SHIV NADAR UNIVERSITY

Agile Group
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SHIV NADAR UNIVERSITY

CARBON FOOTPRINT REPORT

Reporting period

1 April 2021 – 31 March 2022

Contents

1.0 Terms used

Abbreviations	Full Form
CFP	Carbon Footprint
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
BY	Base Year (considered 2019-20)
AY	Assessment year for reporting period (Financial year)
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilograms
$MTCO_2E$	Metric Tonnes of CO_2 Equivalent
LPG	Liquefied Petroleum gas
SNU	Shiv Nadar University

2.0 INTRODUCTION

Present times have witnessed extreme climate scenarios and their unprecedented impact on the environment globally, may it be the records rains in Australia or the killer heat wave setting new records in UK and Europe or wild fires in US, Europe and snow avalanches in alpines in Italy or floods in Iran or excessive floods in many cities of India. All these varied natural catastrophes have, however, only highlighted to the excessive environmental degradation which is a result of the excessive human intervention and abuse of nature by the human being.

Covid times, is known as one of the most disturbing global events in the recent past. While it leaves us with many sad remembrances, however, many may recall the improved environmental conditions which became evident and identified during the initial phase of global lockdown. While Lockdown is not a solution however, it provides evidence that the nature has the power of healing itself, If the human being stops contributing to its degradation.

Past one year has seen an enhanced focus and multiple initiatives including the United Nation Climate Change Conference (COP 26), UN Climate and SDG Synergies Conference, held in Tokyo or the climate change workshops & seminars at various levels only demonstrate visible commitment of both the government and non-governmental institutions towards improving the climate scenario.

The commitment, however, needs to go beyond the passionate statements, discussions and commitments made from the podium by the world leaders and a lot needs to be done to actually and positively contribute to the improved global environment.

Global warming, is still one of the most relevant and sever global issue having impact not only limited to business operations but to the overall survival of every human kind. Educational institutions are not an exception to the impact of the climate change and their commitment to the cause is also evident through the various sustainability initiatives undertaken by these institutions including structured reporting forums like Times Higher Education World Ranking, UNAI, Stars to name a few. Further, the ministry of higher education, India the apex educational fraternity in India, University Grants commission (UGC), AICTE have instituted schemes to motivate the educational institutions in India to sign a pledge for Net Zero Emissions and undertake sustainability initiatives to help contribute to the overall goal of our country and world at large, while NAAC accreditation

also have required the educational institutions to make their humble contribution towards a sustainable institution.

Many global universities have made their commitment to embrace sustainable practices and have embarked on this journey. A few of the global universities and colleges have achieved significantly against the established UN sustainability goals (SDGs) and are motivating many others to follow.

3.0 SUSTAINABILITY COMMITMENT FROM SNU

Shiv Nadar University (SNU), realizes its responsibility towards sustainable environment and has committed to contribute to the overall socio-environmental sustainability by embarking on a journey to make the campus not only "Carbon Neutral Campus", but also work on other UN sustainability goals across various functions at the campus.

The sustainability commitment of the leadership team at Shiv Nadar University could be evidenced through multiple initiatives undertaken as part of the structured sustainability framework with specific targets and timelines. The entire sustainability initiatives being driven from the office of the Director Administration and closely monitored and reviewed by the vice-chancellor herself is a true evidence of leadership commitment to the cause.

As part of the comprehensive sustainability drive and focus, new initiatives including the plantation of trees, shrubs & soil to create a carbon sink and compute the "Carbon Sequestration" have been formally introduced. Further, the university has planned to participate in Global Reporting and Benchmarking surveys including the Times Higher Education Impact Ranking" and be a member of the "United Nation Academic Impact" (UNAI) program.

Carbon Footprint computation is one such initiative which is undertaken by the university covering all academic, non-academic, sports, recreational, biodiversity and residential activities at the campus. This being an annual exercise, the CFP is computed and analysis is undertaken to reflect the key elements contributing to the overall emissions and then identify specific initiatives which could be planned and executed to drive the university to a sustainable and green campus in true sense.

4.0 OBJECTIVES:

- Compute Scope 1, Scope 2 and Scope 3 Carbon Footprint for all activities operating from the SNU Campus for financial year 2021-22
- Compute the various components in each of the categories
- Analyze the change in carbon footprint in various categories as compared to previous year / base year
- Evaluate the impact of the change in the carbon footprint for the various components in each of the scope categories along with the main reason leading to the change.
- Identify opportunities for Improvement to further enhance SNUs performance on their sustainability journey
- Present a factual status of the overall performance through the assessment year on all the three scopes of emissions with a detailed reflection on the trends of change and the established reasons, to facilitate the leadership team at the university to take internal decisions to drive the overall sustainability program.

5.0 REPORTING PERIOD: FY 2021-22 (1 April 2021 to 31 March 2022)

- Performance for the current reporting period (FY 2021 - 22) is reviewed against the values of the previous reporting year FY 2020-21, FY 2019 – 20 & FY 2018-19.
- While the computed values are also available for the FY 2018-19, however the data for the FY 2018-19 is not referred for the comparison being not complete being the first year of the initiation of this initiative to compute the carbon footprint and complete data for the referred period was not complete to justify the reference and comparison.
- Further, for the year 2020-21, as the university operated in a hybrid mode with the academic activities mainly move to the on-line training mode due to the Covid pandemic and the movement of the students and staff was restricted, the Carbon Footprint values of the year 2020-21 are not considered to draw any trend and reflection of the values of the current assessment period
- Year 2019-2020, being a most close to normal operations, is considered as the base year to undertake analysis and reflect on the deviations from the base year values

6.0 SCOPE AND REPORTING BOUNDARY:

a) **Physical boundary**: All activities including academic and non-academic activities based out of the SNU Campus located at NH91, Tehsil Dadri, Greater Noida, Uttar Pradesh 201314

b) Operational boundary

Scope 1 Direct GHG emissions from:

i. Captive power generation activities including the renewable power and the power from the combustion of fossil fuels (HSD) in stationary source of electricity generators, LPG consumption in canteen & laboratories
ii. Combustion of fuels in mobile sources - SNU owned & controlled vehicles and the fuel used for the horticulture activities
iii. Fugitive emissions from Refrigeration/air-conditioning equipment installed and operated

Scope 2 Indirect emissions from:

i. Purchased electricity including renewable and non-renewable power

Scope 3 Other Indirect GHG emissions from:

i. Commuting of Teaching Staff, Non-Teaching Staff, Students and Sub-contractors.
ii. Business Air travel and associated hotel stay
iii. Material procurement, consumption and disposal.
iv. Waste management and disposal.
v. Upstream and downstream activities

7.0 DEPLOYED METHODOLOGY:

In the spirit of the SNU leadership team to Educate, Empower and Engage all stakeholders, the Carbon Footprint (CFP) computation methodology was designed to engage as many stake holders as possible and required. A team of including teaching & non-teaching staff along with the students was established and external consulting partner with proven credentials @ AgileGroup, was engaged to provide the required knowledge support and handhold and guide through the various stages of Carbon Footprinting engagement, including strategy design, competence enhancement, format design, data collection and validation, CFP computation using "AgileCFToolkit"© and then analyze and evaluate the computed outcome for their trend and compare with the previous year performance details.

The Carbon Footprint is computed using the "AgileCFToolkit"© for the data points provided by the respective functions. The Carbon Calculator is updated with the most authentic and relevant emission factors and assessment methodology in line with the global framework and the ISO 14064 standard. Several recognized national and international standards and global frameworks have been referred for the computation of the footprint ofthe University. The GHG emission factors are taken from reliable sources including India GHG protocol, CEA, GRI, WRI & DEFRA data bases, as well as computed using the IPCCC published methodologies to get more accurate values in Indian context.

The report highlights the key emission sources of the university and reflects the trend as compared to the previous years considered as the baseline data. Further, improvement strategies and operational initiatives are planned based on the analyzed output.

SNU is committed to making to having a sustainable campus, and as a first step in that direction has achieved EHS certification. The comprehensive EHS Policy promotes environment friendly & low emission practices in areas of water, energy, waste, habitat protection etc. One such practice is assessing carbon footprint of its activities and undertake initiatives to reduce the carbon foot print aiming to becoming carbon neutral campus. Cross functional team including teaching & non-teaching staff and student community representatives is engaged in deployment of the identified management programs and monitoring the same to ensure an ownership and motivation to keep the CFP initiatives a sustained effort towards being a Carbon Neutral Campus.

Key steps in the Carbon Footprint Journey:

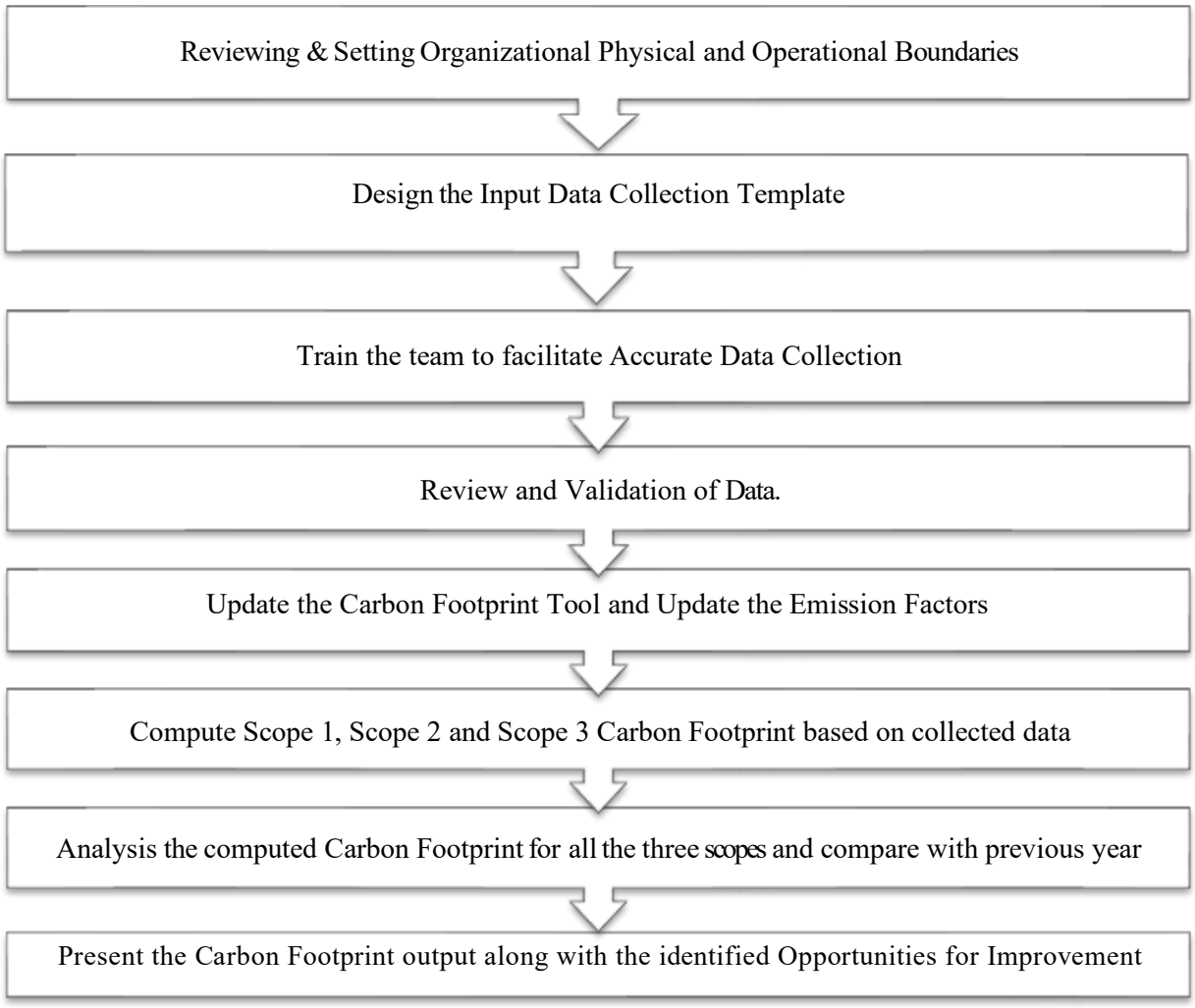


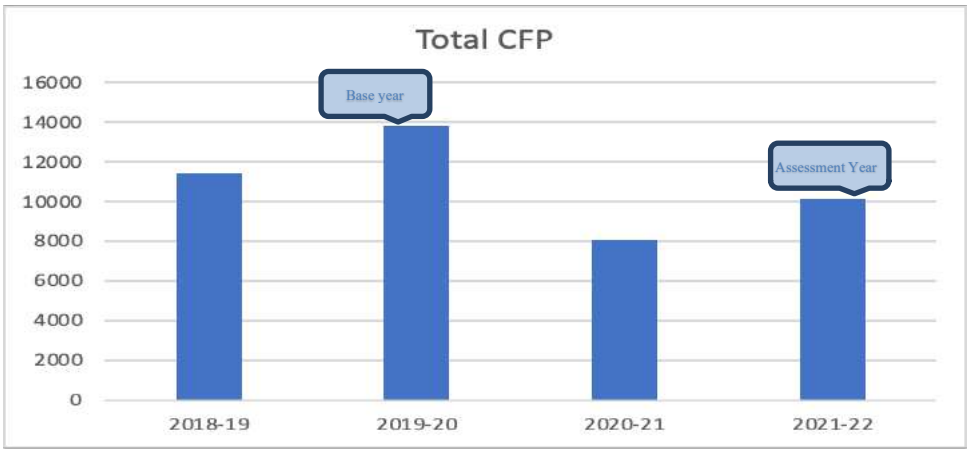
Figure 1: Flowchart Showing Adopted Methodology for Estimation of Carbon Footprint

8.0 COMPUTED RESULT

Computed values of the CFP for Scope 1, Scope 2 & Scope 3 for previous three years.

GHG Emissions	Scope 1	Scope 2	Scope 3
MT CO_2e (2018-19)	743	9668.4	1,029
MT CO_2e (2019-20)	738	10,649	2,427
MT CO_2e (2020-21)	497	6277	1292
MT CO_2e (2021-22)	**1219**	**7168**	**1753**

The computed value is arrived at considering the Emission Factors in Indian Context as obtained from the India GHG Protocol and the published methodologies by IPCCC, WRI, DEFRA and GHG Protocol. The computation of the carbon footprint is undertaken using global defined protocols and International ISO 14064 standards.

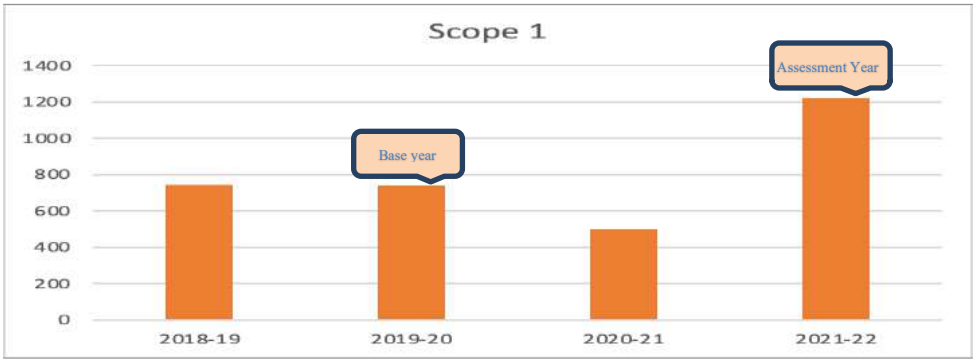


Comparing the cumulative value of the Carbon Foot-print for all Scope 1, 2, & 3 together, there is a **30% reduction in the cumulative CFP as compared to the base year 2019-20.**

9.0 ANALYSIS OF THE GHG EMISSIONS

9.1 SCOPE 1 GHG EMISSIONS

- **A nominal 2% decrease in Scope 1 emissions** for FY 2021-22 from base year FY 2019-20 could be achieved inspite of additional lead for the HVAC on account of new facility (Hostels) added during the year. The reduction could be achieved due to 28% reduction in emissions due to the captive power generation using fossil fuel.



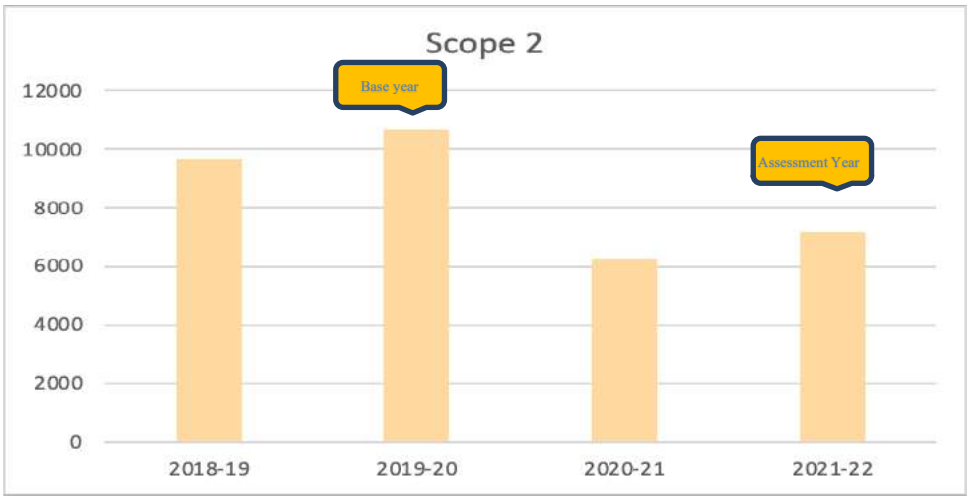
Contributing components of Scope 1 Emission

- **Captive power generation**: 28% reduction in the CO_2e emissions from the base year could be achieved on account of reduced consumption of fossil fuel for the captive power generation.
- **Business travel:** 1% increase in the CO_2e emissions from the base year was observed on account consumption of fossil fuel for local Business Travel using company owned and controlled vehicles
- **HVAC:** A 31% increase in the CO_2e emissions from the base year was observed on account increased capacity on account of additional HVAC infrastructure deployed for the increased built-up area (hostels) at the university.

Category	MT CO_2e
Fuel (2021-22)	179
Fuel (2019-20)	169
Business Travel (2021-22)	179
Business Travel (2019-20)	177
HVAC (2021-22)	524
HVAC (2019-20)	399

9.2 SCOPE 2 GHG EMISSIONS

Scope 2 accounts for the indirect GHG emissions resulting from the generation of electricity which is subsequently purchased and consumed by the university.



A 33% reduction in the Scope 2, CO_2equivalent emission was obtained on account of reduced overall power consumption and transition to cleaner power during the assessment period as against the base year value for the same criteria.

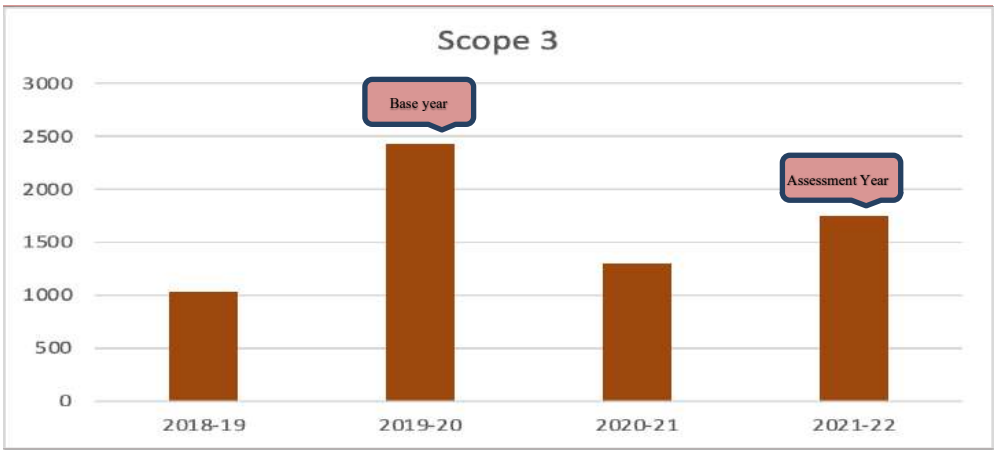
Further, as part of the sustainability program, leadership team at SNU is evaluating the options to further reduce the dependance on grid power through:

- Power Purchase agreement and sourcing of green power from IEX
- The feasibility of setting up a captive **Solar Power Generation** facility at the campus.

9.3 SCOPE 3 GHG EMISSIONS

Scope 3 emissions are contributed by indirect activities including outsourced upstream & downstream activities and is the second highest CO_2e emission contributor at SNU.

During the FY 2021-22, a **28% reduction in the overall Scope 3 emissions** could be achieved against the base year FY 2019-20.



Key contributor to the scope 3 emissions computation include:

Category	MT CO_2e	% Reduction from FY 2019-20
Air Travel (2021-22)	**30**	**17%** ↓
Air Travel (2019-20)	36	
Travel of Employee & Sub-contractors (2021-22)	**178**	**62%** ↓
Travel of Employee & Sub-contractors (2019-20)	470	
Paper (2021-22)	**7.1**	**41%** ↓
Paper (2019-20)	12	
Waste (2021-22)	**173**	**1477%** ↑
Waste (2019-20)	11.19	

While overall there is a reduction in CO_2e emissions in all the scope 3 categories, there is a very steep 1447% increase in the CO_2e emissions in the category of waste disposal resulted from the a very high value of mixed waste on account of construction and accumulated waste during the covid pandemic period.

10.0 CARBON SEQUESTRATION:

As it is evident in today's scenario, climate change and global warming are one of the most focused upon issues upon which appropriate action must be taken at every level today to handle the climate crisis. It is of immense importance that the ecosystem services provided by the trees, shrubs and soil are taken into consideration while looking at different options for greenhouse gas emission reduction and mitigation. Carbon dioxide is one of the most prevalent natural greenhouse gases contributing heavily to the global warming phenomenon. One of the major reasons for its high concentration is the anthropogenic activities undertaken.

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Shiv Nadar University has been computing its carbon footprint since 2019. Now in the reporting year 2021-2022, they are going to calculate its carbon sequestration potential on the campus by different components of terrestrial carbon pool including trees, shrubs and grass cover (Carbon sequestered in the soil) for the first time. Since, this year is the pioneer year for carbon sequestration potential on the campus, annual and net values, both should be considered. As the net value will help to estimate the increment in carbon sequestration potential next year and an approximate annual value will provide a rough and close idea of sequestered carbon per year by considering age as the determining factor as per the methodology used by Charl De Villiers, 2014 (Charl De Villiers, 2014).

Carbon sequestration implies the transfer of atmospheric CO_2 into other long-lived global pools including oceanic, pedologic, biotic and geological strata to reduce the net rate of increase in atmospheric CO_2.

Study Scope for Carbon Sequestration Value Computation

In this study scope for carbon sequestration, a total of **17,281 trees** on the campus**; 1,10,704 shrubs** and **33.9439 hectares of grass cover under three different species of grass in the campus of Shiv Nadar University was computed. The year of plantation for calculating per year value for trees and shrubs is 2017 based on data provided by Shiv Nadar**

University (Charl De Villiers, 2014)**. The process considered the carbon sequestration of the whole university campus with a focus on the three components of the terrestrial carbon pool (trees, shrubs and grass cover).**

Carbon sink pools taken into consideration are the trees, shrubs and soil covered under different types of grasses.

Results

1. Annual Carbon sequestration Values:

Annual Carbon sequestration Value (Year: 2021-2022)			
S. No.	**Category**	**Total quantity of trees / shrubs / area considered respectively**	**Value ($MTCO_2e$)**
1.	Annual Carbon equivalent sequestered in metric tonnes (Trees)	17,281	442.61
2.	Annual Carbon equivalent sequestered in metric tonnes (Shrubs)	1,10,704	509.6
3.	Total carbon equivalent sequestered by soil under different grass species in metric tonnes*	33.944 ha	502.26
4.	**Total**		**1,454.47**

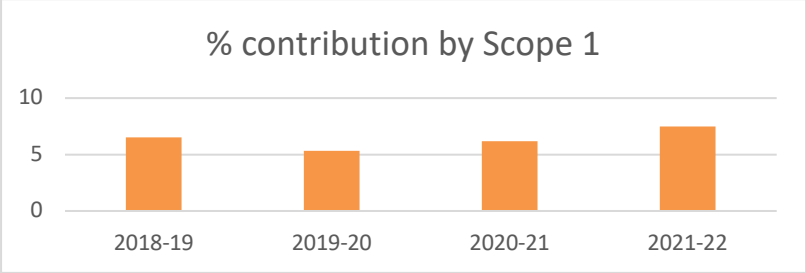
*The value computed for this parameter is the **net carbon stock** value since in this case carbon sequestered by the soil below the three different types of grass species has been computed and **annual** computation of carbon stock for soil is not possible.

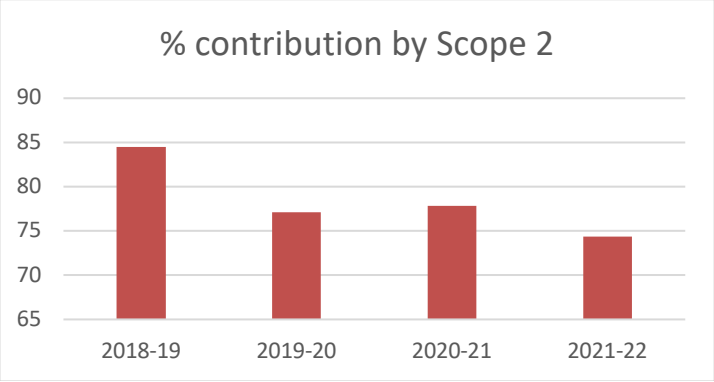
11.0 OVERALL INFERENCE AND CONCLUSION:

Comparing the cumulative CO2equivalent emissions generally for over the past four years (including periods of incomplete and covid pandemic affected period), a general decrease in the overall emissions could be observed.

Further analysis of the data computed for the past 4 years indicate a general trend of scope-wise contribution as follow:

Scope 1 contribution to the overall CFP has generally remained within the 5 -7 Percent of the total Cumulated CFP for the assessment period

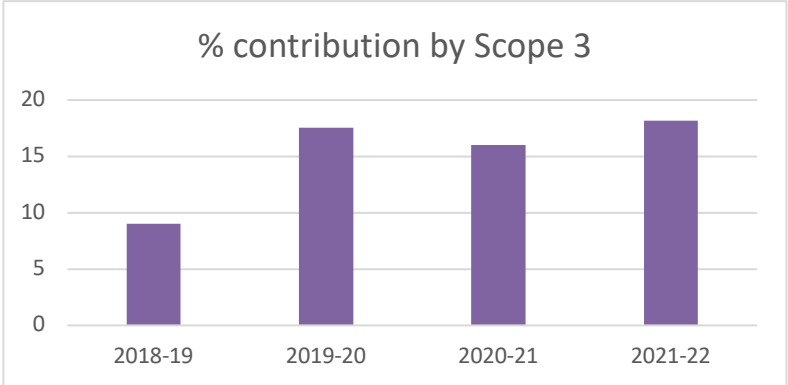




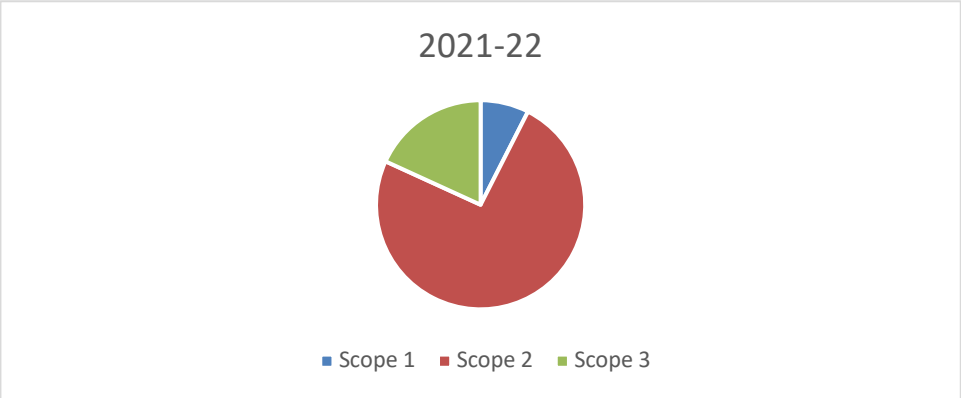
Scope 2 Contribution to the overall CFP has generally stayed in the 85 – 74 % contribution of the overall CFP for the Assessment Period.

The trend of Scope 2 emissions has also indicated a gradual declining trend over the years with the least % contribution in the present assessment period

Scope 3 emissions over the years have generally remained in the 9-18 % range of the total CFP contribution. While in absolute value it has reduced by 28% from the base year, the % contribution for the reporting period has remained at 18% as in the base year.



Overall % contribution by each of the scopes to the cumulative CFP value has stayed almost uniform with a very slight variation over the years.



Interesting inference is also the fact that Scope 2 emission is the major contributor to the overall CFP contribution, generally ranging in the 74-85 % contribution of the overall CFP.

Further, on account of multiple Energy Optimization initiatives undertaken by the university over the years including, but not limited to the "General reduction in the absolute power consumption, and Transition to Cleaner power, including setting up a captive Green power generation facility, further reduction in the absolute Scope 2 emissions can be planned.

Further, the overall Carbon Sequestration by the Trees, Shrubs and the Soil planned and maintained at the campus has resulted in the creation of a carbon sink value of **1,454.47 MTCO$_2$e.,** which effectively results in **15% of the net CFP is neutralised on account of the green cover at the campus**

12.0 LIMITATIONS :

Following limitations were encountered during the implementation of the activity:

- The data used for computation of CF was as provided by SNU as is considered to be accurate.
- The electricity units were taken from the actual electricity meter bills and the same is considered to be accurate.
- Calibration error in the monitoring and measuring equipment used by SNU in data generation is expected.
- Limitation in availability of India centric GHG emission factors including the scope 3 Extraction and T&D emission factors, the values are either take from global database and further computed to India centric operational practices or else computed using published global methodologies.

Constraints

- Carbon sequestration value computation involves a lot of variables like the girth of the plant, per year increment, soil type, vegetation type, damage to the plant and considering the aspect that other than natural forest present in the university and wild grasses near the natural lake, the vegetation is altered and has human interference e.g., maintenance, hedging, etc. However, considerations of possible factors have been as much as possible at every stage.
- Calculation of the amount of carbon dioxide sequestered by shrubs and trees per year is difficult due to the complexity of the variables involved and the assumption of using age factor as a dividing factor though based upon documented process increases uncertainty, thus the value calculated is an approximate value.
- The university maintains the vegetation for ornamental purposes and the health of the plants. Through maintenance or accidental loss, loss of carbon sequestration potential is observed.
- SNU's vegetation is still young and needs to be given more time to mature further and have more potential for carbon stock storage in its terrestrial carbon pools.
- Age is calculated and assumed from the year of plantation for the shrub and tree species till the reporting year. Limitations were observed in ascertaining the exact age from the sapling stage for the trees and shrubs.

Assumptions

- Parameters and careful recording protocols for data collection have been followed and duly taken into consideration by the university.
- Shrub annual sequestration value has been calculated by using age as the dividing factor based on the methodology followed for tree annual carbon sequestration value. In addition, it has been based on the input from the university that shrubs are maintained at a certain height and gain maturity in one year, thus incremental change in girth is taken into consideration as factoring of age.
- Soil sample collection is done at a depth of 15 cm for SOC stock calculation in grass cover areas of *Paspalum conjugatum, Zoysia tenufolia,* and Selection-1 grass and for wild grass, the depth taken into consideration is 30 cm.

13.0 RECOMMENDATIONS AND SUGGESTIONS

Basis the analysis of the computed Carbon Footprint and its comparison with the performance for the previous years, there is evidence of improvement in all sections and all scope of CFP. While the reduction in the carbon footprint can also be attributed to Covid Pandemic, the results are also a result of planned and structured initiatives.

To ensure the improvement is further achieved, the major focus areas may include:

- Optimize resource usage through enhanced efficiency in processes and controls
- Avoid wastage through the use of technology and human controlled processes
- Work towards water neutral campus
- Transition / expansion of clean energy source with aim to achieve 100% green power
- Undertake "Zero Cost" Improvement projects with the participation of Students, Faculty & Non-teaching staff
- Usage of new & energy efficient technologies to reduce energy consumption
- Increase green cover with plantation of trees with high carbon sequestration index
- Engage stake holders within the campus and from nearby society through increased participation in structured events like Earth-day, Environment-day, Safety weeks, etc.
- Ensure effective management of Integrated Management System
- Adopt, deploy and achieve certification to water efficiency management system ISO 46001
- Ensure energy optimization and conduct of regular energy audit
- Encourage use of e-vehicles at campus
- Encourage and promote paperless documentation for official communication and academic activities like online submission of assignments / providing notes
- Sub-metering to identify high consumption areas of electricity to be able to drive specific optimization initiatives
- Review the possible impact of key events towards GHG emissions (example: Increased use of electricity, extended operating hours, use of special equipment).