



Gold Standard[®]
for the Global Goals

METHODOLOGY

METHODOLOGY FOR METERED ENERGY COOKING DEVICES

SDG 13

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SUMMARY

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ACKNOWLEDGMENT

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1| Definition

1.1.1 | For the purpose of this methodology, the following definitions apply:

- a. **Metered cooking devices** – metered cooking devices are cooking devices for heating and cooking food that either record fuel or energy use directly, or through a supplementary meter with the ability to record amount of energy or fuel used for cooking over a period of time. These may, amongst others, include induction cookstoves, electric pressure cookers, hot plates, rice cookers, solar electric cookers, and metered LPG and ethanol cookers when metered and sold for use in a dedicated device.

2| Scope, Applicability, and entry into force

2.1 | Scope

2.1.1 | This methodology is applicable to project activities that introduce technologies, that reduce or avoid greenhouse gas (GHG) emissions and quantify emission reductions from cooking devices through direct measurement of energy or fuel consumed in households, communities, and/or institutions such as schools, prisons or hospitals (hereinafter referred as end-users).

2.1.2 | This methodology may be applied by project developers promoting the installation of improved cooking devices, where the actual amount of energy or fuel used in the project scenario is measured directly in real-time for every device or otherwise monitored via measurement. This includes, but is not restricted to:

- a. metered LPG cookstove where fuel used is measured for each device,
- b. metered electricity cookstove where energy used is measured for each device, or
- c. bio-ethanol cookstove where the amount of bio-ethanol purchased for cooking by each customer is recorded with arrangements to ensure the bio-ethanol is used for cooking and to prevent the alternative use of the bio-ethanol.
- d. Metered biogas stoves

2.2 | Applicability

2.2.1 | The methodology is applicable under the following conditions:

- a. Project shall choose a technology design that has predictable performance in that it is proven to be efficient and durable under field conditions; for cookstoves, the rated thermal efficiency shall be at least 40%.
- b. The technology shall have continuous useful energy output of less than 150kW per unit, where "continuous useful energy output" is defined as the total useful energy delivered from start to end of operation of a unit divided by time of operation.
- c. The project activity is implemented by a project developer and can include additional project participants. However, the individual households and institutions do not act as project participants.
- d. The project developer must design incentives for the elimination of inefficient baseline stoves, which should be effective as fast as possible, and describe the incentives design in the PDD.
- e. To avoid double counting or double claiming, the project developer must:
 - i. clearly communicate its ownership rights and intention of claiming the emission reductions resulting from the project activity to the following parties by contract or clear written assertions in the transaction paperwork: all other project participants; project technology manufacturers; and retailers of the project technology or the renewable fuel in use; and
 - ii. inform and notify the end users that they cannot claim emission reductions from the project, and
 - iii. ensure the technologies counted in the project shall neither be included in any other voluntary market or CDM project activity/PoA,

nor displace the technologies of another CDM or voluntary project/PoA. See data and parameters not monitored, avoidance of double counting or double claiming with other mitigation actions, for details on this demonstration.

- f. Under this methodology, emission reductions cannot be claimed for fuel-switch only. Proposed project activities also need to introduce new technologies, i.e. technology switch is also involved.
- g. For project cooking devices that use fossil fuel, only emission reductions from efficiency improvement are eligible.
- h. For project cooking device that use grid electricity, only emission reductions from efficiency improvement are eligible.
- i. The measured fuel or energy is used to calculate both baseline and project emissions. The project developer must have systems in place to monitor the fuel or energy consumption by all the project devices under the project to be recorded in a database, which is maintained by the project developer.

2.3 | Safeguards

- 2.3.1 | The project shall not undermine or conflict with any national, sub-national or local regulations or guidance for thermal energy supply or fuel supply or use. The project shall document the national, regional and local regulatory framework for provision of thermal energy services of the type the project provides in the project boundary (see data and parameters not monitored).
- 2.3.2 | If the expected technical life of project technology is shorter than the crediting period, the project developer shall describe measures to ensure that end users are provided replacement technology of comparable quality at the end of the technical life, by either replacing with comparable or better technology, or retrofitting essential parts with performance guarantee. If neither of the prior conditions can be demonstrated, no emission reductions can be claimed for the technology after its technical life has ended.
- 2.3.3 | For project activities introducing bio-ethanol cookstoves, project participants shall demonstrate that the bioethanol cookstoves are designed, constructed and operated to the requirements (e.g. with regard to safety) of a relevant national or local standard or comparable literature. Latest guidelines issued by a relevant national authority or an international organisation may also be used.

2.4 | Entry into force

- 2.4.1 | The date of entry into force of this methodology is **XX** August 2021.

3| Baseline Methodology

3.1 | Project Boundary

3.1.1 | Project developer shall provide clear definitions of project boundary, target area, and fuel production and collection area in line with section 3.1 TPDDTEC V4.0.

3.2 | Emissions sources included in the project boundary

3.2.1 | Emissions from fuels can occur during fuel production, transport and consumption.

- a. Baseline emissions from any gases marked below may be omitted for simplification.
- b. All project emissions from any of the gases marked below must be accounted for, unless demonstrably negligible or not applicable to the individual project.

Table XX Emissions sources included in or excluded from the project boundary

Scenario	Source	Gas	Included	Justification/Explanation
Baseline scenario	Delivery of thermal energy	CO ₂	Yes	Important source of emissions
		CH ₄	Yes	Important source of emissions
		N ₂ O	Yes	Can be significant for some fuels
	Production of fuel, transport of fuel	CO ₂	Yes	Important source of emissions
		CH ₄	Yes	Important source of emissions
		N ₂ O	Yes	Can be significant for some fuels
Project scenario	Delivery of thermal energy	CO ₂	Yes	Important source of emissions
		CH ₄	Yes	Important source of emissions
		N ₂ O	Yes	Can be significant for some fuels
	Production of fuel, transport of fuel	CO ₂	Yes	Important source of emissions
		CH ₄	Yes	Important source of emissions
		N ₂ O	Yes	Important source of emissions

3.3 | Demonstration of additionality

3.3.1 | The project developer must show that the project could not or would not take place without the presence of carbon finance. Possible reasons for the need for carbon finance may be that the initial investment or the on-going marketing, distribution, quality control and manufacturing costs are unaffordable for the target population.

3.3.2 | To demonstrate additionality prior to registration, the project developer shall conform to the additionality requirements of the most recent version of, one of the options below:

- a. Applicable GS4GG [Activity Requirements](#);
- b. [CDM Tool 01 - Tool for the Demonstration and Assessment of Additionality](#);
- c. [CDM Tool 19- Demonstration of additionality of microscale project activities; \(not applicable to Gold Standard microscale projects\)](#)
- d. [CDM Tool 21 – Demonstration of additionality of small-scale project activities](#); (applicable to small-scale projects only)
- e. An approved Gold Standard VER additionality tool

3.4 | Baseline scenario determination

3.4.1 | In the absence of the project activity, the general baseline scenario would be the use of single or multiple fuels/device combinations for meeting similar thermal energy needs by the representative end users specifically:

- a. In the case the project cooking device uses fossil fuel, the baseline scenario is use of a less efficient cooking device using the same fossil fuel.
- b. In the case the project cooking device uses grid electricity, the baseline scenario is use of a less efficient cooking device using grid electricity.
- c. In the case the project cooking device uses exclusively renewable fuels (e.g. bio-ethanol) or renewable energy sources (e.g. solar energy), the baseline is the emissions of kitchens of the representative end user type¹ in a given country or region using an baseline emission factor that is calculated for the country or region based on the fuel and device mix observed in the kitchens that can be replaced by the project cooking device.

3.4.2 | The specific baseline of fuel/device combination(s) for representative user groups shall be identified with justifications following section 3.4 & 3.5 of TPDDTEC V4.0. and taking into account the restrictions of the three general baselines defined in paragraph 3.4.1, above.

3.5 | Baseline emissions

3.5.1 | A baseline emission factor (tCO₂e per TJ of useful energy) for baseline cooking devices and fuels used in a country or region for representative end user

¹ Same user type refer to the end users with same socio-economic circumstances and have similar cooking practices

groups is determined using data from credible published literature, project-relevant measurement reports, or project specific field tests (see parameters EF_b).

- 3.5.2 | To determine the baseline emission factor, the following shall be determined:
- Types of cooking devices and fuels used by target population in the baseline scenario.
 - Efficiencies of the identified baseline devices.
 - Proportionate use of those cooking devices and fuels (for example, 50% use of charcoal stove, 10% use of kerosene stove and 40% use of LPG stove). When multiple devices/fuels are used by the end user in same premises, the proportion use shall be established based on delivered useful energy by different baseline device/fuels combination or following an approach which leads to conservative emissions estimation.
 - The restrictions for project devices that use fossil fuel or electricity to account only emission reductions from efficiency improvement.

3.5.3 | The baseline emissions are calculated by multiplying the useful energy delivered by the project devices with the emission factor of the baseline devices with their established fuel mix, with a cap defined in this document.

3.5.4 | The baseline emissions factor is determined applying the equation below:

$$EF_b = \sum_k (\sum_{i,j} P_{b,i,j} \times EF_{b,i})_k \div \sum_k (\sum_{i,j} EF_{b,i} \times NCV_{b,i} \times \mu_{b,i,j})_k \quad Eq. 1$$

Where:

EF_b	=	Baseline emissions factor (tCO ₂ e per TJ of useful energy)
$P_{b,i,j}$	=	Amount of baseline fuel i used in device j in year y (tonnes)
$EF_{b,i}$	=	Emission factor of the baseline fuel i (tCO ₂ e/tonne)
$NCV_{b,i}$	=	The net calorific value of the baseline fuel type i (TJ/tonne)
$\mu_{b,i,j}$	=	Efficiency of baseline device j with fuel i (fraction)
k	=	Household k from the target population
j	=	Baseline devices j
i	=	Baseline fuel i

3.5.5 | If the fuel involved is non-renewable biomass, the amount of fuel in the numerator of equation (1) is multiplied by the fraction of non-renewable biomass ($fNRB_{i,y}$).

3.5.6 | The baseline emission factor value determined as above shall be fixed for the project for the crediting period for the project cooking device type and end user type in the region or country. It shall be reassessed at each crediting period renewal.

3.5.7 | In the case of programmes, once determined, the baseline emission factor can be used by other activities within the programme of the same cooking device and end user types in the same country or region over the crediting period for a period of three years after first activity inclusion, after which it must be updated for new activity inclusion.

3.5.8 | The overall baseline emissions for the project shall be calculated as follows:

$$BE_y = EG_{p,useful,y} \times EF_b \quad \text{Eq. 2}$$

Where:

- BE_y = Baseline emissions (tCO₂e) in the year y
- $EG_{p,useful,y}$ = The amount of useful energy applied in the project in year y (TJ)
- EF_b = Baseline emissions factor (tCO₂e per TJ of useful energy)

3.5.9 | Where the total electricity use in the project scenario is monitored and recorded, the useful project energy in year y shall be calculated as follows:

$$EG_{p,useful,y} = \sum_d EG_{p,d,y} \times 0.0036 \times \mu_{p,d} \quad \text{Eq. 3}$$

Where:

- $EG_{p,d,y}$ = The amount of electricity used in the project scenario by device d in year y , considering cap (MWh)
- 0.0036 = Factor to convert MWh to TJ
- $\mu_{p,d}$ = Energy efficiency of the project device (fraction)
- d = Project device d

3.5.10 | Where the total fuel use in the project scenario is monitored and recorded, the useful project energy is calculated as follows:

$$EG_{p,useful,y} = \sum_d EG_{p,d,y} \times NCV_{p,i} \times \mu_{p,d,y} \quad \text{Eq. 4}$$

Where:

- $EG_{p,d,y}$ = The amount of fuel used in the project in by device d in year y , considering cap (mass or volume unit)

$NCV_{p,i}$	=	The net calorific value of the fuel i used in the project scenario in year y
$\mu_{p,d,y}$	=	Energy efficiency of the project device, d in year y (fraction)
d	=	Project device d

3.6 | Project emissions

- 3.6.1 | The project device is assumed to provide the same or similar energy service that would have been delivered by the baseline fuel(s) and device(s). Using the project device, the units of energy delivered and utilised by the end-user displace a certain amount of energy in the baseline. The total quantity of fuel displaced is higher than the amount used in the project, as the baseline devices are less efficient.
- 3.6.2 | Where project devices use renewable energy, such as solar energy, there are no project emissions. In the case of bio-ethanol, it must be evaluated if there are project emissions associated with production and transport of fuel. Furthermore, for other energy or fuel sources, project emissions associated with fuel or energy consumption must be calculated.
- 3.6.3 | The following sources of project emissions also shall be considered, as applicable:
- Project emissions associated with electricity use in the project scenario: CO₂ emission factor from electricity consumption by the project activity shall be calculated using the latest version of CDM tool "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation".
 - Project emissions associated with the use of fossil fuel in the project scenario: CO₂ emissions factor from fossil fuel consumption by the project activity shall be calculated using the latest version of CDM tool "TOOL03: Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion".
 - Project emissions from transportation of fuel/biomass shall be accounted if the transportation distance is more than 200 km; otherwise they can be neglected

3.6.4 | Project emissions (PE_y) shall be calculated as follows:

- Where the project device uses electric energy, the project emissions in year y are then calculated using the following equation:

$$PE_y = \sum_d EG_{p,d,y} \times EF_{el,y} \times (1 + TDL_{j,y}) \quad \text{Eq. 5}$$

Where:

PE_y	=	Project emissions in year y (tCO ₂)
$EG_{p,d,y}$	=	The amount of energy used in the project scenario by device d in year y , considering cap (MWh)

$EF_{el,y}$	= The emissions factor of the electricity system (tCO ₂ e/MWh)
$TDL_{j,y}$	= Average technical transmission and distribution losses for providing electricity to source j in year y .

- b. Where the project device uses other fossil fuels, the project emissions in year y are then calculated using the following equation:

$$PE_y = \sum_d P_{p,d,y} \times NCV_{p,i} \times EF_{p,i} \quad \text{Eq. 6}$$

Where:

PE_y	= Project emissions in year y (tCO ₂)
$P_{p,d,y}$	= The amount of fuel used in the project in by device d in year y , considering cap (TJ)
$NCV_{p,i}$	= The net calorific value of the fuel i used in the project scenario in year y
$EF_{p,i}$	= The emissions factor of the project fuel i (tCO ₂ e per TJ)

3.7 | Leakage emissions

3.7.1 | Leakage emissions, LE_y , shall be calculated as per Sec 3.11 of TPDDTEC V4.0.

3.8 | Emission reductions

3.8.1 | The emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Eq. 7}$$

Where:

ER_y	= Emission reductions in year y (t CO ₂ e/yr)
BE_y	= Baseline emissions in year y (t CO ₂ e/yr)
PE_y	= Project emissions in year y (t CO ₂ /yr)
LE_y	= Leakage emissions in year y (t CO ₂ /yr)

3.9 | Changes required for methodology implementation in 2nd and 3rd crediting periods

3.9.1 | When the project developers apply for crediting period renewal, the baseline emission factor (EF_b) must be reassessed, in addition to other relevant methodological parameters as per the latest version of the methodology available at the time submission of renewal of crediting period and GS4GG crediting period renewal requirements.

3.10 | General requirements for data and information sources

3.11 | Data and parameters not monitored

Data/parameter ID	MECD 1
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Data / Parameter:	EF_b
Data unit:	tCO ₂ e per TJ of useful energy
Description:	Baseline emissions factor
Source of data:	<p>The baseline fuel/device combination(s) in the target end users are determined from one of the following sources, taking into account the restrictions to the baseline scenario dependent on the project cooking device:</p> <ul style="list-style-type: none"> - baseline survey, - credible published literature for project region, - studies by academia, NGOs or multilateral institutions, or - official government publications or statistics <p>Source applied must not be more than 3 years old. Calculated.</p>
Any comment:	<p>In the case of projects, the baseline emission factor value for the project cooking device type and end user type in the region or country is fixed for the project for the crediting period. It shall be reassessed at each crediting period renewal.</p> <p>In the case of programmes, the baseline emission factor value for the project cooking device type and end user type in the region or country may be applied for a period of three years after its approval, after which it must be updated.</p>

Data/parameter ID	MECD 2
Data / Parameter:	$P_{b,i,j}$
Data unit:	Tonne/ year-device, Tonne/trial-device, Tonne/day-device
Description:	Amount of baseline fuel i used in device j (tonnes) in the baseline survey sample
Source of data:	<p>The baseline device performance may be taken from:</p> <ul style="list-style-type: none"> - Sampling campaign using Standard Water Boiling Test, - Credible published literature for project region, - Studies by academia, NGOs or multilateral institutions, or - Official government publications or statistics. <p>Source applied must not be more than 3 years old.</p>

Any comment: -

Data/parameter ID	MECD 3
Data / Parameter:	$NCV_{b,i}$
Data unit:	Terrajoules (TJ)/tonne of fuel
Description:	The net calorific value of the baseline fuel type <i>i</i>
Source of data:	<ul style="list-style-type: none"> - IPCC default data, - project-relevant measurement reports, or project specific field tests. <p>If either project-specific or project-relevant results are used, these must be cross-checked with IPCC defaults and differences shall be justified using evidence.</p>
Any comment:	-

Data/parameter ID	MECD 4
Data / Parameter:	$EF_{b,i}$
Data unit:	tCO ₂ e/tonne
Description:	The emission factor of baseline fuel <i>i</i>
Source of data:	IPCC default value converted by applying $NCV_{b,i}$
Any comment:	The parameter is used to calculate baseline emissions factor.

Data/parameter ID	MECD 5
Data / Parameter:	$\mu_{b,i,j}$
Data unit:	Fraction
Description:	Energy efficiency of baseline device <i>j</i> with fuel <i>i</i>
Source of data:	<p>Determined from</p> <ul style="list-style-type: none"> - Standard Water Boiling Tests, - Credible published literature for project region, - Studies by academia, NGOs or multilateral institutions, - Official government publications or statistics, or - The following default values may be applied: <ul style="list-style-type: none"> - Three-stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation

	<p>system, that is without either a grate or a chimney: default efficiency 10%.</p> <ul style="list-style-type: none"> - Other conventional systems using woody biomass: default efficiency 20% - Improved cookstoves: manufacturer specification, or if not available, default efficiency 30% - Fossil fuel combusting system: manufacturer specification, or if not available, from an alternate source described above.
	When sampling is used, follow the “general requirements for sampling” of the main methodology.
Any comment:	The parameter is used to determine the baseline emission factor.

4| Monitoring methodology

4.1 | Monitoring data and information requirements

- 4.1.1 | The project developers shall keep a record of all the fuel or energy that is consumed by each device under the project.
- 4.1.2 | During project implementation, the exact number of project devices and their corresponding fuel or energy consumption will be monitored as part of the monitoring plan.

4.2 | Data and parameters monitored

Data/parameter ID	MECD 6
Data / Parameter:	$\mu_{p,d,y}$
Data unit:	Fraction
Description:	Thermal efficiency of the project device
Source of data:	Any of the following sources shall be used: <ul style="list-style-type: none"> - Manufacturer specifications - Third-party certification by a qualified entity - Commercial guarantee - Technical reports from the installer
Monitoring frequency:	Annual
QA/QC procedures:	A default schedule of linear decrease in efficiency up to the terminal efficiency may be applied through the life span of the project device
Any comment:	This parameter is used in the determination of useful energy

Data/parameter ID	MECD 7
Data / Parameter:	$EG_{p,d,y}$
Data unit:	MWh
Description:	The amount of energy used in the project scenario by device d in year y , considering cap (MWh)
Source of data:	Direct measurement
Monitoring frequency:	Continuous
QA/QC procedures:	<p>Measurement using credible and calibrated equipment</p> <p>Data logger measuring the electricity consumption of the electric cooking appliance(s) shall be in conformity with industry standard and calibrated according to relevant national requirements.</p> <p>Compare result to the cap of 0.49 kWh per capita per day². If the project energy use is higher per person, then apply 0.49 kWh per capita as a cap on the electricity consumption per person as applied in equation 3. Equation 5 should continue to use the real monitored value.</p>
Any comment:	This parameter is monitored during project implementation when the project device uses electricity

Data/parameter ID	MECD 8
Data / Parameter:	$EF_{el,y}$
Data unit:	tCO ₂ e/MWh
Description:	The emissions factor of the project electricity system in year y
Source of data:	Determined using CDM tool TOOL05 (Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation)
Monitoring frequency:	Annually, or fixed ex-ante for devices connected to a national interconnected system.
QA/QC procedures:	<p>Using credible data for the electricity system</p> <p>In case the electricity system is a mini-grid introduced by the project, mini-grids powered by fossil-fuel engines are not eligible, with the exception renewable mini-grids with</p>

² ESMAP, MECS, World Bank Group. 2020. Cooking with electricity, a cost perspective. International Bank for Reconstruction and Development / The World Bank, Washington D.C. September 2020. Table 2.5.

	<p>back-up engines that are used for no more than 10% of operating hours in the year.</p> <p>Where back-up fossil-fuel engine(s) are used, use the monitored fuel amount to estimate the number of operating hours during the monitoring period, and compare this to the total number of operating hours of the mini-grid for the same period. If the use of the engine surpasses 10% of operating hours, then determine the number of days in which the backup technology was used to operate the mini-grid for more than 10% of total operating hours during the day. The project devices are ineligible for crediting on the days when the use of back-up technology was more than the 10% threshold.</p>
Any comment:	This parameter is monitored where the energy consumed by the project devices is electrical and directly measured during project implementation

Data/parameter ID	MECD 9
Data / Parameter:	$TDL_{j,y}$
Data unit:	Fraction
Description:	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data:	Determined as per the CDM tool TOOL05, paragraph 7.2 (Data/parameters monitored, table 3),
Monitoring frequency:	Once per monitoring period
QA/QC procedures:	Using credible data for the electricity system or default value
Any comment:	This parameter is monitored where the energy consumed by the project devices is electrical and is directly measured during project implementation.

Data/parameter ID	MECD 10
Data / Parameter:	$fNRB_{i,y}$
Data unit:	Fraction non-renewability
Description:	Non-renewability status of woody biomass fuel in scenario i during year y
Source of data:	Applicable NRB assessment following the main methodology
Monitoring frequency:	Following the requirements of the main methodology, use the latest version of the CDM TOOL30.
QA/QC procedures:	Use of latest version of the CDM TOOL30: Calculation of

	the fraction of non-renewable biomass
Any comment:	As applicable, NRB assessment may be used for multiple scenarios where woody biomass is used

Data/parameter ID	MECD 11
Data / Parameter:	$P_{p,d,y}$
Data unit:	mass or volume unit
Description:	The amount of fuel used in the project in by device d in year y, considering cap
Source of data:	Direct measurement by metering or at sales
Monitoring frequency:	Continuously, aggregated monthly
QA/QC procedures:	Measurement using credible and calibrated equipment with mechanisms that ensure alternative use of the fuel is not possible. Measuring device shall be in conformity with industry standard and calibrated according to relevant national requirements. CAP TBD
Any comment:	In case direct metering is not applied, then the fuel purchases, which are summarised on a monthly basis, are automatically captured on a continuous basis.

Data/parameter ID	MECD 12
Data / Parameter:	LE_y
Data unit:	tCO ₂ e per year
Description:	Leakage in project scenario in year y
Source of data:	Follow requirements of main methodology, i.e., Option 1: Apply a discount value of 0.95 to the emission reductions to approximate leakage emissions, or Option 2: Evaluate leakage following the procedure described there.
Monitoring frequency:	Follow requirements of main methodology
QA/QC procedures:	Transparent data analysis and reporting
Any comment:	Aggregate leakage can be assessed for multiple project scenarios, if appropriate

4.3 | Baseline scenario survey

4.3.1 | The baseline scenario survey provides critical information on target population characteristics, baseline technology use, fuel consumption, leakage, and sustainable development indicators. The baseline scenario shall be conducted following the section 4.3 of TPDDTEC V4.0

4.4 | General requirements for sampling approach

4.4.1 | The sampling approach shall be in line with the section 4.4 of TPDDTEC V4.0.

DOCUMENT HISTORY

Version	Date	Description
1.0	Mm/dd/yyyy	TBD