SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

12B status by UGC

Climate Action Plan (2020-2030)

Protect People and Planet…

Message

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Sathyabama has become a globally recognized Educational Institution with excellence in higher education to international standards. Having bestowed with the state of the art infrastructure, world class research facilities and highly qualified teaching faculty, our Institution has become an epitome of excellence.

We are really proud for being recognized as one of the Top 5 Private Universities in India for Innovation, by ARIIA (ATAL Ranking of Institutions on Innovation Achievements) 2020, an initiative of Ministry of Education, Govt. of India to systematically rank Higher Education Institutions involved in high Quality research, Innovation and Entrepreneurship. We are also happy that Sathyabama is placed at 39th Rank among Universities in the Country by National Institutional Ranking Framework (NIRF) 2020.

It fills us with a sense of satisfaction and encouragement to see the Contribution of our Institution towards Climate Action. Our Institution has a commitment to reduce Carbon emission by all measures and ensure the achievement of Sustainable Development. We take immense pleasure in sharing some of our initiatives towards carbon neutrality and develop a green environment

We acknowledge the sincere efforts of all the staff members for their contribution towards building a Green Environment. We also congratulate the Team involved in the preparation of this Climate Action Plan.

Foreword

Sathyabama's progress plan is designed with great emphasis on research, innovation and entrepreneurship as prime objectives. The Institution has achieved significant milestones during the year 2019-2020 as the outcomes of our effort to strengthen innovation and research. This Climate Action Plan serves as an evidence of our honest and systematic pursuit towards building a greener Environment.

Sathyabama's focus on research has grown tremendously and to combat Climate Change and its impact Our Centre for Climate Change studies is working towards various areas of research in Climate action Plans. The Centre has published in high impact factor publications, working in research projects in Climate Action with research grants and international collaborations to mitigate the effects of Climate Change. The University is continuing its research and social outreach programmes with a commitment towards Climate Action and Achieve SDG 13.The Centre also addresses the Sustainable Development Goals of Agenda 2030, which requires the participation of individuals, institutions, countries and Governments in creating a better world free from poverty, hunger, health issues, inequalities, and providing access to quality education, access to clean water and sanitation, access to affordable and clean energy.

I am obliged to thank our staff and students for their contribution to our success. I take this opportunity to appreciate them for their unparalleled effort and support**.**

Dr. T. SASIPRABA, M.E., Ph.D.

VICE CHANCELLOR

Editorial Team

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EXECUTIVE SUMMARY

Climate Change is one of the important issues in the recent time. In India, its ramifications extend from basic science to diplomacy, from risk assessment to intergenerational ethics. We are now in a time when it can no longer be safely ignored and large institutions like Sathyabama Institute of Science and Technology (SIST), Chennai faces a series of choices about how they respond to its challenges. Those choices not only involve addressing SIST own actions but include the energy and preparedness for the same. These issues resonate through SIST's research and educational missions. To address these issues, the Centre for Climate Change Studies is developing a Climate Action Plan (CAP). The management convened a Climate Action Task Force composed of faculty, staff, and students to consider a wide variety of options, communicate broadly with the community and bring recommendations forward. The Climate Action Task Force convened in January 2020, since then exploring ways to address reducing greenhouse gas emissions and increasing campus resilience.

Sathyabama's Climate Action Plan sets two goals with respect to climate neutrality. First, we adopt an interim goal of reducing emission by 25% by 2025. Second, we set a target date of 2030 for achieving climate neutrality (net Zero greenhouse gas emissions).

1 INTRODUCTION

We believe colleges and universities must exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality. Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society.

Our Climate Action Plan is based on an inventory of Sathyabama's greenhouse gas emissions in 2019. The greenhouse gas we track, and the inventory are the six gases that are covered under the Kyoto protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). The inventory covers the main campus at Sholinganallur. The inventory encompasses emissions classified as scope 1, scope 2 and, scope 3 by the Institution's Climate Commitment. Scope 1 includes direct emissions from the boilers, the cogeneration plant, campus vehicles, and fugitive emissions from refrigerants in air conditioning equipment. Scope 2 includes indirect emissions from purchased electricity. Scope 3 includes indirect emissions from commuting, air travel, and solid waste.

2 EXISTING MITIGATION INITIATIVES

This section describes the primary mitigation strategies available to the institute. The significance of individual mitigation strategies derives from our current emission profile. The largest source of emissions form Sathyabama are those associated with the building and energy systems, electricity consumption, and commuting.

2.1 Establishment of Solar kitchen

Spread over 1,100 square feet (largest surface area given to any solar steam cooking project in the country) on the terrace of the boys hostel mess on the university campus are 110 solar concentrator dishes neatly arranged in eight rows, which would supply 2.2 MW thermal power to the kitchen. It would be used to cook 30,000 meals every day. Each solar dish is made up of reflective glass and measures 10 square metres. A solar concentrator dish, on an average, saves 5 KW of power per hour. The Rs. 1.2-crore solar steam cooking system was developed by Gadhia Solar Energy Systems, an Ahmedabad-based company, along with Sathyabama Institute of Science and Technology. A solar-powered kitchen consumes less power and time than a conventional kitchen. "Power from solar dishes ensures that a meal is cooked in half-an-hour, while it may take one-and-a-half hours to cook the same using LPG. This kitchen, by replacing LPG with solar dishes, saves nearly Rs 20 lakh every year

2.2 Setting up of solar panels on the footpath/walkways

Sathyabama has established nearly 1-1.5 kms of footpath installed with solar powered LED lights. This initiative will be helpful in reducing the usage of general electricity in the campus.

2.3 Biodiesel fueled transport system

The Centre for Waste Management (CWM), Sathyabama Institute of Science and Technology, in association with the Central Leather Research Institute (CLRI), have started off a biodiesel production centre on the campus of the University. The cooking oil waste generated at the University's mess is being used as the raw material. And, the bio-fuel is being used to operate buses. Nearly 70 per cent of the oil is obtained from the mess every 15 days, which after transesterification yielded 98.17 percent of bio-fuel. The bio-fuel gives a smoother ride with

minimal pollution as compared to petrol or diesel. Bio-diesel also degrades four times faster than petroleum-based diesel. The bio-fuel obtained by this process has sulphur content close to zero, generating significantly lower lifecycle greenhouse gas emissions and non-toxic bio-fuels.

2.4 Battery vehicle for on campus transportation

In order to reduce the direct emissions on campus, the management has launched the battery cars for on campus transportation of students, staff and guests.

2.5 Tree plantation in and around University for CO2 sequestration

Through the National Service Scheme (NSS), Eco club, and Rotaract students we have been engaged in mass tree plantation in our campus as well as outside our campus, in and around Chennai.

Sl.No.	Name of activity	Period
1	Mass tree plantation	14th August,2019
2	Mass tree plantation	27/01/2019
3	Tree plantation	08.09.2017
4	Tree plantation	05.04.2018
5	Tree plantation	16.07.2016
6	Tree plantation on 70th Independence day	15.08.2016

Tree plantation organised by the NSS of our university jointly with Indian bank on 20th August 2016. 100 saplings were planted at the university garden.

2.6 Terrace gardening

First Phase of Terrace Gardening-Our management inaugurated the first phase of terrace gardens on 15th August 2016, Eco club along with Rotaract club of Sathyabama Institute of Science and Technology developed in a 100sq.ft.terrace garden on the terrace of Administration building, International Research Centre, ECE Block, CSE Block, 14th Block, Biotechnology Department and Chemical Engineering Department.

3 EMISSION REDUCTION PLAN FOR 2030

In this section we address the timing and projected impact on emissions of the mitigation initiatives we will undertake. Our goal is structured over two time periods with respect to climate neutrality. First, we adopt an interim goal of reducing emission by 25% by 2025. Second, we set a target date of 2030 for achieving climate neutrality (net Zero greenhouse gas emissions).

4 NEAR-TERM ACTION FOR THE YEAR 2025

The goal of the emission reduction plan over the next five years is to achieve a reduction in net emissions of 25% by 2025. The key elements of the 2020-2025 plan are as follows:

4.1 Building systems and information technology

We anticipate that over the time period between 2020 to 2030 there will be continued improvements in the availability, cost and energy performance of building systems, including lighting, computing technology, and other building systems. In the area of lighting, LED or

inductive lighting as potential alternatives. Also initiating technology-based improvements in energy efficiency building systems and information technology would result in much reduction in electricity consumption over the period between 2020-2030.

4.2 Green Building

The architecture department at Sathyabama aims to evolve into an insightful school of architectural thought by imparting holistic education and to develop architects of high personal integrity and values focusing on human, socio-cultural, environmental, scientific and technological, aesthetic and philosophical values.

4.3 Energy Research funded by MHRD

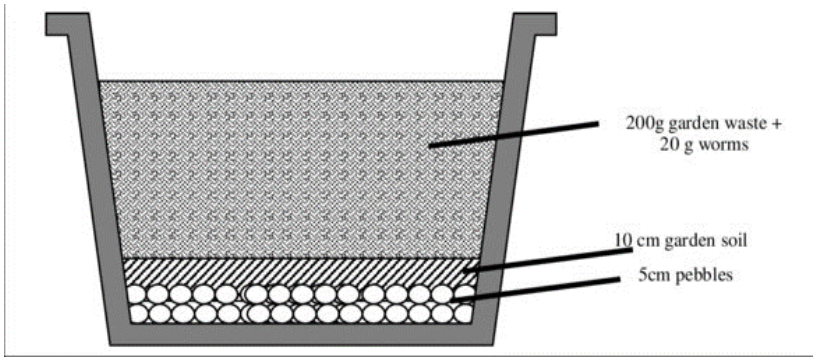
The primary objective of the Centre is to provide sustainable energy solutions to the need for energy. Research at the Centre is taken up in four domains covering Solar Cells, Solar Thermal, Fuel Cells and Bioenergy. Research initiatives have been already taken up in the development of polycrystalline silicon thin film PN junctions, Compound and Multi-junction photovoltaics, Solid oxide fuel cells, Proton Exchange Membrane (PEM) Fuel Cells, Algal Biodiesel, Bioethanol from macro algal rejects and Biohydrogen from food waste.

4.4 Monitoring & Measurement of GHG Emissions

GreenHouse Gas concentration using CH4 - CO2 sensors will be installed at different hotspots inside the campus to do the continuous monitoring. This sensor will record and transmit the sensed data to the web server through the OGC standard sensor web. This data will help us for decision-making and development, waste dissociation rate and the GHG dispersion rate.

4.5 Setting up of solid waste management plants (Vermicomposting)

In order to reduce the biodegradable waste generated from the hostel kitchen of Sathyabama, setting up of solid waste management is necessary. As a part of it, Vermicomposting bins will be installed in and around the kitchen to mitigate the waste in a scientific manner (. The black gold (vermicompost) produced by the earthworms are rich with nutrients and can be directly utilized as a biofertilizer for terrace gardening as well as for plants and trees inside the campus.



Model vermicompost bin for effective utilization of biodegradable waste (Fauziah and Periathamby, 2009).

4.6 Reduction in GHG emissions and management from Agriculture sector

The main objective of our agriculture team at Sathyabama Institute of Science and Technology is to develop adaptation strategies that can reduce greenhouse emission from agriculture systems without compromising food production and productivity. Agriculture sector has the potential to be developed as a potential sink of GHGs by developing cost-effective and simple low carbon technologies that can be adopted by resource-poor farmers. This is by increasing our understanding of plant physiology, productivity, its interaction with soil, microbes, fertilizers, pesticides and other biotic and abiotic factors.

4.7 Air travel and commuting

Since our inventory also includes emissions associated with air travel and commuting by employees and students, we suggest increased use of videoconferencing, teleconferencing and other technologies that may allow some reduction in the travel. Due to the ongoing pandemic crisis, we do not anticipate a major increase in the use of public transportation for commuting in the near term. In addition, we also encourage bike sharing or carpooling by staff and students while coming to university which can promote sustainable reduction of emissions by the individuals.

4.8 Smart bike or Light Electric Vehicle transportation

Implementation of smart bike or Light Electric Vehicle transportation is a good solution that can obtain the desired carbon reduction effect. It encourages conventional cycling which keeps you fit as well as diminishing the carbon footprint.

4.9 Algal wall/Vertical garden

To strengthen our commitment toward a green environment, along with ongoing activities like Tree plantation and Terrace Garden, we have also been looking to establish an algal wall and vertical garden in the campus. Vertical garden and algal wall will not only be an excellent attempt to make a sustainable structure but can also be a very good educational tool for students and staff in the campus. Preliminary research work is undergoing in our research centers.

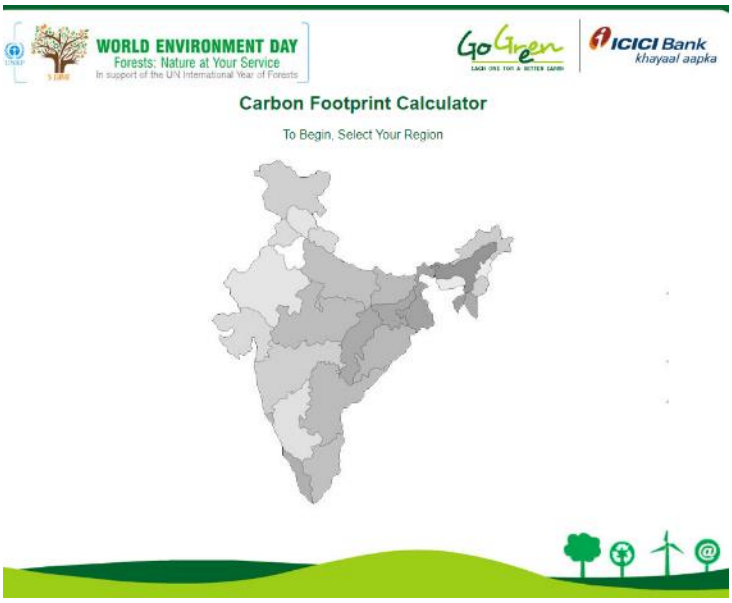
5 OTHER BEHAVIORAL INITIATIVES

5.1 Individual carbon footprint management

Carbon Footprint is defined as “the amount of carbon dioxide or other carbon compounds emitted into the atmosphere by the activities of an individual, company, country etc. This sentence sums up the motive behind the formulation of major policies in event 100-year global warming potential” but who understands that gibberish. Let’s translate that into layman’s terms. Your carbon footprint is the amount of carbon dioxide (or carbon dioxide equivalent of greenhouse gases) you produce directly or indirectly (we’ll visit the direct and indirect part in just a minute).

5.2 Online carbon footprint calculator for effective monitoring

We have been developing the online carbon footprint to effectively monitor carbon emission by our students, teachers and staff towards Go Green initiative. Based on this, an individual can try to reduce his/her own Co2 emissions by monitoring footprint. A sample of the calculator is shown here (developed by ESF and ICICI bank https://www.icicibank.com/go-green/carbon-world-day/indexef62.html)



6 LIMITATIONS

Achievement of the goals outlined in this plan is dependent upon the successful execution of the strategies described and the mitigation of the inherent risks outlined below:

1. The institute grows more rapidly than anticipated. Our climate action plan indicates that the institute will become more efficient in its use of space and other resources to accommodate growth in enrollments and other program activity with lower emissions intensity.
2. Price of carbon offsets increased substantially. Even with very substantial mitigation initiatives, the University will need to offset remaining emissions from off-campus boilers, commuting and air travel.
3. Fuel costs increase putting pressure on carbon reduction strategies. Technically, Sathyabama's energy practices have been heavily influenced by the cost of field, especially the fluctuation in price of oil and natural gas. Therefore, the cost of natural gas and biofuels as well as the price of electricity generated from renewable sources, will be a constraint on our climate action plan strategy. In addition, constrained availability of biofuels may limit our ability to switch out of natural gas and as a result make it more difficult and more costly to achieve climate neutrality.
4. Growth and use of technology in institute operations becomes more energy intensive. Over the past decade technology has become an ever more pervasive dimension of the academic enterprise. We have seen growth in the number of computers connected to the Sathyabama network, as well as increased use of other electronic equipment. Should these trends continue unabated, it will become more difficult and more costly to achieve climate neutrality.
5. Cost of capital increases significantly and access to capital is more constrained. As detailed in the next section, this climate action plan anticipates significant capital investments, especially in energy plant systems.

7 EDUCATIONAL RESEARCH AND COMMUNITY OUTREACH EFFORTS

Our Climate Action Plan benefits from the rich array of existing courses, and undergraduate and graduate programs in which sustainability issues are already addressed by the Sathyabama Institute of Science and Technology. Relevant undergraduate courses are offered across a range

of other undergraduate majors, including biology, commerce, biomedical technology, management, philosophy, physics, law and sociology.

As part of this Climate Action Plan we intend to further expand and strengthen our academic curriculum initiatives as follows:

1. Encourage faculty to use the Climate Action Plan as the context for course teaching and student research. Also, making the Environmental Science and Engineering as a mandatory course for all the undergraduates, postgraduates and Ph.D students as a part of the curriculum.
2. Promote student involvement in the development and implementation of the Climate Action Plan as opportunities to develop capacities of effective practice (planning, teamwork, resilience, persuasion, and so on). Several successful recent sustainability initiatives on campus have arisen as a result of effective student leadership, including a bike share program, a community campus garden, and campus composting.
3. Explore opportunities to develop and expand graduate program offerings that are tailored toward students pursuing careers in sustainability management.

7.1 Research

Few departments at Sathyabama such as Centre for Climate Change Studies, Centre for Earth and Atmospheric Sciences, Centre for Ocean Research, Centre for Remote Sensing Technology and Centre for Waste Management are currently serving as the focal point for sustainability research on campus. It also promotes exemplary and inspired research connected to the environment, education and other important social concerns. The Centre for Climate Change is extensively working on understanding the carbon sequestration capacity of macrophytes as well as the adaptational responses of marine invertebrates to elevated temperature and pH.

7.2 Outreach

The faculty, staff and students of Sathyabama are vital in disseminating information to the outside community related to climate change, environmental studies, pollution and disaster

management. However, for the future initiatives, setting up of eco-reps or Climate Task Force will be helpful for outreach within campus to discuss more on the Climate Action Plan and the sustainability goals set for the year 2030 regarding climate neutrality. Progress toward carbon neutrality will be assessed and reported annually by the Climate Task Force to maintain the campus sustainability.

WORKING TOWARDS A BETTER ENVIRONMENT