Response to pre-assessment queries submitted on 10 Feb 2011

Q1. Please provide detailed information on the "Existing Facility" and "New Facility" as mentioned in your query, e.g. the technology employed (an illustrative sketch/picture may be used), the designed load and the actual load (COD level of the inflow and out flow), treatment efficiency;

A1: Detail information about the Exiting Facility and the New Facility

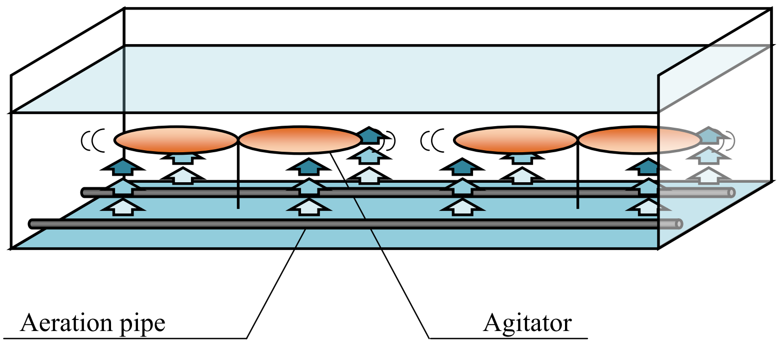
The Existing Facility is comprised of aeration function and agitation function.

The designed COD value of inflow is around 6,000mg/L. And then after the treatment, COD value of outflow is designed around 250mg/L. That means its treatment efficiency would be more than 95%. However, the actual COD value of inflow is around 18,000mg/L, very much high. So the treatment condition is under overloading.

Since COD value is not reduced to dischargeable value at one time, waste water is now being set back to inflow position and re-treated until the quality satisfies dischargeable value.

Therefore, we consider that only part of waste water is treated by aerobic in one cycle and the other parts are under anaerobic condition.

The New Facility is Upflow Anaerobic Sludge Blanket (UASB) and its treatment efficiency would be more than 85%. We will install the New Facility at the preliminary stage of the Existing Facility. As a result, COD value of inflow will be reduced to around 3,000 by the New Facility. After that, waste water with low COD value will be further treated by the Existing Facility under preferable and complete aerobic condition.



Q2. Please provide the preliminary calculation of the emission reductions of the proposed project activity, if it is available.

A2: Please see the calculation of emission reduction with regard to AMS-III.H.

Parameter	Description	Value	Source
$BE_{ww,treatment,y} = \sum_i (Q_{ww,i,y} * COD_{removed,i,y} * MCF_{ww,treatment,BL,i}) * B_{o,ww} * UF_{BL} * GWP_{CH4}$			
$BE_{ww,treatment,y}$	Baseline emissions of the wastewater treatment systems affected by the project activity in year y (tCO2)	Calculated	-

$Q_{ww,i,y}$	Volume of wastewater treated in baseline wastewater treatment system i in year y (m3)	4,015,000	Design flow rate (11,000m3/day * 365days)
$COD_{removed,i,y}$	Chemical oxygen demand removed by baseline treatment system i in year y (t/m3), measured as the difference between inflow COD and the outflow COD in system i	0.0139	Calculation (0.0140ton/m3 of COD * 99% of removal rate)
$MCF_{ww,treatment,BL,i}$	Methane correction factor for baseline wastewater treatment systems i (MCF values as per Table III.H.1)	0.3	AMS-III.H.Ver.15, Table III.H.1. for Aerobic treatment, overloaded
i	Index for baseline wastewater treatment system	-	-
$B_{o,ww}$	Methane producing capacity on the wastewater (tCH4/tCOD)	0.25	AMS-III.H.Ver.15, default value for COD
UF_{BL}	Model correction factor to account for model uncertainties	0.89	AMS-III.H.Ver.15, Model correction factor to account for model uncertainties
GWP_{CH4}	Global warming potential for methane (tCO2/tCH4)	21	AMS-III.H.Ver.15, Global Warming Potential for methane
$BE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{BL} * COD_{ww,discharge,BL,y} * MCF_{ww,BL,discharge}$			
$BE_{ww,discharge,y}$	Methane emissions from degradable organic carbon in treated wastewater discharged in e.g., a river, sea or lake in the baseline situation in year y (tCO2)	Calculated	-
$Q_{ww,y}$	Volume of wastewater treated in year y (m3)	4,015,000	Design flow rate (11,000m3/day * 365days)
$COD_{ww,discharge,BL,y}$	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the baseline situation in the year y (t/m3). If the baseline scenario is the discharge of untreated wastewater, the COD of untreated wastewater shall be used	0.0001	Calculation (0.0140ton/m3 of COD * 1% of removal rate)

$MCF_{ww,BL,discharge}$	Methane correction factor based on discharge pathway in the baseline situation (e.g. into sea, river or lake) of the wastewater (faction) (MCF values as per Table III.H.1)	0.1	AMS-III.H.Ver.15, Table III.H.1. for Discharge of wastewater to sea, river or lake

Parameter	Description	Value	Source
$PE_{ww,treatment,y} = \sum_k Q_{ww,k,y} * COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k} * B_{o,ww} * UF_{PJ} * GWP_{CH4}$			
$PE_{ww,treatment,y}$	Methane emission from the project wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in year (tCO2)	Calculated	-
$Q_{ww,k,y}$	Volume of wastewater treated in baseline wastewater treatment system k in year y (m3)	4,015,000	Design flow rate (11,000m3/day * 365days)
$COD_{removed,PJ,k,y}$	Chemical oxygen demand removed by project wastewater treatment system k in year y (t/m3), measured as the difference between inflow COD and the outflow COD in system k	0.0119	Calculation (0.0140ton/m3 of COD * 85% of removal rate)
$MCF_{ww,treatment,PJ,k}$	Methane correction factor for project wastewater treatment systems k equipped with biogas recovery equipment	0.8	AMS-III.H.Ver.15, Table III.H.1. for anaerobic reactor without methane recovery
k	Index for project wastewater treatment system	-	-
$B_{o,ww}$	Methane producing capacity oh the wastewater (tCH4/tCOD)	0.25	AMS-III.H.Ver.15, default value for COD
UF_{PJ}	Model correction factor to account for model uncertainties	1.12	AMS-III.H.Ver.15, Model correction factor to account for model uncertainties
GWP_{CH4}	Global warming potential for methane (tCO2/tCH4)	21	AMS-III.H.Ver.15, Global Warming Potential for methane
$PE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{PJ} * COD_{ww,discharge,PJ,y} * MCF_{ww,PJ,discharge}$			

$PE_{ww,discharge,y}$	Methane emissions from degradable organic carbon in treated wastewater in year y (tCO2)	Calculated	-
$Q_{ww,y}$	Volume of wastewater treated in year y (m3)	4,015,000	Design flow rate (11,000m3/day * 365days)
$COD_{ww,discharge,PJ,y}$	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the project situation in the year y (t/m3)	0.0001	Calculation (0.0140ton/m3 of COD * 1% of removal rate)

$$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$$

$$PE_{y,fugitive,ww} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$$

$$MEP_{ww,treatment,y} = Q_{ww,y} * B_{o,ww} * UF_{PJ} * \sum_{k} COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k}$$

$$PE_{y,fugitive,s} = (1 - CFE_{s}) * MEP_{s,treatment,y} * GWP_{CH4}$$

$$MEP_{s,treatment,y} = \sum_{l} (S_{PJ,l,y} * MCF_{s,treatment,PJ,l}) * DOC_{s} * UF_{PJ} * DOC_{F} * F * 16/12$$

$PE_{y,fugitive,s}$ is not relevant, as no sludge treatment facility.

$PE_{fugitive,y}$	Methane emissions from release in capture systems in year y (tCO2)	Calculated	-
$PE_{fugitive,ww,y}$	Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y (tCO2)	Calculated	-
CFE_{ww}	Capture efficiency of the biogas recovery equipment in the wastewater treatment systems	0.9	AMS-III.H.Ver.15, Capture efficiency of the biogas recovery equipment in the wastewater treatment systems
$MEP_{ww,treatment,y}$	Methane emission potential of wastewater treatment systems equipped with biogas recovery system in year y (tonnes)	Calculated	-

Data / Parameter:	$Q_{ww,i,y}$
Data unit:	m3/year
Description:	Volume of wastewater treated in year y
Source of data used:	Design flow rate (11,000m3/day * 365days)
Value applied:	4,015,000

Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is all of average amount of waste water generated from the cannery based on the feasibility study.
Any comment:	-

Data / Parameter:	$COD_{removed,BL,i,y}$
Data unit:	tonnes/m3
Description:	Chemical oxygen demand removed by baseline treatment system i in year y, measured as the difference between inflow COD and the outflow COD in system i
Source of data used:	Calculation (0.0140ton/m3 of COD * 99% of removal rate)
Value applied:	0.0139
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of COD of waste water generated from is average data in 2010 based on the feasibility study.
Any comment:	-

Data / Parameter:	$COD_{ww,discharge,BL,y}$
Data unit:	tonnes/m3
Description:	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the baseline situation in the year y
Source of data used:	Calculation (0.0140ton/m3 of COD * 1% of removal rate)
Value applied:	0.0001
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of COD of waste water generated from is average data in 2010 based on the feasibility study.
Any comment:	-

Data / Parameter:	$COD_{removed,PJ,k,y}$
Data unit:	tonnes/m3

Description:	Chemical oxygen demand removed by project activity treatment system k in year y, measured as the difference between inflow COD and the outflow COD in system k
Source of data used:	Calculation (0.0140ton/m3 of COD * 85% of removal rate)
Value applied:	0.0119
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of COD of waste water generated from is average data in 2010 based on the feasibility study.
Any comment:	-

Data / Parameter:	$COD_{ww,discharge,PJ,y}$
Data unit:	tonnes/m3
Description:	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the project activity situation in the year y
Source of data used:	Calculation (0.0140ton/m3 of COD * 1% of removal rate)
Value applied:	0.0001
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value of COD of waste water generated from is average data in 2010 based on the feasibility study.
Any comment:	-

Baseline emissions

$$BE_{power,y} = 1.1_{(MW)} * 24_{(hours)} * 320_{(days)} * 0.709_{(tCO2/MWh)}$$

$$= 5{,}989.6_{(tCO2/year)}$$

$$BE_{ww,treatment,y} = \sum_i (Q_{ww,i,y} * COD_{removed,i,y} * MCF_{ww,treatment,BL,i}) * B_{o,ww} * UF_{BL} * GWP_{CH4}$$

$$= 4{,}015{,}000_{(m3)} * 0.0139_{(tCOD/m3)} * 0.3 * 0.25_{(kgCH4/kgCOD)} * 0.89 * 21_{(tCO2/tCH4)}$$
$$= 78{,}004.4_{(tCO2/year)}$$

$BE_{s,treatment,y}$: There is no sludge treatment system takes place in the baseline.

$$BE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{BL} * COD_{ww,discharge,BL,y} * MCF_{ww,BL,discharge}$$

$$= 4{,}015{,}000_{(m3)} * 21_{(tCO2/tCH4)} * 0.25_{(kgCH4/kgCOD)} * 0.89 * 0.0001_{(tCOD/m3)} * 0.1$$
$$= 262.6_{(tCO2/year)}$$

$BE_{s,final,y}$: There is no sludge treatment system takes place in the baseline

Project emissions

$$PE_{power,y} = 1.25_{(MW)} * 24_{(hours)} * 320_{(days)} * 0.709_{(tCO2/MWh)}$$

$$= 6{,}806.4_{(tCO2/year)}$$

$$PE_{ww,treatment,y} = \sum_k Q_{ww,k,y} * COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k} * B_{o,ww} * UF_{PJ} * GWP_{CH4}$$

$$= 0.0_{(m3)} * 0.0139_{(tCOD/m3)} * 0.3 * 0.25_{(kgCH4/kgCOD)} * 0.89 * 21_{(tCO2/tCH4)}$$
$$= 0.0_{(tCO2/year)}$$

$PE_{s,treatment,y}$: There is no sludge treatment system installed in the project and no sludge treatment takes place.

$$PE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{PJ} * COD_{ww,discharge,PJ,y} * MCF_{ww,PJ,discharge}$$

$$= 4{,}015{,}000_{(m3)} * 21_{(tCO2/tCH4)} * 0.25_{(kgCH4/kgCOD)} * 1.12 * 0.0001_{(tCOD/m3)} * 0.1$$
$$= 330.5_{(tCO2/year)}$$

$PE_{s,final,y}$: There is no sludge treatment system takes place in the baseline

$$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$$

$$= 22{,}475.0_{(tCO2/year)}$$

$$PE_{y,fugitive,ww} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$$
$$= (1 - 0.9) * 10{,}702 * 21$$
$$= 22{,}475.0_{(tCO2/year)}$$

$$MEP_{ww,treatment,y} = Q_{ww,y} * B_{o,ww} * UF_{PJ} * \sum_k COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k}$$

$$= 4{,}015{,}000_{(m3)} * 0.25_{(kgCH4/kgCOD)} * 1.12 * 0.0119_{(tCOD/m3)} * 0.8$$

$PE_{flare,y}$: In general all of the biogas produced by the project is utilized electricity generation. A flaring system will be installed by the project activity to combust excess biogas if any. For the ex-ante calculation, methane emissions from the flare are set to zero.

Leakage

There is no leakage.

Emission reduction

The emission reduction is calculated as follows.

$$ER_y = BE_y - (PE_y + LE_y)$$

$$= 8,4256.7_{(tCO2/year)} - 29,611.9_{(tCO2/year)}$$
$$= 54,644.8_{(tCO2/year)}$$