

## JCM Project Design Document Form

### A. Project description

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

Introduction of 30MW Rooftop Solar Power System to Large Supermarkets

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

The purpose of the project is to reduce the GHG emission from the consumption of grid electricity at the supermarket. To realize the purpose, the project involves installation of rooftop solar power systems with the total generating capacity of 30MW at 37 supermarkets under “Big C” chain in Thailand. The project is implemented by “Impact Electrons Siam Co., Ltd.” (IES) and the subsidiary “Impact Solar Limited” (ISL) in Thailand. This project introduces the crystalline silicon photovoltaic (PV) modules of Sharp Energy Solutions Corporation of Japan (ND-AH315, ND-AF320 and ND-AF330H). Sharp's PV modules are well known for high durability, adhering to the company’s standard which is more stringent than Japan Industrial Standards or International Electrotechnical Commission standards. The PV systems in the proposed project activity are connected to internal grids of each supermarket which is connected to the national grid. The PV systems replace grid electricity mostly derived from fossil-fuel and contribute to greenhouse gas emissions reduction in Thailand.

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

Country	The Kingdom of Thailand
Region/State/Province etc.:	Various sites in Thailand
City/Town/Community etc:	<p>Supermarket 1 (Pathum Thani) 996.48kW 41/10 Moo 3, Ban Chang, Mueang, Patumthani, 12000</p> <p>Supermarket 2 (Ayutthaya) 996.48kW 80 Moo 2, Ban Krod, Bang Pa-in, Phra Nakhon Si Ayutthaya, 13160</p> <p>Supermarket 3 (Buriram) 766.08kW 150 Moo 7, Isan, Mueang, Buriram, 31000</p> <p>Supermarket 4 (Chaiyaphum) 996.48kW 99 Moo 1, Bung Khla, Mueang, Chaiyaphum, 36000</p> <p>Supermarket 5 (Namyuen) 432.00kW 199 Moo 15, Si Wichian, Nam Yuen, Ubon Ratchathani, 34260</p>

	Supermarket 6 (South Pattaya) 996.48kW 565/41 Moo 10, Nongprue, Bang Lamung, Chonburi, 20150
	Supermarket 7 (Lam Lukka) 996.48kW 3/83 Moo 7, Lat Sawai, Lam Lukka, Pathum Thani, 12150
	Supermarket 8 (Wangnamyen) 443.52kW 916 Moo1, Wang Nam Yen, Wang Nam Yen, Sa Kaeo, 27210
	Supermarket 9 (Navanakorn) 996.48kW 99 Moo3, Khlong Sam, Khlongluang, Pathum Thani, 1210
	Supermarket 10 (Omyai) 992.25kW 17/17 Moo8, Omyai, Sampran, Nakhon Pathom, 73160
	Supermarket 11 (Ratchaburi) 996.48kW 534 Moo 1, Khoke Mor, Mueang, Ratchaburi, 70000
	Supermarket 12 (Hangdong2) 593.28kW 111 Moo 5, Hangdong, Hangdong, Chiangmai, 52030
	Supermarket 13 (Sukhothai) 996.48kW 68 Moo 2, Ban Kluai, Mueang, Sukhothai, 64000
	Supermarket 14 (Suksawat) 992.25kW 94 Moo 18, Bang Phueng, Phrapadaeng, Samutprakarn, 10130
	Supermarket 15 (Lumphun) 846.72kW 200 Moo 4, Ban Klang, Mueang, Lamphun, 51000
	Supermarket 16 (Yasothon) 996.48kW 323 Moo 2, Samran, Mueang, Yasothon, 35000
	Supermarket 17 (Lumpang) 996.48kW 65 Soptui, Mueang, Lampang, 52100
	Supermarket 18 (Tha Tako) 587.52kW 989 Moo 1, Tha Tako, Tha Tako, Nakornsawan, 60160
	Supermarket 19 (Phrae) 789.12kW 600 Moo 9, Nachak, Mueang, Phrae, 54000
	Supermarket 20 (Korat2) 875.52kW 103, NaiMueang, Mueang, Nakornratchasima, 30000
	Supermarket 21 (Suwannaphum) 576.00kW 12 Moo 5, Srakoo, Suwannaphum, Roi Et, 45130

	Supermarket 22 (Ladkrabang) 992.25kW 99/7 Moo1, Khlong Preng, Mueang Chachoengsao, Chachoengsao, 24000
	Supermarket 23 (Dankhuntod) 564.48kW 384 Moo 3, Dan Khun Thot, Dan Khun Thot, Nakornratchasima, 30210
	Supermarket 24 (Wichienburi) 552.96kW 157 Moo 4, Sapradu, Wichianburi, Phetchabun, 67130
	Supermarket 25 (Nakhornpathom) 996.48kW 754 Petchkasem Rd. Huayjarakae, Muang Nakhon Pathom, 73000
	Supermarket 26 (Hangdong1) 996.48kW 433/4-5 Moo 7, Mae Hia, Mueang, Chiangmai, 50000
	Supermarket 27 (Phang Khon) 512.64kW 506 Moo 8, Phang Khon, Phang Khon, Sakon Nakhorn, 47160
	Supermarket 28 (Thanyaburi) 915.84kW 158/17 Moo 4, Rangsit, Thanyaburi Pathumthani, 12110
	Supermarket 29 (Kham Ta Kla) 478.08kW 296 Moo 11, Kham Ta Kla, Kham Ta Kla, Sakon Nakhon, 47250
	Supermarket 30 (Ban Dung) 633.60kW 500 Moo 9, Srisuttho, Bandung, Udonthani, 41190
	Supermarket 31 (Phetchaburi) 887.04kW 130 Moo 1, Ton Mamuang, Mueang, Phetchaburi, 76000
	Supermarket 32 (Chonburi2) 806.40kW 15/17 Moo 3, Huai Kapi, Mueang, Chonburi, 20000
	Supermarket 33 (Roi-Et) 702.72kW 320 Moo 10, Nuea Mueang, Mueang, Roi Et, 45000
	Supermarket 34 (Ban Phai) 581.76kW 100 Moo 6, Huanong, Ban Phai, Khon Kaen, 40110
	Supermarket 35 (Krabi) 997.92kW 349 Moo 11, Krabi Noi, Mueang, Krabi, 81000
	Supermarket 36 (Petchaboon) 997.92kW 939 Moo 2, Sadiang, Mueang, Phetchabun, 67000
	Supermarket 37 (Chantaburi) 997.92kW

	1012 Talad, Mueang, Chanthaburi, 22000
Latitude, longitude	Supermarket 1: N14.0050, E100.5205 Supermarket 2: N14.3193, E100.61121 Supermarket 3: N14.9774, E103.07422 Supermarket 4: N15.77739, E102.02705 Supermarket 5: N14.4933, E105.0176 Supermarket 6: N12.9156, E100.8940 Supermarket 7: N13.93463, E100.71429 Supermarket 8: N13.5100, E102.1777 Supermarket 9: N14.1226, E100.61698 Supermarket 10: N13.70651, E100.28121 Supermarket 11: N13.5506, E99.8231 Supermarket 12: N18.66776, E98.91456 Supermarket 13: N17.01123, E99.77335 Supermarket 14: N13.6538, E100.52238 Supermarket 15: N18.591, E99.0412 Supermarket 16: N15.82773, E104.11475 Supermarket 17: N18.2755, E99.4812 Supermarket 18: N15.6353, E100.4763 Supermarket 19: N18.1284, E100.144 Supermarket 20: N14.9486, E102.0542 Supermarket 21: N15.5971, E103.8083 Supermarket 22: N13.692197, E100.901588 Supermarket 23: N15.1931, E101.7622 Supermarket 24: N15.651145, E101.087099 Supermarket 25: N13.8126, E100.072 Supermarket 26: N18.74496, E98.96208 Supermarket 27: N17.393359, E103.702359 Supermarket 28: N14.0258, E100.7433 Supermarket 29: N17.856384, E103.764704 Supermarket 30: N17.674374, E103.251090 Supermarket 31: N13.079, E99.9482 Supermarket 32: N13.315733, E100.96029 Supermarket 33: N16.0766, E103.6491 Supermarket 34: N16.048073, E102.713432 Supermarket 35: N8.10837, E98.92927 Supermarket 36: N16.398730, E101.138657 Supermarket 37: N12.59817, E102.09929

## A.4. Name of project participants

The Kingdom of Thailand	Impact Electronics Siam Co., Ltd. Impact Solar Limited
Japan	Sharp Energy Solutions Corporation

## A.5. Duration

Starting date of project operation	01/08/2018
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Expected operational lifetime of project	17 years
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#### A.6. Contribution from Japan

The proposed project was partially supported by the Ministry of the Environment, Japan (MOEJ) through the Financing Programme for JCM Model projects, which provided financial support of less than half of the initial investment for the projects in order to acquire JCM credits. The technology of advanced and efficient solar power system is introduced in the proposed project by the Japanese project participant. Further, implementation of the proposed project promotes technology transfer of low carbon technologies in Thailand.

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

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

Selected approved methodology No.	TH_AM001
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	The project installs solar PV system(s).	The solar PV systems are installed on to the rooftops of 37 supermarkets.
Criterion 2	The solar PV system is connected to the internal power grid of the project site and/or to the grid for displacing grid electricity and/or captive electricity at the project site.	The solar PV systems are connected to the internal power grids of the project sites (each supermarket) for displacing grid electricity at the project sites.
Criterion 3	The PV modules have obtained a certification of design qualifications (IEC61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).	The PV modules installed in the project have been certified for IEC 61215, IEC 61730-1 and IEC 61730-2.
Criterion 4	The equipment to monitor output power of the solar PV system and irradiance is installed at the project site.	Electricity meters and pyranometers have been installed at the project sites to monitor output power and irradiance respectively.

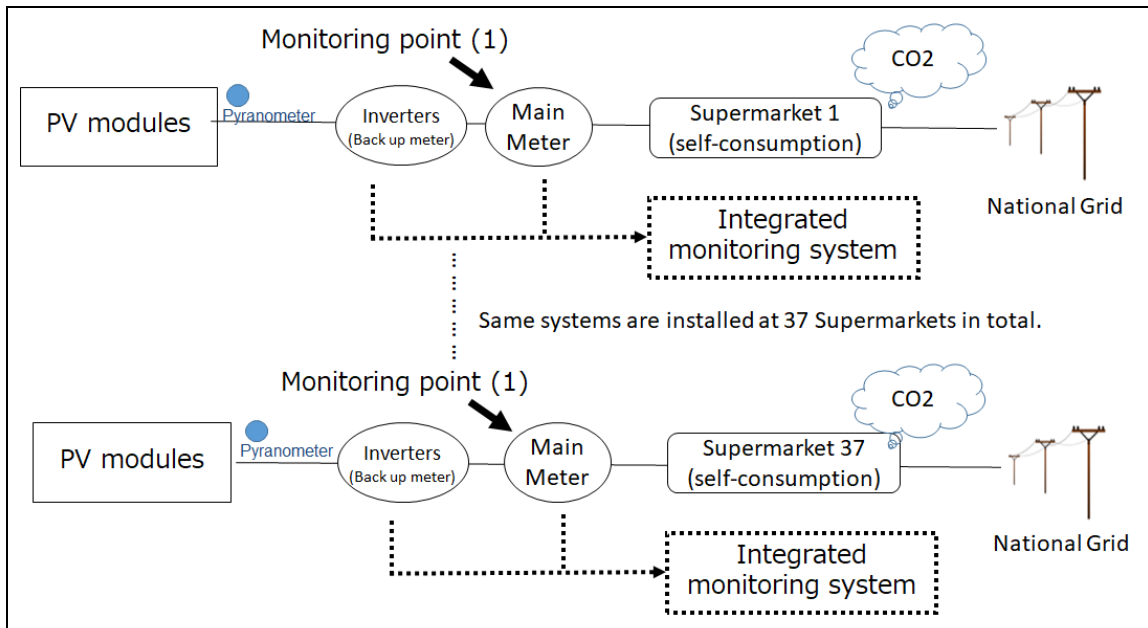
### C. Calculation of emission reductions

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

Reference emissions
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Emission sources	GHG type
Consumption of grid electricity	CO <sub>2</sub>
Project emissions	
Emission sources	GHG type
Generation of electricity from the solar PV system(s)	N/A

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>2</sub> e)	Estimated Project Emissions (tCO <sub>2</sub> e)	Estimated Emission Reductions (tCO <sub>2</sub> e)
2013	-	-	-
2014	-	-	-
2015	-	-	-
2016	-	-	-
2017	-	-	-
2018	5,572.2	0	5,572
2019	13,293.2	0	13,293
2020	13,293.2	0	13,293
2021	13,293.2	0	13,293
2022	13,293.2	0	13,293
2023	13,293.2	0	13,293

2024	13,293.2	0	13,293
2025	13,293.2	0	13,293
2026	13,293.2	0	13,293
2027	13,293.2	0	13,293
2028	13,293.2	0	13,293
2029	13,293.2	0	13,293
2030	13,293.2	0	13,293
Total (tCO <sub>2</sub> e)			165,088

#### 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

To solicit comments from local stakeholders, a consultation meeting was planned by the project participants, and the project participants invited various stakeholders. Details of the local stakeholders consultation meeting is summarized as follows:

Date and Time: 30th November 2018, 14:30 – 15:30

Venue: Big C Supercenter Public Company Limited

Address: 6th Floor, 97/11 Rajdamri Road, Lumpini, Pathumwan, Bangkok 10330

Following organizations from Thailand side were invited to the consultation meeting:

- Thailand JCM Secretariat (TGO)
- Impact Electrons Siam Co., Ltd.
- Impact Solar Limited
- Big C Supercenter Public Company Limited

At the meeting, the details of the proposed JCM project and the technology to be introduced were explained by the representative of Sharp Energy Solutions Corporation. And Impact Solar Limited introduced the overview of the project.

There were no negative comments toward the proposed project expressed during the stakeholders meeting by the attendees. The comments received during the local stakeholders

meeting are summarized in the following section.

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

Stakeholders	Comments received	Consideration of comments received
TGO	<ol style="list-style-type: none"> <li>1. Who is in charge of developing PDD?</li> <li>2. How did project participants set Monitoring period?</li> <li>3. Who owns the solar power system and JCM credit?</li> <li>4. How many sites and how much capacity have been installed?</li> <li>5. Could you clarify the process of validation by TPE?</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharp Energy Solutions Corporation is in charge of PDD. The data and information are provided by Impact Solar Limited. And NTTD IOMC supports drafting PDD. [No action is needed]</li> <li>2. The monitoring period is 17 years. The period is based on Japanese depreciation period. [No action is needed]</li> <li>3. Impact Solar Limited built, owns, and operates the Solar Power System based upon PPA contract with Big C. Japanese government will take more than 51% of the JCM credits, and project participants will take rest of credits. [No action is needed]</li> <li>4. Most of them are in mechanical completion stage. Some are pending for government license approvals. [No action is needed]</li> <li>5. The validation process will finish by March 2019. At first, MOEJ will assign TPE, and TPE will</li> </ol>



		<p>conduct validation process including site inspections in January to February. Finally TPE will close validation and Sharp Energy Solutions Corporation will submit PDD and other documents to JC in order to register the project in line with JCM procedure.</p> <p>[No action is needed]</p>
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**F. References**

N/A

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

**Annex**

N/A

**Revision history of PDD**

Version	Date	Contents revised
01.0	28/02/2019	First edition
02.0	21/01/2020 <u>27/03/2020</u>	Revised based on Validation Comments <u>Initial registration by the Joint Committee through electronic decision</u>