COLLEGES & UNIVERSITIES OF THE ANGLICAN COMMUNION

Problem statements: Dr Paul Wilson, Principal of Madras Christian College in Chennai, developed this approach for analyzing the different ways which that campus can be used to explore climate change issues (and develop possible solutions) could be encapsulated in country specific problem statements. These are liable to be fairly general in nature and could be posted on the CUAC website to enable students and staff from different institutions to share ideas about how they might be addressed. This approach has the potential to be a dynamic device which will engage students in a collaborative manner and raise the profile of climate change in a positive way.

Carbon Emission Resource of the Campus	Background/Status	Probable Pointers for solution	Illustrative problem statements	Possible campus based initiatives
Diesel Powered Electricity Generators	The CO2 emission of a diesel generator is between 2.4-2.8 kg CO2/L depending on the characteristics of both the engine and the fuel [5] . The average specific fuel consumption of a diesel generator is 0.33 L/kWh, so the CO2 emission generated by a diesel generator is estimated to be 0.8-0.93 kg CO2/kWh.	diesel generators emit 159 Metric Tons of CO2 annually to produce 200 Megawatts-hours of energy. If, instead, this energy was sourced from the grid, only 74 Metric Tons of CO2 would have been emitted.	Ideations for Innovative and alternative energy source to minimise/eliminate the usage of Fossil fuel-based generators Localized solar powered energy sources for specific purposes, mobile solar powered energy sources Grid powered ploughing machine ideas for the FARM	

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Land use and Forestry	Roughly 30% of the world's greenhouse gas emissions come from land use	Integrated Landscape Management ideas would have a systemic thinking Forest Conservation Projects could also mitigate	Ideations for Dry leaf Composting" by sourcing it from the littered leaves as nutrient for agriculture in the campus. Ideations for Developmental plans that are carbon neutral concerning land utilization needed. Ideations for Networking all the activities of the campus through a digital management system for assessing carbon footprint to make informed decisions	

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Construction of carbon neutral buildings	The built environment generates **nearly 50% of annual global CO2 emissions**. Of those total emissions, building operations are responsible for 27% annually, while building materials and construction (typically referred to as embodied carbon) are responsible for an additional 20% annually.	Biophilic design,incorporating aspects such as natural lighting and ventilation, natural landscape features and other elements for creating a more productive and healthy built environment for people Climate resilient designs for mitigating temperature, cold and flood can serve as pointers	**Statement: I**nfrastructural development at the cost of green cover of the campus and the call to avoid deforestation through cutting of trees decarbonization ideas for the opérations solicited Effective optimization approaches or ideas for reducing greenhouse gas emissions from planning, construction, operation and management of the real estate needed A thoroughly debated draft on Institutional carbon offset standards for infrastructural developments in the campus needed.	

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Food	About a third of all human-caused greenhouse gas emissions is linked to food. This means that the contribution of food wastage emissions to global warming is almost equivalent (87%) to global road transport emissions	Green processing and delivering of food from "***Farm to Fork Model"*** Food processed, transported, distributed, prepared, consumed, and sometimes disposed to have low carbon intensive protocols Campus to come up with food innovation hackathon to curate ideas for climate smart food.	Ideations for ***"Climate Smart Cafeteria"*** serving only Climate Smart Food which is Ethno-specific, economically viable, low carbon emitting, nutritious, marketable, having high demand by consumers - Ideation required Every campus has wastage of food from cafeteria, events conducted, residential areas. How can we convert, minimize, avoid, conserve the food through smart processes?	

Climate Smart Institutional policies	Development of an integrated carbon footprint calculator acceptable globally has not been successful so far. Some of the Policies on voluntary carbon offsetting for passengers in Air travel has not been successful. A proper study on the failure would help drafting policies.	voluntary carbon offsetting measures. **"Study Carbon Neutral"** scheme for students to be designed Incentive based Innovative ideas for policy that appeals to students, and is sustainable monetarily, in addition to its easy adoptability Recognizing faculty securing minimum carbon footprints through a monitored management system with r**ewards** Project based learning (PBL) on climate change as part of Curriculum leading to ***empathetic personality traits among students as*** a tangible outcome **Awarding** Units/Departments who promote plantation drives for increasing green cover of the campus	Innovative and appealing Incentivization for students through drafting **Carbon offset policies** for the College: **Problem statement:** a) Students engagement to such commitments -A challenge b) Socio-economic status of students forcing them to seek jobs for paying their fee and hence they do not offer priority towards environment Country and College specific Policies for Carbon Financing ideas: Waiving tuition fee, Fee Concession, carbon credits (academic & financial) to facilitate carbon neutral institution. **Incentivization guidelines needed** with authentic *Key performance indicators* as part of the policy featuring Minimization through conservation (Renew, Recycle and Reuse) as philosophies, Usage of public transports, renewable energy, using less energy intensive gadgets by the stakeholders etc	

6.Waste disposal in the campus	Each ton of Municipal Sewage Waste incinerated typically releases **between 0.7 and 1.7 tons** of CO2	Are there ways to create an administration system (Purchase department) with restraint for carbon sources at the procurement level? Can we simulate a synthetic crisis for a designated period and observe the same as "**carbon neutral month**" in the institution as part of the institution calendar provoking empathy among stake holders? Can we reckon students as man power and redeem their creative ideas to be used in disposal through designing "**Carbon neutral service learning programme"** of the institution towards an innovative Waste disposal proposal and integrate "waste management" as an integral part of their curriculum to instill the attitude as habit? Can we integrate c**arbon offset fee collection** as part of the admission fee and enable them to redeem the same once they establish themselves to be carbon neutral? One which is not redeemed would be spent for creating carbon neutral campus.	Primary constraint for establishing waste disposal in the institution is its cost towards infrastructure, man power and transport. Need an innovative process that is easily executable. Institutional waste disposal policy that is pragmatic and executable to be drafted We need to Design economically viable indigenous gadgets or formulating protocols and processes and the same to be credited to academics in lieu of few credits.	

Energy consumption Water treatment	**Wastewater treatment plants are the source of greenhouse gas emission**, i.e.: carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4) which result from biological processes occurring in wastewater Wastewater treatment plants (WWTP) consume large amounts of energy, estimated at **between 1% and 3% of global energy output**. State-of-the-art facilities consume 20-45 kWh per population equivalent (PE) connected. The energy needed to move, treat, and use water in the US for both residential and commercial purposes produces nearly **290 million metric tonnes of CO2 annually** – the equivalent of 5% of the nation's overall carbon emissions	Can we install or convert the existing treatment plants to the solar powered water treatment plant to conserve energy?	**Problem Statement:** Conservation of Water consumes energy through the sewage treatment plant in the campus. Process or Design Optimization ideas to mitigate	

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Campus Transportation	Carbon intensive processes from the industry such as Transportation causes 27 % green house gases and Electricity production emits 25 % green house gases.	Encouraging Bicycle users in the academic campus Grid driven vehicles (Solar powered) Campus residents use cars.	Formation of bicycle users club with incentivization ideas solicited Huge academic campus integrates residential area and four wheelers are owned by the residents. How to mitigate the implications of 4-wheeler usage?	

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Academic and Research laboratories:	Research carried out in the earlier dispensation had reductionism as philosophy leading to the development of technologies and chemical processes without systemic thinking. As a consequence, the environmental concern was not integrated as part of inventions.	Laboratories of the institution to integrate into the curriculum the Green protocols as part of the sustainable development goals. Investment for waste disposals to be considered not as expenditure A system thinking approach to use the problem-solving processes (designing green protocols) for capacity building of faculty and students to be contemplated. Minimum waste production and converting waste to wealth to be reckoned as a mandatory process to be adhered with. A curriculum integrated approach would be constructive in its essence.	**Change management** from the conventional scientific processes is a challenge for the faculty members. Intervention strategies needed for creating **empathy** among students towards stewardship and environmental concern and construct problem statements on their own for establishing **carbon neutral science education** Intervention strategies to curate in-house solutions (Design, process and Product innovations) for the waste disposal, waste minimization and zero waste processes to be complied with in the laboratories from the stake holders (faculty, students) through the academic programs solicited	

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Designing of Carbon neutral Events:	Events organized in the campus demands energy consumption, uses carbon emitting gadgets, food wastage, transportation etc together adding to the carbon footprint.	Sustainable materials, minimum transportation, less energy intensive events, solar power lighting, redeeming day light, less printed materials, using QR code, vegetarian food, Greener transportation, Designing of green events would help mitigating the emission.	Challenge is to create a **culture of carbon neutral ecosystem** and conditioning the stakeholders to comply with the new normal Graded and equilibrated intervention strategies as process innovations solicited to realise the suggested pointers Intervention strategies include Awareness strategies through digital handles, strategy to create a need for complying with, facilitating the carbon neutral culture to emerge as a status among the stakeholders or new civilization For the stakeholders.	