

Discussion Forum on - Sustainable Energy : General Basics & Advanced Interdisciplinary Learning

A program sponsored by UGC - RCN under Indo - Norwegian Cooperation Programme 2014 (INCP)

Organized by the Global Change Program, Jadavpur University & Bengal Chamber of Commerce & Industry (24th May, 2016)



Project No.: INCP-2014/10086

Sustainable Energy: General B...
... program under Indo-



n Cooperation Programme 2014 (INCP)

Kolkata

'Sustainable Energy: Ge...'
An Education program under Indo-Norwegian Cooperation Programme 2014 (INCP)

24th May 2016

Kolkata




JOHN TILLY WARD

DEB A NGHRIWAL

ALIKR MOHANTHA

ADITY KUMAR RAY

OLUF LANGSHELLE




BCC&I
THE BENGAL CHAMBER

Sponsored by **UGC-RCN**
Project No.: INCP-2014/10086

Discussion Forum
on
'Sustainable Energy:
General Basics and Advanced Interdisciplinary
Learning'

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Cooperation Programme 2014 (INCP)

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Full Report

Discussion Forum on Sustainable Energy: General Basics and Advanced Interdisciplinary Learning

Editor: Professor Sudipta De

Department of Mechanical Engineering, Jadavpur University

Core Committee Member, Global Change Programme,

Jadavpur University

Summary of the Proceedings

Professor Sudipta De

Coordinator, INCP Project: F. No. 58-8/2014(IC)

Professor, Department of Mechanical Engineering, Jadavpur University

“Sustainable Development” as a concept was formally introduced by the United Nations’ Brundtland Commission in 1987. It defined sustainable development as **‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs’**. Energy technology and use is also adopted now trying to embrace the concept of ‘sustainable energy’ which is in line with the concept of sustainable development. In the context of paradigm shift of the world-wide energy scenario, energy education needs substantial introspection and transformation. With the need of developing alternative technologies and economic systems and social practices to emerge in the backdrop of both resource depletion and environmental degradation, energy education needs to keep up with changing needs. To reflect on these timely and relevant issues, Global Change Program of Jadavpur University (**GCP-JU**) in association with the Bengal Chamber of Commerce and Industry (BCC&I) organized an interactive and a very successful programme on 24 May 2016 at Williamson Magor Hall, Bengal Chamber of Commerce and Industry, Kolkata, to discuss the critical need for change in energy education for a sustainable future. The program was organized as an active collaboration between Jadavpur University and the University of Stavanger, Norway (one of the leaders in the discipline in Europe) under the Indo-Norwegian Cooperation Program (INCP). Following highly relevant issues were discussed during the course of the proceedings:

- The United Nation Climate Change Conference, held in November-December 2015 and its impact in the rapidly transforming energy sector.
- Reducing the employability gap in the field and bridging the gap between industry and academia.
- Innovation being the principal currency in the energy sector in near future.
- Reducing India’s energy deficiency.

- Pedagogical priority to energy science in from as early as undergraduate level.
- Prospects and concerns in the energy sector in America with special reference to the initiatives such as Inter State Renewable Energy Council (IREC) and National Renewable Energy Laboratory (NREL) based in Colorado.
- Explaining policy formation, explaining policy decisions, exploring policy output and policy outcomes, understanding of social behavior, understanding social acceptability/rejections, exploring concepts, theories of transition and finally, exploring imaginaries about the future.
- The current priorities of the government of Norway.
- Establishment of a common knowledge platform
- Integrative concept of PESTEL, merging the concepts of political, economic, social, technological, environmental and legal domain in determining the energy needs.
- To move from the command and control policy to a more market based policy.
- Setting the benchmark for energy consumption parameters.
- Regulation landscape, transformation of technology and a new era of industrial development and finally.
- Importance of curriculum development.

The discussion was followed by the final segment of the day's proceedings: an open house session & conclusion based on the themes discussed. This was the most interactive session of the proceedings and audience members participated with great vibrancy and awareness, throwing up important questions on issues such as smart grids, the crucial mapping mechanism to bridge industry and academia, the role of content management and how it can influence knowledge management along the same lines.

Acknowledgements

Just like the ongoing programme between Jadavpur University Global Change Programme, INCP and Bengal Chamber of Commerce and Industry, the preparation of this proceedings report too was a collaborative team effort. First and foremost, I gratefully acknowledge the fund provided for the flagship project by University Grants Commission (UGC), India and Research Council of Norway. Needless to say that without the constant encouragement and support of these two institutions the project would not have been so successful.

I would like to individually thank all the participants of the two panel discussions on 24 May 2016. Despite their extremely busy schedule they decided to respond to the invitation with great sincerity and enthusiasm and made the forum a grand success. I am grateful to them. My special thanks to the Embassy of Norway in India, New Delhi and the Consulate of Norway in Kolkata for their support in matters related to the organisation of this programme, especially the logistical and intellectual support provided by them to ensure the safe visit of the Norwegian visiting team as part of the Indo-Norwegian Co-operation Programme (INCP).

In addition I would like to thank Mr Richard T. Ward of United States Consulate in Kolkata for his presence and important insight on the day of the forum, the entire administrative unit of Jadavpur University, Mr. Subhodip Ghosh, Director General Designate and Ms. Sukanya Bose, Assistant Director, BCCI, Professor Joyashree Roy and the entire unit of Research Scholars and staff working under her inspiring leadership at Global Change Programme, Jadavpur University.

Finally, I would like to warmly thank Mr Somak Mukherjee, Department of English, Jadavpur University for the compilation of this report and Mr Kuntal Jana, Department of Mechanical Engineering for the encouraging support provided by him at the every stage of preparation.



Professor Sudipta De,

Coordinator, INCP Project

Professor, Department of Mechanical Engineering, Jadavpur University

Core Committee Member, Global Change Programme, Jadavpur University

Invitation Letter

Discussion Forum on - Sustainable Energy: General Basics and Advanced Interdisciplinary Learning

An Education program sponsored by UGC-RCN under Indo-Norwegian Cooperation Programme 2014 (INCP)

Organized by the Global Change Program, Jadavpur University and Bengal Chamber of Commerce & Industry

Tuesday, 24th May, 2016, 10.00 a.m. – 2.00 p.m.

Williamson Magor Hall, Chamber premises

Dear Sir/Madam,

The Global Change Program of Jadavpur University (GCP-JU) in association with the Bengal Chamber of Commerce and Industry is organizing a discussion forum on “Sustainable Energy: General Basics and Advanced Interdisciplinary Learning” on Tuesday, 24th May 2016 from 10 a.m. to 2 p.m at the Williamson Magor Hall, Chamber premises.

In the context of a paradigm shift of the world-wide energy scenario, energy education needs substantial introspection and transformation. Given current practices trained manpower in different disciplines are good for running/developing plants/systems using mostly fossil fuels within conventional disciplinary boundaries. However, with the need of developing alternative technologies and economic systems and social practices to emerge in the backdrop of both resource depletion and environmental degradation, energy education needs to keep up with changing needs. Breaking boundaries of disciplines and evolving interdisciplinary approach is a critical need of present/near future energy education. Some fundamental aspects may be relevant for all disciplines considering the significance of the field of ‘sustainable energy’. However, a more advanced interdisciplinary education will also be needed to meet the challenge. Some efforts have started but a much larger effort is desirable keeping in view the possible growth.

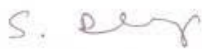
The programme is a part of collaboration between Jadavpur University with the University of Stavanger, Norway under the Indo-Norwegian Cooperation Program (INCP). The forum will highlight both European Union and Indian experiences and discuss the issues of sustainable energy education.

We are aware of the pressures on your time, but we do hope you will consider this request and join us at this programme. For any communication with the Chamber, please contact Sukanya Bose, Tel: 91-33-2213 0744, Cell: +91-9830296033.

Looking forward to receiving your confirmation,

With kind regards,

Yours sincerely,



Professor Sudipta De,



Subhodip Ghosh

Director General Designate

The Bengal Chamber of Commerce
and Industry

Programme Schedule

9.30 a.m. - 10.00 a.m.	Registration	
10.00 a.m. - 11.15 a.m.	Inaugural Session	
10.00a.m. - 10.05 a.m.	Welcome Address	Mr Subhodip Ghosh Director General Designate The Bengal Chamber of Commerce and Industry.
10.05 a.m. - 10.10 a.m.	Setting the theme and objective of the programme	Prof. Sudipta De (Program Coordinator) Department of Mechanical Engineering and Core committee member, GCP-JU Jadavpur University.
10.10 a.m. - 11.15 a.m.	Inaugural Panel: Advanced interdisciplinary learning in Energy in the context of industry-academia collaboration.	
		<p>Moderator</p> <ul style="list-style-type: none"> • Mr. Alope Mookherjea Past President, The Bengal Chamber of Commerce and Industry & Chairman Solyvent Flakt (India) Private Limited. <p>Panellists</p> <ul style="list-style-type: none"> • Prof. Ajay Kumar Roy Director, IEST. • Mr. Jonathan T. Ward Principal Commercial Officer U.S. Consulate Kolkata. • Prof. Oluf Langhelle University of Stavanger, Norway. • Mr. Deb A Mukherjee, Chairperson Energy & Environment Committee, The Bengal Chamber & Managing Director, Enfragy Solutions

		<p>India Private Limited.</p> <ul style="list-style-type: none"> • Mr Sutanu Ghosh President Designate, The Bengal Chamber of Commerce and Industry.
11.10 a.m. - 11.15 a.m.	Vote of Thanks	Mr Arun Kumar Mukherjee Chairman Emeritus, Energy and Environment Committee, The Bengal Chamber of Commerce and Industry.
11.15 a.m. - 1.15 p.m.	Technical Panel Session: Industry needs from Energy Education: future perspective	
		<p>Moderator</p> <ul style="list-style-type: none"> • Prof. Mohsen Assadi Faculty of Science and Technology University of Stavanger And Managing director of Center for Sustainable Energy Solutions (cenSE) Norway <p>Panelists</p> <ul style="list-style-type: none"> • Mr. Deb A Mukherjee, Chairperson Energy & Environment Committee, The Bengal Chamber & Managing Director, Enfragy Solutions India Private Limited • Mr. Sanjib Bezbaroa Vice President - Corporate EHS ITC Limited • Prof. Joyashree Roy Coordinator, Global Change Program Jadavpur University • Shri Sankar Mukhopadhyay Deputy General Manager (Training)

		<p>CESC Limited</p> <ul style="list-style-type: none"> • Mr. Ajeya Bandyopadhyay Director - Advisory Services Ernst & Young LLP • Dr. Dipak Sen Choudhury Advisor Technology and Innovation Exide Industries Limited
1.15 p.m. - 2.00 p.m.	Open House Session & Conclusion	The Bengal Chamber of Commerce and Industry.
2.00 p.m.	Lunch	

Introduction

Sustainable Energy: For a Better Future

The invention of fire is widely considered to be one of the touchstones of human civilization, facilitating its rapid progress and evolution. Since this epoch making event, successful conversion of naturally available 'primary energy' to convenient 'secondary energy' (mostly electricity) has been the key to rapid industrial growth and many developmental aspects of human society. For example, per capita consumption of energy has been considered as an index of 'development and standard of living' of the people of a country. Fossil fuels were the principal (if not almost entire) source of primary energy for the rapid development of human society over centuries. Matching technology development for energy conversion and use with these fuels dominated the agenda of energy technology during this period. Thus large scale power plants using fossil fuels or efficient transport systems using petroleum were developed and improved over a long period with substantial efforts. In fact these two catered to two very basic needs of civilization, electricity supply for general use and movement of both material transaction (goods, commodities, raw materials for industrial development etc). During these developmental phase goal was faster economic development, and eventually environmental impacts went unnoticed. Most significant among them is the worldwide phenomenon of 'climate change', mostly caused by anthropogenic CO₂ emission. Also the fossil fuel reserves have limits and geopolitical implication in terms of energy security. Naturally, There has been a growing need for alternative technology and implementation strategy for sustenance of developmental process.

"Sustainable Development" as a concept was formally introduced by the United Nations' Brundtland Commission in 1987. It defined sustainable development as '**Development that meets the needs of the present without compromising the ability of future generations to meet their own needs**'. Energy technology and use is also adopted now trying to embrace the concept of 'sustainable energy' which is in line with the concept of sustainable development. In the context of paradigm shift of the world-wide energy scenario, energy education needs substantial introspection and transformation. Given the fact that in current practices trained manpower in different disciplines are good for running/developing plants/systems using

mostly fossil fuels within conventional disciplinary boundaries. However, with the need of developing alternative technologies and economic systems and social practices to emerge in the backdrop of both resource depletion and environmental degradation, energy education needs to keep up with changing needs. Breaking boundaries of disciplines and evolving interdisciplinary approach is a critical need of present/near future energy education. Some fundamental aspects may be relevant for all disciplines considering the significance of the field of 'sustainable energy'. However, a more advanced interdisciplinary education will also be needed to meet the challenge. Some efforts have started but much larger effort is desirable keeping in view the possible growth.



To reflect on these timely and relevant issues, Global Change Program of Jadavpur University (GCP-JU) in association with the Bengal Chamber of Commerce and Industry (BCC&I) organized an interactive and a very successful programme on 24 May 2016 to discuss the critical need for change in energy education for a sustainable future. The program was organized as an active collaboration between Jadavpur University with University of Stavanger, Norway (one of the leaders in the discipline in Europe) under the Indo-Norwegian Cooperation

Program(INCP). The visiting group of academics from the Norway is involved in providing sustainable energy solutions in Europe and is also deeply involved with energy education in Europe. They shared their valuable experiences in the forum. From Indian side, leading academics, industry leaders and policymakers shared their experiences and discussed the issues of sustainable energy education that should be addressed with great urgency and concern. The discussion was followed by an intensive and vibrant interaction with extremely well informed audience/participants, consisting thought leaders from energy industry as well as energy education.

The Discussion forum was divided into several sessions and was held in the Williamson Magor Hall at the premises of the Bengal Chamber of Commerce and Industry, Kolkata, between 10:00 am and 2:00 pm on 24 May 2016.

Please find below a detailed session by session report of this highly successful endeavor:

Inaugural Session: 10.00 a.m. - 11.15 a.m.



The welcome address for the forum was fittingly delivered by Mr. Subhodip Ghosh, Director General Designate, The Bengal Chamber of Commerce and Industry. In his well-informed speech, Mr Ghosh underlined the serious nature of the discussion at hand, saying that his organization does not see this forum as a just another industry leadership meeting. He referred to the United Nation Climate Change Conference, held in November-December 2015 and emphasized the rapid transformations taking place in the energy sector world over. The theme of his message was collaboration and he highlighted the collaborative work being done in the field of Sustainable Energy and Sustainable Development between Indian and European institutions. Bengal Chamber of Commerce itself has several collaborative projects running. The Director General Designate appreciated the academic thrust on the discussion, highlighting the involvement of UGC, INCP and Jadavpur University. He warmly welcomed all the guests and delegates, including the visiting team from Norway.



Professor Sudipta De, Department of Mechanical Engineering, Jadavpur University and Core Committee Member, Global Change Programme, Jadavpur University followed this speech by lucidly and succinctly charting out the theme and objectives of the forum. Professor De, who is the chief architect of the forum, pointed the need for a definitional specificity with regard to the term “sustainable” both in the field of energy and development studies. After defining the key developments in the field in recent years (seen by many as transformative), Professor De urged the industry leaders to give input with regard to manpower requirement and skill development to academic community, indicating that it would be beneficial in reducing the employability gap in the field and bridging the gap between two sectors. He said to enable and encourage divergent impulses the structure of the form has been deliberately kept flexible and in the format of an open house.



These crisp yet beneficial introductions to the proceedings were followed by the inaugural panel for the day. The theme for the discussion was: **Advanced Interdisciplinary Learning in the Context of Industry Academia Collaboration**. This session was moderated by veteran industry leader Mr. Alope Mookherjea, Past President, The Bengal Chamber of Commerce and Industry & Chairman, Solyvent Flakt (India) Private Limited. The equally interesting list of panellists included illustrious names like Prof. Ajay Kumar Roy, Director, Indian Institute of Engineering Science and Technology, Shibpur; Mr. Jonathan T. Ward, Principal Commercial Officer, Consulate of the United States, Kolkata; Professor Oluf Langhelle, University of Stavanger, Norway; Mr. Deb A Mukherjee, Chairperson Energy & Environment Committee, The Bengal Chamber and Managing Director, Enfragy Solutions India Private Limited and Mr Sutanu Ghosh, President Designate, The Bengal Chamber of Commerce and Industry.



In his introduction to the panel theme, Mr Alok Mookherjea highlighted that while the topic may seem to have bunched together different concerns the focus should be twofold: a) on learning (about energy) and b) on learning together. He said that apart from the central focus on sustainability the supplementary factors of affordability and accessibility should also be given equal importance. He spoke about inspiring a new generation of students to study the emerging trends in the field. Mr.Mookherjea fielded an interesting concept of establishing an energy bioscience institute by the government. He said the sustainable energy has the potential to be a truly multidisciplinary discipline converging not only the theoretical concerns of different fields but their divergent skill sets as well. He ended his speech on an interesting note by saying that the chief currency of the future will not be Dollar or Euro or even the rupee but innovation. The urge to innovate makes one constantly learn and re-learn going beyond their chief skill set. Mr. Mookherjea inspired the audience by indicating that there is no limit to the extent one can leverage his learning and the same should be principal criterion in learning about energy: both in developmental and scientific contexts.



In the following speech reputed academic Professor Ajay Ray, Director, IEST Shibpur spoke about the need for the industry and academics coming together. He also charted in detail the different sources of energy. He commented that it is rather regrettable to see India's energy deficiency is not up to the global standard; in fact India's energy production to energy utilization ratio is below par by global standard as well. In his comprehensive and highly enlightening speech, Professor Roy, who has a formidable scholarship and experience in the field urged every stakeholder in the discipline to stand together for a future without deficiency in energy generation. He also spoke in detail about projects such as GIAN (Global Initiative of Academic Networks) and their usefulness in enhancing inter-disciplinarity in interrelated fields. Most importantly, he put forward the proposal that pedagogical priority to energy science in from as early as undergraduate level can generate tremendous awareness on the subject, as it will ensure that students from different disciplines like Mechanical Engineering or Electrical Engineering will study energy science as a basic course.



Mr Jonathan T. Ward, , Principal Commercial Officer, Consulate of the United States, Kolkata started his speech on a humorous note by paraphrasing a quote from celebrated American novelist Mark Twain, who incidentally spent some time in Calcutta in late Nineteenth Century. Mr Ward's talk afterwards was equally charming and compelling. He congratulated America's close ally Norway for their leadership in promoting clean energy initiatives, while lauding the effort of Jadavpur, INCP and Bengal Chamber of Commerce in coming together. He highlighted the relevance of issues at hand with specific reference to the situation in the United States. He said that thousands of jobs in the United States manufacturing are remaining unfulfilled due to the failure of bridging a gap between employability and available skillsets Taking a cue from Alok Mookherjea's mantra that the principal currency of the future would be innovation, Ward succinctly put forward the prospects and concerns in the energy sector in America, by referring

to the initiatives such as Inter State Renewable Energy Council (IREC). They work with workforce investment boards in close partnership at local level. Ward also mentioned the implementation of Workforce Innovation Opportunity Act which was signed by President Obama in July 2014 and which came into effect in July 2015. They promote training opportunities and apprenticeship. He also mentioned the presence of workforce boards in city and state level in America who facilitate such initiatives, there are specified organizations working in the healthcare industry or in the field of professional welfare such as Centre for Women and Work. He mentioned the role United States Department of Energy is playing in building a strategic workforce. He also mentioned the crucial role played by National Renewable Energy Laboratory (NREL) based in Colorado at a hugely spread out campus. Ward emphasized the importance of intra institutional integration before inter disciplinary collaboration to have a coherent and consistent structure of policy regarding energy. He mentioned the increasing thrust given on solar energy in India in governmental and institutional level. Despite not being a subject expert Ward's thoughtful speech was extremely well researched and had several lessons for the audience, with a particular focus on bridging the skill gap in the clean energy market in both United States and India, and the potential of these two strategic allies working hand in hand to overcome the obstacles, especially considering the phenomenal improvement in diplomatic and business relations between them in the last few years.



The next distinguished speaker was Professor Olaf Langhelle (Dr. Polit), University of Stavanger, Norway. In his highly impressive power point presentation Professor Langhelle underlined the importance of fostering a culture of multi-disciplinary education and research in the field. He said that many of the energy and environment related challenges are not merely technological. Rather, the fact is that, many of the important drivers and barriers related to technological change and transitions are political, economic, and also social. Debates about what constitutes sustainable energy policy have become increasingly common and intensified in most nations: developed and developing economies alike. There are political conflicts over the true meaning of concepts such as sustainable energy, low carbon transition.

These are often linked to different interests, with competing visions about the future energy mix and future energy system. He gave the examples of Germany (*Energiewende*) and Norway: (Carbon Capture and Storage and Electric cars). Following this he charted out the specific methodological contributions of social science in the field, giving the examples of: explaining policy formation, explaining policy decisions, exploring policy output and policy outcomes, understanding of social behavior, understanding social acceptability/rejections, exploring concepts, theories of transition and finally, exploring imaginaries about the future. Then he discussed the current priorities of the government of Norway, saying that the Government will scale up appropriations to research and higher education within six long-term priority areas: a) Seas and oceans, b) climate, environment and clean energy, public sector renewal, c) better and more effective welfare, health and care services, d) enabling technologies, e) innovative and adaptable industry and f) world-leading academic groups. The Government's long-term objectives of achieving a low-emission society will entail significant change. This will require a better understanding of what a low-emission society will look like, what it will take to bring us there and the social challenges inherent in this process. He underlined the need for a better comprehension of which social benefits and opportunities lie in low-emission development and urged for greater insight into the economic foundation for the same. Additionally Professor Langhelle also discussed that the conversion into a low-emission society requires comprehensive research and innovation efforts and broad-based cooperation between social science, the humanities, technology subjects and natural science. He said that the education programmes must be designed to ensure that the experts India trains in Norway will become positive forces and key players in this conversion.



His speech was followed by the talk given by Mr. Deb A. Mukherjee, Chairperson Energy & Environment Committee, The Bengal Chamber & Managing Director, Enfragy Solutions India Private Limited. Mr Mukherjee also focused on interdisciplinary learning and industry-academia partnership. He mentioned the alarming trend of huge water scarcity and degradation of fossil fuel resources around the world. He said we need to have some understanding of ecological principles to create proper energy solutions. Mr Mukherjee proposed the establishment of a common knowledge platform, which utilizes social media to people from diverse backgrounds around the world. He said it might sound a little utopian to begin with but after the huge success story of social media platforms like facebook in the last few years the possibility is worth pondering as it may well facilitate an integrative global movement. Mr Mukherjee's proposal was received with great enthusiasm and praise among the panel members and audience members alike.



The final speaker of the panel was Mr Sutanu Ghosh, President Designate, The Bengal Chamber of Commerce and Industry. Mr. Ghosh summed up the proceedings with great efficiency by focusing on the keywords which emerged in the process of the discussion: innovation, learning energy, industry-academia partnership and sustainability. After his concluding remarks the floor was opened to a question answer session. The discussion was vibrant and relevant as it involved a range of queries and opinions coming from the informed audience members, with the insight of the panel members.



This session was concluded by a vote of thanks from Mr Arun Kumar Mukherjee, Chairman Emeritus, Energy and Environment Committee, The Bengal Chamber of Commerce and Industry. He thanked all the stakeholders involved and the members of the panel were presented with a memento as a token of appreciation.

Technical Panel Session: Industry needs from Energy Education: Future Perspective

11:15 am:1:15 pm

This session was moderated by Professor Mohsen Assadi, who teaches in the Faculty of Science and Technology, University of Stavanger and is Managing director of Center for Sustainable Energy Solutions (cenSE), Norway. The panellists for this session were Mr. Deb A Mukherjee, Chairperson Energy & Environment Committee, The Bengal Chamber and Managing Director, Enfragy Solutions India Private Limited; Mr. Sanjib Bezbaroa, Vice President - Corporate EHS, ITC Limited; Professor Joyashree Roy, Coordinator, Global Change Program, Jadavpur University ; Shri Sankar Mukhopadhyay, Deputy General Manager (Training), CESC Limited; Mr. Ajeya Bandyopadhyay, Director - Advisory Services, Ernst & Young LLP and Dr. Dipak Sen Choudhury, Advisor, Technology and Innovation, Exide Industries Limited.



In his introductory speech accompanied by a concise yet remarkably lucid power point presentation, Professor Assadi focused on sustainable energy solutions. He discussed the industry needs for additional capacity to address the future issues. The ways universities can contribute to that, according to Professor Assadi include: short training courses, new modules added to existing educational programs, completely new education program and a composite method consisting of a combination of these. He opined that sustainability goals need a time frame and energy efficiency is the fastest approach to achieve that. While discussing the European approach to the subject he gave the example of “FP7 project EUA-EPUE & KIC InnoEnergy”, the project is involved in the mapping

of education & research programs across Europe and mapping of skills needed in evolving energy fields. In its second phase the project will deliver on addressing education gaps, building clusters of excellence among universities to develop new energy technologies/encourage breakthrough innovation in fundamental research for the development of new low-carbon energy technologies and solutions. The approach, he opined, underscores the need for a more systematic and interdisciplinary understanding and upgradation of competences. Professor Assadi's approach included an integrative concept of PESTEL, merging the concepts of political, economic, social, technological, environmental and legal domain.

His speech was followed by Mr. Deb A Mukherjee, Chairperson Energy & Environment Committee, The Bengal Chamber & Managing Director, Enfragy Solutions India Private Limited. He said in the context of the future scenario energy and resources (food products) will be fully related in their functional capacity. Naturally the areas of food production will assume greater importance considering that along with growing population consumer needs are also growing. Organisation like CESC has done a great work in areas of consumer care. If we are looking at energy in a holistic sense the consumer will be at the centre of things. Thereby, utility models are also evolving around the world and India is no exception. There are three forces working together that determined the shape of things to come: policy, technology, skills. Knowledge management dissemination and getting that knowledge across to the target audience is very important.



The next speech was by Mr. Sanjib Bezbaroa, Vice President - Corporate EHS, ITC Limited. His talk brought a refreshingly new perspective into the proceedings as it was more experiential and less demonstrative. He brought different examples from his work experience in his organization and various green/clean energy initiatives promoted by ITC. He spoke about the changing perceptions regarding energy consumption. He gave an interesting example of how in hospitality sector, increasing occupancy does not necessarily mean increase in energy consumption. This was an excellent lesson in an interface between energy and functionality. He spoke about ITC's uniform data management system and standard operating

procedures. He shared the data from the latest financial year end report from ITC declaring that 47% of energy consumption now comes from renewable resources.



The next speaker was Professor Joyashree Roy, Co-Ordinator, Global Change Program, Jadavpur University and a reputed academic at the same institution. The initial focus in her enlightening talk was on policy change. She brought to notice the fact that since 1992, if we study industry data in the context of energy efficiency it reveals that it is the business sense of the organizations which prompted them to be energy efficient. Since 1990 onwards a decoupling of energy and output growth is taking place in main energy intensive industries. This became a factor in boosting the confidence of policymakers, seeing that how industry is contributing to the goals, rather than being an obstacle to it. Policies changed in the first place because industries performed and innovations took place. With regard to policy changes she also brought to attention another example from the power sector: of coal based ash. Roy said that every country functions based on its political, economic, social and cultural realities. She gave the example of foundation and subsequent journey of the School of Energy Studies at Jadavpur University since 1986. It was Jadavpur University who first brought a multidisciplinary thrust in the field of energy studies in India among public universities. We need to understand, she said, about a whole portfolio of activities while talking about clean/sustainable energy, dependent upon human resource, financial resource and other factors. We need to move from the command and control policy to a more market based policy. She emphasized on the need for a more dialogue on a continuous basis. Professor Roy said dependence on only one kind of capacity building is not going to yield the desired result and the attention should be given right from the undergraduate level.

The next speaker was Shri Sankar Mukhopadhyay, Deputy General Manager (Training), CESC Limited. Drawing from his valuable experience in the century old organisation,



Mr Mukhopadhyay said energy consumption, just like GDP figures can forecast the economic condition of a developing and progressive society. He raised the issues of education and development. He suggested that setting the benchmark for energy consumption parameters is currently lacking in many organisations. He ended his talk on an optimistic note by suggesting that greater understanding of renewable energy sectors is making our society more educated and knowledgeable as a whole.



His speech was followed by Mr. Ajeya Bandyopadhyay, Director - Advisory Services, Ernst & Young LLP. He spoke about the relevance of the theme of the panel. At the heart of the energy dialogue, he said, is the energy industry. Each of these sectors is currently undergoing a radical shift. This shift is unprecedented and one in a lifetime experience. The energy was produced, distributed, transmitted and consumed is going through a rapid transformation. Alternative technologies are becoming more attractive with each passing day. He spoke about three dominant traits: a) regulation landscape B) transformation of technology and c) a new era of industrial development based on digital revolution. Traditional customer base is now shifting and as its consequence traditional energy producers are finding harder and harder to recover their investment. What is changing is the profit pattern of energy producers and distributors. Commodity suppliers are changing their role to that of energy advisors. He also highlighted the aspect of risk assessment. He said the developments are encouraging but the pace is slow and the principal stakeholders have a lot to catch up on.

The final speaker of the panel was Dr. Dipak Sen Choudhury, Advisor, Technology and Innovation, Exide Industries Limited. He said his sequence as the last speaker of the

panel is a bit symbolic as he represents in this whole energy chain the subject of energy storage: perhaps the least understood and often misunderstood concept in the discipline.



He gave the example of Elon Musk, describing him as the Steve Jobs of the energy market. Musk is one of the most prominent inventors of our times and the founder CEO of Tesla Motors. He reminded the listeners about the importance of curriculum development and proposed that his organization would be happy to help in any such endeavor. He spoke with great candor about the bureaucratic obstacles often faced by his organization and how they overcome them. He also emphasized on the importance of setting up a digital library as the knowledge formation in the field especially with regard to areas like specification is not up to the mark. He finished his speech with the assurance and promise of collaboration and assistance from his organization in any innovative output indicators, emerging out of the discussion.

Open House Session and Conclusion

1:15 pm-2:00 pm

The discussion was followed by the final segment of the day's proceedings: an open house session and conclusion based on the themes discussed. This was the most interactive session of the proceedings and audience members participated with great vibrancy and awareness, throwing up important questions on issues such as smart grids, the crucial mapping mechanism to bridge industry and academia, the role of content management and how it can influence knowledge management along the same lines. Professor Amitava Datta, Department of Power Engineering, Jadavpur University and Director, Internal Quality Assurance Cell of the same institution raised the important issue of thrust in interdisciplinary from the undergraduate level in academic institutions. The question of discipline specific cadres and employability is a pressing concern in relatively new areas like power engineering is a bit puzzling, he said. This is precisely why today's initiative should be lauded as it focuses on a holistic approach towards energy studies. The leadership of Norway in hydropower generation was also discussed. Undergraduate students also asked questions with equal zeal, especially with regard to the

mainstreaming of energy studies in the grassroots teaching agenda. The issues of affordability and access were discussed in detail in the session.

The session concluded with a vote of thanks. The members participated in a lunch ceremony 2:00 pm onwards and engaged themselves in informal discussion following the day's extremely exciting proceedings.

Delegate List

The discussion forum was attended by almost one hundred registered delegates, apart from the panelists. The participants came from an astonishingly diverse disciplinary and professional background, including academics, industry professionals, researchers, independent business owners and policymakers. Distinguished delegates attending the proceedings included Mr Somnath Chatterjee, Vice President, Energy and Utilities, Capgemini India; Col A.K. Nath (retired) of C-DAC Kolkata Centre; Professor A.K. Ghosh, Director, Centre for Environment & Development, Honorary President, ENDEV; Dr Chandan Kumar Chanda, Professor, Department of Electrical Engineering, IEST Shibpur and Professor Amitava Datta, Department of Power Engineering, Jadavpur University. **Please see Annexure 1 for a full delegate List.**



Annexure 1
Full Delegate List

Sl No	Name	Designation	Organization	Tel No	Mobile No	Email Id
1	Mr.N K Dutta	Director	Best Surveyors & Valuers Pvt Ltd		9830014315	Best surveyors@gmail.com
2	Mr.Hirak Sarkar	Director	Best Surveyors & Valuers Pvt Ltd		9830516933	
3	Mr. J K Ghosh	Director	Bicon Consultants Pvt. Ltd		9831070078	bicon59a@gmail.com
4	Mr. R. B. Chaudhuri	Director	Bicon Consultants Pvt. Ltd		9830661115	bicon59a@gmail.com
5	Mr. Debsankar Dutta	Office Superintendent	Board of Practical Training			ddutta@bopter.gov.in
6	Mr. Somnath Chatterjee	Vice President-Energy and Utilities	Capgemini India	6621 5000 ; (VOIP) 333 1722	9836288855	somnath.chatterjee@capgemini.com
7	Mr. Sanjay Neogi		Capgemini India			
8	Col AK Nath (Retd)	Executive Director	C-DAC Kolkata Centre	23576309	9433031537	asheet.nath@cdac.in
9	Mr. Satvik Nath		C-DAC Kolkata Centre			
10	Ms. Farha Naaz	JRF, DECCMA Project	CED		8981774335	farhanaaz603@gmail.com
11	Ms. Sukanya Banerjee	JRF, DECCMA Project	CED		9163089140	deutschland.sukanya@gmail.com
12	Ms. Sanghamitra Basu	Research Associate	CED		9830898796	oomphsenorita090@gmail.com
13	Ms.Shilanjani Bhattacharyya	Research Intern	CED		9051571493	shilanjani@gmail.com
14	Mr. Sourit Dey	Research Intern	CED		8902516102	deysourit@gmail.com
15	Prof. (Dr) A.K.Ghosh	Director	Centre for Environment & Development, Honorary President, ENDEV	033) 2414 9801		cedkolkata@yahoo.com ; cedendev@gmail.com
16	Mr. PARTHA PROTIM DATTA	Architect, Environmental Planner & LEED AP	CENTRE FOR SUSTAINABLE DEVELOPMENT	40704149	9830496278	csd.indus@gmail.com; ppdatta10@yahoo.co.in
17	Dr (Prof) Sibamoy Ghosh	Principal	CIEM,KOLKATA			
18	Mr. K.R.Natarajan		CIEM,KOLKATA			rr.natarajan@rediffmail.com
19	Dr. Tushar Chakraborty		CSIR - IICB		9831746294	tushar@iicb.res.in
20	Mr. DILIP KUMAR SINHA	Currently, Guest Faculty	Department of Atmospheric Sciences & Marine Sciences, University College of Sciences, University of Calcutta,		9830461736	dilipkumarsinha@rediffmail.com

21	Dr.Chandan Kumar Chanda	Professor	Department of Electrical Engineering, IEST		94332 69567	ckc_math@yahoo.com , ckc@ee.iests.ac.in
22	Mr. Amal K.Das	Consultant and Former Regional Director	Deptt.of atomic Energy, Govt.of India.			amaldas.das220@gmail.com
23	Mr. DEBASHIS DE	Deputy General Manager	Development Consultants Pvt Ltd	4012558 2		debashisde@in.dclgroup.com
24	Ms.Amitasree Ghosh	Senior General Manager and Incharge Technology Control	Development Consultants Pvt. Ltd	(33) 4012 5588	9331827323	aghosh@in.dclgroup.com
25	Mr. Ashitava Sen	Deputy General Manager	Development Consultants Pvt. Ltd.		9339983913	asen@in.dclgroup.com ; ashitava@yahoo.com
26	Mr. Dipankar Dasgupta	Director	Development Institute for Societal & Human Advancement (DISHA)		9748771622	Ddasgupta1@gmail.com
27	Mrs. Karuna Singh	Country Director	Earth Day Network India			
28	Mr. Navonil Das		Earth Day Network India			navonildas@gmail.com
29	Mr. Monoddip Dutta		Earth Day Network India			monodip.dutt@gmail.com
30	Mr.K G Ajaykumar	Dy GM	Electrosteel Castings Lts		9831752732	kgajay@electrosteel.com
31	Mr.L R N Murthy	GM	Electrosteel Castings Lts		9831567718	Lrn.murthy@electrosteel.com
32	Ms. Purbita Chowdhury	Research Associate	ENDEV		9674576681	chowdhury.purbita@gmail.com
33	Mr. Pritam Datta Roy		Finwiz Consultants			dattaroy@rediffmail.com
34	Mr.Amar Nath Bhadra	Former Director of Boilers,	Govt. Of West Bengal		9433521350	amarnathhow@yahoo.com
35	Mr. Rajib Das		Greenfinity Powertech Pvt. Ltd.		8956485039	rajib@greenfinity.co.in
36	Mr.Kunal Saha		Greenfinity Powertech Pvt. Ltd.			
37	Prof. A. Rouf	Professor	IEST, Shibpur, Electrical Engg.		9433098388	rouf_a@hotmail.com
38	Prof. A. Barman	Associate Prof.	IEST, Shibpur, Electrical Engg.		9432493108	ab@ee.iests.ac.in
39	Sm. Sayni Sana	PG Student	IEST, Shibpur, Electrical Engg.			saynisana@gmail.com
40	Sm. Poulomi Chaudhuri	PG Student	IEST, Shibpur, Electrical Engg.			
41	Sri Shubhajit Sarkar	PG Student	IEST, Shibpur, Electrical Engg.			shubhajit123@gmail.com
42	Mr.Ranendra Roy	Research Scholar	IEST, Shibpur,Departme nt of Mechanical Engg.,		9531738984	ranendraroy2009@gmail.com

43	Mr.Avik Ray	PG Student	IEST, Shibpur,Departme nt of Mechanical Engg.,		9903753337 3	ray.avik2014@gmail.com
44	Prof Piyali Sengupta	Faculty Member	IISWBM			piyali.sengupta@gmail.com
45	Mr.Lavish Jindal	Assistant Manager	India Power Corporation Limited		8334820220	
46	Mr. Manoj Singh	Chief Manager	India Power Corporation Limited		983651445	
47	Mr. Wasim Parvez	Relationshi p Manager	International Business Centre		9830495495	wasim.officials@gmail.com
48	Mr. Unus Molla	CEO	International Management Centre		9874523523	imcworld100@gmail.com
49	Dr. Amitava Datta	Professor	Jadavpur University, Salt Lake Campus ,Department of Power Engineering	2335581 3		amdatta_ju@yahoo.com
50	Prof. Bireswar Majumdar	Professor	Jadavpur University, Salt Lake Campus ,Department of Power Engineering			
51	Prof. Kamal K. Mandal	Professor	Jadavpur University, Salt Lake Campus ,Department of Power Engineering			
52	Dr. Ranjan Ganguly	Professor	Jadavpur University, Salt Lake Campus ,Department of Power Engineering			
53	Dr. Rajat Chakraborty	Associate Professor	Jadavpur University,Chemic al Engineering Department		9831259201	rajat_chakraborty25@yahoo.com
54	Ms. Jyoti Dey	Vice President	Lucid INFRAHEIGHTS LIMITED			jyoti.dey@gmail.com
55	Prof. Amlan Chakrabarti	Professor & Head - Electrical Engineering	Narula Institute of Technology		9331219030	amlanc@hotmail.com
56	DR. SUKUMAR CHANDRA KONAR	Professor	NARULA INSTITUTE OF TECHNOLOGY, EE Dept		9836799318	sckonar55@gmail.com
57	Prof. MANOJIT KUMAR BASAK	Professor	NARULA INSTITUTE OF TECHNOLOGY, EE Dept		9432987079	manojit1952@gmail.com

58	Mr. Biman Kumar Chattopadhyay	Librarian	National Power Training Institute(ER) (Ministry of Power, Govt. of India)		9735155651	khokanchatt@gmail.com
59	Mr.Tusharmay Bandopadhyay	Visiting Faculty, NPTI(ER)	National Power Training Institute(ER) (Ministry of Power, Govt. of India)		9434647594	tusharmay@rediffmail.com
60	Mr. Tamal Roy		PACT		9332104780	2tamalroy@gmail.com
61	Mr. Arun Kumar Mukherjee	Director (Technical)	Prerana Engineers & Consultants Pvt. Ltd.		9830051979	arunm48@gmail.com
62	Mr. Arijit Roy	Director	Protiviti (PI Advisory Pvt. Ltd.)		Sally Mob. No. 9830270017	arijit.roy@protivitiglobal.in
63	Mr. Saket Kumar Agarwal	Manager	Protiviti (PI Advisory Pvt. Ltd.)			
64	Mr. Harsh Agarwal	Consultant 3	Protiviti (PI Advisory Pvt. Ltd.)			
65	Mr. Sanjay Datta Majumdar	Manager	Protiviti (PI Advisory Pvt. Ltd.)			
66	Mr. R K Mitra	Chairman	Racily Udyog		9831102710	rkmitra2@hotmail.com
67	Mr. Dipankar Das	Technical Head - India Operations	Regula Systems AB, Sweden - India liaison office	033 - 2447 - 5348	9432260969	das_dipankar1@yahoo.co.in
68	Mr. Saibal Mukhopadhyay	Director	RERF		8420916319	mukherjee_saibal12000@yahoo.co.in
69	Mr. R.K.CHAUDHURI	Corporate Trainer In HRD	Resource Solution Management		9331099711	rkchau@rediffmail.com
70	Prof SUBHASIS NEOGI	Professor	SCHOOL OF ENERGY STUDIES, JADAVPUR UNIVERSITY		9433065426	neogi_s@yahoo.com
71	Mr. ARNA GANGULY	RESEARCH SCHOLLAR	SCHOOL OF ENERGY STUDIES, JADAVPUR UNIVERSITY		9874111890	arna.g.90@gmail.com
72	Mr. DEBRUDRA MITRA	RESEARCH SCHOLLAR	SCHOOL OF ENERGY STUDIES, JADAVPUR UNIVERSITY		9830416057	debrudramitra@yahoo.com
73	Mr.ATANU DUTTA	RESEARCH SCHOLLAR	SCHOOL OF ENERGY STUDIES, JADAVPUR		9883109114	atanu.dutta07@gmail.com

			UNIVERSITY			
74	Mr. Arup Jana	Certification and Business Enhancement National Sales Manager - Certification	SGS India	66506116 (D) / 100 / 101	9433220320 / 9007074274	arup_jana@sgs.com
75	Mr. Manoranjan Jena	Manager-Inspection	SGS India-Consumer and Retail	66506162	98311 52907	
76	Mr. Bhaskar Sen	Assitant Manager-Business Development	SGS India-Consumer and Retail	66506166	8697730058	
77	Mr. B.P.Sarkar		Steel Tech	23377939	9674760562	info@steelttech-india.com
78	Mr. Soumitra Chakrabarti	General Manager (Sales)	Subhasree Projects Private Limited	2242-3629 / 5528	9830736806	Soumitra.chakrabarti@subhasree.in
79	Mr. ANIT GHOSE	PRINCIPLE ADVISOR	SUPREME & CO.Pvt. LTD		9831074586	IKONANIT@GMAIL.COM
80	Mr.DEBASHIS DAS	GIS APPLICATION DEVELOPER	SUPREME & CO.Pvt. LTD		9836347945	DEBASHISDAS.NET@GMAIL.COM/DEBASHIS.GIS@SUPREME.IN
81	Mr.BISWANATH DEY	GIS APPLICATION DEVELOPER	SUPREME & CO.Pvt. LTD		8348614061	BISWANATH.GIS@GMAIL.COM
82	Mr. Swarnendu Dhar	Lead Consultant	Tech Solutions		9339535650	swarnendu_dhar@yahoo.com
83	Mr. Mr. A K Mukherjee	Executive Director (Technical)	Techno Electric & Engineering Co. Ltd.	4051-3000	9831567329	ajit.mukherjee@techno.co.in
84	Prof. S K Das, FIE, IRSE (Retd.), MASCE (USA)	Guest Faculty	Techno India Group		94338 78351	sdhr_das@yahoo.com , sudhirdas84@gmail.com
85	Mr. S. K.Roy	President	UAL-KONCRETE		9874400037	skroy@ualind.com
86	Mr. Partha Ghosal	Manager- E &I	UAL-KONCRETE		9836341717	pghosal@ualind.com
87	Mr.Amit Chakladar	Faculty	University of Calcutta			
88	Ms. Raksha Megotia	Student MBA	University of Calcutta			
89	Mr.Nurul Amin	Student MBA	University of Calcutta			
90	Mr. Nazimul Haque	Student MBA	University of Calcutta			
91	Mr. Mukesh Patro	AVP-Operation	VBL Sonarpur Plant		9836900805	Mukesh.Patro@rjcorp.in
92	Mr. Rajat Bhattacharjee	DGM-Maintenance	VBL Sonarpur Plant		9874554111	Rajat.Bhattacharjee@rjcorp.in

93	Mrs. Soma Sen	Assistant Manager - Quality	VBL Sonarpur Plant		9874238585	Soma.Sen@rjcorp.in
94	Mr. Malcolm Munsif					mmunsif007@gmail.com
95	Mr. Samir Rekha Datta					skdrekha@hotmail.com
96	Tushar Mitra					Tmitra218@gmail.com

Annexure 2

Full Press Coverage

The event received an excellent coverage from print and online media.

1. Link to the Core Sector Communiqué coverage of the event: <http://corecommunique.com/sustainable-energy-general-basics-advanced-interdisciplinary-learning/> covered by Chawm Ganguly
2. Link to the coverage by Business Standard on 24 May 2016: http://www.business-standard.com/article/news-ians/indian-norwegian-researchers-to-urge-ugc-on-interdisciplinary-energy-education-116052401067_1.html

The story to Business Standard, one of the premier business dailies in India was sourced by Indo Asian News Service (IANS)

Highlights from the story:

3. **Indian, Norwegian researchers to urge UGC on interdisciplinary energy education**

IANS | Kolkata May 24, 2016 Last Updated at 18:10 IST

Experts working under an Indo-Norwegian collaborative programme said on Tuesday that they will approach India's University Grants Commission to take a "serious look" into launching interdisciplinary sustainable energy education in the country.

Experts from Jadavpur University and the University of Stavanger, Norway, under the Indo-Norwegian Cooperation Program (INCP), on Tuesday participated in a discussion on 'Sustainable Energy: General Basics and Advanced Interdisciplinary Learning' to distill out the requirements of a comprehensive and collaborative energy education initiative.

"Our objective is to submit a document of the discussion to the UGC highlighting the requirement of comprehensive education in sustainable energy," Sudipta De, professor, department of mechanical engineering and core committee member of Global Change Programme (GCP), Jadavpur University, told IANS.

The discussion was organised by the GCP and Bengal Chamber of Commerce and Industry.

Mohsen Assadi, faculty of Science and Technology University of Stavanger, said the current educational collaboration is about the decarbonisation roadmap of India, and the programme is sponsored by UGC and the Research Council of Norway (RCN).

"... and we are looking at a multidisciplinary approach including people from fields of political science, social sciences and all engineering and scientific backgrounds, in the future. We are looking forward to student exchanges, lectures by Norwegian researchers in India and lectures by Indian experts in Norway," Assadi told IANS.

He said there would be a meeting in New Delhi between Indian and Norwegian researchers in June to evaluate the projects and the programme.

"We have been asked to join via Skype and present the planned activities such as a proposed interdisciplinary energy education initiative between Jadavpur University and our varsity," said Assadi, also the managing director of Center for Sustainable Energy Solutions (cenSE), Norway

Sirshendu Panth, Bureau Chief, IANS, Kolkata.

Indo-Asian News Service

Please find below weblinks and highlights from more Press coverage of the event:

4. **Press:** Indiablooms.com / (http://www.indiablooms.com/ibns_new/photos-details/F/2620/kolkata-bcc-amp-i-ju-organise-education-programme-on-sustainable-energy.html)

Date: 24th May 2016

Page: Online

Story Source: IBNS

Kolkata: BCC&I, JU organise education programme on sustainable energy

By: IBNS

The Bengal Chamber of Commerce and Industry and Jadavpur University on Tuesday (May 24, 2016), jointly organised "Sustainable Energy: General Basics and Advanced Interdisciplinary Learning"-an education programme sponsored by UGC-RCN under Indo-Norwegian cooperation programme at the Chamber premises in Kolkata.

5. **Press:** Dailyworld.in / (<http://dailyworld.in/indian-norwegian-researchers-to-urge-ugc-on-interdisciplinary-energy-education/>)

Date: 24th May 2016

Page: Online

Story Source: IANS

Indian, Norwegian researchers to urge UGC on interdisciplinary energy education

Education, Environment, National, Science May 24, 2016, 6:16 pm Daily World

Kolkata, May 24 : Experts working under an Indo-Norwegian collaborative programme said on Tuesday that they will approach India's University Grants Commission to take a "serious look" into launching interdisciplinary sustainable energy education in the country.

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/IANS

6. **Press:** Indiaeveryday.com (<http://www.indiaeveryday.in/news-indian-norwegian-researchers-to-urge-ugc-on-1007-2200877.htm>)

Date: 24th May 2016

Page: Online

Story Source: IANS

Indian, Norwegian Researchers To Urge UGC On Interdisciplinary Energy Education

24 May 2016 07:46

Kolkata, May 24 (IANS) Experts working under an Indo-Norwegian collaborative programme said on Tuesday that they will approach India's University Grants Commission to take a "serious look" into launching interdisciplinary sustainable energy education in the country.

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--IANS

sgh/vd--

Sirshendu PanthBureau Chief, IANS, Kolkata.

Indo-Asian News Service

7. **Press:** Newswebindia123.com
(<http://news.webindia123.com/news/articles/Science/20160524/2867958.html>)

Date: 24th May 2016

Page: Online

Story Source: IANS

Indian, Norwegian researchers to urge UGC on interdisciplinary energy education

Kolkata | Tuesday, 2016 6:45:05 PM IST

Experts working under an Indo-Norwegian collaborative programme said on Tuesday that they will approach India's University Grants Commission to take a "serious look" into launching interdisciplinary sustainable energy education in the country.

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--IANS sgh/vd

-- Sirshendu PanthBureau Chief, IANS, Kolkata. Indo-Asian News Service

(305 Words)

2016-05-24-18:14:05 (IANS)

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8. **Press:** Newsnow.in (<http://www.newsnow.in/news/indian-norwegian-researchers-to-urge-ugc-on-interdisciplinary-energy-education>)

Date: 24th May 2016

Page: Online

Story Source: IANS

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--IANS sgh/vd

-- Sirshendu PanthBureau Chief, IANS, Kolkata. Indo-Asian News Service

(305 Words)

2016-05-24-18:14:05 (IANS)

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9. **Press:** [News.yahoo.com \(https://in.news.yahoo.com/indian-norwegian-researchers-urge-ugc-interdisciplinary-energy-education-124005411.html\)](https://in.news.yahoo.com/indian-norwegian-researchers-urge-ugc-interdisciplinary-energy-education-124005411.html)

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Indo Asian News Service

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sgh/vd--Sirshendu PanthBureau Chief, IANS, Kolkata.\

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