

## JCM Project Design Document Form

### A. Project description

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

Introduction of High Efficiency Air-conditioning in Hotel
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#### A.2. General description of project and applied technologies and/or measures

The proposed JCM project aims to improve electricity consumption by introducing the Japanese advanced high-efficiency inverter air conditioners for the hotel in Hanoi, Viet Nam.

This project introduced a total of 17 high-efficiency inverter air conditioners with different COPs (one with COP 3.27, one with COP 3.29, two with COP 4.05, twelve with COP 4.09 and one with COP4.53).

The key technology is a new type DC inverter scroll compressor. The intermediate pressure performance is drastically improved by using a release valve and optimizing orbiting scroll lifting force in the improved new compression mechanism. Therefore, intermediate pressure performance is largely improved for energy-saving.

While non-inverter air conditioner with poor energy efficiency has the dominant market share in Vietnam, this project is intended to achieve energy saving with the introduction of high efficiency air-conditioning system to reduce GHG emissions.

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

Country	Viet Nam
Region/State/Province etc.:	N/A
City/Town/Community etc.:	Hanoi City
Latitude, longitude	N 21°03'04.7" and E 105°78'54.9"

#### A.4. Name of project participants

The Socialist Republic of Viet Nam	Peace Real Estate Investment Company Limited
Japan	NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

#### A.5. Duration

Starting date of project operation	6/10/2016
Expected operational lifetime of project	10 years

## A.6. Contribution from Japan

The proposed JCM Project was partially supported by the Ministry of Environment, Japan through the financing programme for JCM model projects, which provided financial support up to 50% of initial investment for the projects in order to acquire JCM credits.

The Japanese project participant transfers the technology through conducting the training on operation and maintenance of newly installed equipment through this project.

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

### B.1. Selection of methodology (ies)

Selected approved methodology No.	JCM_VN_AM006
Version number	ver01.0

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

Eligibility criteria	Descriptions specified in the methodology	Project information										
Criterion 1	Air-conditioning system with inverter is newly installed or installed to replace existing non-inverter air conditioning system.	The project newly introduces air-conditioning system with inverter into the new hotel in 6th Oct 2016.										
Criterion 2	Cooling capacity of project air conditioning system is more than or equal to 14kW.	The cooling capacities of project air conditioning system are 73kW, 90kW, 95kW, 109kW and 125kW. So the cooling capacities of project air conditioning system are more than 14kW.										
Criterion 3	COP of project air-conditioning system has a COP value higher than that of the value indicated in the table below.  <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>COP for Reference Air Conditioning System (COP<sub>REF</sub>)</caption> <thead> <tr> <th>Cooling Capacity [kW]</th> <th>Reference COP</th> </tr> </thead> <tbody> <tr> <td>14 ≤ x &lt; 28</td> <td>2.97</td> </tr> <tr> <td>28 ≤ x &lt; 42</td> <td>2.94</td> </tr> <tr> <td>42 ≤ x &lt; 56</td> <td>2.91</td> </tr> <tr> <td>56 ≤ x</td> <td>2.56</td> </tr> </tbody> </table>	Cooling Capacity [kW]	Reference COP	14 ≤ x < 28	2.97	28 ≤ x < 42	2.94	42 ≤ x < 56	2.91	56 ≤ x	2.56	The COPs of project air-conditioning system are 3.27, 3.29, 4.05, 4.09 and 4.53. So each COP of project air-conditioning system has a COP value higher than 2.56 indicated in the table.
Cooling Capacity [kW]	Reference COP											
14 ≤ x < 28	2.97											
28 ≤ x < 42	2.94											
42 ≤ x < 56	2.91											
56 ≤ x	2.56											
Criterion 4	Ozone Depletion Potential (ODP) of the refrigerant used for project air conditioning system is zero.	Refrigerant used for project air-conditioning system is R410A whose ODP is zero. So ODP of the refrigerant used for project air conditioning system is zero.										
Criterion 5	Plans to prevent release of refrigerants into the atmosphere at the time of air conditioning system removal are prepared for both project air conditioning system and the existing air conditioning	To prevent release of refrigerants into the atmosphere due to the project, at the time of air-conditioning system removal, the project owner plans to collect										

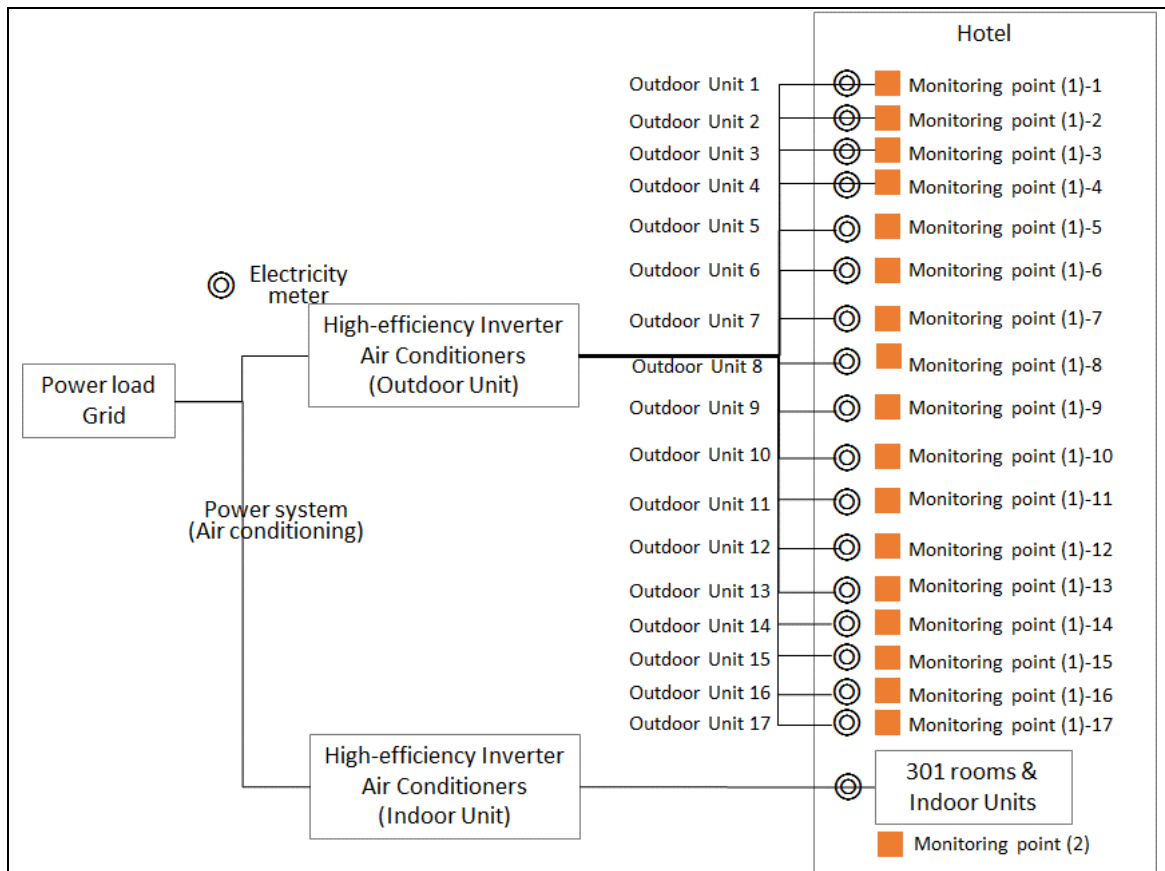
	<p>system replaced by the project. In the case of replacing existing air conditioning system by project air conditioning system, execution of the prevention plan is checked at the time of verification, e.g. re-use of the refrigerant, in order to confirm that refrigerant used for the existing air conditioning system removed by the project is not released to the air.</p>	<p>refrigerants from project air-conditioning system removed by using refrigerant recovery machine, and ensure storage of collected refrigerants, meanwhile project owner will check by own check sheet and pictures of refrigerant recovery procedure. Letter of consent on not releasing refrigerant used for project chiller was prepared by participants from both sides.</p>
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### 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 reference air conditioning systems	CO <sub>2</sub>
Project emissions	
Emission sources	GHG type
Electricity consumption by project air conditioning systems (include an indoor unit and an outdoor unit)	CO <sub>2</sub>

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



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO <sub>2e</sub> )	Estimated Project Emissions (tCO <sub>2e</sub> )	Estimated Emission Reductions (tCO <sub>2e</sub> )
2016	727.5	504.7	222
2017	3,052.5	2,117.5	935
2018	3,052.5	2,117.5	935
2019	3,052.5	2,117.5	935
2020	3,052.5	2,117.5	935
<b>Total (tCO<sub>2e</sub>)</b>	<b>12,937.5</b>	<b>8,974.7</b>	<b>3,962</b>

**D. Environmental impact assessment**

Legal requirement of environmental impact assessment for the proposed project	NO
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## E. Local stakeholder consultation

### E.1. Solicitation of comments from local stakeholders

The project participant identified the following stakeholders, accommodating the suggestions from Vietnam JCM Secretariat.

[Direct stakeholders] Staff member of Peace Real Estate Investment Company Limited

[Expert] Director General of School of heat engineering and refrigeration, Hanoi University of Science and Technology.

The project participant conducted a face-to-face interview with local stakeholder consultation with identified stakeholders (see table below). Comments received from the participants of the local stakeholder consultation are summarized in the following section E.2. below. The project received no negative comments from the participants of the local stakeholder consultation, and, also, it was confirmed that none of the received comments requires further action from the project side.

#	date	Venue	Method	Attendance
1	November 25th, 2016 14:00 ~ 16:00	Novotel Suites Hotel Room3 on 3rd Floor	Local stakeholder consultation	Hotel Owner Hotel's engineer manager MONRE Expert

### E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
Ministry of Natural Resources and Environment (MONRE)	How was the amount of CO <sub>2</sub> emissions reduction calculated in JCM Approved Methodology of this project?	The amount of CO <sub>2</sub> emissions reduction will be calculated by the JCM approved methodology: JCM_VN_AM006.
Expert	Why does the JCM approved methodology applied to this project use COP as cooling performance, instead of using CSPF or APF? The amount of CO <sub>2</sub> emissions reduction could be calculated by using CSPF or APF as well.	This project installed the air conditioning system at the hotel. Therefore, it is assumed that the introduced air conditioner has a relatively large capacity. The minimum cooling capacity of the project air-conditioning was 73kW. As a result, inverter air conditioners

		<p>for commercial use with the capacity of 14 KW or more are introduced.</p> <p>Since CSPF is a standard that is applied to air conditioners for homes or stores with less than 14 KW and APF is a standard that is not adopted in Vietnam according to the Japanese air-conditioner industry company, this project chose COP as cooling performance.</p>
	<p>Was BEMS installed in Novotel Suites Hotel? If BEMS is installed, it is not necessary to install measurement equipment.</p>	<p>BEMS was installed in Novotel Suites Hotel. But BEMS was not set to measure the electricity consumption of indoor and outdoor units of air-conditioning system at the moment. Although it has an optional BEMS function as an air conditioner system, it cannot be used as a monitoring device of the JCM because the accuracy is insufficient and the measured data cannot be accumulated.</p> <p>This project installed measuring equipment for monitoring electricity consumption in each outdoor unit and total electricity consumption of indoor units of air conditioning system.</p>
	<p>How can the release of HFC into the atmosphere be prevented at the time of air-conditioning system removal?</p>	<p>The project owner plans to collect refrigerants from the air-conditioning system removed by using refrigerant recovery machine and ensure storage of refrigerants collected. Meanwhile the project owner would be checking by own check sheet and pictures of refrigerant recovery procedure. Also,</p>

		a letter of consent on not releasing refrigerant used for project chiller was under preparation, based upon the agreement by participants from both sides.
	The project participants should handle HFC carefully for not releasing the HFC into the atmosphere. If it were released, it would become the big CO <sub>2</sub> emissions sources.	No action is necessary.

**F. References**

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

**Annex**

**Revision history of PDD**

Version	Date	Contents revised
01.0	15/03/2017	First edition