JCM Sustainable Development and Safeguards Assessment Report

Project description	
Title	Power Generation by Waste Heat Recovery in Cement Industry
Project participant (Thai)	Siam City Power Company Limited
Project participant (Japanese)	NTT Data Institute of Management Consulting, Inc.
Project location	99 Moo 9 and 219 Moo 5, Mitraparb Road Km. 129-131 Tambon Tabkwang, Amphor Kangkoy, Saraburi Province 18260 Thailand
Latitude, longitude	N14° 37'24.8" and E101° 05'43.7"
Project status	Operated since 18th March 2018

Report description		
Date of report completion	February 3, 2025	
Version	01.0	
Corresponding author	Name	Motoshi Muraoka
	Title	Executive Officer
	Organization	NTT Data Institute of Management Consulting, Inc.
	Telephone	[redacted]
	E-mail	

Note:

- Related figures, documents, evidence related to the description may be attached as attachment.
- In the case where there is any other relevant issue that needs to be considered, it is be specified in the last row of each area of assessment.

Certification letter

3/2/2025

I, the undersigned, hereby certify that NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc. is the author of the "Sustainable Development and Safeguards Assessment Report" of the project titled Power Generation by Waste Heat Recovery in Cement Industry developed by NTT Data Institute of Management Consulting, Inc. and Siam City Power Company Limited located at 99 Moo 9 and 219 Moo 5, Mitraparb Road Km. 129-131 Tambon Tabkwang, Amphor Kangkoy, Saraburi Province 18260 , Thailand

The report was prepared by the team members as follows:

No.	Name	Position	Signature
1	Motoshi Muraoka	Executive Officer	[redacted]
2	Manabu Horiuchi	Manager, Eco Business Support Center	
3	Suwicha Nummeechai	Chief WHR Operation Siam City Power Company Limited	

Signature [redacted]

(Motoshi Muraoka)

Position Executive Officer

Seal (if any)

Part 1: General information of the project area before project implementation

Provide baseline information describing the conditions before project implementation. This data is essential for assessing the project's environmental, social, and economic impacts. Ensure the details are accurate and comprehensive to support a thorough evaluation.

Area of Assessment	Description
1. Environment and natural resources	
1.1 Air pollution	The project has no point source of air pollution found in the area. The ambient air quality consistently met the standards.
1.2 Water pollution	No surface water and ground water pollution problem were reported in the area.
1.3 Soil pollution	No soil pollution was reported in the area.
1.4 Noise pollution	No point sources of noise pollution were found in the area.
1.5 Odor pollution	No odor was reported in the area.
1.6 Water consumption	Cement plant consume deep well and water consumption was limited and controlled by legal of Department of groundwater resources.
1.7 Solid waste/municipal solid waste	Generated waste by cement plant will be managed and transferred to AF (Alternative Fuel) for Kiln. We use RDF3 as AF for secondary combustion for Kiln. We already started AF usage since Year 2005.
1.8 Hazardous waste/infectious waste/electronic waste	No pollution from hazardous waste/infections waste/electronic waste was reported in the area.
1.9 Energy (i.e. Wasted Energy, Renewable Energy)	Prior to project implementation, cement plant receive electricity from PEA.
1.10 Land Use	Cement plant has permitted to use land under right concession and permit.
1.11 Biodiversity	Prior to project implementation, this area was open land, and it did not affect biodiversity.
1.12 Wild animal/ Aquatic ecosystem	No wild animal or aquatic ecosystem is found in the area.
1.13 Other (Please specify…)	-
2. Society	
2.1 Socio-cultural characteristics	Population: The majority of the population are Thais who practice Buddhism. But there are other ethnic

Area of Assessment	Description
	groups. Living together, such as Lao Wiang, Lao Phuan, Lao Ngaeo, Thai Yuan, Mon, and others. The people of Saraburi Province live together peacefully and respect each other's cultural differences. There are many educational institutions in the province such as Government schools, Private schools and Universities. Most of the population is engaged in agriculture, trading, and contract work.
2.2 Health and safety	There is no major concern in term of health and safety in the area.
2.3 Traditions, cultures and/or valuable places worthy of conservation	The tradition and cultural values of the people in the area which are valuable such as Songkran festival, Loy Krathong festival etc.
2.4 Race, religion, and ethnic group	The most of population in the area are of Thai origin is Buddhist. There is a small group informal foreign workers from neighboring countries. Although Saraburi Province has a diverse population of races, religions and ethnicities. But everyone lives together peacefully and respects each other's cultural differences.
2.5 Transportation	Primary mode of transportation in the area is private vehicles (cars, trucks and motorbikes). There is also a use local public transport such as train, buses, vans.
2.6 Other (Please specify…)	
3. Economic	
3.1 Overall local economy (i.e. income, expenditure, etc.)	Main occupation: It was found that most of the interviewees were engaged in trading/private business at 41.1%. Most of the interviewees stated that 95.4% did not have any additional occupations, and there were some interviewees who had additional occupations, 4.6%, with secondary occupations/additional occupations for the total monthly income of the family, most of the interviewees stated that Have an income between 15,001 – 20,000 baht/month.
3.2 Employment/Career	Office employee, merchants, factory worker, and farmers etc.

Area of Assessment	Description
3.3 Major agricultural activity in the area	Corn, cassava, rice etc.
3.4 Major industry in the area	Cement manufacturing
3.5 Major service sector in the area	Food service
3.6 Basic infrastructure (i.e. road, school, etc.)	Road, hotel, school, hospital
3.7 Other (Please specify…)	-

**Project Participant explains in detail of provenance and importance of issue consider about before project implement and specify if the project is rightful/environmental law, social, and economy. To have Negative impact assessment (Do-no-net-harm) with supporting documents.*

Part 2 Sustainable Development Goals

2.1 Sustainable Development Contributions Assessment

*Please mark ✓ in ☐ to identify the contributions of the proposed project to specific SDG. The project is required to contribute to **at least two SDGs, in addition to** SDG13: Climate Action.*

Project Contributions to SDGs	Indicator (Please specify)	Description of Indicator
☐ SDG 1: No Poverty		
☐ SDG 2: Zero Hunger		
☐ SDG 3: Good Health and Well-being		
☐ SDG 4: Quality Education		
☐ SDG 5: Gender Equality		
☐ SDG 6: Clean Water and Sanitation		
☐ SDG 7: Affordable and Clean Energy		
☑SDG 8: Decent Work and Economic Growth	Amount of energy saved (Unit MWh)	Energy saving reduces costs and contributes to economic outputs.
☐ SDG 9: Industry, Innovation and Infrastructure		
☐ SDG 10: Reduced Inequality		
☐ SDG 11: Sustainable Cities and Communities		
☑SDG 12: Responsible Consumption and Production	Amount of generated electricity (Unit MWh) .	Save internal energy consumption and maximize net power output.
☐SDG 13: Climate Action		
☐ SDG 14: Life Below Water		
☐ SDG 15: Life on Land		

Project Contributions to SDGs	Indicator (Please specify)	Description of Indicator
☐ SDG 16: Peace and Justice Strong Institutions		
☑ SDG 17: Partnerships to achieve the Goal	Last progress report submission date	Operational continuity of the JCM project, which mobilizes additional financial resources, disseminates low-carbon technologies, and reduces GHG emissions in Thailand

**Project Participant provides the description for each indicator of the selected SDGs and presents currently available datasets along with supporting documents.*

2.2 Details on Monitoring Parameters for Demonstrating SDG Contributions

Provide details on how to monitor the indicators identified in Section 2.1.
(Tables can be added based on the number of selected SDGs.)

SDG Number	SDG8
SDG Target	Decent Work and Economic Growth
Variable or Indicator	Amount of Energy Saved (Unit MWh)
Duration/Frequency	Quarterly
Method/Tool	Data calculation from meter
Responsible person	Staff of Siam City Power Company Limited

SDG Number	SDG12
SDG Target	Responsible Consumption and Production
Variable or Indicator	Amount of Generated Electricity (Unit MWh) Self-station service ratio, Net power output 1) Self-station service ratio (SSC) <SSC = SCE / GPO x 100> 2) Net Power Output (NPO) <NPO=Gross Power Output (GPO) ー Self-consumption electricity (SCE)> Monitor and control SSC less than 13% and Submit monthly energy report including NPO

Duration/Frequency	Monthly
Method/Tool	record
Responsible person	Staff of Siam City Power Company Limited

SDG Number	17
SDG Target	Partnerships to achieve the goal
Variable or Indicator	Last annual progress report submission date
Duration/Frequency	Yearly
Method/Tool	-
Responsible person	Staff of NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

Part 3 Do no net harm

3.1 'Do no net harm' Risk Assessment and Safeguards

Specify impacts and mitigation plans to mitigate negative impacts.

Potential Impact of Project Activity	Severity Level of Impact				Description of Impact	Action Plan to mitigate harmful impacts
	None	Low	Moderate	High		
1. Impacts on Environment and Natural Resources						
1.1 Physical resources						
Water pollution	/					
Soil pollution	/					
Air pollution	/		☑		Particulate matter, and NOx emissions are expected from the machine.	The project consistently operates the machine under standard conditions as outlined in the technical specifications, ensuring the emissions have never exceed air quality standards during normal operation.
Noise pollution	/		☑		Some noise will be caused by the operation of the machine.	The machine will be operated at the sound pressure level of 85 dB according to the standard. In any area where the sound level exceeds the specified limit, signs will be posted to enforce the use of hearing protection.
Odor pollution	/					

Potential Impact of Project Activity	Severity Level of Impact				Description of Impact	Action Plan to mitigate harmful impacts
	None	Low	Moderate	High		
Soil erosion, coastal/river erosion	/					
Vulnerability to natural disaster	/					
Other	-					
1.2 Waste management						
Increase in solid waste/municipal solid waste	/					
Increase in hazardous waste such as waste contaminated with oil, chemicals and used oil etc.	☑/				1. Chemical drum 2. Cloth gloves (contaminate oil)	Background: 1) Chemical drums are utilized for the chemical treatment of cooling water and boiler systems. Empty drums are subsequently disposed of by 3rd parties in compliance with Thai regulatory requirements. 2) Cloth gloves are generated by maintenance activities such as PM, Machine repair etc. The used cloth glove will be disposed as compliance with Thai regulatory requirement. 1. We implement drum less method (Vendor will rotate chemical drum for usage.

Potential Impact of Project Activity	Severity Level of Impact				Description of Impact	Action Plan to mitigate harmful impacts
	None	Low	Moderate	High		
						2. Collect cloth gloves, then send them to a company that provides legal disposal services.
Increase in infectious waste	/					
Increase in electronic waste	/					
Other	-					
1.3 Biological resources						
Impacts on forest areas and land-use change	/					
Loss of land and wildlife ecosystem	/					
Loss of water resources and aquatic ecosystem	/					
Foraging	/					
Food	/					
Other	-					
1.4 Human livelihood						
Water drainage or waterway diversion	/					

Potential Impact of Project Activity	Severity Level of Impact				Description of Impact	Action Plan to mitigate harmful impacts
	None	Low	Moderate	High		
Change in water consumption	/					
Change in land ownership	/					
Other	-					
2. Social impacts						
Public security such as increase in crime risks	/					
Health impacts	/					
Relocation or temporary/permanent loss of land	/					
Loss of housing	/					
Impact on public utilities such as electricity, telephone service etc.	/					
Impact on traffic	/					
Community conflict	/					
Employment and labor	/					
Impact on people of certain race, religion and ethnic groups	/					

Potential Impact of Project Activity	Severity Level of Impact				Description of Impact	Action Plan to mitigate harmful impacts
	None	Low	Moderate	High		
Damage to areas of high conservation value, such as religious sites, historic sites, monuments, important places of the community etc.	/					
Impact on human rights such as education, freedom of thought, religion etc.	/					
Gender inequality such as in employment opportunities, salary, promotion, benefits, termination of contract etc.	/					
Other	-					
3. Economic impacts						
Increase unemployment /loss of income of people in local communities	/					
Other						

**Criteria for assessing the level of impact severity*

1. None: The proposed activity has no direct/indirect impacts on the environment, society and economy.

2. Low: The proposed activity causes some changes to the existing conditions but has no implication on the quality of the environment, society and economy. The impact is short-lived and temporary, and the extent of the affected area is not large (1km perimeter).

3. Moderate: The proposed activity causes some changes to the existing conditions and has implications on values or qualities of the environment, society and economy. The impact is short-lived and temporary. The extent of the affected area is large but confined to the related area (2km perimeter).

4. High: The proposed activity causes some changes to the existing conditions and has implications on value or quality of the environment, society, economy, and potentially the ecosystem. The impact is permanent and the extent of the affected area id extensive (3km perimeter).

3.2 Details on Monitoring Parameters for Ensuring No Negative Impacts

Provide details on how to monitor the impacts identified in Section 3.1.

(Tables can be added based on the number of negative impacts identified)

Category of negative impact	Environmental impact
Subcategory of negative impact	Air Pollution **Air Pollution Impacts** **Human Health:** Fine particulate matter (PM2.5, PM10) from cement plants causes respiratory issues (irritation, cough, difficulty breathing etc.). **Environmental:** Cement production's CO2 emissions drive climate change (global warming, sea level rise, extreme weather). **Ecosystems:** Acid rain and pollution damage habitats (forests, vegetation, wildlife), causing biodiversity loss. **Economic/Social:** Pollution-related illnesses raise healthcare costs.
Vulnerable group	• Nearby communities within 5 km • Workers in the surrounding areas
Possible negative impact	• Respiratory issues • Community complaints • Deterioration of air quality
Parameter/indicator	<u>Source (Stack emission)</u> • Total Suspended Particulate (TSP) < 50 mg/m3 • SO_2, < 30 ppm • Nox <500ppm <u>Occupational Health (Workplace)</u> • TD (Total Dust) • RD (Respirable Dust)
Reference	<u>Stack emission</u> • Notification of the Ministry of Industry: Specified contaminated substance in the emission from the cement plant, dated October 31, 2006, published in the Government Gazette, Vol. 123, Special Section 125 Ngor., dated December 4, 2006 (Effective from December 5, 2006)

<table>
<tr><td></td><td>

- Notification of the Ministry of Natural Resources and Environment: Specified control standards of emission from cement plant using waste as fuel or raw material in the production process, dated November 8, 2006, published in the Government Gazette, Vol. 123, Special Section 125 Ngor., dated December 15, 2006 (Effective from December 16, 2006)

<u>Workplace</u>

- Notification of the Ministry of Industry: Safety measures for industry related to the workplace environment, dated 6 November 2003 published in the Government Gazette General Announcement, Vol. 120, Special Section 138 Ngor., dated December 3, 2003

</td></tr>
<tr><td>Duration/frequency</td><td>Twice a year</td></tr>
<tr><td>Method/Tools</td><td>

<u>Stack emission</u>

Environmental Quality	Sampling Method	Analysis Method
Stack		
• TSP	- U.S. EPA Method 5	- Gravimetric Method
• SO_2	- U.S. EPA Method 6	- Titration Method
• NO_x (as NO_2)	- U.S. EPA Method 7	- Phenoldisulfonic Acid Method
• Mercury (Hg)	- U.S. EPA Method 29	- Cold-Vapor Atomic Absorption Spectrometric Method
• Cadmium (Cd)	- U.S. EPA Method 29	- Direct Air-Acetylene Flame
• Lead (Pb)	- U.S. EPA Method 29	- Direct Air-Acetylene Flame
• Antimony (Sb)	- U.S. EPA Method 29	- Inductively Coupled Plasma
• Arsenic (As)	- U.S. EPA Method 29	- AAS (Hydried) Method
• Chromium (Cr)	- U.S. EPA Method 29	- Direct Air-Acetylene Flame
• Cobalt (Co)	- U.S. EPA Method 29	- Inductively Coupled Plasma
• Copper (Cu)	- U.S. EPA Method 29	- Direct Air-Acetylene Flame
• Manganese (Mn)	- U.S. EPA Method 29	- Direct Air-Acetylene Flame
• Nickel (Ni)	- U.S. EPA Method 29	- Direct Air-Acetylene Flame
• Vanadium (V)	- U.S. EPA Method 29	- Inductively Coupled Plasma
• Beryllium	- U.S. EPA Method 29	- Inductively Coupled Plasma

<u>Workplace</u>

Environmental Quality	Sampling Method	Analysis Method
Occupational Health and Safety		
(1) Total Dust	- Filter / Air Sampling Pump	- Gravimetric Method (NIOSH Method 0500)
(2) Respirable dust	- Filter / Air Sampling Pump	- Gravimetric Method

</td></tr>
<tr><td>Responsible person</td><td>

- Sustainability and Environmental Compliance Department, Siam City Cement Publics Company.

</td></tr>
<tr><td>Expected outcome</td><td>The emission do not exceed the air quality standard.</td></tr>
</table>

<table>
<tr><td>Category of negative impact</td><td>Environmental impact</td></tr>
<tr><td>Subcategory of negative impact</td><td>Noise Pollution Impacts
Human Health: Hearing loss (especially for employees, >85 dB), impaired concentration, communication issues.
Environment & Wildlife: Disrupts animal behavior (communication, foraging, migration), reduces biodiversity, affects aquatic life (stress, navigation disruption).</td></tr>
<tr><td>Vulnerable group</td><td>• Workers in the surrounding areas</td></tr>
<tr><td>Possible negative impact</td><td>• Stress, fatigue, or loss of concentration</td></tr>
<tr><td>Parameter/indicator</td><td>• TWA (Time Weighted Average) < 85 dBa
• Lmax < 115 dBa</td></tr>
<tr><td>Reference</td><td>• Notification of the Ministry of Industry: Safety measures for industry related to the workplace environment, dated 6 November 2003 published in the Government Gazette General Announcement, Vol. 120, Special Section 138 Ngor., dated December 3, 2003
• Ministerial regulations of the Ministry of Labor: Specified the standards of occupational health and safety management related to Heat, Lighting, Noise, B.E.2559 (2016)
• Notification of the Department of Labor Protection and Welfare: Standard of Time Weighted Average (TWA) Noise Level, B.E. 2561 (2018)
• Notification of the Department of Labor Protection and Welfare: Calculation of the volume that is exposed in the ear when wearing personal safety production equipment., B.E. 2561 (2018)</td></tr>
<tr><td>Duration/frequency</td><td>Twice a year</td></tr>
<tr><td>Method/Tools</td><td><table><tr><th>Environmental Quality</th><th>Sampling Method</th><th>Analysis Method</th></tr><tr><td>TWA</td><td>- Noise Dose Meter</td><td>- Department Labour Protection and Welfare (B.E.2561)</td></tr><tr><td>Lmax</td><td>- Sound Level Meter</td><td>- ISO 1996/1</td></tr></table></td></tr>
<tr><td>Responsible person</td><td>• Staff of Siam City Power Company Limited</td></tr>
</table>

	• Sustainability and Environmental Compliance Department
Expected outcome	• Maintain noise levels within regulatory standards • Reduce number of noise complaints from community • Improve community relations and environmental performance

Category of negative impact	Environmental impact
Subcategory of negative impact	Waste management
Vulnerable group	• Waste handling workers • Community near waste storage/transportation area • Natural resources (soil, water)
Possible negative impact	• Soil and groundwater contamination • Odor nuisance • Risk of fire or chemical exposure • Non-compliance with hazardous waste regulations
Parameter/indicator	• Quantity and type of waste generated (kg/month) • Annual waste volume report • Number of non-compliance cases
Reference	• Notification of the Ministry of Industry Re: Management of Wastes or Unused Materials B.E. 2566 (2023) • ISO 14001 requirements
Duration/frequency	Monthly
Method/Tools	• Waste manifest system • On-site inspection and record review • Lab analysis (for leachate, sludge) • Internal waste tracking spreadsheet
Responsible person	• Staff of Siam City Power Company Limited • Sustainability and Environmental Compliance Department, Siam City Cement Publics Company
Expected outcome	• 100% legal disposal of hazardous waste • Reduced risk of environmental contamination • Improved waste segregation and recycling rate • Compliance with applicable laws and regulations