JCM Model Project

Installation of High Efficiency Air Conditioning System and Chillers in Semiconductor Factory

Sony Device Technology (Thailand) Co., Ltd.

1 March 2017

Sony Corporate Services (Japan) Corporation
About Sony

- **Company Name:** Sony Corporation
- **Founded:** May 7, 1946
- **Headquarters:** 1-7-1 Konan Minato-ku, Tokyo, Japan
- **Representative Corporate Executive Officers:**
  - President and CEO Kazuo Hirai, Executive Deputy President and CFO Kenichiro Yoshida
- **Common stock:** 858,867 million yen (As of March 31, 2016)

- **Major Products:** Sony consists of the following segments: Mobile Communications, Game & Network Services, Imaging Products & Solutions, Home Entertainment & Sound, Semiconductors, Components, Pictures, Music, Financial Services, and All Other businesses

- **Headcount (Consolidated):** 125,300 (as of March 31, 2016)

- **Consolidated Sales and Operating revenue (Fiscal year ended March 31, 2016):** 8,105,712 million yen
Sony’s global environmental plan

Road to Zero is Sony’s global environmental plan, striving to achieve a zero environmental footprint throughout the life cycle of our products and business activities by 2050. Road to Zero sets a series of specific goals based on four environmental PERSPECTIVES, and six product LIFE CYCLE stages.
Curbing Climate Change: Sony's global environmental plan

Perspectives

Environmental action from four environmental perspectives

Sony business operations rely on a healthy natural environment. To help promote fulfilling lifestyles today and tomorrow, and achieve a zero environmental footprint by the year 2050, we have set goals from four environmental perspectives: curbing climate change, conserving resources, controlling chemical substances and promoting biodiversity.
"Road to Zero"

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Focus Topics toward FY2020

- Sony will reduce the annual energy consumption of its products by an average of 30% by FY2020.
- Efficient Production with a Smaller Environmental Footprint
- Tapping the power of entertainment to raise awareness and inspire action
- Business Partners Becoming Environmental Partners
- Accelerating the Use of Renewable Energy

In addition to ensuring the thorough implementation of energy-saving measures in Sony sites, we are also accelerating the use of renewable energy. Our aim is to increase the amount of renewable energy that we use in order to contribute to CO₂ reductions equivalent to 300,000 tons by FY2020 through the use of certificates and credits.
Curbing Climate Change: Accelerating the Use of Renewable Energy

GHG reduction

1. Reduce energy usage
   - Improve efficiency, fuel, process and operation etc.
   - Reduction energy usage from every angle

2. Utilize Renewable energy
   - For a part of energy usage that difficult to reduce because of company activity, promote the use of renewable energy
   - Wind Power
   - Solar Power
   - Biomass
The significance of the renewable energy introduction

1. For renewable energy spread expansion

2. Greenhouse gas reduction by Sony group

Focus Topics toward FY2020
CO² reductions equivalent to 300,000 tons by FY2020 through the use of certificates and credits.

The renewable energy introduction amount

Green Management 2020
Curbing Climate Change: Accelerating the Use of Renewable Energy

Supplier of Certification & Credit

- **Noshiro Biomass Power Plant**
  - Green Power Certification: 1,600 Million kWh/year
  - Green Heat Certification: 8,000 t-CO₂/year

- **Noshiro Wind Power Plant**
  - Green Power Certification: 220 Million kWh/year

- **Tsubetsu Municipal Forest Project**
  - J-Credit: 600 t-CO₂/year

- **Eurus Tashirodaira Wind Farm**
  - Green Power Certification: 150 Million kWh/year

- **Choshi Byobugaura Wind Power Plant**
  - Green Power Certification: 30 Million kWh/year

- **Noshiro Biomass Power Plant**
  - Green Heat Certification: 8,000 t-CO₂/year

- **Tokamachi municipal government and local small- and medium-size companies Pellet boiler project and other projects**
  - J-Credit: 1,000 t-CO₂/year

- **25 national involved In renewable energy sources nationwide**
  - J-Credit: 8,000 t-CO₂/year
Support Program by Government of Japan (SONY)

METI/NEDO JCM Feasibility Study (FS) 2011
Program organization research of green house gas emission reduction project through next-generation (zero-emission) air conditioning system utilizing solar heat in the Kingdom of Thailand – SONY plant model

MOE/GEC JCM Feasibility Study (FS) 2013
Electrification of off-grid area using solar power and long-life battery system
http://gec.jp/jcm/jp/projects/13fs_ban_02.html
This project introduces high efficiency Centrifugal Chiller and Swirling Induction type air-conditioning system in the newly constructed clean room (6,250m²), which is a part of refurbishment of LSI and image sensor manufacturing plant affected by floods crisis in 2011.

The air-conditioning system is composed of both replacement air conditioning and Swirling Induction Type air diffuser. This system’s target is occupied zone only. Air temperature blown from the fan unit can be closer to the room temperature, which reduces refrigeration load of a chiller. Air flow can also be less than standard system, reducing power consumption. In addition, the chiller is equipped with inverter which contributes to the energy-saving.

Outline of GHG Mitigation Activity

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Expected GHG Emission Reductions

2,588tCO₂/year

- GHG emission reductions = Reference emissions - Project emissions
- GHG emission (tCO₂/y) = Electricity consumption (MWh) x Emission factor(MWh/y)
- CO₂ Emission factor = 0.5(tCO₂/MWh)

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<tr>
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<th>Estimated Energy Saving</th>
<th>Estimated GHG Reductions</th>
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<tr>
<td>Centrifugal chiller</td>
<td>1,164MWh/y</td>
<td>582tCO₂/y</td>
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<tr>
<td>Air-Con. system</td>
<td>3,653MWh/y</td>
<td>2,006tCO₂/y</td>
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<tr>
<td>total</td>
<td>4,817MWh/y</td>
<td>2,588tCO₂/y</td>
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Sites of JCM Model Project

Sony Device Technology (Thailand)
Bangkadi Plant (Bangkadi Industrial Park)

Manufacturing Plant of LSI and Image Sensor
Planned major products are image sensor for digital single-lens reflex camera and LSI device for smartphone.
About JCM Project: Location  Thailand bangkadi

Sony Device Technology Bangkadi Factory

SDT Bangkadi Factory
35km from bangkok
40〜50munits by car
About JCM Project : Products

Image Sensor Device
Further commanding a leading position in Image sensor device market.

Digital-Single lens reflex camera < DSLR >

- Total pixel: 24M
- Cell size: 3.91μm
- Optical system: APS type
- Device type: IMX210

LSI Device For Sony Product
SDT produce the Large Scale Integrated Circuit for small and thin package size.
Which is application for electronic consumer product as mobile phone.

Product Package : VQFN & UQFN
Flood of Thailand: Damage of SDT

Our Situation at the time of the Flood on 21.10.2011

Main Entrance

Before Flood

Flood
Flood of Thailand: Flood Control Measures

Measures against the great flood such as the flood in 2011 that called a 100-year flood are progressing.

Measures of the Thai government
- Unification of the water management, Compensation for farmers
- Dam enlargement, Flood control channel expansion, Tree planting, Monitoring system reinforcement

Measures of BKD Industrial Park
- Reinforcement of the dike (height 5m, width 6m), Drainage pump expansion: drainage capacity 3.5 times
- Raise up the level of the highway which leads to the expressway (4m+1m Water stop board)
* 80% of the companies that suffered from the disaster in BKD Industrial Park reopen their business.

Measures of SDT
- Raise up the level of the floor where we have to install machines and facilities
- Develop BCP scenario and training by using our experience in 2011 as a case study
**Flood of Thailand**: Flood Control Measures by BKD Industrial Park

5m-wall was built to surround the Industrial Park. (total 9 km)

6m

3.5 times drainage power by 5 drainage pump
About JCM Project : Target equipment

Air Conditioning System

SWIT
Swirling Induction Type HVAC System

New HVAC system for the large-scale enclosure

Merits of the SWIT

- Comfort and Clean Environment
- Flexibility and Reduction of Installation Space
- Reduction of Installation Cost and Energy Consumption

- Cooling
  - Fresh air is supplied to occupied zone
  - 26°C
  - Mixing System
  - Half of Installation Space

- Heating
  - 33°C
  - Supply air
  - Mixing System
  - Warm air circulator without draft

- Heating
  - Stay cold air within occupied zone
  - Integrated heat extraction system

Major features

- Capacity 500 USRt
- COP (Coefficient Of Performance)
  - 6.76 (AHRI)
  - 6.2 (JIS)
- MaxCOP at part load 24.4
- IPLV 9.0 (JIS B8621:2011)

Chillers

- ETI-50
- 500RT
About JCM Project: International Consortium

Project Implementation Structure

International Consortium

Japan

Kingdom of Thailand

Institute for Global Environmental Strategies (IGES)

Representative Company

Sony Semiconductor Manufacturing Corporation

System design/Product maker
Takasago Thermal Engineering Co., Ltd.

Dealings

Product maker
Mitsubishi Heavy Industries, Ltd.
Kobe Steel, Ltd.

Construction Company
Thai Takenaka International Ltd.
Organo (Thailand) Co., Ltd.

Local Parter
Sony Device Technology (Thailand) Co., Ltd.

International Consortium

Reporting of Project Progress

Subsidy receipt

Dealings/Support

Reporting of CO2-emissions reductions
About JCM Project : Plant tour

Chiller & Facility personnel

Plant tour (Government of Thailand & Government of Japan)

Air Conditioning System (SWIT)
Utilization of JCM and points to consider

Benefits of utilizing the JCM financial support project
- High efficiency energy saving equipment can be introduced to the host country
- Reduction of greenhouse gases and energy costs

Cautionary points
- Partner company selection in the host country
- Recognition of the Japanese corporation’s obligations
- Commercial flow / exclusion of profits within the international consortium
- Allotment of credits to be created

Points to consider
- Import and export procedures, customs duties
- Utilization of credits by the company
- Promotion of the export of small and medium enterprise technologies using JCM
- Creation of credits in projects that do not utilize the JCM financial support project
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