and oversight over, the project activities?	X			
b. Has a project Board (or equivalent) been defined with clear responsibilities? Are beneficiaries represented in the Board? Is the Project Assurance role properly defined? Is the role independent of the Project Manager?	X			
c. Are annexes (e.g., project cooperation agreements, TORs for staff or contracts if necessary) included?	X			
d. Does the section note the results of capacity assessments of the partners and how resources will be transferred (e.g., advances, reimbursement, direct payment, country office support services)?	X			
e. Does the section indicate measures for strengthening capacities where they are weak?	X			
7. Monitoring Framework and Evaluation				
a. Does the section on Monitoring and Evaluation describe how the key corporate principles for monitoring, measurement and evaluation will be applied?	X			
b. Is there a Communication and Monitoring plan (C&M plan) that describes how activities and outputs will be monitored, reviewed and evaluated, and by whom?	X			
c. Is the C&M plan developed as part of overall Country Programme monitoring and evaluation within the context UNDAF M&E plan?	X			

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QUESTIONS	HIGH	MEDIUM	LOW	COMMENTS
d. Is there a Quality Management table that describes how activities will be monitored and reviewed?	X			
e. Does the section articulate the types of communications and associated scheduling required during the project, as well as reporting requirements with stakeholders?	X			
8. Legal Context				
a. Have the standard legal clauses been applied in this project?	X			
9: ANNEXES				
a. Has the Risk Analysis been completed using the standard format?	X			
b. Have additional agreements, such as cost sharing agreements, project cooperation agreements signed with IIGOs (where the IIGO is designated as the implementing partner) been attached to the project document?			X	No such agreements