Operationalising the Green / Sustainable Agenda for Educational Institutions

A Suggestive Strategy and Action Plan

1. The proposed strategy is based on the Greening concept approved by the IIT Council on Greening Educational Institutions and the deliberations of a consultative meeting held on 2nd March 2013 at Indian Institute of Science, where representatives from 6 IITs along with IISc participated. It was suggested to implement the greening agenda in a phased manner, but to be initiated at the earliest. To oversee the process a Green Office is to be set up in each institution. The Green office could be located in the Institute's existing department/Centre concerned with sustainable development/climate engineering so that technical resource support is available. It could set up a working-group drawn from active faculty/students interested and working on this agenda to create a participatory, transparent process with ownership. It should also involve different department representatives to reflect it's inter-disciplinary and inter dependent concerns. It should also involve external experts from different agencies/ offices/ other organisations engaged meaningfully and constructively with concerns for a green environment.

2. Key Responibilities of the Green Ofice.

I. Develop a green policy (vision document) and framework for the institute

II. Since the biggest challenge is to balance infrastructure needs with environment conservation and sustainable growth, and the Green Office should be able to provide a referential framework for such a balance along with a green audit of infrastructure planning, execution and maintenance in a transparent and publicly accountable way. Some of

the factors that could be considered in the green infrastructure guidelines are:

a. The need for a master plan compliant with environmental norms and at least, GRIHA compliant. In case of older master plan there should be a fresh reappraisal of the Master Plan to make it complaint with environmental norms The need for an environmental plan that delineates permanently green areas, and preserves bio-diversity

b. The need to promote a healthy learning environment, by creating sufficient open and naturally forested spaces in addition to play-grounds and gardens.

c. Careful land use planning. Space audit that reduces the carbon foot – print.

d. Maximum recycle rainwater conservation, harvesting and recycling.). In case the institution uses ground water, periodic reports should be given, and efforts should be made to ensure a healthy recharge of the ground water through construction of storm drains leading to reservoirs (if possible), rain-water harvesting devices to be installed on all buildings.

e. Active use of energy harvesting concepts (e.g. solar energy, wind-energy). Ensure efficient use of natural light, ventilation and building design to minimize energy utilization

f. Compliance of standard international norms with respect to collection and recycling/disposal of building wastes (concrete waste), and other wastes (chemical and bio-degradable) that may emanate due to the proposed activities within the building. Ensuring that the Institute's actitivties (lab effluents, water usage, waste etc) does not have an adverse impact on its neighbourhood environment.

g. International norms for safety and risk proofing against anticipated hazards.

III. Facilitate Quantification of Greening intiatives

    a. Develop a mechanism to prepare a Baseline scenario for green assessment – energy, water, biodiversity and carbon emission

    b. Develop methodology and guidelines for Baseline scenario

    c. Actual development of base-line scenario (resource use – energy, water, waste-management, - CO_2 emission)

    d. Develop targets for achieving sustainability; % reduction in electricity use, %CO_2 emission reduction, % reduction in water use, etc – over 2015, 2020...

    e. Development of green technology packages through inter-institutional workshops and expert groups

    f. Strategy generation and identification of green indicators

    g. Developing milestones, targets and time-line to achieve sustainability

    h. Implementation of the plan in a phased manner

    i. Periodic monitoring, auditing, verification, reporting, etc.

    j. Education, main-streaming sustainability agenda in the educational programs in the green institutions,

    k. Dissemination, outreach and capacity building to other educational institutions, establishments, municipalities, etc.

IV. Suggesting ways of recognising "Greening" initiatives on the campus and its neighbourhood.

V. Making the greening agenda a participatory, transparent process, seeking to generate greater awareness by sharing its reports widely with its campus community and on the institute's web site as well as the IIT Council website.

Suggested Time Frame for operationalising the Green Office and implementing the Green Agenda

Phase	*Main Tasks of the Institute in implementing the Green Agenda*	*Timeframe*
Phase-1:	– Establishment of green office and a green policy (vision document) and framework for the institute. – Develop a mechanism to prepare a Baseline scenario for green assessment – energy, water, biodiversity and carbon emission – Develop methodology and guidelines for Baseline scenario	3 months
Phase-2:	– Actual development of base-line scenario (resource use – energy, water, waste-management, - CO2 emission) – Ensure that the Land use Master plan is developed through a consultative process and factors in the infrastructure growth up to 2020.	3-6 months
Phase-3:	– Develop targets for achieving sustainability; % reduction in electricity use, %CO2 emission reduction, % reduction in water use, etc – over 2015, 2020... – Development of green technology packages through inter-institutional workshops and expert groups – Strategy generation and identification of green indicators – Developing milestones, targets and time-line to	6-9 months

Phase	Main Tasks of the Institute in implementing the Green Agenda	Timeframe
	achieve sustainability	
Phase-4:	– Implementation of the plan in a phased manner	9 months onwards
Phase-5:	– Periodic monitoring, auditing, verification, reporting, etc.	Every 12th month
Phase-6:	– Education, main-streaming sustainability agenda in the educational programs in the green institutions,	12-24 months
Phase-7:	– Dissemination, outreach and capacity building to other educational institutions, establishments, municipalities, etc.	24 months onwards

Green / Sustainable Indicators – Baseline scenario Development – Targets for Greening

Draft for consideration

Green Agenda, Green indicators, Baseline scenario, Current status, projections and targets for sustainability / Greening Agenda

Table 1. Baseline Scenario – Environmental Status Indicators – Year 2012

Sector	*Sources*	*Centres/ Dept/ Unit*	*Endues*	*Qty used in 2012*		*Total Qty per year during 2012*
				Peak	Lean	
Water		1. 2. 3.				
Electricity		1. 2. 3.				
Diesel						
LPG						
Kerosene						
Paper (white printers)						
Others						

Table 2. "Business – As-Usual- Scenario" (Baseline scenario) Projection of Green Indicators and Targets for a 'Sustainable Campus'.

Green Indicator	Level of use in 2012		Growth rate in use during 2007-12	Projected growth rate 2013-20 under BAU	Projected level of use of energy / water and CO2 emissions under BAU			Annual target reduction in % (2013-2020) to become Green
	Units	Qty			Units	2015	2020	
Electricity	MWh				MWh			
Diesel	Tonnes				Tonnes			
Kerosene	Tonnes				Tonnes			
LPG	T				T			
Water consumption	M^3				M^3			
Water recycling	M^3				M^3			
Paper use	Tonnes				Tonnes			
CO2 emission	Tonnes				Tonnes			

Green Indicator	*Level of use in 2012*		*Growth rate in use during 2007-12*	*Projected growth rate 2013-20 under BAU*	*Projected level of use of energy / water and CO2 emissions under BAU*			*Annual target reduction in % (2013-2020) to become Green*
Other								
Other								

Table 3. Building Construction: CO2 emission during 2012*

	Number of buildings	Floor space built during the year	Building types constructed (roofs, walls, floors, etc)	Emission factor kg of CO_2 /m^2	Total CO_2 emission
Residential			1 2 3		
Adm Office			1 2 3		
Laboratory					
Faculty office					
School					
Other					

*CO2 emissions can be estimated according to quantity of Cement, Steel, Aluminium, glass, etc used

Table 4. CO₂ Emission during 2012

Sector	Energy use	Units	Qty used		Emission factor CO₂/kWh or tonne		**Total CO₂** Emission
			Per day	year per	Units	CO2 / unit	
Admin office building	1... 2..						`
Laboratory (Dept. wise) work shop							
Faculty buildings (Dept wire							
Hostels							
School							
Residential quarter							
Car hiring (taxi)							
Busses							
Water pumpkins							

Table 5. Use of Renewable Energy Technologies

Renewable Energy Technology	Installed Capacity in the institute	Capacity added during 2013	Energy generated KWh/GJ	End of uses
Solar PV				
Waste – Bio methane plant				
Wind				

Table 6. Utilisation and recycling of products

Resources	Qty used or Produced	Qyt processed or recycled	Purpose for recycling	% Recycling
Water				
Paper				
Hostel / Residential waste				

Table 7. Forest and tree biodiversity status

Forest or Plantation or garden plots	Area	Species	No. of trees	Tree Girth class			
				<5cm	5.1-10cm	10.1 - 30cm	>30 cm
Plot 1		1 2 3 4					
Plot 2							
Avenue							
Residences							
Play grounds							
Other							

Land use Pattern; Past, current and future

A) Spatial map of institute campus depicting Land use Pattern; Past, current and future

    a. Past or Historical Land use distribution

    b. Current land use pattern for different endues

    c. Future / projected land use pattern: 2020, 2025

B) Land use pattern: Past, current and future

Table 8 Land use pattern: Past, current and future (in ha)

Land use	2000 (1990)	2013	2020	2025
Administrative Buildings				
Laboratories				
Dept/ Centres				
Roads				
School				
Park				
Forest/ Plantations				
Residential area				
Parking area				
Water bodies				
Other amenities				
Total area				

Table 9. Carbon Stock in the trees and land - 2012

	Area	Tree biomass carbon stock (ton/ha)	Soil carbon stock (ton/ha)	Total carbon stock (tonnes)
Forest				
Plantation				
Garden				
Avenue				
Residence				
Other area				
Total				