



Indian Academy of
Sciences Bangalore



Indian National
Science Academy
New Delhi



The National Academy
of Sciences, India
Allahabad

Science Academies' Lecture Workshop on Graduate Engineering Curriculum Development for Biomass Related Subjects, 10-11 March 2011

Report

The two-day meeting was attended by 19 participants from various engineering colleges. The first day constituted a briefing to the participants of the progress in thermo-chemical conversion of bio-residues; it also included the resource mapping on a national scale. The participants got a technical briefing as well a tour of the laboratories containing laboratory experiments on all the devices that were built for heat and power generation. There was vigorous discussion of the techno-economics of the new devices and the current state of outreach.

Subsequent to this, each of the faculty members indicated their understanding and experience as well as the relevance of the bio-energy area in the curriculum. Discussions included the current limitations due the lack of some aspects like laboratory experience in the curriculum, a book in bio-energy relevant to India and a general tendency towards simulation as an alternate to experimentation.

Consequent upon these discussions a few action items were arrived at:

Two teams were formed to draw up syllabus and reference books for PG and UG courses to teach biomass related subjects. Efforts will be made to pursue syllabus revision at VTU and other universities.

A concept note for developing a state of the art renewable energy laboratory facility which could be offered as a service to engineering colleges around Bangalore will be created and opinions of all colleges around Bangalore will be sought regarding its need and their will to participate.

Teams: Biomass related PG Syllabus:

Drs. Milton, C. K. Umesh, P.G. Tewari, S. Dasappa with coordinator being Dr. C. S. Bhaskar Dixit

Biomass related UG Syllabus including laboratory content:

Drs. L. K. Sripathi, Shamsundar coordinated by Dr. C. S. Bhaskar Dixit

The teams will draft a syllabus and reference books by 11th April 2011 in consultation with Dr. N. K. S. Rajan.

The list of participants appears in annexure 1 and the program details are given in annexure 2.

Annexure 1: Participants List

SL	Name and Designation	Contact	Institution
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1.	Dr. L. K. Sripathi, Professor, Mech.	Phone: 08182-274952(R), 276707/8/9(O) 9448000643(M) sreepathi_lk@hotmail.com	JNNCE, SHIMOGA
2.	Dr. George Milton Professor, Mech.	milton_george@rediffmail.com +91-0816 2200314, 2201073	SSIT, TUMKUR
3.	Dr. C. R. Rajshekar Professor, Mech.	90085330758 crrtmk@gmail.com	
4.	Dr. T. K. Chandrashekhar Professor, Mech.	Chandra_ssit@yahoo.co.in +91-0816 2200314, 2201073	
5.	Dr. Anil T. R. Professor Mech.	O: 0831-2405500,03 Res :0831-2495388, M: 09448863763 tranil@git.edu	GIT BELGAUM
6.	Dr. H. R. Purushottamma Asst. Professor, Mech.	9480637616 hrp_sit@yahoo.co.in	SIT TUMKUR
7.	H. Manjunath Senior Lecturer, Mech.	9448808299 mhuruli@yahoo.co.in	
8.	Dr. Shamsundar, Asst. Professor and Director, CREST	0821 -4250502(Direct), 0821 - 2488170- Ex:320. M: 09901153357 sham.niecrest@gmail.com	NIE MYSORE
9.	Dr. N. R. Banapurmath Professor, Mech.	+91 9880726748 nr_banapurmath@rediffmail.com	BVBCET HUBLI
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13.	Dr. B. K. Muralidhara, Professor, Mech.	080-22961900/1871, 9886705438 drmuralidhara@gmail.com	UVCE BANGALORE
14.	Dr. C. K. Umesh, Professor, Mech.	9449024145 umeshuvce@yahoo.co.in	
15.	Dr. S. N. Sridhara Principal	9448507428 sridharasn1964@gmail.com	KSGI BANGALORE
16.	Sadhan Mahapatra Asst. Professor	sadhan.mahapatra@gmail.com 9448272881	Tezpur University TEZPUR, 784028, Assam
17.	Varun Kumar Research Student	varun@cgpl.iisc.ernet.in 9482229632	IISc BANGALORE
18.	Dr. T. S. Prahlad Professor, CDM, JU	9448345273 Tumkur_prahlad@yahoo.com	Jain University Jakkasandra
19.	A. Ve. Sowrirrajan Lecturer	9902437705 sowrirrajan.venugopalan@gmail.com	

Annexure 2

The program as it was conducted

Day 1: 10-March-2011

Venue: Conference Hall, CGPL, IISc, Bangalore

The day started with registration and mutual introduction of participants.

9.30 AM: Prof. H. S. Mukunda appraised the participants about the need for the workshop and major goals required to be achieved by the end of two days deliberations

10:00 AM Dr. Dasappa highlighted the Biomass gasification technology developed at IISc and also spoke about the needs of current PG and UG Curricula for teaching biomass related subjects.

High Tea: 11- 11-15 –AM

11:15 AM Dr. Bhaskar Dixit introduced the developments in the area of biomass combustion and discussed several combustion devices used for thermal energy generation which are the outcome of research at CGPL. Significance of densification of biomass and related advantages was highlighted.

12:15 AM the following were demonstrated:

1. Ejector Induced GASification Stoves for continuous mode operation
2. Batch mode biomass pellet stoves
3. 80 kg/hour gasifier - IC engine power plant in operation with electrical loading. Participants were demonstrated the obtained producer gas quality and energy content through composition measurement. Effectiveness of newly developed filtration technology which traps the salts in gas resulting in a cleaner gas was also demonstrated.
4. 1 kg/hour gasifier system
5. H₂S scrubbing technology for biogas cleaning
6. IPSIT technology for extraction from rice husk ash
7. Puffed rice recuperation based biomass stove
8. A mini rocket launch

1.30 AM: Lunch

2.15 AM: Prof. P. J. Paul appraised of recent research in biomass gasification and combustion.

3.30. PM: Tea

3.45 PM: Dr. N. K. S. Rajan described the biomass resource mapping developed at CGPL and its web based interface was demonstrated to the participants.

Participants were provided with a comparative table of biomass related syllabus content of 9 different universities in India and reference books followed at PG and UG levels. They were also provided with the content of a forthcoming book on biomass energy.

Day: 2: 11-03-2011

Venue: Board room, Jain University

10 AM: Principal, SBMJCE, Dr. Y. Vijayakumar welcomed the gathering to Jain Campus. Prof. R. N. Iyengar, Head, CDM, gave a brief overview of work being carried at CDM. This was followed by a presentation on carbon foot prints by Sri. B. V. Umesh. He described the current global status on carbon migration to atmosphere and resultant global warming. He also quantified these effects. Mitigation measures and effort at Jain University in rendering Jain Global campus a green campus was highlighted.

Dr. C. S. Bhaskar Dixit described the fire research activity at JU campus. Importance of ignition of solid fuels including biomass which form fuel load during fire hazard was described. Limiting Oxygen Index apparatus which quantifies the flammability of specimen, Non-combustibility apparatus for classifying building materials into combustible and non combustible varieties and Nord Test Apparatus which is used to determine ignitability of solid fuels were described. He highlighted the importance of integrating the fire research findings with main stream combustion research.

This was followed by a demonstration of fire research equipment described at the Laboratory.

11.45 AM. Tea

12 Noon: Prof. Mukunda requested the participants to describe the biomass related activities in their universities. He also sought their views on biomass related curriculum development.

Dr. Anil T. R. stated that lacunae existed in the current UG and PG VTU syllabus involving renewable energy technologies. He also pointed out this year VTU syllabus is due for revision and therefore prompt action is essential.

Dr. Shamsundar: Described biomass related activities at NIE and made a mention of gasifier, biogas and fuel efficient biomass stoves at NIE. He stated a compulsory subject Renewable energy Technology is part of 3rd sem NIE UG syllabus. He stressed the need for formulating a syllabus including experimentation at UG level. Discussion took place as to whether a separate course to create experts in renewable energy is required.

Dr. T. S. Prahlad opined that at UG level it may be important not to brand engineers as only renewable energy technology specialists. This was accepted by all.

Dr. Sripathi summarized biomass related activities at JNNCE. He stated current UG syllabus of VTU needs revision. He also expressed the need for a single text book coherently covering major areas of biomass to energy conversion technologies. He stated a separate biomass energy laboratory has emerged as a major requirement.

Dr S. Dasappa stated existing syllabi from various universities must be examined thoroughly before drawing up draft syllabus. He also agreed that energy laboratory could be a major way forward.

Sadhan Mahapatra presented the biomass-to-energy curriculum followed at Tezpur University for PG education. He highlighted the fact that two syllabi one elective and one compulsory, completely devoted biomass-to-energy activity with associated experimentation existed at Tezpur University.

Dr. A. Ramachandra appreciated the quality of biomass combustion achieved at CGPL. He mentioned that presently electrical furnace of about 10 KW connected load is being used to heat specimen for forging laboratory at their college. He opined biomass fuel with CGPL combustion technology could form a better replacement.

Dr. Milton of SSIT expressed that a formal inclusion of demonstration of biomass related experiments as a lab agenda would facilitate furthering the cause of education.

Dr. C. K. Umesh: stated UVCE has 4 M. Tech courses with one course in thermal engineering. He also expressed that need that exists for laboratory experimentation in the area of bio-energy and the difficulties in sourcing finance for creating lab facility.

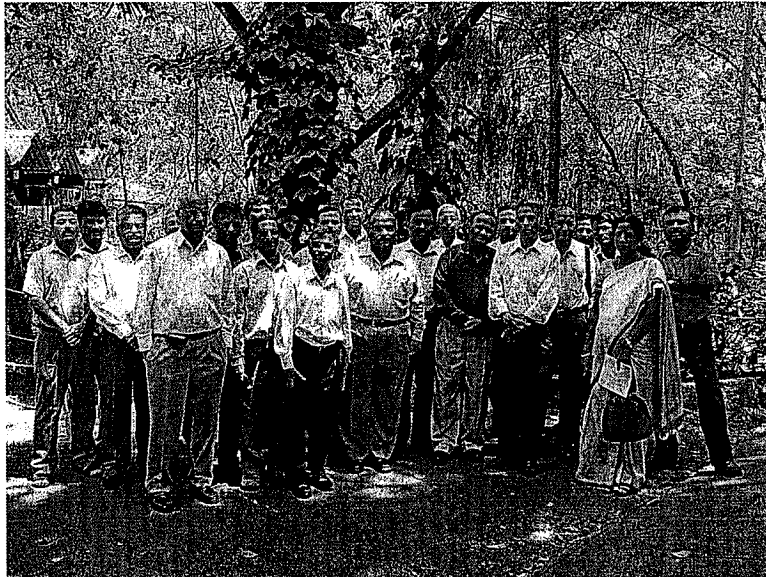
Dr. N. R. Banapurmath presented a brief overview of biodiesel activity at BVBCE.

Dr. Purushottam stated activities related to biomass are in a nascent condition at SIT but they intend to progress in this area.

Prof. H. S. Mukunda enquired whether creation of a centralized state of the art renewable energy laboratory facility which could be used by other colleges would be solution. The suggestion was accepted with warmth by all.

Lunch: 1.30 PM

Post lunch participants were taken on tour around Jain Global campus to apprise them of several existing facilities.



Front row: Drs. Purushottama, T. R. Prahlad, Banapurmath, Milton, Dixit, Muralidhara, H. S. Mukunda, A. Ramachandra, Indira
Back row: Drs. Sadhan, Subbu, Sowri, Yeliwal, Sripathi, CKUmesh, Anil, Sridhara, BVUmesh, Rajashekhar, Chandrashekhar,
Manjunath, and Shamsundar

Who Should Attend:

The target audience primarily the faculty members from engineering colleges which are under deemed universities and academically autonomous colleges. VTU-affiliated college faculty is also welcome.

Participation:

Participation is by invitation only. No registration fee is collected. Local hospitality will be provided.

Time Table:

Day 1: 10-03-2011, Thursday

Venue: Conference hall, CGPL, Indian Institute of Science, Bangalore

09.00-09.30 AM	Welcome and Introduction
09.30-10.00 AM	Introduction to Bio-energy, Prof. H. S. Mukunda
10.00-11.15 AM	Gasification Technology, Dr. S. Dasappa
11.15-11.30 AM	Tea
11.30-12.15 PM	Biomass Combustion Devices, Dr. Bhaskar Dixit
12.15-01.15 PM	Lab Visit / Demonstrations
01.15-02.15 PM	Lunch
02.30-03.45 PM	Combustion / Engine Aspects / New Research Prof. P. J. Paul
03.45-04.15 PM	Tea
04.15-05.30 PM	Bio-resource Assessment, Dr. N. K. S. Rajan

Day 2: 11-03-2011, Friday

Venue: Seminar Hall, Jain University, Kanakapura Road, Bangalore