



**Verified Carbon
Standard**

SHINE – DISTRIBUTION OF LED LIGHTBULBS IN INDIA-3

Brightspark Energy Private Limited
(Indian Subsidiary and Project Management Entity of CQC LLC)

Project Title	SHINE – Distribution of LED Lightbulbs in India-3
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed small-scale grouped project (henceforth referred to as SHINE CPA 3) has already been registered as CPA 10484-P1-0003-CP1 under registered CDM Programme of Activities (PoA) 10484 titled: "SHINE – Distribution of LED Lightbulbs in India" which involves distribution of Light Emitting Diodes (LEDs) for domestic lighting in the Northern States of Uttar Pradesh, Haryana, Himachal Pradesh and Eastern states of Bihar, Jharkhand and Odisha.

According to CEA's (Central Electricity Authority) Load Generation Balance Report 2018-19, actual demand supply gap in the North Indian states was 1.7% while the peak deficit was 3.8% during the year 2017-18 whereas in the eastern states the same figures stood at 0.8% and 1.5% during the year 2017-18. Trend shows that there has been a steady increase in peak demand in the states under consideration while supply has not been able to match up to this demand. This project activity could have a positive impact on the demand supply gap by introducing energy efficient light bulbs thereby reducing peak hour demand of power in residential areas.

The baseline survey done to understand the preference of lighting equipment and their wattages amongst rural and peri urban households revealed that most of the households use 60 W and 100 W incandescent lamps. Considering this, in this section and elsewhere, wattage of baseline lamps has been referred to as 60 or 100 Watts. But it is possible that during project implementation, households are found to be using ICLs of other wattage as well.

The wattage of baseline lamps to be replaced is at the sole discretion of the Project Proponent/ Implementer, as well as the decision on wattage of project lamp to replace a specific wattage of baseline lamp shall also be with the Project Proponent/ Implementer as long as it is in compliance with applicability criteria set out in the applied CDM methodology namely the service level (which for lighting projects is light output) of the project equipment being between 90 to 150 per cent of the service level of baseline equipment. Thus, the project activity envisages replacement of 60W ICL with 9W/7W LED and 100W ICL with 12W/14W LED as the lumen output is within the specified limit.

Project Activity Instance is defined as set of implemented technologies and/or measures that constitute the minimum unit of activity necessary to comply with the criteria and procedures applicable to the project activity under the methodology applied to the project in VCS Program Definitions v4.2. Hence, each project activity instance refers to number of project devices, i.e., number of LEDs distributed to each grid connected household. Maximum number of six LEDs (7 W/9 W and 12 W/14 W) will be distributed to an individual grid connected household under a single project activity instance.

Under this grouped project, as on 01-July-2022, 3,099,557 LEDs have been distributed in 526,491 grid connected households (i.e., project activity instance). Therefore, total 526,491 project activity instances are considered as on date under this grouped project.

Further, 12W, 7W and 9 W LEDs have been distributed in the ratio of 66:17:17 respectively. However, exact criteria for capacity limit for each project activity instance is defined under section 1.4 of this VCS-PD.

Maximum emission reductions from a single project activity instance under this grouped project are estimated to be 1.1 tCO₂e per year (considering replacement of six 100 W ICLs with six 12 W LEDs in a grid connected household). Further, the annual average emission reductions from total number of 526,491 project activity instances under this grouped project are estimated to be 491,554 tCO₂e per year and total emission reductions from total number of 526,491 project activity instances under this grouped project are estimated to be 4,915,540 tCO₂e during the fixed crediting period of 10 years.

1.2 Sectoral Scope and Project Type

Sectoral scope: 03 Energy Demand.

Project type: Type II – Energy Efficiency improvement project.

Grouped project: Yes.

1.3 Project Eligibility

The Grouped Project involves replacement of electric lighting with more energy efficient electric lighting, such as the replacement of incandescent electrical bulbs, fluorescent tubes and compact fluorescent lamps with high efficiency LEDs which falls under the category of efficiency improvements in thermal applications. The baseline & monitoring methodology applied for this project is “AMS-II.C.-Demand-side energy efficiency activities for specific technologies; Version 15.0”, which is small scale methodology.

The grouped project falls under small-scale Type II CDM project activity as per the Glossary CDM terms v10.0 (page 18)¹. Further, maximum energy savings from a single project activity instance are calculated to be 1.20 MWh (considering six 12 W LEDs have replaced six ICLs in a household). Therefore, it is evident that the aggregate energy savings by a single project activity instance shall not exceed the equivalent of 60 GWh per year as mentioned in applicable methodology AMS II-C: Demand-side energy efficiency activities for specific technologies, Version 15.0.

Further, under section 2.1.1., Table 1 of the VCS standard v4.3 provides the excluded list of project activities as per the small scale and large scale designations defined under CDM (refer

¹ https://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf

footnote 2 on page 2). As per Table 1, only large scale project activities proposed in non-LDC are excluded from the scope of VCS.

As stated above, each project activity instance under this grouped project meets the applicability criteria of the applied small-scale methodology which can be further referred from the registered CPA-DD². Therefore, this small-scale grouped project does not fall under the excluded list of projects.

In addition, as per Appendix 2 of the VCS Standard v4.3 (page 64) for a CDM Component Project Activity (CPA) that does not include afforestation and/or reforestation activities, three conditions have been stated as mentioned below-

i) The CPA shall be part of a Program of Activities (PoA) with an original program crediting period start date on or after 1 January 2016; or

ii) Where the CPA is part of a Program of Activities (PoA) with an original program crediting period start date from 1 January 2013 to 31 December 2015 and where the CPA has an original crediting period start date from 1 January 2013 to 31 December 2015, the CPA shall have issued credits during the period 1 January 2016 to 5 March 2021, or shall have a status of “issuance requested” by 5 March 2021; or

iii) Where the CPA is part of a PoA with an original program crediting period start date from 1 January 2013 to 31 December 2015 and where the CPA has an original crediting period start date on or after 1 January 2016, no prior credit issuance is required.

The project activity is CDM CPA 10484-P1-0003-CP1, which is part of CDM PoA 10484 for which the PoA period starts from 10-June-2019(PoA registration date under CDM). Therefore, this condition b(i) is applicable on this grouped project and the CPA -P1-0003-CP1 is eligible to be transferred from CDM to VCS under VERRA.

Further, the inclusion date of SHINE CPA 3 as per the CPA inclusion form is 11- January-2020. Since the inclusion date as per the CPA inclusion form is within two years of the project start date (06-March-2020), this project is eligible to complete validation under VCS in line with the clause 3.20.3 of the VCS Standard, v4.3.

1.4 Project Design

The project has been designed as a grouped project having multiple project activity instances. Each project activity instance is defined as number of project devices, i.e., number of LEDs distributed to each grid connected household. Maximum number of six LEDs (7 W/9 W and 12 W/14 W) will be distributed per grid connected household.

Eligibility Criteria

² https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/L4XT6COND7KEVO2ZFW9AJIBQR5HSGM/view

The project is a grouped project, therefore for each new instance the following eligibility criteria are to be confirmed in line with section 3.5.15 and 3.5.16 of the VCS Standard v4.3:

S.No.	Criteria	Condition to be met	Supporting Evidences
1	Methodology	Meet the applicability conditions set out in the methodology applied to the project: The project activity instance shall use AMS-II.C- Demand-side energy efficiency activities for specific technologies, version 15.0. and shall meet all the applicability conditions.	Details of how each project activity instance meets the requirements of the methodology can be confirmed from the registered CPA-DD ³ .
2	Technology	Use the technologies or measures specified in the project description: New LEDs will replace existing incandescent lamp (ICL). The lumen output of the project LEDs would be between 90% - 150% of the lumen output of the baseline incandescent lamps.	Technical Specifications of the LEDs provided by manufacturer have been provided to the VVB at the time of validation of instances under the grouped project.
3	Baseline Scenario	New project activity instances are subject to the baseline scenario determined in the project description for the specified project activity and geographic area: The baseline is “continued use of existing luminaries in the households.” This also conforms to paragraph 51 of applied methodology according to which, “assumed baseline scenario is that lighting by the project lamps would have	Baseline Scenario can be confirmed from the registered CPA-DD ⁴

³ https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/L4XT6C0ND7KEV02ZFW9AJIBQR5HSGM/view

⁴ https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/L4XT6C0ND7KEV02ZFW9AJIBQR5HSGM/view

		been provided by the lamps collected and replaced by the project activity”.	
4	Additionality	Have characteristics with respect to additionality that are consistent with the initial instances for the specified project activity and geographic area: Net Present Value (NPV) is the financial indicator against which the Project activity instances will demonstrate investment barrier.	Net Present Value (NPV) calculation spreadsheet. Same has been provided to the VVB at the time of validation of instances under the grouped project.
5	Defined geographic area	Occur within one of the designated geographic areas specified in the project description: Uttar Pradesh, Haryana, Himachal Pradesh and Eastern states of Bihar, Jharkhand and Odisha.	Project Activity Instance Database containing geographical coordinates of each consumer to which LEDs are distributed. Same will be provided to the verifying VVB at the time of verification of instances under the grouped project.
6	Ownership	Have evidence of project ownership, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance. A default Beneficiary Agreement for end users including the provision that emission reductions generated by the project activity are owned by the Project Proponent will be provided for the project activity instance.	Copy of Consent letter/record of consent given from End User to Project Proponent regarding emission reduction claims. Same has been provided to the VVB at the time of validation of instances under the grouped project.
7	Start Date	The project activity instance start date will be same as or	Copies of signed consent letter/ record of consent

		later date than the grouped project start date.	given by end user to Project Proponent for first LED distributed for each project activity. Same has been provided to the VVB at the time of validation of instances under the grouped project.
8	Capacity Limit	Where a capacity limit applies to a project activity included in the project, no project activity instance shall exceed such limit: 1. The aggregate energy savings by a single project activity instance shall not exceed the equivalent of 60 GWh per year as mentioned in applicable methodology AMS II-C: Demand-side energy efficiency activities for specific technologies, Version 15.0 2. Each project activity instance that exceeds one percent of the capacity limit (i.e., 0.6 GWh) shall be identified. 3. Such instances shall be divided into clusters, whereby each cluster is comprised of any system of instances such that each instance is within one kilometer of at least one other instance in the cluster. Instances that are not	Project Activity Instance ER Spreadsheet containing estimation of annual energy saving from each project activity instance. Same has been shared with VVB for instances under the grouped project. The maximum annual energy savings from each project activity instance are calculated to be 1.20 MWh which is well below 1% (i.e., 0.6 GWh) of capacity limit (considering replacement of six 100 W ICLs with six 12 W LEDs in a grid connected household). Therefore, the project activity instances under this grouped project shall not be assigned to clusters.

		within one kilometer of any other instance shall not be assigned to clusters.	
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For each new project activity instance, the above eligibility criteria are confirmed within the project database at the time of verification. The monitoring reports will provide a summary of the new project activity instances and confirm the technology employed, geographic location and end user group to confirm the eligibility of their inclusion.

1.5 Project Proponent

Organization name	Brightspark Energy Private Limited (Indian subsidiary and project management entity of CQC LLC)
Contact person	Tridip Kumar Goswami
Title	Chief-Carbon and Sustainability Accounting Team
Address	Level 14 & 15, Concorde Towers, UB City, 1 Vittal Mallya Road, Bangalore, Karnataka
Telephone	+ 91 8075519856
Email	TGoswami@cquestcapital.com cqc-operations@cquestcapital.com

1.6 Other Entities Involved in the Project

Organization name	Ecoeye Co., Ltd.
Role in the project	Project financing
Contact person	Sangsun HA
Title	Executive Director
Address	70 Dusan-ro, Geumcheon-gu, Seoul, South Korea #1503, Hyundai Knowledge Industrial Center B Seoul
Telephone	+82- 2-6480-7346

Email	Sangsun_ha@ecoeye.com
Organization name	Korea Impact Carbon Corporation
Role in the project	Project financing
Contact person	Sangsun HA
Title	-
Address	#704(3rd room), 70 Dusan-ro, Geumcheon-gu, Seoul, Republic of Korea
Telephone	+82- 2-6480-7346
Email	Sangsun_ha@ecoeye.com

1.7 Ownership

The ownership can be determined from the records of consent agreements signed by end user (LED bulb owner) to PP during the registration process.

The consent agreement includes the statutory clause which is summarised below:

End User agrees that Project Proponent is solely and exclusively entitled to all legal rights associated with any emission reductions and all corresponding certificates, benefits, credits, environmental or social attributes and/or rights, which include Certified Emissions Reductions (CERs), in connection with the LED bulbs given to the end user in exchange for ICLs, and the end user hereby transfer, assign and waive any such rights to the Project Proponent and authorize Project Proponent to transfer and assign such rights without further notice or consent.

This is in line with clause 5 of section 3.6.1. of VCS standard v4.3.

1.8 Project Start Date

The project start date is the date on which the project began generating GHG emission reductions or removals; equal to “Project Crediting Period Start Date”. This is in line with the section 2.2 of Clarification 2 published by VERRA on 19 April 2022 which was further updated on 21 April 2022⁵.

The project is a non-AFOLU project and the first energy efficient LED under this grouped project was distributed on 06-March-2020.

⁵ <https://verra.org/wp-content/uploads/2022/04/VCS-Program-Clarifications-19-April-2022-rev.pdf>

Thus the project start date is considered as 06-March-2020.

1.9 Project Crediting Period

Fixed Crediting Period: 10 Years

Project Crediting Period Start Date is the date on which the project began generating GHG emission reductions or removals; equal to “Project Start Date”. This is in line with the section 2.2 of Clarification 2 published by VERRA on 19 April 2022 and further updated on 21 April 2022⁶.

Crediting Period Start Date: 06-March-2020

Crediting Period End Date: 05-March-2030

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	✓

As per the VCS Program Definitions v 4.2, the scale of the grouped project is “large project” as the estimated greenhouse gas emission reductions are more than 300,000 tCO₂e per year.

The estimated greenhouse gas emission reductions from 526,491 project activity instances under this grouped project are summarized in the following table ⁷ –

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 2020-2021 (06-March-2020- 05-March-2021)	491,554
Year 2021-2022 (06-March-2021- 05-March-2022)	491,554
Year 2022-2023	491,554

⁶ <https://verra.org/wp-content/uploads/2022/04/VCS-Program-Clarifications-19-April-2022-rev.pdf>

⁷ Actual emission reductions corresponding to each project activity instance will be calculated and submitted to VERRA during the verification stage of the grouped project.

(06-March-2022- 05-March-2023)	
Year 2023-2024 (06-March-2023- 05-March-2024)	491,554
Year 2024-2025 (06-March-2024- 05-March-2025)	491,554
Year 2025-2026 (06-March-2025- 05-March-2026)	491,554
Year 2026-2027 (06-March-2026- 05-March-2027)	491,554
Year 2027-2028 (06-March-2027- 05-March-2028)	491,554
Year 2028-2029 (06-March-2028- 05-March-2029)	491,554
Year 2029-2030 (06-March-2029- 05-March-2030)	491,554
Total estimated ERs	4,915,540
Total number of crediting years	10
Average annual ERs	491,554

1.11 Description of the Project Activity

This grouped project involves distribution of Light Emitting Diodes (LEDs) for domestic lighting in Northern States of Uttar Pradesh, Haryana, Himachal Pradesh and Eastern states of Bihar, Jharkhand and Odisha. Under this grouped project, incandescent light bulbs, fluorescent tubes and compact fluorescent lamps will be considered for replacement.

The baseline survey done to understand the preference of lighting equipment and their wattages amongst rural and peri urban households revealed that most of the households use 60 W and 100 W incandescent lamps. Considering this, in this section and elsewhere, wattage

of baseline lamps has been referred to as 60 or 100 Watts. But it is possible that during project implementation, households are found to be using ICLs of other wattage as well. It shall be the sole decision of Project Proponent/Implementer whether to consider its replacement or not.

The decision on wattage of project lamp to replace a specific wattage of baseline lamp shall also be with the PP/Implementer as long as it is in compliance with applicability criteria set out in the methodology namely the service level (which for lighting projects is light output) of the project equipment being between 90 to 150 per cent of the service level of baseline equipment. Thus, while in the registered CDM PoA-DD 60W ICL was proposed to be replaced by 9W LED and 100W ICL with 14W LED, the project activity envisages replacement of 60W ICL with 7W/9W LED and 100W ICL with 12W/14W LED as the lumen output is within the specified limit.

Following are the stipulated specifications/features of the LED lamps for monitoring operating hours. The project implementer however is free to choose LEDs/data meters of any other make with similar specifications.

Specifications of LED Lamps –



Image of LED Bulb with Shine LOGO

Technical Specification of 7W LED bulb	
Rated Wattage	7 W
Working Voltage	220-240 V, 50 Hz
Colour Temperature	5700 K - 6500 K
Initial Lumen	740 lm
Service level as compared to baseline lamp of 60W (715 lm as per methodology)	103% of lumen output
CRI	>80
Power Factor	0.90
Average Life	25,000 hrs
BIS compliant as per IS 16102 (Part 2): 2012	Yes

Technical Specification of 9W LED bulb	
Rated Wattage	9 W
Working Voltage	100 V-300 V
Colour Temperature	6500 K
Initial Lumen	820 lm
Service level as compared to baseline lamp of 60W (715lm as per methodology)	115% of lumen output
CRI	>80
Power Factor	0.90
Average Life	25,000 hrs
BIS compliant as per IS 16102 (Part 2): 2012	Yes

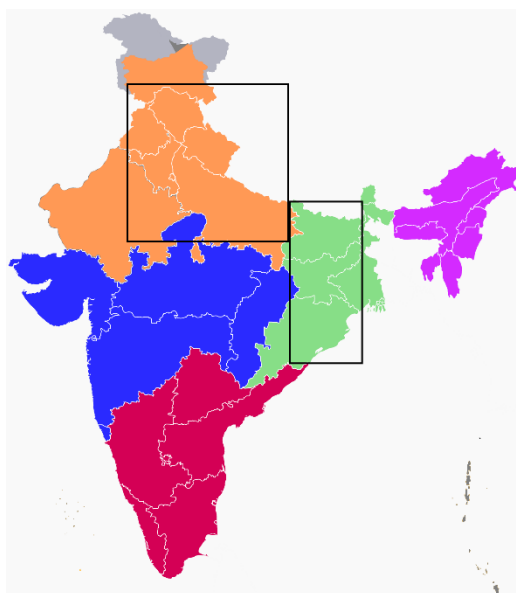
Technical Specification of 12W LED bulb	
Rated Wattage	12 W
Working Voltage	230 V
Colour Temperature	6000 K – 7000 K
Initial Lumen	1340 lm
Service level as compared to baseline lamp of 100W (1350lm as per methodology)	99% of lumen output
Power Factor	0.90
Average Life	25,000 hrs
BIS compliant as per IS 16102 (Part 2): 2012	yes

Technical Specification of 14W LED bulb	
Rated Wattage	14 W
Working Voltage	220 V-240 V
Colour Temperature	6500 K
Initial Lumen	1400 lm
Service level as compared to baseline lamp of 100W (1350lm as per methodology)	104% of lumen output
Power Factor	0.90
Average Life	25,000 hrs
BIS compliant as per IS 16102 (Part 2): 2012	yes

1.12 Project Location

The grouped project and all project activity instances will be implemented within the Northern States of Uttar Pradesh, Haryana, Himachal Pradesh and Eastern states of Bihar, Jharkhand and Odisha. These states comprise the Eastern Grid circle and the Northern Grid Circle in the grid map of India. The co-ordinates of each one of them are:

State	Latitude ⁸	Longitude
Uttar Pradesh	27° 40' N	80° 00' E
Haryana	30° .30' N	74° .60' E
Himachal Pradesh	32° 29' N	75° 10' E
Bihar	25° 11' N	85° 32' E
Jharkhand	23° 45' N	85° 30' E
Odisha	26° 00' N	94° 20' E



Grid Map of India

1.13 Conditions Prior to Project Initiation

The baseline scenario is the same as the conditions existing prior to the Grouped Project initiation. Refer to Section 3.4 (Baseline Scenario).

The baseline is “continued use of existing luminaries in the households”. This also conforms to paragraph 51 of applied methodology according to which, “assumed baseline scenario is that lighting by the project lamps would have been provided by the lamps collected and replaced by the project activity”. The lamps collected and replaced under the project activity are ICLs, FTLs and CFLs.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

This grouped project involves the distribution and installation of LED lighting equipment. These LEDs shall be compliant with the existing National/international standards viz. IS 16102 or an equivalent standard. The use of LED lighting equipment does not entail significant

⁸ https://www.mapsofindia.com/lat_long/

environmental impacts. The Government of India does not require any documentation of the environmental impacts of the project activity. The project type/category is not included in the “List of projects or activities requiring prior environmental clearance” included in the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest (MoEF), Government of India, 2006⁹ and demonstrate compliance of the project with all and any relevant local, regional and national laws, statutes and regulatory frameworks.

The DISCOM/Project Proponent/project Implementer will arrange for destruction of collected baseline lamps in accordance with paragraph 43 and footnote 10 of applied methodology.

To facilitate verification by VVB, dates of destruction would be communicated in advance by Project implementer(s) to Project Proponent. To enhance process credibility, project implementer/s shall carry out the destruction in the presence of VVB and/or either DISCOM or independent national institutions or from any other related government organization. This is in line with the methodology requirement which states that “The number and power of a representative sample of the replaced equipment shall be recorded in a way that allows for a physical verification by a VVB”.

The Project Proponent complies with relevant laws, statutes and regulatory frameworks of India.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The “SHINE – Distribution of LED Lightbulbs in India-3” is registered as a Small-Scale Component Project Activity under the Clean Development Mechanism (CDM) and under the Programme of Activities “SHINE – Distribution of LED Lightbulbs in India” (Ref. PoA 10484).¹⁰ Evidence has been provided to the VVB that the emissions reductions arising from this program are not double counted under the CDM and VCS.

The project has not been submitted for validation/certification under any other GHG or environmentally related program or mechanism, so it is not eligible to create another form of GHG-related environmental credit other than CERs and VCUs.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG program.

⁹ Ministry of Environment and Forests (2006): S.O.1533(E),[14/09/06] - Environmental Impact Assessment Notification.

¹⁰CDM documentation can be accessed through:
https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/MN26BFZ0CHPIR47G01L3YES9XVKTUD/view (PoA) and
https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/L4XT6COND7KEVO2ZFW9AJIBQR5HSGM/view

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project didn't reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

1.17 Sustainable Development Contributions

In accordance with Paragraph 3.17.1 of VCS Standard, version 4.3, "Where project complete a validation or verification to the Sustainable Development Verified Impact Standard (SD VSta) Program at the same time as a VCS Program validation or verification, they are not required to conduct a separate demonstration of compliance with the requirements set out in this Section 3.17."

The project is being pursued for validation under SD VSta. Therefore, details of SDGs claimed are not required to be mentioned in VCS PD.

1.18 Additional Information Relevant to the Project

Leakage Management

According to the applied methodology, leakage emissions must be considered if the energy efficiency technology involves equipment transferred from another activity. In the proposed project activity, LEDs that will be distributed to the households are not transferred from another activity; hence leakage emissions are not applicable. Also, project activity instances implemented under this grouped project will monitor the scrapping of replaced ICLs /fluorescent tubes/ CFLs in line with footnote 10 of the applied methodology.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

Sustainable Development

1. Economic Sustainability

The high upfront cost of LED as well as limited availability of LED technology in India, has resulted in most of the residential and commercial consumers preferring energy guzzling

ICLs and toxic fluorescent lamps to LED. Incandescent bulb consumes 80 percent more electricity than LED lamp, but given their low price and ease of availability, they are used extensively in rural and semi urban areas. The replacement of ICLs with LEDs under this project activity will contribute to economic sustainability by reducing the pressure on the Indian power system. While on one hand this will result in surplus electricity being supplied to other consumers and on the other, the financial resources which were to be spent on infrastructure investments for production, transmission and distribution to satisfy the given level of demand would be available for use to drive economic development. It will also result in lower utility bills for the end user who usually ends up paying higher energy costs when they use ICL/fluorescent lamps.

Comparison of electricity consumption and energy cost incurred by different lighting technologies

Lamp Equivalent	Incandescent Bulbs	LEDs	CFL
Life Expectancy	1200 hrs	50,000 hrs	8000 hrs
Watt	60 watts	7 watts	13-15 watts
Kwh of electricity used in 50,000 hrs	3000	263	700
Considering ₹3.62 as average cost of per unit of electricity in India, total energy cost for 50,000 hrs	₹ 10,860	₹ 952.06	₹ 2,534

Source: EESL DELP Toolkit¹¹ & Data.Gov.in for average electricity cost¹²

Additionally, demand for LED will stimulate development of a high-quality Indian LED lamp manufacturing industry which is currently in nascent stage.

2. Environmental Sustainability

Thermal power plants accounted for an overwhelming 70% of the total generation capacity of electricity in the country in 2016. Introduction of energy efficient LED technology will reduce the GHGs released in the atmosphere by the thermal power plants in course of electricity generation.

Under this PoA, households, small and medium enterprises and commercial offices and shops will be provided with highly subsidized LEDs as a replacement of the ICLs or fluorescent lamps, thereby reducing GHG emissions through avoided use of fossil fuels ensuing from reduced consumption of electricity. In addition to reduced GHG emissions, the program will also result in reduced waste generation as LEDs last 25-50 times longer than the ICLs and do not contain toxic mercury as is the case with compact fluorescent lamp.

¹¹ EESL toolkit for DELP Scheme, page 12

¹² <https://data.gov.in/node/91740>

Moreover, as LEDs are composed of solid-state components which are resilient in the face of severe voltage fluctuation and external shock they are less prone to damage, unlike fluorescent and incandescent bulbs, which are fragile and prone to early failure in low quality power supply regimes.

3. Social Sustainability

In addition to creating job opportunities during, installation, destruction of replaced bulbs and monitoring activities, the project will also improve the quality of life of the low-income households by delivering light which is energy efficient, saves resources and is of higher quality as compared to ICL. The use of the lamps will also create first-hand experience with LED lighting technology leading to a better understanding of the technology's benefits that will encourage behavioral change and increase general awareness of energy efficiency among end-users.

4. Technological Sustainability

The light-emitting diode (LED) is one of today's most energy-efficient and rapidly-developing lighting technologies. Quality LED light bulbs last longer, are more durable, and offer comparable or better light quality than other types of lighting. However, the high upfront cost of the LEDs acts as a deterrent for its acceptance in the low-income households. Small commercial establishments as well as SMEs also factor in the cost while opting for lighting technology. The long-term benefits of LED are often ignored as these consumers prefer cheap lighting options for their space lighting requirements. Through this program, LED bulbs will be made available to the consumers at extremely subsidized rates thereby allowing diffusion of the LED technology to the sections of society that cannot pay for it and thereby are denied its advantages.

2 SAFEGUARDS

2.1 No Net Harm

Under this grouped project, households, small and medium enterprises and commercial offices and shops will be provided with highly subsidized LEDs as a replacement of the ICLs or fluorescent lamps, thereby reducing GHG emissions through avoided use of fossil fuels ensuing from reduced consumption of electricity. In addition to reduced GHG emissions, the program will also result in reduced waste generation as LEDs last 25-50 times longer than the ICLs and do not contain toxic mercury as is the case with compact fluorescent lamp. Therefore, the LEDs distributed under this project presents positive environmental impacts wherever they are applied, and no negative environmental impacts have been identified.

2.2 Local Stakeholder Consultation

The local stakeholder consultation was done at PoA level, prior to the registration of the PoA. Key institutional stakeholders like Standard making bodies, Manufacturers of LEDs and Electricity regulatory bodies act at the National level, so do leading NGOs active in this field. Moreover, the CDM PoA covers pan India. In view of the above, the stakeholder opinion has been sought at PoA level. This has been done through stakeholder meeting that was organized on 7-March-2018 in Hyderabad, India.

A list of invitees was made prior to the stakeholder's consultation meeting. They were then contacted through calls, e-mails, public advertisements and follow-ups via word of mouth to ensure maximum participation. The stakeholder meeting was well attended, and the participants were actively involved. Through this meeting, it was evident to the PP representatives that not only did the stakeholders embrace the concept, they wanted to be educated about the product and kept in the loop regarding information about the success of project. Overall, the PP representatives believe the engagement was robust and beneficial to all parties involved. The program got positive feedback and participants appreciated the PP's efforts for this community-based project which in addition to reducing the GHGs would also lead to improvement in living condition owing to better lighting facilities.

The outcomes from the local stakeholder consultation are available in Section F of the CDM PoA-DD¹³.

PP conducted regular spot checks to observe that project LEDs were being used properly and to get feedback from stakeholders on LED usage and its benefits. Also, LED users can contact Project Proponent for any concerns /comments on the project or project LEDs through Project Implementors. The LEDs that will be distributed under the CDM PoA will carry a warranty of three years. If within this period, the bulb becomes non-functional then the project implementer will replace it free of cost.

2.3 Environmental Impact

No negative environmental impacts have been identified from the project and environmental impact assessment (EIA) is not required for the project.

2.4 Public Comments

The VCS PD was listed on the VERRA registry for public comments from 26-April-2022 to 26-May-2022. No public comments were received during this period.

2.5 AFOLU-Specific Safeguards

This section is not applicable as the project is a non-AFOLU project.

¹³ https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/MN26BFZ0CHPIR47GQ1L3YES9XVKTUD/view (PoA) and

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

AMS-II.C- Demand-side energy efficiency activities for specific technologies, Version 15.0.

The project has also referred to following documents:

- Methodology: AMS-I. D: Grid connected renewable electricity generation; Version 18.0
- Standard: CDM project standard for Programmes of activities Version 02.0
- Methodological tool 19: Demonstration of additionality of microscale project activities Version 09.0
- Methodological tool 21: Demonstration of additionality of small-scale project activities Version 12.0
- Guideline: General guidelines for SSC CDM methodologies Version 22.1

3.2 Applicability of Methodology

There is no change in applicability criteria of the methodology. Compliance of applicability of the methodology can be checked from the registered CPA-DD¹⁴.

3.3 Project Boundary

The project boundary was defined and included under Section B.2. of registered CDM CPA-DD with CDM reference number 10484-P1-0003-CP1, and according to paragraph 3.20.5 of the VCS Standard v4.3, this section not required to be filled.

3.4 Baseline Scenario

The baseline scenario was defined and included under Section B.3 of registered CDM CPA-DD with CDM reference number 10484-P1-0003-CP1, and according to paragraph 3.20.5 of the VCS Standard v4.3, this section not required to be filled.

3.5 Additionality

The additionality was defined and included under Eligibility Criteria number 7 of Section F of registered CDM CPA-DD with CDM reference number 10484-P1-0003-CP1.

The proposed grouped project is a voluntary activity initiated by the PP. The initiative is solely based on expected CER revenue and is being run on financial assistance from ECOEYE and other investors. There are no mandatory policies and/or regulations in India that mandates the installation of LED lighting equipment in households. Furthermore, end users and other stakeholders participating in this project activity will do so through a voluntary collaboration

¹⁴ https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/L4XT6C0ND7KEVO2ZFW9AJIBQR5HSGM/view

with the PP. Implementation of LED projects pose considerable investment barrier owing to high upfront cost of quality LEDs and the fact that these bulbs are distributed free of cost. Only cost of destruction of replaced ICLs is being recovered from end user. The benefit in terms of energy saving is passed on directly to the consumer and the investor can expect returns only from sale of Certified Emission Reductions (CERs).

A financially more viable alternative to the project activity would be the continued use of baseline luminaires i.e. ICLs, FTLs and CFLs as these cost less and are easily available but would lead to higher emissions. The financial indicator against which the project activity will demonstrate investment barrier, shall be Net present value (NPV). A specific project activity instance for which NPV is negative without CER revenue shall be deemed additional.

For this project activity, negative NPV value confirms that from project implementer(s) perspective, considering the upfront capital requirements towards purchase of LED and costs related to distribution and project monitoring as well as the associated risk of CER delivery, poses a considerable investment barrier.

3.6 Methodology Deviations

The project did not apply any methodology deviation.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to paragraphs 20 and 21 of the applied methodology, Option 1 i.e. 'Constant Load Equipment's' is applicable for the present project. Baseline emission is calculated using the following equations:

$$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y} + Q_{ref,BL} \times GWP_{ref,BL}$$

As the project entails replacement of LED in place of ICLs hence no refrigerant is involved. The above equation is then modified as:

$$BE_y = E_{BL,y} \times EF_{CO2,ELEC,y}$$

BE_y = Baseline emissions in year y (tCO₂e)

$E_{BL,y}$ = Energy consumption for the baseline (ICLs) in year y (kWh)

$EF_{CO2,ELEC,Y}$ = Electricity emissions factor. If electricity displaced is grid, the emission factor in year y shall be calculated in accordance with the provisions in AMS-I.D (tCO₂/MWh). If electricity displaced is captive electricity, the emission factor in year y shall be calculated in accordance with the “Tool to calculate baseline, project and/or leakage emission from electricity consumption”

Energy consumption for baseline in year y is calculated as:

$$E_{BL,y} = \sum_i (n_i \times \rho_i \times o_i / (1 - l_y))$$

Where,

n_i = Number of pieces of equipment of the group of ‘i’ baseline equipment (ICLs) replaced.

ρ_i = Electrical power demand (kW) of the group of ‘i’ baseline equipment (e.g. 60W or 100W incandescent lamps).
In the case of more than one type of ICLs are replaced, electrical power demand is the weighted average of the rated power (kW) of group i baseline equipment (ICLs).

o_i = Average annual operating hours of the group of ‘i’ baseline equipment (ICLs).

The operating hours of the baseline equipment in year y can be determined using surveys by continuous measurement of usage hours of baseline equipment for a minimum of 90 days. For a large population of baseline equipment: (a) Use a representative sample (sampling determined by a minimum 90% confidence interval and 10% maximum error margin); (b) Apply correction for seasonal variation, if any; and (c) Ensure that sampling is statistically robust and relevant, i.e. the selection of the equipment to be analysed for operating hours has a random distribution and is representative of target population (size, location).

l_y = Average annual technical grid losses (transmission and distribution) during year y for the grid serving the locations where the devices are installed, expressed as a fraction. This value shall not include non-technical losses such as commercial losses (e.g. theft). The average annual technical grid losses will be determined using recent, accurate and reliable data available for the host country. This value can be determined from recent data published either by a national utility or an official governmental body. The reliability of the data used (e.g. appropriateness, accuracy/uncertainty, especially exclusion of non-technical grid losses) will be established and documented by the project participant. A default value of 0.1 shall be used for average annual technical grid losses, if no recent data are available or the data cannot be regarded accurate and reliable

4.2 Project Emissions

Project emissions on account of electricity used by the project equipment shall be calculated according to following equations:

$$PE_y = E_{PE,y} \times EF_{CO2,ELEC,y} + PE_{ref,y}$$

Where,

- PE_y = Project emissions in year y (tCO₂e)
- $EP_{PJ,y}$ = Energy consumption in project activity in year y. This shall be determined ex post based on monitored values
- $EF_{CO2,y}$ = Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption should be calculated in accordance with the procedures of AMS-I.D. For fossil fuel displaced reliable local or national data for the emission factor shall be used; IPCC default values should be used only when country or project-specific data are not available or difficult to obtain
- $PE_{ref,y}$ = Project emissions from physical leakage of refrigerant from the project equipment in year y (tCO₂e/y)

As the project entails replacement of LED in place of ICLs hence no refrigerant is involved. The above equation is then modified as:

$$PE_y = E_{PE,y} \times EF_{CO2,ELEC,y}$$

Where,

$$E_{PE,y} = \sum_i (n_i \times \rho_i \times o_i / (1 - l_y))$$

Where,

- n_i = Number of group 'i' project devices operating during time interval t in year y.
- ρ_i = Electrical power demand (kW) of the group 'i' project devices measured during the time interval t in year y.
- o_i = Operating hours of group of 'i' project devices in the time interval t in year y

4.3 Leakage

According to the applied methodology, leakage emissions have to be considered if the energy efficiency technology involves equipments transferred from another activity. In the proposed project activity, LEDs that will be distributed to the households are not transferred from another activity; hence leakage emissions are not applicable.

4.4 Net GHG Emission Reductions and Removals

The emission reductions from all the project activity instances under this grouped project will be calculated in accordance with equation 10, of the small-scale methodology AMS II.G., Version 15.0.

$$ER_y = (BE_y - PE_y) - LE_y$$

Where:

ER_y Emission reductions in year y (tCO₂e)

BE_y Baseline emission in year y (tCO₂e)

PE_y Project emission in year y (tCO₂e)

LE_y Leakage emission in year y (tCO₂e)

Since, Leakage emission considered as Zero (0). Hence,

$$ER_y = BE_y - PE_y$$

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 2020-2021 (06-March-2020- 05-March-2021)	560,557	69,003	0	491,554
Year 2021-2022 (06-March-2021- 05-March-2022)	560,557	69,003	0	491,554
Year 2022-2023 (06-March-2022- 05-March-2023)	560,557	69,003	0	491,554
Year 2023-2024 (06-March-2023- 05-March-2024)	560,557	69,003	0	491,554
Year 2024-2025	560,557	69,003	0	491,554

(06-March-2024- 05-March-2025)				
Year 2025-2026 (06-March-2025- 05-March-2026)	560,557	69,003	0	491,554
Year 2026-2027 (06-March-2026- 05-March-2027)	560,557	69,003	0	491,554
Year 2027-2028 (06-March-2027- 05-March-2028)	560,557	69,003	0	491,554
Year 2028-2029 (06-March-2028- 05-March-2029)	560,557	69,003	0	491,554
Year 2029-2030 (06-March-2029- 05-March-2030)	560,557	69,003	0	491,554
Total	5,605,570	690,030	0	4,915,540

5 MONITORING

5.1 Data and Parameters Available at Validation

The data and parameters available at Validation were defined and included under section B.4.2 of the registered CDM CPA-DD with CDM reference number 10484-P1-0003-CP1, and according to paragraph 3.20.5 of the VCS Standard (Version 4.3), this section not required to be filled.

5.2 Data and Parameters Monitored

The data and parameters Monitored were defined and included under section B.5.1 of the registered CDM CPA-DD with CDM reference number 10484-P1-0003-CP1, and according to paragraph 3.20.5 of the VCS Standard v4.3, this section not required to be filled.

5.3 Monitoring Plan

The Monitoring Plan was defined and included under section B.5 of the registered CDM CPA-DD with CDM reference number 10484-P1-0003-CP1, and according to paragraph 3.20.5 of the VCS Standard v4.3, this section not required to be filled.

The following section elaborates upon the (i) LED distribution and ICL disposal approach adopted to implement the project activity (Figure 1) (ii) Monitoring plan developed to monitor the ground scenario of the project post distribution of LEDs (Figure 2).

A. LED Distribution and ICL Disposal Mechanism

The project activity adopted a two-way approach, i.e., kiosk-based approach and direct installations in households to replace the ICLs with LED lightbulbs as represented in the following figure.

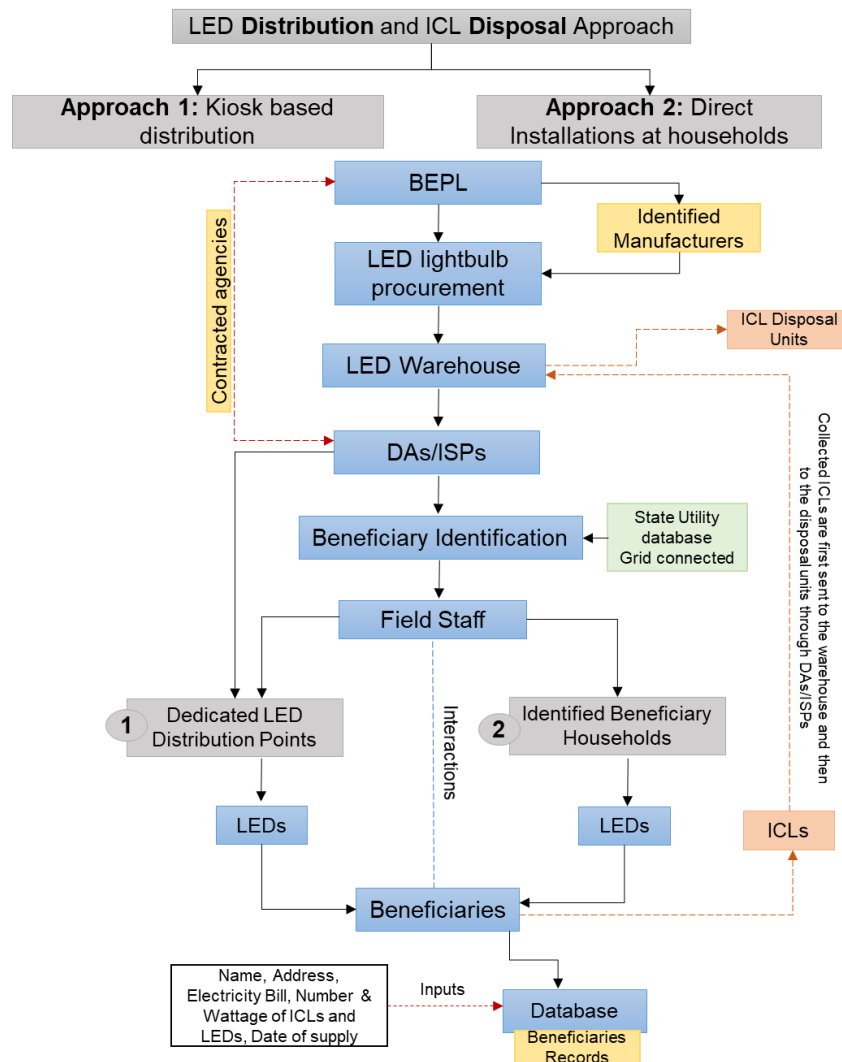


Figure 1: LED Distribution and ICL Disposal Approach

B. Ex-post monitoring Survey

The key elements of the ex-post monitoring survey are the following:

- Data collection procedures
- Distribution and Monitoring Database
- Spot Checking of LEDs (ongoing mechanism)
- Sample Plan for the Monitoring Survey
- Data Quality, Consistency and Duplication Checks
- Monitoring Reporting

The below flow-chart illustrates the roles and responsibilities of the parties during the implementation of the monitoring plan for the project. In the below flowchart, the project implementer is abbreviated to “Imp”, and can be the PP or another party authorized by the PP.

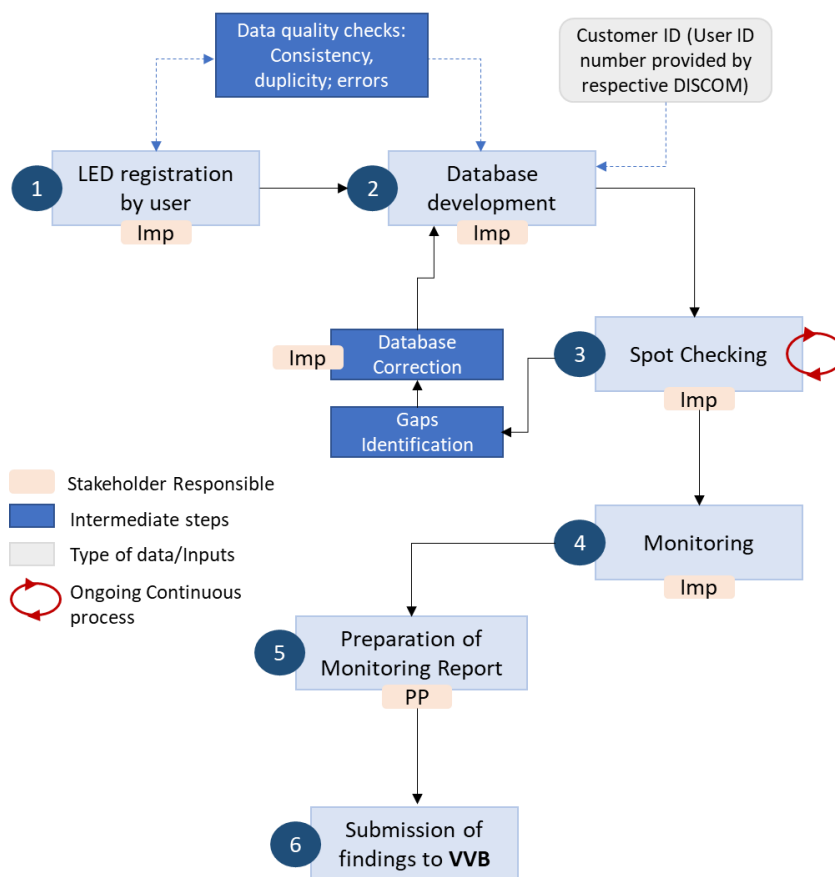


Figure 2: Ex-post Monitoring survey Approach

1. **User registers LED:** Project implementer will collect/receive the necessary information requested in the Registration process from the user. Means of collecting this information will be through a registration process performed by ground team under both the types of distribution. In addition to registering the LEDs, a record is also maintained about the number

of ICLs collected back from the beneficiaries. The project adopts a one-to-one mapping approach for replacing ICLs with LEDs. PP staff shall double check the accuracy of information provided, and request for ground team additional clarifications if needed.

2. **Data logged into database:** DA trained staff will input the data in the database automatically using a digital platform. DA staff shall double check the information included on the database and check for duplications. Any duplicate information shall be investigated, and errors corrected or excluded from the database if it is a true duplicate entry.
3. **Spot-checking (ongoing):** DA field staff will randomly select units included in the database and visit or contact the LED lightbulbs households to cross-check the information on the database with the factual evidence in the field. Any inconsistencies found (e.g., change in the address of a user) will be updated on the database, and in the case, LEDs are found to be no longer in use, they will be clearly marked as such and excluded from emission reductions calculations.
4. **Monitoring:** DA will follow the requirements as per PD to collect the necessary information for a monitoring report.
5. **Preparation of monitoring report:** The PP will prepare the final monitoring report to be provided to the VVB for verification of emission reductions. A copy of the monitoring report will remain with the PP.

The PP will coordinate and manage each DA and assist them in implementing each element of the monitoring plan. Also, regular audits conducted throughout the project lifetime ensures proper functioning of LED lightbulbs and determination of the lifespan of the same.

APPENDIX

Appendix A: List of Abbreviations

AMS: Approved small scale Methodology

BEPL: Brightspark Energy Private Limited

CDM: Clean Development Mechanism

CFL: Compact Fluorescent Lamps

CPA: Component Project Activity

CQC: C-Quest Capital LLC

DA: Distribution Agency

DD: Design Document

DISCOM: Distribution Company

EIA: Environmental Impact Assessment

FTL: Fluorescent Tubelight Lamp

GHG: Greenhouse Gas Emissions

ICL: Incandescent Lamps

ISP: Independent Service Providers

LDC: Least Developed Country

LED: Light Emitting Diode

MoEF: Ministry of Environment and Forest

PA: Project Activity

PoA: Programme of Activities

PD: Project Description

PP: Project Proponent

SDG: Sustainable Development Goals

SD VISta: Sustainable Development Verified Impact Standard

SME: Small and Medium Enterprises

VCS: Voluntary Carbon Standard

VVB: Validating and Verifying Body