# JCM Project Design Document Form

## A. Project description

### A.1. Title of the JCM project

Energy Saving in Factories with Air-Conditioning Control System

### A.2. General description of project and applied technologies and/or measures

The proposed JCM project aims to reduce $CO_2$ emissions in Viet Nam by facilitating the utilization of equipment to enhance energy efficiency of air-conditioners utilized in manufacturing plants of electronic components. The proposed project introduces 474 units of "Eco Power Fit", an air-conditioning control system to air conditioners in six components factories in Vietnam to control operation of the compressors equipped in the air conditioner outdoor units. "Eco Power Fit" suspends the compressor to which it is attached for a prescribed amount of time in 30-minute interval based on pre-programmed schedule developed through detailed survey of the air-conditioner operation. By partial suspension of compressor operation, "Eco Power Fit" prevents excessive cooling and achieves reduction of electricity consumption that results in $CO_2$ emissions reduction.


| Factory Park | Plant Name |
|---|---|
| Saigon High-Tech Park at district 9 in Ho Chi Minh city | Nidec Vietnam |
| | Nidec COPAL PRECISION |
| | Nidec SERVO |
| | Nidec SANKYO |
| Tan Thuan Export Processing Zone at district 7 in Ho Chi Minh City | Nidec TOSOK |
| | Nidec Copal Precision Corp.- Tan Thuan Branch |

Figure: Project location

### A.3. Location of project, including coordinates

| | |
|---|---|
| Country | The Socialist Republic of Viet Nam |
| Region/State/Province etc.: | Ho Chi Minh City |
| City/Town/Community etc: | (1) Saigon High-Tech Park, District 9<br>(2) Saigon High-Tech Park, District 9<br>(3) Saigon High-Tech Park, District 9<br>(4) Saigon High-Tech Park, District 9<br>(5) Tan Thuan Export Processing Zone, District 7<br>(6) Tan Thuan Export Processing Zone, District 7 |
| Latitude, longitude | (1) 10°51'18.0"N 106°47'39.1"E |

| | |
|---|---|
| | (2) 10°51'28.9"N 106°47'50.2"E<br>(3) 10°51'28.9"N 106°47'40.0"E<br>(4) 10°51'33.0"N 106°47'34.8"E<br>(5) 10°45'40.4"N 106°44'40.6"E<br>(6) 10°45'46.2"N 106°44'41.5"E |

A.4. Name of project participants

| | |
|---|---|
| The Socialist Republic of Viet Nam | (1) Nidec Vietnam Corporation<br>(2) Nidec Copal Precision (Vietnam) Corporation<br>(3) Nidec Servo Vietnam Corporation<br>(4) Nidec Sankyo Vietnam Corporation<br>(5) Nidec Tosok (Vietnam) Co., Ltd. |
| Japan | Yuko Keiso Co., Ltd. |

A.5. Duration

| | |
|---|---|
| Starting date of project operation | 16/01/2017 |
| Expected operational lifetime of project | 7 years |

A.6. Contribution from Japan

The proposed project receives financial support from the government of Japan. The project has been selected as one of the JCM model projects by the Ministry of the Environment, Japan (MOE). As a result of the financial support provided by MOE program, the initial investment cost of the proposed project has been partially financed by Japanese government (up to 50% of the initial investment cost). Further, implementation of the proposed project promotes diffusion of low carbon technologies within Viet Nam. Through the MOE program, know-hows on optimum operation and monitoring of air conditioners are transferred to the project sites.

## B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

| | |
|---|---|
| Selected approved methodology No. | JCM-VN-AM015 |
| Version number | Ver.01.0 |

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

| Eligibility | Descriptions specified in the | Project information |
|---|---|---|

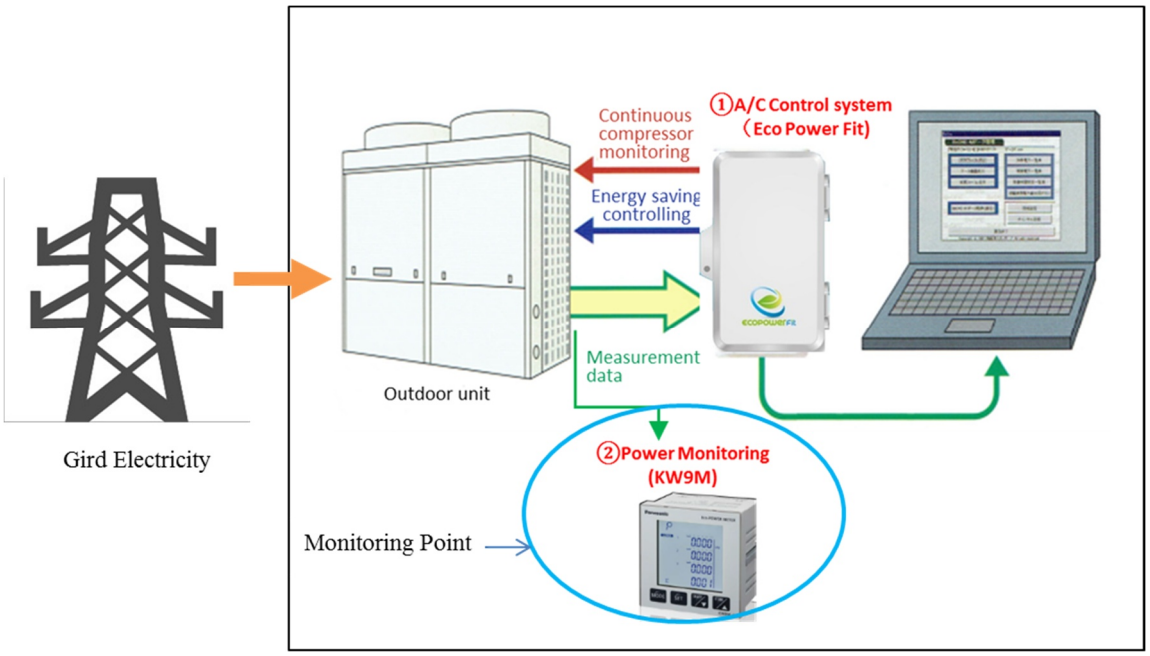
| criteria | methodology | |
|---|---|---|
| Criterion 1 | The project installs compressor control system(s) for new and/or existing non-inverter split type air conditioners utilizing electric heat pump. | The proposed project installs "Eco Power Fit" that control operation of compressors attached to existing non-inverter split type air conditioners utilizing electric heat pump. |
| Criterion 2 | The compressor control system(s) has a function to measure electric current of compressor(s) at the sampling rate of 0.01 seconds or below and to estimate the amount of electricity consumption of compressor(s) in non-inverter split type air conditioner system(s). | The electric current of compressors is monitored at the sampling rate of 0.01 seconds or below, which can be used to estimate the amount of electricity consumption of compressor(s) in non-inverter split type air conditioner system(s). |

## C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

| Reference emissions | |
|---|---|
| Emission sources | GHG type |
| Electricity consumption by compressor of outdoor unit in new and/or existing non-inverter split type air conditioner(s) without compressor control system | $CO_2$ |
| **Project emissions** | |
| Emission sources | GHG type |
| Electricity consumption of compressor of outdoor unit in project split type air conditioner(s) with compressor control system(s) | $CO_2$ |

C.2. Figure of all emission sources and monitoring points relevant to the JCM project




*There are 474 units of Eco Power Fit and the monitoring equipment installed in the Project. The above diagram shows one example.

Figure: Project diagram

C.3. Estimated emissions reductions in each year

| Year | Estimated Reference emissions ($tCO_{2e}$) | Estimated Project Emissions ($tCO_{2e}$) | Estimated Emission Reductions ($tCO_{2e}$) |
|---|---|---|---|
| 2017 | 20,735.2 | 17,417.6 | 3,317 |
| 2018 | 21,623.9 | 18,164.1 | 3,459 |
| 2019 | 21,623.9 | 18,164.1 | 3,459 |
| 2020 | 21,623.9 | 18,164.1 | 3,459 |
| Total ($tCO_{2e}$) | 85,606.9 | 71,909.9 | 13,694 |

| **D. Environmental impact assessment** | |
|---|---|
| Legal requirement of environmental impact assessment for the proposed project | No |

## E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

As part of JCM process, the project participants held a local stakeholder consultation meeting in order to take due steps to engage stakeholders and solicit comments for the proposed project. The following public and private entities have been identified as stakeholders and invitations were provided through letter or e-mail followed up by telephone calls. The final number of participants was 21.

- Ministry of Natural Resources and Environment
- People's Committee of Ho Chi Minh City
- Ho Chi Minh City Department of Science and Technology
- Energy Conservation Center of Ho Chi Minh City
- Nidec group companies based in Viet Nam and Yuko Keiso

The LSC consultation was carried out at 9am on Tuesday, 25 July, 2017 in Nidec Vietnam Meeting Room according to the following agenda.

- Introduction of JCM by Mitsubishi UFJ Morgan Stanley Securities
- Introduction of the JCM project by Yuko Keiso
- Explanation of JCM Project Cycle and Schedule by Mitsubishi UFJ Morgan Stanley Securities
- Q and A session

For those who were invited but were not available to attend the meeting, comments were solicited via e-mail but no further comments have been received.

The overall response to the proposed project is positive and project participants clarified all the questions raised with no further action required.

E.2. Summary of comments received and their consideration

| Stakeholders | Comments received | Consideration of comments received |
|---|---|---|
| Energy Conservation Center of Ho Chi Minh City | What is the procedure for setting the time and frequency of switching off compressors? | 24 hours are divided into 4 blocks and for each block, it is decided that compressors are switched off once or twice. The settings are made based on the operation patterns investigated in the feasibility study. The approximate duration of switch-off is 2 to 5 minutes each. It is shorter; i.e. 3 minutes during day time and |

| | | |
|---|---|---|
| | | longer; i.e. 10 minutes during night time.<br>Switching-off is carried out not based on the temperature change detected by sensors but based on the pre-programmed schedule. |
| Energy Conservation Center of Ho Chi Minh City | How does the project technology bring energy saving when it is assumed that when air-conditioners are switched off, the room temperature rises which generally leads to operation of the air-conditioners? | Although the project technology has a function to switch off compressors, it does not stop air circulation, resulting in very small effect on the room temperature. As such, the project technology can save energy while securing uniform room temperature. |
| Energy Conservation Center of Ho Chi Minh City | What is the capacity and type of air-conditioners for which the project technology is suitable? Is it possible to install project technology to chillers and freezers? Or inverter or VRV (multi-split) air-conditioning system? | The project technology can be installed for air-conditioners regardless of the capacity. It is also possible to install them in chillers and there are some track records in Japan. However, it is to be noted that different programming method is required due to chillers having residual operation after a compressor is switched off.<br>For freezers, it is possible, in principle, to install the project technology in freezer storage. However, it is assumed to achieve small amount of energy saving when installed in areas with big temperature fluctuation, such as show-cases in supermarkets.<br>For inverter based systems, although it is technically possible to install the project technology, it is not suitable do so under the JCM as JCM |

| | | |
|---|---|---|
| | | monitoring regime requires monitoring of electricity consumption by an ammeter and it is difficult to carry out the required monitoring by invertors' secondary current. |
| Nidec Servo | Does the project technology have an effect on the compressors' operation life? | No negative effect on compressors' life is expected as compressors have built-in protection circuit to protect damage from switching on/off and the manufacturer's guarantee has been obtained as well. In reality, the project technology contributes to extending the life of compressors by early detection of anomalies through close monitoring of operation patterns. |

| **F. References** |
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| No references are provided. |

Reference lists to support descriptions in the PDD, if any.

| **Annex** |
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| N/A |

| **Revision history of PDD** | | |
|---|---|---|
| Version | Date | Contents revised |
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