

Reporting Meeting on JCM Projects and Feasibility Studies
in JFY2015



JFE

JCM Model Project

“Power generation by waste heat recovery in cement industry”

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Gen TAKAHASHI

Deputy General Manager

Global Business Development

JFE Engineering Corporation

- ▶ **About JFE Engineering**
- ▶ **Project Summary**
- ▶ **Project Methodology**
- ▶ **Reference / Another JCM Project**



Group Structure



JFE Holdings (holding company)

Turnover: **39 billion\$**

Employees: **57,500**

Fortune Global 500:
Ranked in **278**

Japan Marine United

Net Sales (million \$)

3,600

Employees

6,000



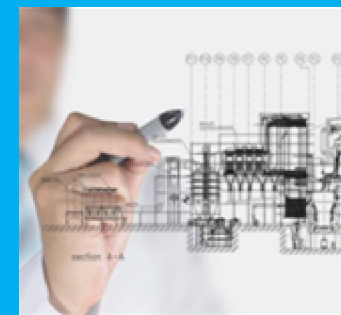
JFE Engineering

Net Sales (million \$)

3,700

Employees

8,500



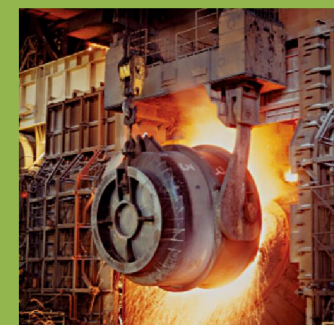
JFE Steel

Net Sales (million \$)

29,000

Employees

43,000



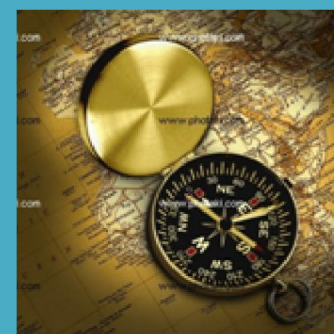
JFE Shoji Trade

Net Sales (million \$)

19,000

Employees

6,000



Business Field



***Industrial Machinery
& Others***



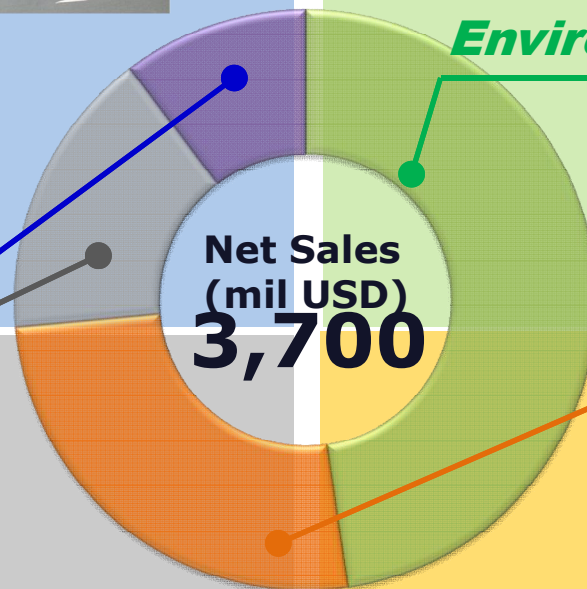
Steel Structure



Environment



Energy Plant & Pipeline



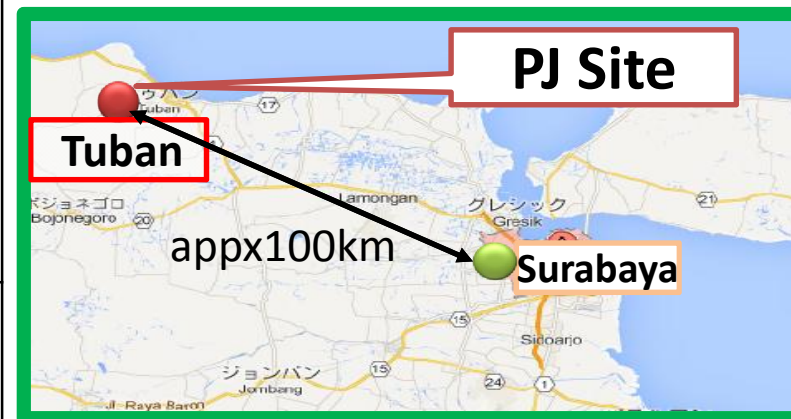
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JCM Model Project Summary



Counterpart	PT Semen Indonesia
Site	Tuban Plant East Jawa
Power Generation	28MW
GHG Emission Reduction	122,000t-CO2 /year



Waste Heat Recovery Benefits



Benefits

CO₂ Emission Reduction

Reduced Consumption from Grid-Connected Power Plants

No Additional Fuel Required

Electricity Generation Using Only Waste Heat

Electricity Reserve for the Community

Available Electricity for the Communities

Savings on Production Costs

Apx. 20% substituted with Electricity by WHR

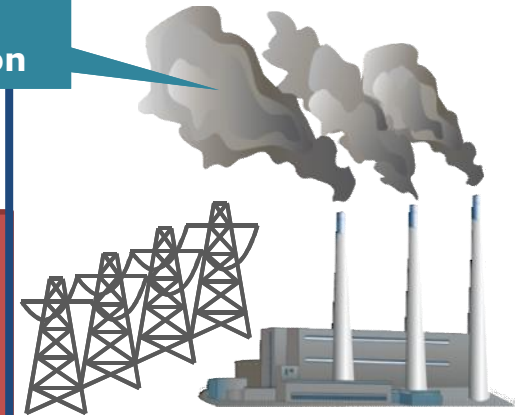
Cement Production – Baseline



CO₂ emission due to
Fossil Fuel Combustion

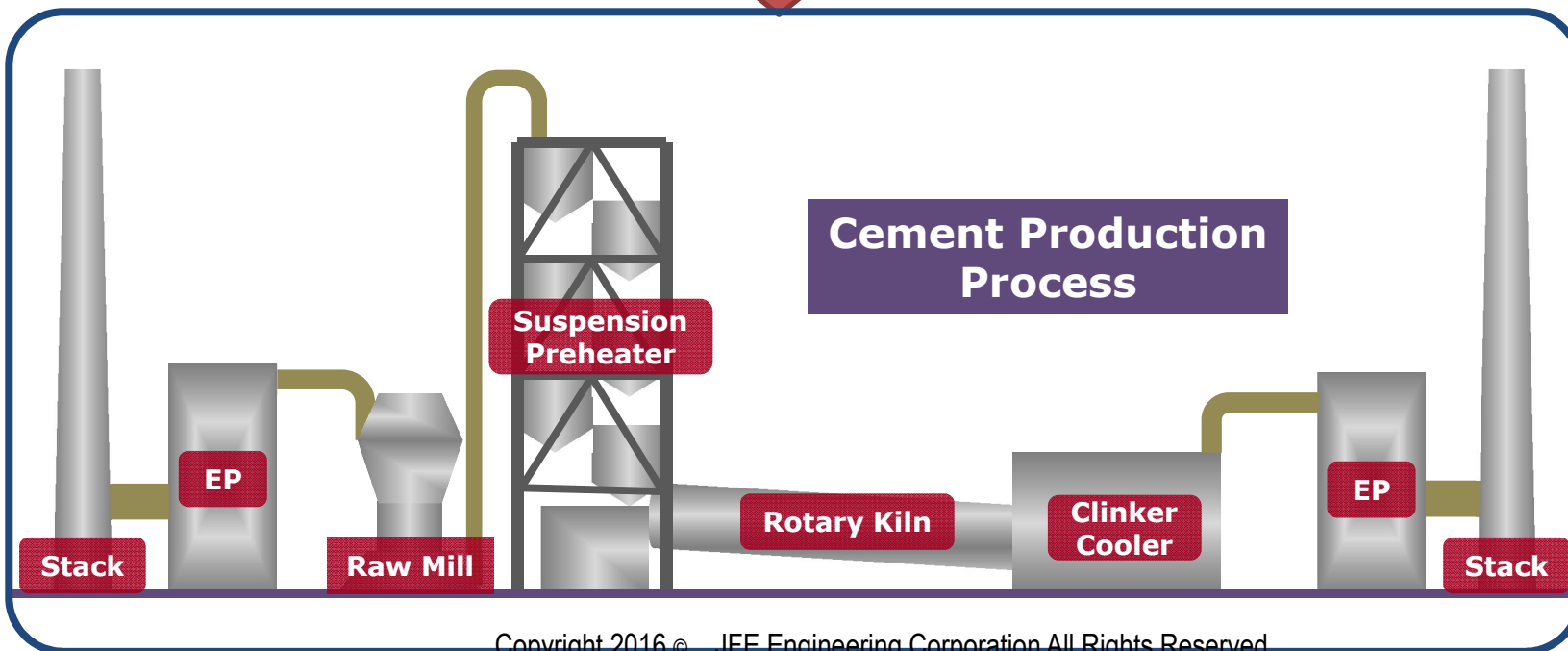
Electricity

100
%

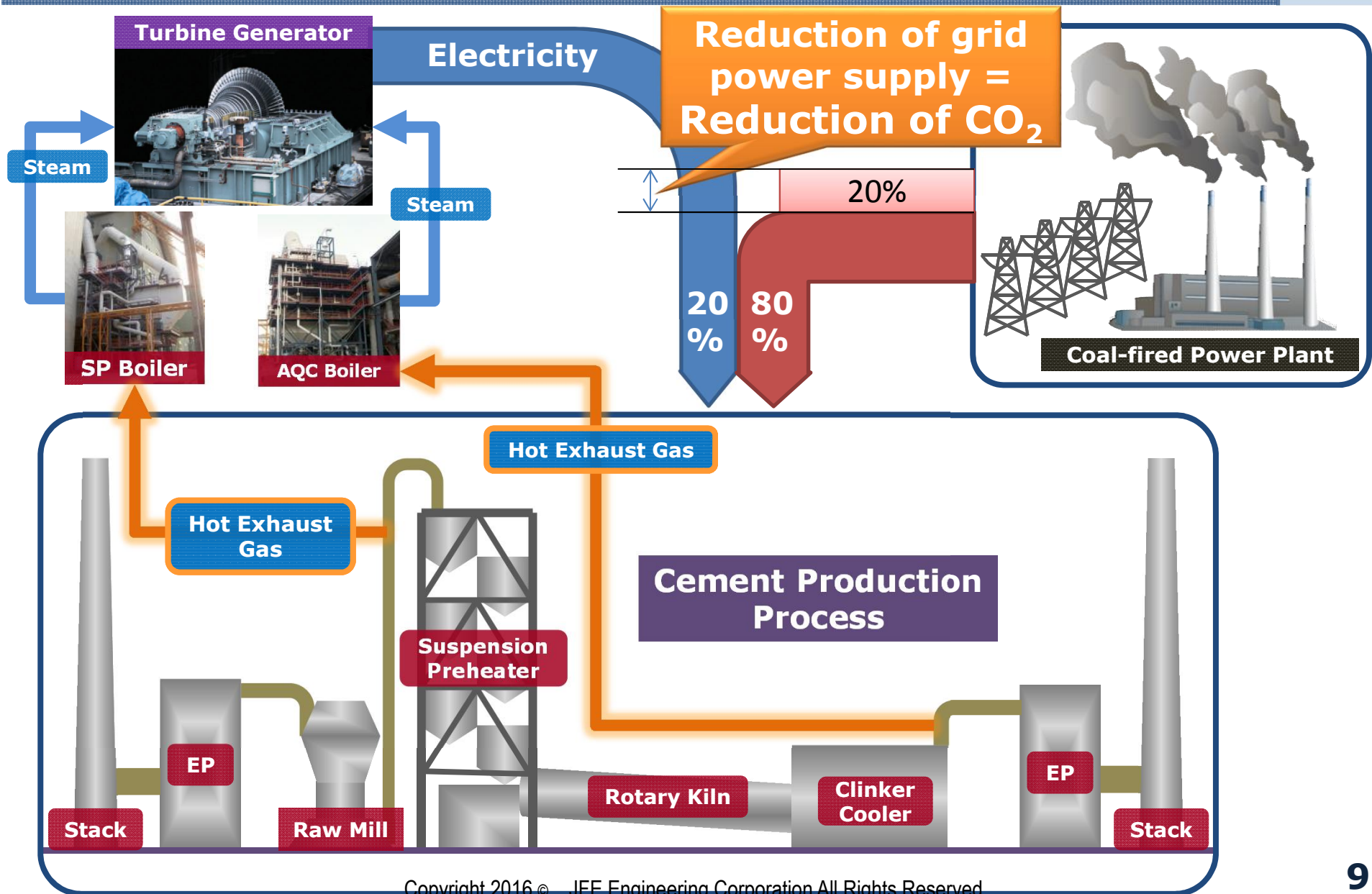


Coal-fired Power Plant

Cement Production
Process



After WHR System Installation



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Eligibility Criteria



Criterion 1	The project utilizes waste heat from a cement production facility by waste heat recovery system (WHR) to generate electricity
Criterion 2	WHR system consists of a Suspension Preheater boiler (SP boiler) and/or Air Quenching Cooler boiler (AQC boiler), turbine generator and cooling tower
Criterion 3	WHR system utilizes only waste heat and does not utilize fossil fuels as a heat source to generate steam for power generation
Criterion 4	WHR system has not been introduced to a corresponding cement kiln of the project prior to its implementation
Criterion 5	<p>Cement factory where the project is implemented is connected to a grid system and the theoretical maximum electricity output of the WHR system, which is calculated by multiplying maximum electricity output of the WHR system by the maximum hours per year ($24 \times 365 = 8,760$ hours), is not greater than the total amount of the electricity imported to the cement factory from the grid system:</p> <ul style="list-style-type: none"> > During the previous year before the validation, if the validation of the project is conducted before the operation of the project, or > During the previous year before the operation of the project, if the validation of the project is conducted after the operation of the project

Calculation of Reference Emissions



	A	B	C	D	E(A*B*C*D)
Quantity of Electricity Generation	Generation Capacity (MW)	Operating day per year (days/y)	Time (hrs/day)	Operating Rate	Electricity (MWh)
Dry Season	28	182.5	24	0.85	104,244
Rainy Season	22	182.5	24	0.85	81,906
The quantity of electricity consumption	2.4	365	24	1	21,024
The quantity of net electricity generation by the WHR system which replaced grid electricity import					165,126

$$RE_y = EG_y * EF_{\text{grid}}$$

$$= 165,126 \text{ MWh/y} * 0.741 \text{ tCO}_2 \text{ e/MWh}$$

$$= \mathbf{122,358 \text{ tCO}_2 \text{ e/y}}$$

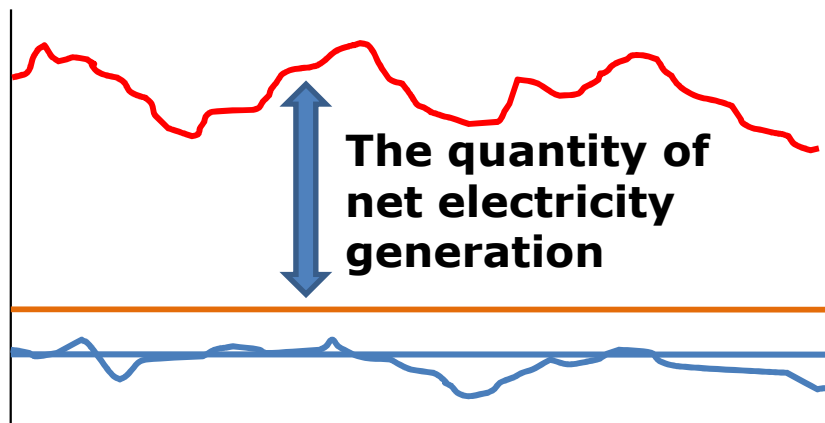
Reference Emissions

Reference

Reference is the situation where WHR system has not been introduced. Diffusion rate of WHR system is very low in Indonesian Cement Industry 1 plant installed / 25 plants total

Conservativeness

Electricity consumption of WHR system is calculated by the theoretically maximum load of auxiliary equipment
=> Rated capacity of installed equipment (EG_{CAP}) related to WHR system and max. hours/period



The quantity of gross electricity generation by waste heat

$$EG_{AUX,y} : 2.4MW(EG_{CAP}) * 24h/d * 365days$$

$$1.9MW(\text{Designed capacity}) * 24h/d * 365days$$

Reference Emissions

$$RE_y = EG_y * EF_{grid}$$

RE_y : Reference emissions

EG_y : The quantity of net electricity generation

EF_{grid} : CO₂ emission factor for an Indonesian regional grid system

Determination of EG_y

$$EG_y = EG_{GEN} - EG_{AUX}$$

EG_{GEN} : The quantity of gross electricity generation by waste heat

EG_{AUX} : The quantity of electricity consumption by WHR system

Determination of EG_{AUX}

$$EG_{AUX} = EG_{CAP} * 24 * 365$$

EG_{CAP} : The total maximum rated capacity of equipments of WHR system

Emission Reduction / Monitoring

Emission Reductions = Reference Emissions

Replacement of Grid Electricity Generation

- **Calculation of reference/project emissions**
Emissions to be calculated in the methodology are those replaced by power generation of WHR system
- **Emission Reductions**
= Reference Emissions – Project Emissions
- **No additional fuel**
Project Emissions = 0

Monitoring






- ▶ **EG_{GEN/y}: Quantity of gross electricity generation**

Watt meter log data are saved:
every one minute in both electronic data in a server and on printed paper

Project Schedule



Power Generation will be envisaged in the beginning of 2017

	2013	2014	2015	2016	2017
Design					
Equipment					
Construction					
Commissioning					



No.4 SP Boiler Area



No.4 AQC Damper



Steam Turbine

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Waste to Energy Plant in Yangon - JCM Model Project -



Image

First WTE Project with JCM

First WTE Project in Myanmar

Counterpart	Yangon City Development Committee
Site	Mingalardon area, Yangon City, MYANMAR
Technology	Waste to Energy(WTE) Incinerator : 60ton/day Generator : 0.7MW
GHG Emission Reduction	4,700t-CO₂/year



Ground Breaking Ceremony on Oct. 10th 2015

Thank you for your kind attention.



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