# GREENHOUSE GAS EMISSIONS VERIFICATION REPORT

**Attention to: MEMC Electronic Materials Sdn Bhd**

## 1. Objective and Scope of the GHGs Emission Calculation

HSE Group (hereafter "HSEG") was engaged by One Island Consultation (hereafter "OIC) to provide an independent verification (2nd party) on GHG Emissions Calculation Report for Year 2022 (hereafter "Report") for MEMC Electronic Materials Sdn Bhd (hereafter "MEMC"). The content of verification was to express the conclusion, based on the verification methodology, on whether the statement of information regarding the Greenhouse Gas (GHG) emissions in the Report was correctly measured and calculated, in accordance with the "ISO14064-1:2018". The purpose of the verification is to evaluate the Report objectively and to enhance the credibility of information regarding GHG emissions in the Report. The data in the Report is collected within 1st January 2022 until 31st December 2022.

## 2. Methodology for Verification

HSEG conducted the verification in accordance with "ISO14064-1:2018". The scope of this verification assignment covers GHG emissions from (1) direct GHG emissions (energy derived CO2 & air conditioner leakage HFCs); (2) indirect GHG emissions from purchased electricity; (3) indirect GHG emissions from procurement & shipping transportation; and (4) indirect GHG emissions from purchased raw material & waste disposal (hereafter "Category 1,2,3 and 4"). The verification was conducted to a limited level of assurance. The organizational boundary of the verification is only at Petaling Jaya, Selangor, Malaysia.

Our verification methodology included checking on:
(1) scope and boundaries (geographic, operations covered, timeframe, etc.);
(2) any missing information and potential uncertainty in regard with the provided raw data;
(3) validity of methodology applied;
(4) validity of assumptions made;
(5) accuracy of emissions calculations; and
(6) magnitude of errors and faults.

## 3. Conclusion

Based on the methodology described above, the statement of the information regarding the GHG Emissions Calculation Report for Year 2022 for Category 1,2,3 and 4 is prepared in accordance with ISO14064-1:2018.

| Category | 1 | 2 | 3 | 4 | Total |
|---|---|---|---|---|---|
| tCO2eq Emissions | 236.27 | 14,432.73 | 5,022.95 | 20,356.63 | 40,048.58 |

## 4. Scope of Work

OIC was responsible for preparing the Report for MEMC, and HSEG's responsibility was to conduct verification of GHG emissions in the Report only. There is no conflict of interest between MEMC, OIC and HSEG.

***Ir Ts Nurul Huda binti Mat Nor***
Sustainability Impact Consultant (Sustainability Excellence Professional – 11498904)
HSE Group
13th April 2023

2022

# MEMC Electronic Materials Sdn Bhd : Carbon Footprint

## CARBON FOOTPRINT VERIFICATION & CALCULATION REPORT

REPORTING YEAR: 2021

ONE ISLAND CONSULTANCY

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# 1. Introduction

Climate Change is an increasingly pressing environmental and societal issue, which is directly linked to Greenhouse Gases (GHG) mainly generated from industrial operations. For that reason, a wide range of stakeholders require businesses to take active and proactive actions, including the calculation of their carbon footprint and the adoption of new ecofriendly strategies to mitigate emissions and abate climate change.

Towards this direction, and in line with the societal requirements, with assistance of One Island Consultancy, MEMC Electronic Materials Sdn Bhd proceeds with the calculation of its carbon footprint for the year 2021. Specifically, MEMC Electronic Materials Sdn Bhd has calculated its Scope 1 and Scope 2 emissions which were then verified by CSE (Centre forSustainability and Excellence). One Island Consultancy has also assisted MEMC Electronic Materials Sdn Bhd with the calculation of the selected topics for Scope 3 emissions. The verification and the calculation process were based on the Greenhouse Gas Protocol of 2021.

The purpose of verification was to have an independent third party assess MEMC Electronic Materials Sdn Bhd carbon calculations and assure that no material errors exist that could mitigate the overall quality of the reported information. Last, the external verification/calculation process has reassured that MEMC Electronic Materials Sdn Bhd carbon calculations are consistent with universal criteria about quantification, reporting and practice standards.

## 2. Background Information

Based on the internationally recognized GHG Protocol (Corporate Standard), the emissions are divided into the following 3 categories (Scope 1, 2 & 3) according to emissions sources:

**Scope 1** - Direct Emissions: Direct GHG emissions refer to emissions directly related to the company and concern sources owned or controlled by the company (e.g., fuel combustion for energy production).

**Scope 2 -** Indirect Emissions: Indirect GHG emissions refer to energy purchased from third parties (e.g., energy suppliers) for electricity, heat, and other business purposes.

**Scope 3** - Indirect Emissions: Indirect GHG emissions refer to emissions indirectly related to the company and concern sources not owned or controlled by the company (e.g., business flights).

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# 3. MEMC Electronic Materials Sdn Bhd Carbon Footprint: Analysis [Malaysia Version]

Referring from the table (from CSE report) the below table shows the value of the carbon footprint of MEMC Electronic Materials Sdn Bhd for 2021 using the Malaysia format for ease reference.

| Category | Source Type | CO2e Emissions (metric tons) | % of Total CO2e Emissions | Reporting Year | Methodology |
|---|---|---|---|---|---|
| Scope 1 | ***Vehicle fleet: Use of LPG*** | **105.02** | 0.51% | 2021 | Refers to LPG consumption at MEMC Electronic Materials Sdn Bhd facilities (Forklift, Sludge Dryer and Canteen Gas). |
| | ***Diesel for Genset and Firefighting Pump*** | **1.62** | 0.01% | 2021 | Refers to Diesel consumption at MEMC Electronic Materials Sdn Bhd facilities (Genset and Firefighting pump). |
| | ***Company Car*** | **0.59** | 0.00% | 2021 | The calculations are based on the GHG Protocol of 2021. |
| | ***R-22*** | **123.08** | 0.60% | 2021 | Refers to the category of refrigerants.<br>The calculations are based on the GHG Protocol of 2021. |
| | ***R-123*** | **6.93** | 0.03% | 2021 | Refers to the category of refrigerants.<br>The calculations are based on the GHG Protocol of 2021. |
| | | | | | |
| Scope 2 | ***Electricity Consumption*** | **14,582.72** | 70.55% | 2021 | To calculate the emissions, we use the GHG Protocol of 2021. |
| | | | | | |
| Scope 3 | ***Air Freight*** | **4,362.80** | 21.11% | 2021 | Refers to air freight for transporting raw materials. The total tkm for 2021 were 1,894,986.14tkm. |
| | ***Ocean Shipping*** | **397.99** | 1.93% | 2021 | Refers to ocean shipping of raw materials. The total amount of tkm for 2021 were 32,984,639.44tkm. |
| | ***Inland Shipping*** | **70.14** | 0.34% | 2021 | Refers to inland shipping (with truck and lorries) of raw materials. The total amount of tkm for 2021 were 115,683.016tkm. |
| | ***Distribution of Products*** | **332.55** | 1.61% | 2021 | Schenker is one of the main distributors and we assumed that all transportations were made by land with average size trucks. The total tkm for 2021 were 548,455.473tkm. |
| | ***Transportation (Car)*** | **241.88** | 1.17% | 2021 | Refers to the employer's transportation by car for 2021, the total km travelled were 876,506.5tkm. We assumed that all transportations were made by average size cars with unknown fuels. |
| | ***Transportation (Motorbike)*** | **39.02** | 0.19% | 2021 | Refers to the employer's transportation by motorbike for 2021, the total km travelled were 343,680.1tkm. We assumed that all transportations were made by average size motorbikes. |

| | | | | | |
|---|---|---|---|---|---|
| | ***Waste Disposal*** | **405.66** | 1.96% | 2021 | Refers to waste production and management for 2021. In the calculations were included sludge, general waste to landfill, recycling itemsand wastewater. The total CO2e emissions for 2021 was 405.66 tonnes. More specific:<br>• Emissions from recycling/ reusing 661 tonnes of sludge = 194.99 tonnes CO2e<br>• Emissions from 130 tonnes of general waste going to landfill = 60.71 tonnesCO2e<br>• Emissions from recycling 55 tonnes of recycled waste (Sun Mercury and Golden Star) = 1.17 tonnes CO2e<br>• Emissions from wastewater treatment (547 tonnes of wastewater) = 148.78 tonnes CO2e |
| | | | | | |
| **Total** | **All** | **20,670.00** | **100%** | **2021** | |

## Below is the analysis from 2020 vs 2021 GHG Calculations for MEMC Electronic Materials Sdn Bhd

| Category | Source Type | 2021 CO2e Emissions (metric tons) | 2020 CO2e Emissions (metric tons) | Variance |
|---|---|---|---|---|
| **Scope 1** | Vehicle fleet: Use of LPG | 105.02 | 103.08 | **+1.52 (increase)** |
| | Diesel for Genset and Firefighting Pump | 1.62 | 2.16 | |
| | Company Car | 0.59 | 0.47 | |
| | R-22 | 123.08 | 123.08 | |
| | R-123 | 6.93 | 6.93 | |
| | **Scope 1 Total** | **237.24** | **235.72** | |
| **Scope 2** | Energy Consumption | 14,582.72 | 15,076.23 | **- 493.51 (reduction)** |
| Scope 3 | Air Freight | 4,362.80 | NA | **NA** |
| | Ocean Shipping | 397.99 | NA | **NA** |
| | Inland Shipping | 70.14 | NA | **NA** |
| | Distribution of Products | 332.55 | NA | **NA** |
| | Transportation (Car) | 241.88 | NA | **NA** |
| | Transportation (Motorbike) | 39.02 | NA | **NA** |
| | Waste Disposal | 405.66 | NA | **NA** |
| TOTAL | **Corporate Carbon Footprint** | **20,670.00** | | |

## Conclusion

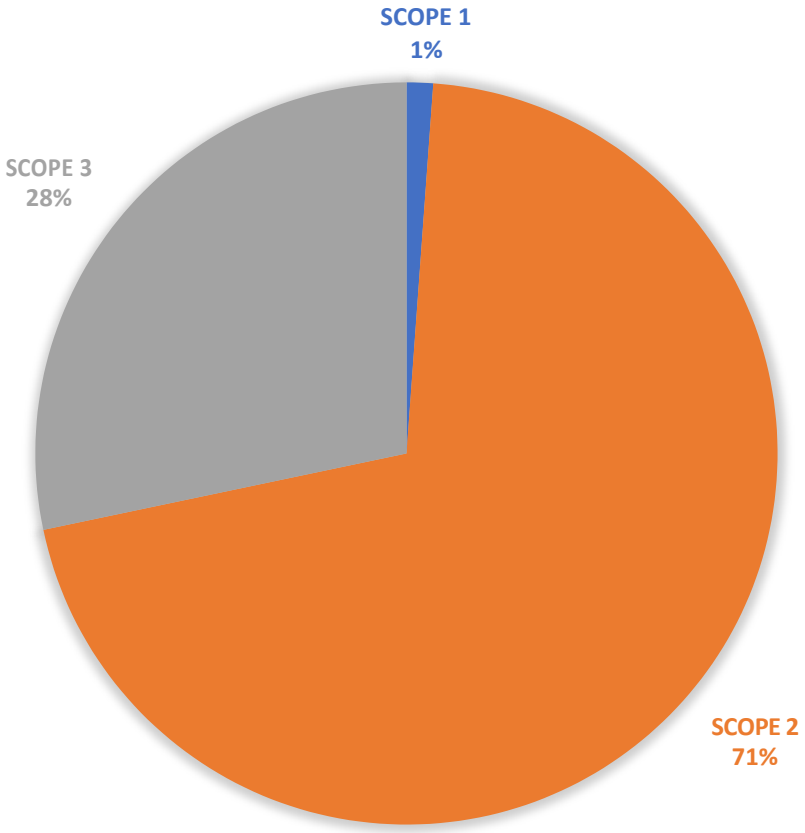
Comparison of data for 2021 versus 2020

- The data for scope 1 (reporting year 2021) showed slight increasing (1.52 tCO2e Emission) compared to 2020
- The data for scope 2 (reporting year 2021) showed reduction of 493.51 tCO2e Emission compared to 2020
- Total emission for scope 1 and scope 2 is lower in 2021 compared to 2020
- For scope 3, the company started data collection in reporting year 2021, thus no comparison is made versus 2020

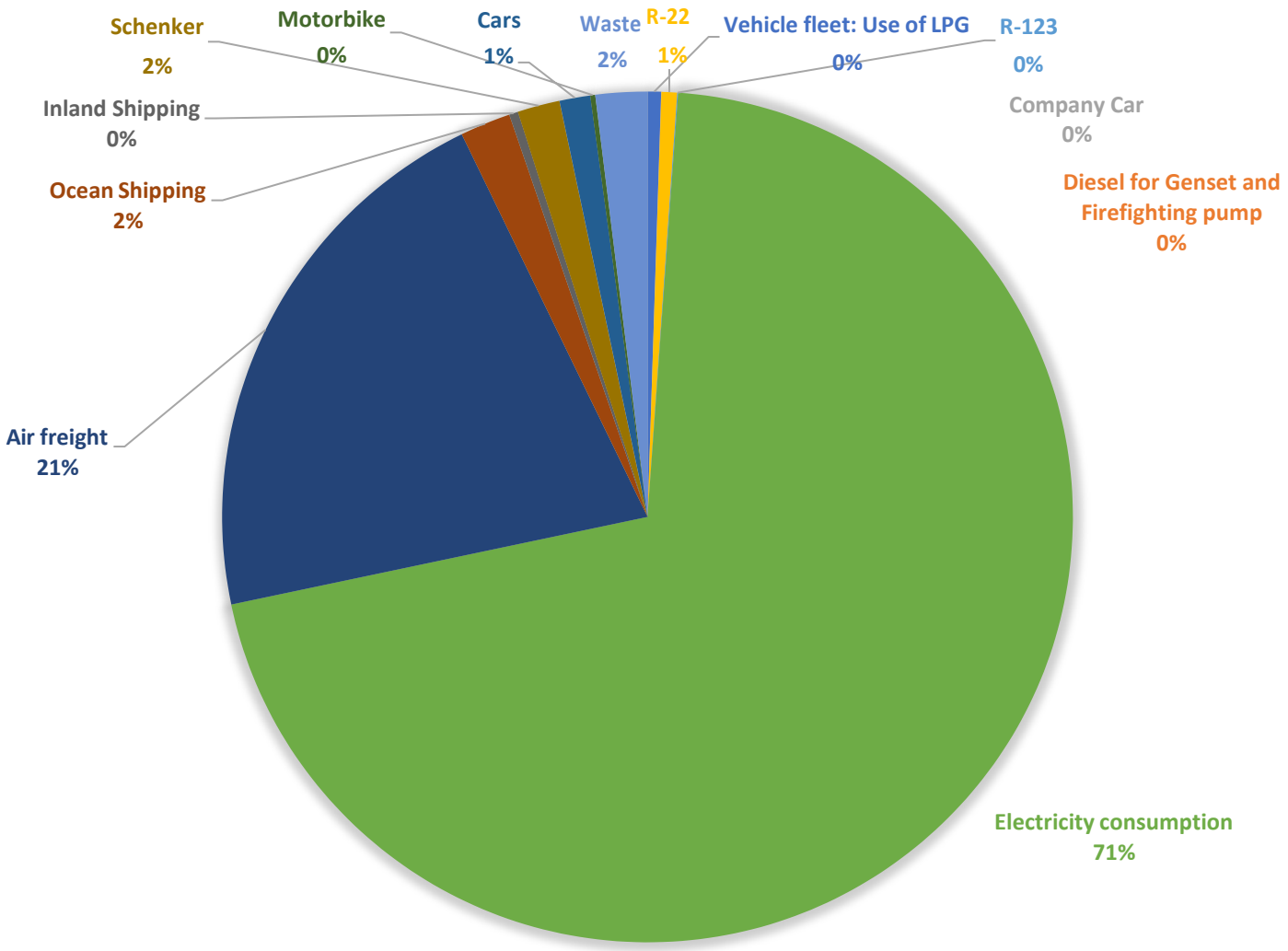
Overall, the data still in collection phase, therefore the comparison may not be representing the real / actual value.

# 4. MEMC Electronic Materials Sdn Bhd Carbon Footprint: Overview

The total amount of CO2e emitted, representing MEMC Electronic Materials Sdn Bhd operations in 2021, is 20,670.00 metric tonnes. The percentage contribution of Scope 1, 2 and 3 emissions in the total is as follows:



In the following graph you shall find the contribution of each source type in the Scopes 1, 2 and 3 emissions total.



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# 5. MEMC Electronic Materials Sdn Bhd Carbon Footprint: Verification

The following table compares the carbon footprint of MEMC Electronic Materials Sdn Bhd as calculated by the company and its external verifier CSE.

| Category | Source Type | CO2e Emissions (metric tonnes) CSE | Calculation Tools CSE | CO2e Emissions (metric tonnes) MEMC Electronic Materials Sdn Bhd | Calculation Tools MEMC Electronic Materials Sdn Bhd | Reporting Year | Verification Status |
|---|---|---|---|---|---|---|---|
| Scope 1 | ***Vehicle fleet: Use of LPG*** | **105.02** | GHG Protocol 2021 | **105.02** | GHG Protocol 2021 | 2021 | **VERIFIED** |
| | ***Diesel for Genset and Firefighting pump*** | **1.62** | GHG Protocol 2021 | **1.62** | GHG Protocol 2021 | 2021 | **VERIFIED** |
| | ***Company Car*** | **0.59** | GHG Protocol 2021 | **0.59** | GHG Protocol 2021 | 2021 | **VERIFIED** |
| | ***R-22*** | **123.08** | GHG Protocol 2021 | **123.08** | GHG Protocol 2021 | 2021 | **VERIFIED** |
| | ***R-123*** | **6.93** | GHG Protocol 2021 | **6.93** | GHG Protocol 2021 | 2021 | **VERIFIED** |
| Scope 2 | **Energy consumption** | **14,582.72** | GHG Protocol 2021 | **14,582.72** | GHG Protocol 2021 | 2021 | **VERIFIED** |

# 6. Procedure & Limitations

The current report is divided into two parts. The first part **(Part A)** concerns the verification of MEMC Electronic Materials Sdn Bhd CO2e emissions which include part of the Scope 1 emissions and the total Scope 2 emissions. To do so, One Island Consultancy recalculated all values reported by MEMC Electronic Materials Sdn Bhd. The second part **(Part B)** concerns the calculation of parts of Scope 3 emissions, by One Island Consultancy.

To proceed with the recalculations and calculations, MEMC Electronic Materials Sdn Bhd has provided One Island Consultancy with the required data. The data cover basic information on the Scope 1 direct emissions, Scope 2 energy indirect emissions and Scope 3 other indirect emissions. Then, CSE (Centre for Sustainability and Excellence) determined the accuracy and validity of the provided data.

***The data were assessed against the following parameters:***

1. Scope boundaries (geographic, operations covered, timeframe, etc.)
2. Missing information and potential uncertainty in regards with the provided raw data
3. Validity of methodology applied
4. Validity of Assumptions made
5. Accuracy of emissions calculations
6. Magnitude of errors and faults

***Findings based on the parameters (Part A):***

1. MEMC Electronic Materials Sdn Bhd has reported data that cover adequately all its geographic locations of operation (US) and type of operations (operational control). Regarding the timeframe (2021), MEMC Electronic Materials Sdn Bhd submitted data relevant to 2021.
2. The raw data provided by MEMC Electronic Materials Sdn Bhd had no missing information; All information was retrieved from MEMC Electronic Materials Sdn Bhd records of energy bills, fuel usage and list of refrigerants.
3. MEMC Electronic Materials Sdn Bhd had used widely accepted tools, of which methodology is considered valid universally.
4. No assumptions were made by MEMC Electronic Materials Sdn Bhd regarding the provided data on ***Scope 1*** and ***2*** emissions.
5. One Island Consultancy recalculated the amount of CO2e emissions from ***Vehicle fleet: Use of LPG, use of Diesel, Company Car, R-22 and R- 123 (Scope 1)*** and ***Energy consumption (Scope 2)*** and verified the accuracy of the calculations performed by MEMC Electronic Materials Sdn Bhd. To recalculate the values, One Island Consultancy has applied the Greenhouse Gas Protocol (Corporate Standard) of 2021.
6. No errors were found in the calculations

***Findings based on the parameters (Part B):***

1. Some information was missing in respect to ***"Business flights"*** and ***"Waste mix" (Scope 3)***. The missing information concerns departure-arrival airports and waste types, respectively. To cover the gaps, assumptions were made on the expected types of waste. No lack of information or uncertainty was found in the rest of the data.
2. One Island Consultancy has calculated the CO2e emissions from ***Scope 1, Scope 2*** and the ***Scope 3*** emissions based on the widely accepted Greenhouse Gas Protocol (Corporate Standard) of 2021.
3. All assumptions made by One Island Consultancy were based on logical reasoning and assessed against their hypothetical basis and values assigned by peer reviewers.

# 7. Suggestions for improvement

MEMC Electronic Materials Sdn Bhd has gathered and reported adequately its Scope 1, 2, 3 emissions, finding that the total amount of CO2e emitted, representing MEMC Electronic Materials Sdn Bhd operations in 2021 (Baseline), is 20,670.00 metric tonnes.

One Island Consultancy provides the following suggestions for consideration:

A. MEMC Electronic Materials Sdn Bhd needs to focus more on acquiring specific data for the following information:

1. Employee commuting
2. Business travel
3. Key Suppliers GHG emissions

Providing accurate data regarding the above-mentioned categories would allow a better representation of the carbon footprint.

B. MEMC Electronic Materials Sdn Bhd may consider implementing carbon neutrality strategies for Scope 1 & 2 emissions and build a greener brand for its clients.

That would include two main steps:

1. Adoption of Science-Based Targets (SBT) that refer to scientifically approved measures for carbon reduction (such as energy efficient technologies, eco-friendly resources for power generation, increase of recycling etc.). These targets are in line with the Paris Agreement to limit global warming to well-below 2°C above pre-industrial levels.
2. Use of renewable energy for Scope 2 emissions.
3. Carbon-offsetting to balance out any amount of CO2e which is not possible to be removed.
4. Setting of new emissions reduction targets according to MEMC Electronic Materials Sdn Bhd capacity, budget, and available technologies.
5. Consider issuing a sustainability report.

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# Appendix A.

## Verification Statement

### External Verification Statement of Greenhouse Gas emissions 2021 MEMC Electronic Materials Sdn Bhd

The External Verification Statement was conducted by the third-party Center for Sustainability and Excellence (CSE). With the current statement, CSE verifies the accuracy and validity of the CO2e emissions calculated by MEMC Electronic Materials Sdn Bhd. The emissions concern the year 2021 and Scope 1, Scope 2 and part of Scope 3 emissions produced due to MEMC Electronic Materials Sdn Bhd operations.

CSE provided external review on the methodologies applied by MEMC Electronic Materials Sdn Bhd, the calculation tools used, the raw data provided, and the numerical calculations performed by MEMC Electronic Materials Sdn Bhd. CSE recalculated all values following the methodology of the Greenhouse Gas (GHG) Protocol of 2021 (Corporate Standard and found them accurate.

### Data verified:

| Category | Source Type | CO2e Emissions (metric tonnes) | Calculation Tools |
|---|---|---|---|
| Scope 1 | *Vehicle fleet: Use of LPG* | 105.02 | GHG Protocol 2021 |
| | *Diesel for Genset and Firefighting pump* | 1.62 | GHG Protocol 2021 |
| | *Company Car* | 0.59 | GHG Protocol 2021 |
| | *R-22* | 123.08 | GHG Protocol 2021 |
| | *R-123* | 6.93 | GHG Protocol 2021 |
| Scope 2 | Energy consumption | 14,582.72 | GHG Protocol 2021 |

### The data were assessed against the following parameters:

1. Scope boundaries (geographic, operations covered, timeframe, etc.)
2. Missing information and potential uncertainty in regards with the provided raw data
3. Validity of methodology applied
4. Validity of Assumptions made
5. Accuracy of emissions calculations
6. Magnitude of errors and faults

### Findings based on the parameters:

1. The raw data provided by MEMC Electronic Materials Sdn Bhd had no missing information.
2. MEMC Electronic Materials Sdn Bhd had used widely accepted tools, of which methodology is considered valid universally.
3. No assumptions were made by MEMC Electronic Materials Sdn Bhd regarding the provided data on ***Scope 1*** and ***2*** emissions.

4. CSE recalculated the amount of CO2e emissions from ***Scope 1*** and ***Scope 2*** and verified the accuracy of the calculations performed by MEMC Electronic Materials Sdn Bhd. To recalculate the values, CSE has applied the Greenhouse Gas Protocol (Corporate Standard) of 2021.

5. No errors were found in the calculations.

## Statement of Independence, Impartiality and Competence

CSE and its team of external assurance, assures that it has kept its independency and objectivity, and that no events or issues occurred that could possibly influence the level of independency and objectivity. CSE has conducted this verification independently and to its knowledge there has been no conflicts of interest.

CSE's external assurance team has extensive knowledge and international experience on conducting assurance and audit services on topics and systems around the environment, the society and employees, stakeholders mapping and engagement and identification of material topics. Due to combined knowledge in the field of Sustainability, CSE has an excellent understanding of good practices regarding corporate responsibility, sustainability practices and assurance services.

CSE applies business ethics through an integrated Code of Conduct to ensure that its employees maintain integrity, objectivity, confidentiality, and professional behavior in their day-to-day business activities.