Monitoring Plan for the N_2O Emission Reduction Project in Onsan, Republic of Korea

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1. The monitoring plan

This document serves as the Monitoring Plan (MP) for the Nitrous Oxide (N_2O) Emission Reduction Project in Onsan, Republic of Korea. The MP presents a plan to meet the requirements for the collection, processing and reporting of data required to fulfil the requirements in decision 17/CP.7, document FCCC/CP/2001/13/Add.2 of the Kyoto Protocol.
This MP describes management systems and procedures to be implemented by Rhodia Polyamide Co. Ltd (Korea) upon project implementation in order to ensure consistent project operation as well as monitoring, processing and reporting of data required for the calculation of emission reductions (ERs) taking into account AM0021 and the guidance presented in the Validation and Verification Manual.
If necessary, the MP can be updated and adjusted to meet operational requirements, provided such modifications are approved by a Designated Operational Entity (DOE) during the process of validation and/or verification.

2. Obligations of the adipic acid plant manager

It is the responsibility of the adipic acid plant manager to develop and implement a management and operational system that meets the requirements of this MP. Equally, it is the plant manager's responsibility to enter into appropriate agreements with local institutions to secure adequate data gathering, processing and recording.

3. Description of data required to be monitored

The MP foresees recording of the following parameters during project operation[1] in order to enable calculation of emission reductions from the project activity. In tables 1-3 they are described in detail. The tables also show the recording frequency of each parameter as given in AM0021.

Table 1: Parameters to be monitored for calculation of project emissions:

ID	Data variable	Source of data	Data unit	Recording frequency
Q_GE	Volume of effluent gas leaving the stack	Flow meter	m^3/h	Monthly
N_2O_GE	Concentration of N_2O in the effluent gas	Infra –Red online analyzer	ppm	Monthly
Q_NG	Amount of natural gas burned	Natural gas meter	Nm^3	Monthly
NGC	Natural gas composition required for calculation of E_NG[2]	Gas supplier	Volume ratio	Yearly
%_on-line	% of production time the position switches on the by-pass valves are open	Position switches on bypass valves	% of production time	Monthly

Table 2: Parameters to be monitored for calculation of baseline emissions:

[1] Some parameters will need to be monitored at the start of the project activity, see section 4 for details.

[2] AM0021 requires calculation of E_NG from Q_NG (see table D.2.1.1. in PDD). This MP uses the natural gas composition of the burned gas to calculate E_NG. Calculation of E_NG from the amount of gas burned is not possible.

ID	Data variable	Source of data	Data unit	Recording frequency
P_AdOH	Amount of adipic acid production	Log sheet for packaged product and DCS for silo inventory	t	Monthly
Nitric acid consumption (HNO3_consumption) & physical losses in the adipic acid production process (HNO_3_physical)	All data required for calculation of HNO_3 chemical[3]	Excel workbook based on the raw material consumption, DCS data and Lab data	-	Monthly
Q N_2O reg	Per Korean regulation allowed N_2O emissions	Korean regulation	kg[4]	Date when relevant legislation is in place
N_2O reg/AdOH	Per Korean regulation allowed N_2O emissions per kg of adipic acid produced	Korean regulation	kg/kg	Date when relevant legislation is in place
r_y	Per Korean regulation required share of N_2O emissions to be destroyed	Korean regulation	%	Date when relevant legislation is in place
P N_2O	Market price of N_2O	Estimated	€/t	Yearly
Q_Steam_p	Amount of steam produced by the decomposition process	Steam meter	kg	Monthly
Steam supplier data	All data required for calculation of E_Steam[5]	External steam supplier and steam properties	-	Yearly

Table 3: Parameters to be monitored for calculation of emissions due to leakage:

ID	Data variable	Source of data	Data unit	Recording frequency
Q_Power	Electric consumption of the decomposition facility	Electricity meter	kWh	Monthly
Electricity	All data required for	Korean Energy	-	Yearly

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[3] AM0021 requires calculation of N_2O_AdOH from the "chemical" consumption of nitric acid (see table D.2.1.3. in PDD). The chemical consumption of nitric acid can be established from the "physical" nitric acid losses. Hence, the physical losses in the adipic acid production process need to be measured.

[4] AM0021 requires monitoring of Q N_2O reg in the unit [kg] (see table D.2.1.3. in PDD). In this MP, Q N_2O reg will be measured in the unit [kg/a] as it can be assumed that the latter unit is more likely to be chosen by Korean authorities upon implementation of such legislation.

[5] AM0021 requires annual calculation of E_Steam (see table D.2.1.3. in PDD). However, a concrete methodology for calculation has not been specified. The procedure for calculation of E_Steam is provided in this MP in section 6.3.1, so is the required data for calculation of E_Steam. AM0021 requires yearly monitoring of E_Steam. In this MP we use a different approach that however will guarantee conservative results for E_Steam (for details see section 6.3).

grid data	calculation of E_Power according to AM0002[6]	Economics Institute		
Q_Steam_c	Amount of steam consumed by the decomposition facility	Steam meter	kg	Monthly
Steam suppliers data	All data required for calculation of E_Steam_c[7]	Internal & External steam suppliers	-	Yearly

4. Approach used in this monitoring plan

This MP has been designed to clearly separate data collection activities and ER calculation activities. Each activity follows its own organizational structures and procedures. ER calculation will be undertaken with a stand-alone Excel spreadsheet (in the following referred to as the „workbook“) which will be finalized upon project implementation.
Data collection activities have been designed to derive verifiable monthly and yearly values from the periodic measurements undertaken for each parameter that can be easily processed in a workbook for ER calculation.

After validation and after each reporting of emission reductions to the DOE the Adipic Acid Plant Manager will organize a meeting with all staff involved in the execution of MP. The purpose of the meeting will be the identification for corrective actions in the organizational structures and procedures in order to provide for more accurate future monitoring and reporting taking into account possible requests for improvements by the DOE. Findings of the meeting will be communicated to the DOE and alterations might be made to the MP in accordance with the DOE.

Section 5 outlines the organizational structures and procedures for collection, processing, review, storage and reporting of data required for ER calculation.

All parameters in table 1, 2 and 3 above will be measured during project operation, except for NGC. NGC will need to be monitored at the start of the crediting period (latest one month after the start), because the value is required for monthly calculation of E_NG as required by AM0021. Data on NGC will then be updated annually.

Data required for calculation of E_Steam will be monitored at the point of time of preparation of the first monitoring report[8].

The steam supplier data required for calculation of E_Steam_c will be monitored ex-post at the point of time of preparation of the monitoring report for the period covering the starting date of

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[6] AM0021 requires calculation of E_Power by using ACM0002 (see table D.3.2. in PDD). However, ACM0002 allows different approaches for calculation of the grid emission factor. Which approach will be used for calculation of E_Power is described in section 7.1. of this MP.

[7] AM0021 requires calculation of E_Steam_c (see table D.2.3.1. in PDD). However, a concrete methodology for calculation has not been specified. The procedure for calculation of E_Steam_c is provided in this MP in section 6.4., so is the required data for calculation of E_Steam.

[8] This is an alteration of AM0021 which requires yearly monitoring of E_Steam. In this MP we use a different approach that however will guarantee conservative results for E_Steam (for details see section 6.3).

the crediting period until the date of submission (maximum one year). The steam supplier data will then be updated ex-post at each establishment of the monitoring report.

The market price of N_2O will be established at the starting date of the crediting period and updated annually.

For calculation of ERs this MP follows the formulae specified in AM0021. All formulae will be incorporated in the workbook (for reference see Section D of the PDD). However, AM0021 does not contain specific formulae for calculation of E_NG, E_Steam and E_Steam c.
The formulae for calculation of those parameters as well as the related organizational structures and procedures are described in section 6.

For the purpose of clarity the formulae for calculation of HNO_3_chemical (N_2O_AdOH) as well as the related organizational structures and procedures are also described in section 6.

Section 7 describes the approach that will be used for calculation of E_Power and organizational structures and procedures for grid data collection.

Section 8 describes the organizational structures & procedures for calculation of ER as well as review, storage and reporting of the ER calculation results.

Section 9 describes different protocols to be prepared during project implementation (e.g. training protocol).

5. Description of organizational structures & procedures for collection, processing, review, storage and reporting of data

The following table provides detailed information on the organizational structures & procedures for collection, processing, review, storage and reporting of data during operation of the project activity.

Table 4: Organizational Structures and Procedures for Monitoring, Processing, Review, Storage and Transfer

Parameters		**Project emissions**					**Baseline emissions**	
		Q_GE	**N_2O_GE**	**Q_NG**	**NGC**	**%_online**	**P_AdOH**	**Nitric acid consumption (HNO3_consump-tion) & physical losses in the adipic acid production process (HNO_3_physical)**
Monitoring of raw data	Responsible person at Rhodia	Production Engineer	Production Engineer	Production Engineer	Production Engineer	Production Engineer	Production Engineer	Production Engineer
	Data source	Digital Control System	Digital Control System	Natural gas meter	Natural gas supplier	Digital Control System	Supply Chain Engineer	Digital Control System, Lab Server and Supply Chain Engineer
	Frequency of data collection	Daily	Daily	Daily & Monthly	Yearly	Daily	Daily/ Monthly	Daily/ Monthly[9]
	Data format	Electronic	Electronic	Paper for monthly and electronic for daily	Paper	Electronic	Paper or electronic	Paper or electronic
	Procedures for maintenance and calibration of monitoring equipment	See calibration and maintenance protocol in section 9.	See calibration and maintenance protocol in section 9.	See calibration and maintenance protocol in section 9.	Not applicable	See calibration and maintenance protocol in section 9.	See calibration and maintenance protocol in section 9.	See calibration and maintenance protocol in section 9.
Data processing	Responsible person at Rhodia	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer
	Description of procedure	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording
	Frequency of processing	Daily	Daily	Daily	Yearly	Daily	Daily	Daily
	Format after processing	Excel	Excel	Excel	Excel	Excel	Excel	Excel
	Data storage at source	10 years	10 years	10 years	10 years	10 years	10 years	10 years
Data review	Responsible person at Rhodia	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager

[9] To closely monitor the nitric acid consumption of the plant on a daily basis, one needs to take into account variation of the plant hold-up (in process content volume with different specific concentration that is not included in the daily recorded data). On a daily basis this can represent may be a couple of tons variation. Over a monthly period the impact of such a variation of plant hold-up is divided by a ratio of 30 and can be neglected in the overall calculation. And as we will use those data quarterly or annually, the impact of those in process plant data variation is divided by 90 or 365, which justifies the fact that we neglect them in the data monitored daily.
This applies also to the adipic acid production (very accurate daily production would require in-process storage variation) Over a month period those variations can be neglected and the impact of accuracy of the silo content is largely improved as this represent only a small share of the total figure.

	Description of procedure	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.
Monthly/Yearly aggregation of data	Responsible person at Rhodia	Process engineer	Process engineer	Process engineer	Not applicable	Process engineer	Process engineer	Process engineer
	Description of procedure	Aggregates the daily measurements to monthly value and saves it in electronic format	Aggregates the daily measurements to monthly value and saves it in electronic format	Aggregates the daily measurements to monthly value and saves it in electronic format	Not applicable	Aggregates the daily measurements to monthly value and saves it in electronic format	Aggregates the daily measurements to monthly value and saves it together with the more accurate monthly value supplied by process engineer in electronic format	Aggregates the daily measurements to monthly value and saves it together with the more accurate monthly value supplied by process engineer in electronic format
Data storage of aggregated data	Responsible person at Rhodia	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer
	Frequency of storage	Monthly	Monthly	Monthly	Yearly	Monthly	Monthly	Monthly
	Format of data stored	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version
	Duration of storage	10 years	10 years	10 years	10 years	10 years	10 years	10 years
	Location of data stored	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room

Table 4 (continued): Organizational Structures and Procedures for Monitoring, Processing, Review, Storage and Transfer

Parameters		**Baseline emissions**			**Emissions due to leakage**			
		P N_2O	**Q_Steam_p**	**Steam supplier data**	**Q_Power**	**Electricity grid data**	**Q_Steam_c**	**Steam supplier data**
Monitoring of raw data	Responsible person at Rhodia	Production Engineer	Production Engineer	Production Engineer	Production Engineer	Production Engineer	Production Engineer	Production Engineer
	Data source	Estimate of South Korean independent expert	Digital Control System	Steam supplier	Electricity meter	Korean Energy Economics Institute	Digital Control System	Steam Supplier
	Frequency of data collection	Yearly	Daily	Yearly	Daily	Yearly	Daily	Yearly
	Data format	Paper or Electronic	Electronic	Paper	Paper or Electronic	Paper or Electronic	Electronic	Paper
	Procedures for maintenance and calibration of monitoring equipment	Not applicable	See calibration and maintenance protocol in section 9.	Not applicable	See calibration and maintenance protocol in section 9.	Not applicable	See calibration and maintenance protocol in section 9.	Not applicable
Data processing	Responsible person at Rhodia	Process Engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer
	Description of procedure	Not applicable	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording	Consistency check, validation and recording
	Frequency of processing	Yearly	Daily	Yearly	Daily	Yearly	Daily	Yearly
	Format after processing	Excel	Excel	Excel	Excel	Excel	Excel	Excel
	Data storage at source	10 years	10 years	10 years	10 years	10 years	10 years	10 years
Data review	Responsible person at Rhodia	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager	Adipic Acid Plant Manager
	Description of procedure	-	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.	See data review protocol in section 9.
Monthly/Yearly aggregation of data	Responsible person at Rhodia	Not applicable,	Process engineer	Not applicable	Process engineer	Not applicable	Process engineer	Not applicable
	Description of procedure	Not applicable,	Aggregates the daily measurements to monthly value and saves it in electronic format	Not applicable	Aggregates the daily measurements to monthly value and saves it in electronic format	Not applicable	Aggregates the daily measurements to monthly value and saves it in electronic format	Not applicable
Data storage of aggregated data	Responsible person at Rhodia	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer	Process engineer
	Frequency of storage	Yearly	Monthly	Yearly	Monthly	Yearly	Monthly	Yearly

	Format of data stored	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version	Electronic (Excel) and paper version
	Duration of storage	10 years	10 years	10 years	10 years	10 years	10 years	10 years
	Location of data stored	Electronic version: server Paper version: Archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: Archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room	Electronic version: server Paper version: archive room

6 Description of organizational structures & procedures and formulae for calculation of E_NG, HNO_3_chemical, E_Steam and E_Steam_c

6.1. E_NG:

The formula required for calculation of E_NG is:
E_ NG = (CO_2 specific gravity in standard state) × (average number of C in a molecule of natural gas)

At standard conditions (0°C, 1atm.) the CO_2 specific gravity is: $44.01\times10^{-3} / 22.4 = 1.965\times 10^{-3}$ [t CO_2/Nm3]

The average number of C in a mole of natural gas can be obtained by using the formula:
Average number of C in a mole of NG = Σ (number of C in each mole) × (volume ratio)

The volume ratio for each component will be obtained from the natural gas supplier. The number of C in each mole is determined from the chemical formula of each component.

Due to certain requirements described in section 4 the parameter E_NG will need to be calculated at the start of the crediting period (latest one month after the start). The production engineer will collect the NGC from the natural gas and document the date of collection. The process engineer monthly calculates E_NG (starting with the month after the start of the crediting period) The calculations and the E_NG value will be documented in both electronic and paper format by the process engineer and data review and storage follows the same procedure as for the NGC as described in table 4.
The production engineer will collect new data on the NGC from the natural gas supplier one year after the collection of the old data, records the collection date and this data will then be used for calculation of E_NG by the process engineer.

6.2. HNO_3_chemical

The N_2O emission factor can be calculated using the following formula:

N_2O_/ AdOH = HNO_3_chemical / P_AdOH / 63 / 2 × 0.96 × 44

Where HNO_3_chemical is the "chemical consumption" of nitric acid, HNO_3, in the adipic acid production process.

HNO_3_chemical can be calculated using the following formula:

HNO_3_chemical = HNO_3_consumption - HNO_3_physical

Where:
HNO_3_consumption is the total consumption of nitric acid for the production of adipic acid
HNO_3_physical is the summation of the following losses:

- nitrates contained in the aqueous waste (monitored for waste water regulation);
- nitrates in the by-products (glutaric acid, succinic acid) (monitored for quality);

- nitrates in the adipic acid production (monitored for quality control);
- NOx in the reaction off gases (monitored for air regulation)

At the Rhodia plant the physical losses are continuously monitored for environmental and quality purposes. Data are on the Digital Control System (DCS) or the lab server. HNO_3_physical is calculated daily and monthly. The monthly HNO_3_physical value will be used for monthly calculation of HNO_3_chemical (see Table 4).

6.3. E_Steam:

The production of steam by the decomposition unit will induce a reduction of 6 bar steam production in the existing natural gas boilers at the Onsan plant and 3 bar steam production in the currently coal-fired co-gen plant at an external supplier facility.

There is no easy way to calculate how the steam production will affect those 2 steam producers as steam is supplied to other users whose activity is not related to adipic acid production. What is more, due to reasons of confidentiality the external steam supplier is not prepared to reveal data required for calculation of the emission factor of his steam.

As a conservative approach we assume that all substituted steam is generated by a highly efficient state-of the-art natural gas condensing boiler with an operational efficiency of 97 % (30°C flue gas temperature).

The amount of natural gas (Q_{NG}) required for producing one t of steam can be obtained from the formula:
Q_{NG_tsteam} (Nm^3/ t of steam) = ΔH (kcal/t) / LHV (kcal/Nm^3) × η (%)

Where
ΔH is the energy required to produce steam (at given pressure and temperature) from the boiler feed water (of a given pressure and temperature) which can be obtained from the steam table,
LHV refers to the lower heating value of the natural gas and
η is fixed at 0.97.

E_Steam can then be calculated using the following formula:
E_Steam = Q_{NG_tsteam} (Nm^3/ t of steam) × E_NG [t CO_2/Nm^3]

Where E_NG is the emission factor of natural gas calculated as described in 6.1.

As detailed information on the steam properties of steam from the decomposition facility is not yet known, E_Steam will be calculated according to the above procedure upon first establishment of the monitoring report. It will then be fixed for the remaining crediting period.

The production engineer will collect the data on the steam and feed water properties and document the date of collection. The process engineer then calculates E_Steam. The calculations and the E_Steam value will be documented in both electronic and paper format by the process engineer and data review and storage follows the same procedure as for the NGC as described in table 4.

6.4. E_Steam_c:

E_Steam_c will need to be calculated ex-post at the point of time of preparation of the monitoring report for the period covering the starting date of the crediting period until the date of submission (maximum one year). Calculation of E_Steam follows the rationale and the procedure outlined below.

The steam inlet of the decomposition facility will be connected to the 6 bar steam network at the Rhodia Polyamide plant. Hence, all steam consumed in the decomposition facility will be generated by the existing plant boilers which are fired by natural gas.

The gas volume Q_{NG_tsteam} (Nm^3/ t of steam) required for generating one tonne of steam at 6 bars is obtained by dividing the consumption of natural gas in the boiler Q_{NG} (Nm^3) by the production of steam of those boilers Q_{steam} (t) as shown in the following formula:

$$Q_{NG\_tsteam,\,t}\ (Nm^3/\ t\ of\ steam) = Q_{NG,\,t}\ (Nm^3)\ /\ Q_{steam,\,t}\ (t)$$

Where t is the period covering the starting date of the crediting period until the date of submission of the monitoring report (maximum one year).

E_Steam_c can then be calculated taking into account the CO_2 emission factor of natural gas as shown in E.1.:

$$E\_\ Steam\_c_{\,t}\ (t\ CO_2/\ t\ steam) = Q_{NG\_tsteam,\,t}\ (Nm^3/\ t\ of\ steam) \times E\_NG\ (CO_2/Nm^3)$$

Where t is the period covering the starting date of the crediting period until the date of submission of the monitoring report (maximum one year).

The production engineer will collect all data required for calculation of E_steam_c and document the date of collection. The process engineer then calculates E_Steam_c. The calculations and the E_Steam_c value will be documented in both electronic and paper format by the process engineer and data review and storage follows the same procedure as for the NGC as described in table 4.

7 Description of approach for calculation of E_Power and organizational structures and procedures for grid data collection

7.1. Approach for calculation of E_Power

Data availability in South Korea

The Korean state-owned electricity utility, Korea Electric Power Corporation (KEPCO), which holds the required data for calculation of electricity emission factor using the combined margin (CM) approach according to ACM0002, does not supply the required plant-specific data required for build margin (BM) calculation due to confidentiality agreements with the power plant operators.

The only official Korean source which holds data on the Korean grid and makes it publicly available is the Korean Energy Economics Institute (KEEI). The data can be accessed at http://www.keei.re.kr/keei/frame/eng_statyear.html.

With the KEEI data only the Simple OM according to ACM0002 can be calculated[10].

Formula for calculation of E_Power

The following formula will be used for annual ex-post calculation of E_Power in year(s) y of the project activity.

$$E\_Power\ (y) = \frac{\sum_{i,j} F(i,j,y) \cdot COEF(i,j)}{\sum_{j} GEN(j,y)}$$

Where
F(i,j,y) the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y,
j refers to the power sources delivering electricity to the grid, not including low-operating costs and must-run power plants, and including imports to the grid
COEF(i,j,y) is the CO_2 emission coefficient of fuel i (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y, and
GEN(j,y) is the electricity (MWh) delivered to the grid by source j.

The CO_2 emission coefficient COEF(i) is obtained as

COEF(i) = NCV(i) * $EFCO_2$(i) * OXID(i)

where:
NCV(i) is the net calorific value (energy content) per mass or volume unit of a fuel i,
OXID(i) is the oxidation factor of the fuel
$EFCO_2$(i) is the CO_2 emission factor per unit of energy of the fuel i.

Vintage of data

Vintage of data used will be the most recent yearly data available at the KEEI website at the point of time of annual calculation of E_Power. As soon as data is available from KEPCO the MP will be altered to facilitate calculation of the CM grid emission factor under consultation of the verifying DOE at the next point in time calculation of E_Power is due.

Electricity imports

South Korea does not have an electricity interconnection with any other country. This situation is unlikely to change over the crediting period. If so, the MP will be adjusted in order to integrate potential electricity imports into the calculation of E_Power.

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[10] However, the simple OM emission factor can be assumed to be conservative as it will lead to a higher emission factor as the CM emission factor because the BM will contain non-thermal electricity generation.

NCV and EFCO₂

Plant-specific data on the NCV and the $EFCO_2$ is not available in South Korea. IPCC Good Practice Guidance values will be used, if available. Otherwise IPCC world-wide default values will be used. The values will be established during first calculation of E_Power. Once established they will be fixed for the remaining period of the crediting period.

Determination of low-operating costs and must-run power plants

Low-operating costs and must-run power plants are nuclear power plants, hydro power plants and all renewable energy power plants.

7.2. Organizational structures & procedures for data collection, processing, review, storage and transfer for calculation of E_Power

The production engineer annually, upon determination of E_Power, checks if data for calculation of the combined margin emission factor is available at KEPCO. If no such data is available he follows the procedure outlined in table 4.
If the required data for calculation of the combined margin emission factor is available the production engineer reports the availability to both the process engineer and the Adipic Acid Plant Manager. The Plant Manager informs the verifying DOE and this MP will be altered under consultation of the verifying DOE in order to cater for calculation of the combined emission factor according to ACM0002.

8 Description of organizational structures & procedures for calculation of emission reductions as well as review, storage and reporting of the ER calculation results

Calculations of ERs are carried out by the Process Engineer in monthly intervals by utilisation of the excel-based workbook which is to be finalized upon project implementation.
The Process Engineer must retain a copy of every month’s workbook. Each month’s workbook must be saved on the plant server under a unique name reflecting the month for which monitoring has been carried out and hard copies of the workbook shall be printed out, signed by the Adipic Acid Plant Manager in accordance with company procedures, and stored in the archive room. In addition, after each data entry and/or modification of the workbook, electronic copies of the workbook shall be saved under a new name, and hard copies shall be signed and stored safely. Quarterly and yearly summaries are calculated based on the monthly results.
The workbooks serve as a data base for the periodic reporting of ERs to the verifying DOE. After completion of the workbook the ER results are reviewed according to the procedures laid out in the data review protocol.
The Adipic Acid Plant Manager is responsible for the declaration of the ERs, at a frequency to be fixed later during project implementation.

9. Organizational structures & procedures during project implementation

Before the start of the crediting period the Adipic Acid Plant Manager will develop the following protocols which functions are described below, based upon the organizational structures & procedures described in this MP.

Data handling protocol

The establishment of a transparent system for the collection, computation and storage of data, including adequate record keeping and data monitoring systems is required. It is the The Adipic Acid Plant Manager's responsibility to ensure implementation of a protocol that provides for these critical functions and processes. For electronic-based and paper-based data entry and recording systems, there must be clarity in terms of the procedures and protocols for collection and entry of data, usage of the spreadsheets and any assumptions made, so that compliance with requirements can be assessed by the DOE. Stand-by processes and systems, e.g. paper-based systems, must be outlined and used in the event of, and to provide for, the possibility of systems failures.

Training protocol

It is the The Adipic Acid Plant Manager's responsibility to ensure that the required capacity and internal training is made available to assigned staff, to enable them to undertake the tasks required by this MP. All staff involved in any of the procedures will be trained before the start of the crediting period in order to perform the tasks specified in this MP. For this purpose a training protocol will be prepared.

Calibration and maintenance protocol

It is the The Adipic Acid Plant Manager's responsibility to ensure that the per manufacturers specifications required calibration and maintenance procedures for all measurement instruments relevant for monitoring the parameters included in this MP are followed. A calibration and maintenance protocol will be established for this purpose.

Data review protocol

It is the The Adipic Acid Plant Manager's responsibility to prepare a data review protocol that in case of failure of an instrument, or non-consistency of the data, enables staff to adjust the data according to the procedures outlined in this protocol. The data review protocol shall also include procedures for emergency preparedness for cases where emergencies can cause unintended emissions.

Data review protocol

It is the The Adipic Acid Plant Manager ´ responsibility to prepare a data review protocol that in case of failure of an instrument, or non-consistency of the data, enables staff to adjust the data according to the procedures outlined in this protocol. The data review protocol shall also include procedures for emergency preparedness for cases where emergencies can cause unintended emissions.