Pollutant Release and Transfer of Kampot Cement industry

Agenda

1. Company profile
2. SCG Vision / Policy
3. Environment protection project
4. Highlight emission and Environment protection
5. Commitment

Dongtong district, Kampot, Cambodia
SCG’s Strategic Business Units

CHEMICALS
- CCS Business
- LSHP Business

PACKAGING
- Regional Business

SCG Cement-Building Materials
- D&R Business
- Logistic Business
- International Business

Cambodia
- Sale & Marketing
- Credit & Finance
- Government & Public Affairs
- Legal & IP
- IT
- HR Country
- New Business Opportunity Management

** KCC: Kampot Cement Co., Ltd

** KCC **
- CPAC
- CPCC
- CRCC

Operation

INTERNAL Do Not Distribute
Kampot Cement Co., Ltd Profile (KCC)

The Kingdom of Cambodia

Cement Plant (Kampot Province)

<table>
<thead>
<tr>
<th></th>
<th>KCC1</th>
<th>KCC2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start Up</strong></td>
<td>Dry Process 2007</td>
<td>Dry Process 2015</td>
</tr>
<tr>
<td><strong>Cement Capacity</strong></td>
<td>1 MT/Y</td>
<td>1 MT/Y</td>
</tr>
<tr>
<td><strong>Product Type</strong></td>
<td>Portland Cement Type I and Plastering Cement</td>
<td></td>
</tr>
<tr>
<td><strong>Product Brand</strong></td>
<td>SCG Cement and K Cement</td>
<td></td>
</tr>
<tr>
<td><strong>Total Area</strong></td>
<td>80 hectares</td>
<td></td>
</tr>
<tr>
<td><strong>No. of Employee</strong></td>
<td>323</td>
<td>1,069 persons</td>
</tr>
<tr>
<td><strong>No. of Sub-Contractor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. of Community</strong></td>
<td>7,071 households live around plant</td>
<td></td>
</tr>
</tbody>
</table>

The Kingdom of Cambodia

Head Office (Phnom Penh)
# KCC’s Product Categories

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Application</th>
<th>Cement Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPC Type I</strong></td>
<td>For concrete, foundation and structure</td>
<td>OPC Type I (Portland cement) Standard:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- ASTM C-150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- TIS 15 PART 1-2547</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- EN 197-1-CEM I 45.2 R</td>
</tr>
<tr>
<td><strong>Mixed Cement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastering Cement: easy work, smooth</td>
<td>Plastering Cement (Mixed Cement) Standard:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- TIS 80-2517</td>
</tr>
</tbody>
</table>

**Portland Cement Type I**
- SCG Cement
- K Cement

**Mixed Cement**
- K Plastering Cement
- Super K Plastering Cement
Cement Industry – PRTR guideline

Cement manufacturing Emission

Emission to air: Dust, Nox, SO2, CO, VOC and volatile metal

Emission to water: pH, TSS, TDS, BOD, COD and free chlorine

Emission to land: S, As, Hg, Oil or fuel (Not significant)
Raw Material consumption of cement production

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Component</th>
<th>Annual Consumption (Ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone</td>
<td>CaCO3</td>
<td>3,000,000</td>
</tr>
<tr>
<td>Clay</td>
<td>Al2O3</td>
<td>320,000</td>
</tr>
<tr>
<td>Laterite</td>
<td>Fe3O4</td>
<td>86,000</td>
</tr>
<tr>
<td>Chert</td>
<td>SiO2</td>
<td>45,000</td>
</tr>
<tr>
<td>Gypsum</td>
<td>CaSO4</td>
<td>110,000</td>
</tr>
</tbody>
</table>

Waste Heat Recovery
SCG Sustainable Development Framework

**Governance**
- Cooperate governance
- Risk
- Reporting

**Economic**
- Direct economic value generated (Revenue)
- Economic value distributed
  - Employee wage and benefit
  - Payment to suppliers
  - Taxes

**Environment**
- Energy
- Climate change
- Water management
- Waste management
- Eco system / Biodiversity
- Logistics

**Society**
- Community investment & donation
- Labor standard and practices
- Human rights
- Human resource
- Stockholder engagement
SCG Vision Policy and Objective

**SCG VISION**

Our vision is that by the year 2015, SCG will be well recognized as an innovative workplace of choice and a role model in corporate governance and sustainable development.

**SCG SD Framework**

**Economic**
- Low Carbon Process
  - Energy efficiency
  - AFR
  - Clinker/Cement
  - ECO Value

**Going Green**
- Zero Waste & EP Trip
- Dust, SOx, NOx,
- Green Area (Dust Free Plant & Tree)
- Water Consumption

- Energy Consumption
- CO2

- Zero Complaints
- Zero Accident
- CSI

- Open House
- OCOP
- Dialogue
- SCS
- Safety culture
- Employee engagement
- C-cement
- Local purchasing
- Local investment

**Community & Employee Engagement**
- Green Supplier
- Green Procurement
- Green Truck
- Green Supply Chain

**Intrinsic Technology**
- ECO Process: Increase efficacy using Biomass, CEMs, Autonomous SOC, Belt Cover, Install NO Nox Burner, Slag Cement plant,, WHG, Gasifier

**KPI**
- EBITDA
- Profitability
- Earnings
- Productivity-Quality-Cost-Delivery-Safety-Morale-Environment
Environment Protection Project

Eco product
- K plastering
- Portland Composite Cement

CO2 reduction: 31,779 tons/year

Water Consumption
- Reuse / Reduce / Recycle.
Reuse: 40,000 m³/year

Waste Management
- Waste Co processing in cement kiln.
1004 tons/year

Waste Heat recovery
Annually 64,646 Mwh
30% power replacement;
CO2 reduction: 37,623 tons CO2/year

Solar power generation
30 MW/day
CO2 reduction: 6372 tons CO2/year

Natural resource
- Replace coal by rice husk 7% by heat (482 GJ).
CO2 reduction: 46 tons/year

CO2 reduction: 31,779 tons/year

 Internally generated report. Do not distribute.
Waste Management approach

SCG prefer to manage waste by co-processing; Recycling, Reuse, prevent and reduction.
Highlight Emission and Environment Protection

1. Recycling of water: Reduce water consumption at WHG.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Result (mg/l)</th>
<th>Blow down (m3/year)</th>
<th>Emission (Kg/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD</td>
<td>2.1</td>
<td>87600</td>
<td>183</td>
</tr>
<tr>
<td>COD</td>
<td>15.5</td>
<td>87600</td>
<td>1357</td>
</tr>
</tbody>
</table>

Reduce consumption: 40,000 m3/year

Advantage
- Zero water pollution
- Reduce water consumption

3 Recycling

Reuse

Reuse

Reuse
Highlight Emission and Environment Protection

2. Co processing: Burn Solid /Household waste in cement kiln at 1450°C

<table>
<thead>
<tr>
<th>Waste Generation (Ton/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>870</td>
</tr>
<tr>
<td>Non Hazardous</td>
</tr>
</tbody>
</table>

Cement Kiln
1. Higher Temperature 1,450 C
2. Retention Time of Gas Burnt ~8 Sec and Retention Time of Raw Material Burnt ~ 40-60 Min.
3. No Ash Residue
Highlight Emission and Environment Protection

3. Co processing: Biomass usage 7% to reduce coal consumption

Replace coal by rice husk 7% by heat (482 GJ). CO2 reduction: 46 tons/year

Gasifier
Highlight Emission and Environment Protection


**Advantage:**
- **Waste heat** recovery can provide up to 30% of a cement plant's overall electricity.

<table>
<thead>
<tr>
<th>SP Boiler</th>
<th>Dust Collector and AQC Boiler</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>70%</th>
<th>30%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDC Power per day</td>
<td>WHR Power per day</td>
<td>Solar Power per day</td>
</tr>
<tr>
<td>519 MW</td>
<td>195 MW</td>
<td>30 MW</td>
</tr>
</tbody>
</table>

5. Renewable energy: Solar Power generation 7MW

**Advantage:**
- 1. is pollution free and causes no greenhouse gases to be emitted after installation
- 2. Reduced dependence fuels
- 3. Renewable clean power.
### PRTR Reporting

<table>
<thead>
<tr>
<th>Parameter</th>
<th>KCC1 (mg/m³)</th>
<th>KCC2 (mg/m³)</th>
<th>Standard (mg/m³)</th>
<th>Emission (tons/y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust</td>
<td>18</td>
<td>21</td>
<td>≤ 400</td>
<td>121</td>
</tr>
<tr>
<td>Nox</td>
<td>588</td>
<td>537</td>
<td>≤ 1000</td>
<td>2920</td>
</tr>
<tr>
<td>SO₂</td>
<td>3.4</td>
<td>3.4</td>
<td>≤ 500</td>
<td>25</td>
</tr>
<tr>
<td>CO</td>
<td>217</td>
<td>168</td>
<td>≤ 1000</td>
<td>1150</td>
</tr>
</tbody>
</table>
### Highlight Emission and Environment Protection

**PRTR Reporting**

**How to calculation dust (PM) emission (Kg/month )**

<table>
<thead>
<tr>
<th>MM/YYYY</th>
<th>°C</th>
<th>%</th>
<th>m/s</th>
<th>m³/min</th>
<th>mg/m³</th>
<th>kg/hr</th>
<th>hr</th>
<th>kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov-18</td>
<td>83.5</td>
<td>12.4</td>
<td>20.51</td>
<td>8,698.60</td>
<td>24.00</td>
<td>12.53</td>
<td>702</td>
<td>8,793.24</td>
</tr>
<tr>
<td>Nov-18</td>
<td>124</td>
<td>8.77</td>
<td>15.9</td>
<td>6,743.43</td>
<td>24.00</td>
<td>7.69</td>
<td>715</td>
<td>5,493.49</td>
</tr>
</tbody>
</table>

---

**Measurement**

\[
m^{3}/\text{min}=S(m^{2})\cdot v(m/s)\cdot 60(s)
\]

\[
S=\pi(D^{2}/4)
\]

\[
D=3m
\]

**Result**

\[
\text{Kg/h}=Q(m^{3}/\text{min})\times (\text{mg/m}^{3})\times 60(\text{min})/1,000,000
\]

\[
\text{Kg}=(\text{kg/h})\times (\text{hr})
\]
## Reporting format for the Pollutants Release and Transfer Register

### 2 Description of Facilities

#### 2.1 Chemicals contained in raw materials used (inputs)

<table>
<thead>
<tr>
<th>Raw material</th>
<th>Commercial name</th>
<th>CAS number</th>
<th>Annual consumption</th>
<th>Measurement unit</th>
<th>Used in ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone</td>
<td>-</td>
<td>-</td>
<td>3,000,000</td>
<td>Ton</td>
<td></td>
</tr>
<tr>
<td>Clay</td>
<td>-</td>
<td>-</td>
<td>320,000</td>
<td>Ton</td>
<td></td>
</tr>
<tr>
<td>Coke</td>
<td>-</td>
<td>-</td>
<td>80,000</td>
<td>Ton</td>
<td></td>
</tr>
<tr>
<td>Shale</td>
<td>-</td>
<td>-</td>
<td>45,000</td>
<td>Ton</td>
<td></td>
</tr>
<tr>
<td>Limestone</td>
<td>-</td>
<td>7664-93-9</td>
<td>110,000</td>
<td>Ton</td>
<td></td>
</tr>
<tr>
<td>Sodium Hydrosulfate</td>
<td>-</td>
<td>7681-52-9</td>
<td>30</td>
<td>Ton</td>
<td></td>
</tr>
</tbody>
</table>

¹: Select one of the following: Process (P), Energy production (E), or Auxiliary service (A) and add description for subprocess

#### 2.2 Manufactured products (outputs)

<table>
<thead>
<tr>
<th>Products</th>
<th>Annual production</th>
<th>Measurement unit</th>
<th>Type of process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement Production</td>
<td>2,370,000 Ton</td>
<td>Yearly</td>
<td>Seasonal</td>
</tr>
</tbody>
</table>

### 2.3 Water consumption

<table>
<thead>
<tr>
<th>Source</th>
<th>Water consumption (lit/hour)</th>
<th>Consumed volume (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial</td>
<td>-</td>
<td>Daily</td>
</tr>
<tr>
<td>Surface</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Deep</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Water canal</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Underground</td>
<td>(specify)</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 2.4 Energy consumption

<table>
<thead>
<tr>
<th>Source</th>
<th>Unit</th>
<th>Consumption (m³/hour)</th>
<th>Monthly consumption</th>
<th>Annual consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>-</td>
<td>19.54</td>
<td>234</td>
<td>2848</td>
</tr>
<tr>
<td>Own source</td>
<td>Thermoelectric</td>
<td>Ton</td>
<td>155</td>
<td>19,700</td>
</tr>
<tr>
<td>others (specify)</td>
<td>-</td>
<td>2400</td>
<td>28,600</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 3 Waste generation

#### 3.1 Solid Waste Generation

<table>
<thead>
<tr>
<th>Process or subprocess</th>
<th>Type of waste ²</th>
<th>Quantity (ton/year)</th>
<th>Treated directly on-site</th>
<th>Transferred to treatment company or site landfill</th>
<th>Name of the landfill or company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Process</td>
<td>Non-Hazardous</td>
<td>870</td>
<td>94</td>
<td>776</td>
<td>Burning in kiln</td>
</tr>
<tr>
<td>Hazardous</td>
<td>240</td>
<td>12</td>
<td>228</td>
<td>50</td>
<td>Statom Trading</td>
</tr>
</tbody>
</table>

²: Type of waste: (Select one of the following): general Waste (GW), Hazardous Waste (HW), and Infectious Waste (IW)

#### 3.2 Liquid Waste Generation

<table>
<thead>
<tr>
<th>Process/subprocess</th>
<th>Substance Parameter (³)</th>
<th>Unit</th>
<th>Quantity (m³/year)</th>
<th>Treatment method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Heat Generation</td>
<td>BOD</td>
<td>2.1 mg/l</td>
<td>87600</td>
<td>Recycle in tank and cooling hot air</td>
</tr>
</tbody>
</table>

³: Type of waste: (Select one of the following): general Waste (GW), Hazardous Waste (HW), and Infectious Waste (IW)

#### 3.3 Emission Release

<table>
<thead>
<tr>
<th>Process/sub-process</th>
<th>Substance Parameter (⁴)</th>
<th>Air emissions (Unit; mg/Nm³, Vol %)</th>
<th>Amount of exhaust generated (m³/h)</th>
<th>Prevention or control method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bruning Process KCC1</td>
<td>Particulate Matter</td>
<td>18.00</td>
<td>386,496</td>
<td>Electrostatic precipitation</td>
</tr>
<tr>
<td></td>
<td>Nitrogen Oxide</td>
<td>588.00</td>
<td>333,060</td>
<td>Thermic (Gas)</td>
</tr>
<tr>
<td></td>
<td>Sulfur dioxide</td>
<td>3.40</td>
<td>168.00</td>
<td>Chemical treatment</td>
</tr>
<tr>
<td></td>
<td>Carbon monoxide</td>
<td>217.00</td>
<td>275,780</td>
<td>Electrostatic precipitation</td>
</tr>
<tr>
<td>Bruning Process KCC2</td>
<td>Particulate Matter</td>
<td>21.00</td>
<td>257,180</td>
<td>Electrostatic precipitation</td>
</tr>
<tr>
<td></td>
<td>Nitrogen Oxide</td>
<td>537.90</td>
<td>288,450</td>
<td>Thermic (Gas)</td>
</tr>
<tr>
<td></td>
<td>Sulfur dioxide</td>
<td>3.40</td>
<td>168.00</td>
<td>Chemical treatment</td>
</tr>
<tr>
<td></td>
<td>Carbon monoxide</td>
<td>217.00</td>
<td>275,780</td>
<td>Electrostatic precipitation</td>
</tr>
</tbody>
</table>

⁴: Type of waste: (Select one of the following): general Waste (GW), Hazardous Waste (HW), and Infectious Waste (IW)
### Reporting format for the Pollutants Release and Transfer Register

#### 4.1 Emissions and transfers

<table>
<thead>
<tr>
<th>Emission / transfer</th>
<th>chemical identity</th>
<th>Generation point</th>
<th>Emission or transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name of the material</td>
<td>Name of chemical substance</td>
<td>Quantity</td>
</tr>
<tr>
<td>Air</td>
<td>Raw Meal</td>
<td>Particulate Matter</td>
<td>Stack EP raw mill</td>
</tr>
<tr>
<td></td>
<td>Coal</td>
<td>Nitrogen Oxide</td>
<td>Stack EP raw mill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sulfure dioxide</td>
<td>Stack EP raw mill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon monoxide</td>
<td>Cement plant</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>BOD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>COD</td>
<td></td>
</tr>
</tbody>
</table>

#### Emissions to:

- Soil (land)
- Reuse
- Recycle
- Coprocessing
- Treatment
- Incineration
- Final Disposal
- Sewage
- Other (specify)

#### Report PRTR -2018
Highlight Emission and Environment Protection

Continuous Emission Monitoring (CEMs)-

CEMs to control
- Low CO
- Low Nox
Green Industry Award (received from MIME)

- Received “Green Industry Award” from Ministry of Mine and Energy (1st time of Cambodia government implementing green project by joining with United Nations Industrial Development Organization, UNIDO).

June, 20 2013, Kampot Cement have received Green Industry Award from Ministry of Industry, Mine and Energy at Phnom Penh Hotel.
Green and Clean Industry award (received from MOE)

On 22-Dec-2016, TONLEBASSAC II restaurant H.E Eang Sophalleth Under secretary of Ministry of Environment provided appreciation certificate to Kampot cement Co.; Ltd that have done Clean Development Mechanism project on electricity Power Generation from waste heat of cement processing to promote green and Clean industry.
Quality Environment, Occupational Health and Safety Management

Environment 14001:2015

Quality 9001:2015

OHSA 18001:2007

![Certificate of Registration](image1)

![Certificate of Registration](image2)

![Certificate of Registration](image3)

![Group Photo](image4)

10/09/2011

[SCG Logo]
Award for TPM Excellence, Category A
JIPM, Japan, 2018

Dear All Values,

I am pleased to make an announcement that the 2018 TPM Awardees of JIPM, has been approved today that, our company (Kampot Cement Co., Ltd) got officially the "TPM Excellence Award".

Kampot Cement Co., Ltd
Kampot Cement Plant

21,22 Dec 2018

Safety Health and Environment is one of 8 pillars of TPM
Commitment

Our Managing Director commit for **Circular Economy**: reduce plastic usage
- Not use plastic bag
- Reuse plastic bag
- Use personal bottle etc.

**CSR**: Use alternative fuel (waste recovery)
Thank You