

Department of Renewable Energy

(Formerly known as Centre for Energy and Environment)



Rajasthan Technical University, Kota

Rawatbhata Road, Kota-324010

Annual
Report
for the Year
2015



VISIT OF M.TECH. (RET) STUDENTS TO WIND FARMS IN MUPPANDAL AREA NEAR KANYAKUMARI, TAMIL NADU



I. Administrative activities during the year 2015

1. This department was formerly known as *Centre for Energy and Environment* and existed as University Centre of RTU. Now it is renamed as *Department of Renewable Energy* vide the office-order No. F(2)/2015/3583-90 dated 27/05/2015 of the Registrar, RTU and continue to be University Department.
2. For the financial year 2015-16, a budget of Rs. Sixty one lakhs was allotted to the Department of Renewable Energy under the budget heads of Students Scholarship (Teaching Assistantship), Students Education & Training Expenses, Expert lectures/Visitor for centre, Office expenses, Lab equipments, Computers & accessories, Software, Purchase of furniture & office equipment, and Library books.
3. Rules related to students of the Department of Renewable Energy (formerly called Centre for Energy and Environment) for their educational tours and visits, research paper presentation and participation in conferences & workshops have been approved by 11th Finance Committee meeting held on 19th February 2014 and 20th BOM meeting of RTU held on 23th September 2014. Office order was issued by Registrar, RTU vide order no F(2)/2015/24271-75 dated 10/03/2015.
4. Mr. Bharat Kumar Saxena has been appointed as Guest Faculty for the academic year 2015-2016.



PROF. I.K. BHAT, DIRECTOR MNIT JAIPUR & PROF. J.S. RAO IN VALEDICTORY SESSION



PROF. J.S. RAO DELIVERING THE LECTURE



TWO DAYS NATIONAL WORKSHOP ORGANISED BY RTU ALONG WITH MNIT AT JAIPUR



II. Academic activities during the year 2015

A. Research Papers Published / Presented in Conferences and Journals:

1. One research paper co-authored by Mr. Bharat Kumar Saxena and Dr. K.V.S. Rao entitled as “Comparison of Weibull parameters computation methods and analytical estimation of wind turbine capacity factor using polynomial power curve model: case study of a wind farm,” was published as an online open access paper in a peer reviewed *SpringerOpen* international journal “*Renewables: Wind, Water, and Solar,*” vol. 2, no. 3, pp. 1-11, on 20th January, 2015. The journal is published by *Springer-Verlag GmbH*. doi: <http://dx.doi.org/10.1186/s40807-014-0003-8>.
2. One research paper co-authored by Ms. Zainab Akhtar and Dr. K.V.S. Rao entitled as “Theoretical performance analysis of solar chimney power plant for Kota region of Rajasthan, India,” was presented in the *International Conference on Sustainable Energy Resources, Materials and Technologies (ISERMAT)* during 8-9 January, 2015. The conference was organized by SSN College of Engineering at Kalavakkam, Chennai. This research paper is available online in *Applied Mechanics and Materials*, Vol. 787 (2015), pp. 157-161, Trans Tech Publications, Switzerland. doi: <http://dx.doi.org/10.4028/www.scientific.net/AMM.787.157>.
3. One research paper co-authored by Mr. Vishnu Meena and Dr. K.V.S. Rao entitled as “Feasibility of rural electrification through gasification at village Kund Habeli of Sheopur district in Madhya Pradesh, India,” was presented in the *International Conference on Bioenergy, Environment, and Sustainable Technologies (BEST 2015)* on 28-31 January, 2015. The conference was organized by Arunai Engineering College at Tiruvannamalai, Tamil Nadu. The paper was adjudged as best paper among the papers presented in the theme.



**PAPER PRESENTATION IN ISERMAT-2015
AT SSN COLLEGE OF ENGG., CHENNAI**



**PAPER PRESENTATION IN ICTSD-2015
AT DON BOSCO INSTITUTE OF TECHNOLOGY, MUMBAI**



4. One research paper was presented in the *IEEE International Conference on Technologies for Sustainable Development (ICTSD)* during 4-6 February, 2015. The conference was organized by Don Bosco Institute of Technology at Mumbai. The paper is available online on IEEE Xplore Digital Library and the details are as follows: Zainab Akhtar and Dr. K.V.S. Rao, “Effect of collector efficiency on levelized electricity cost of 200 MW solar chimney power plant in India,” pp. 1-6. doi: <http://dx.doi.org/10.1109/ICTSD.2015.7095908>.
5. One research paper co-authored by Mr. Sachin Jain and Dr. Namrata Sengar entitled as “A comparative theoretical and experimental study of hot box solar cookers of two different shapes and same aperture areas,” was published in *International Journal of Science, Environment and Technology*, vol. 4, no. 3, pp. 841-846 on 2nd June, 2015.
6. One research paper was presented in the *IEEE International Conference on Technological Advancements in Power and Energy (TAP Energy)* during 24-26 June, 2015. The conference was organized by Amrita Vishwa Vidyapeetham at Kollam, Kerala. The paper is available online on IEEE Xplore Digital Library and the details are as follows: Kumari Sanno and Dr. K.V.S. Rao, “Effect of air density on kite power,” pp. 132-137. doi: <http://dx.doi.org/10.1109/TAPENERGY.2015.7229605>.
7. One research paper co-authored by Dr. Lata Gidwani and Mr. Ankur Kumar entitled as “Stability analysis and improvement techniques for grid integrated wind energy conversion system,” was published in *International Journal of Wind and Renewable Energy*, vol. 4, no. 2, pp. 49-60, 2015.



**PAPER PRESENTATION IN BEST-2015
AT ARUNAI ENGG. COLLEGE, TIRUVANNAMALAI, TAMIL NADU**



**PAPER PRESENTATION IN ICESA-2015
AT DR. D.Y. PATIL INSTITUTE OF ENGG. & TECH. PUNE**



8. One research paper co-authored by Ms. Divya Modani, a student of the department was presented in the *International Conference on Advances in Power Generation from Renewable Energy Sources*. The authors of paper were Mr. Faizal Khan, Ms. Divya Modani, Mr. Shshank Mishra, and Dr. Vivek Shrivastav and the title of paper was “Mitigation of oscillation through P&O technique in solar generation”. The conference was organized by Department of Mechanical Engineering, Rajasthan Technical University at Kota during 15-16 June, 2015.
9. One research paper co-authored by Ms. Aditi Pareek and Dr. Lata Gidwani entitled as “Measured data of hourly global solar irradiation using two curve-fitting methods”, was published in *International Research Journal of Engineering and Technology*, vol. 2, no. 04, pp. 202-208, July 2015.
10. One research paper co-authored by Ms. Aditi Pareek and Dr. Lata Gidwani entitled as “Solar irradiation data measurement analyzing techniques” was published in the *International Conference on Renewable Energy and Sustainable Environment* at Pollachi, Tamil Nadu during 10-13 August, 2015.
11. One research paper co-authored by Ms. Aditi Pareek and Dr. Lata Gidwani entitled as “Measured data of daily global solar irradiation using curve-fitting methods” was published in the *International Conference on Energy Systems and Applications* at Pimpri, Pune during 30 Oct-01 Nov, 2015.
12. One research paper co-authored by Mr. Bharat Kumar Saxena and Prof. K.V.S. Rao was presented in the international conference on Progressive Developments in Mechanical Engineering (PDME) under the aegis of *International Conference on Emerging Trends in Engineering, Science and Technology (ICETEST-2015)*. The title of research paper was “Estimation of wind power density at a wind farm site located in western Rajasthan region of India”. The conference was organized by Government Engineering College at Thrissur, Kerala during 09-11 December, 2015.
13. One research paper co-authored by Ms. Tahira Bano and Prof. K.V.S. Rao was presented in the international conference on Progressive Developments in Mechanical Engineering under the aegis of *International Conference on Emerging Trends in Engineering, Science and Technology (ICETEST-2015)*. The title of paper was “Levelized electricity cost of five solar photovoltaic plants of different capacities”. The conference was organized by Government Engineering College at Thrissur, Kerala during 09-11 December, 2015.
14. One research paper co-authored by Mr. Sachin Jain and Dr. Namrata Sengar entitled as “A study of variation in temperature profile of load with change in absorber base plate materials for hot box solar cookers,” was poster presented in national conference on *Advanced Functional Materials and their Application 2015, (AFMA)* during 11-12 December, 2015. The conference was organized by Govt. Women Engineering College, Ajmer.



B. Research Papers Accepted for Publication in Journals & Conferences:

1. Four research papers were accepted for presentation in *IEEE International Conference on Power & Energy Systems: Towards Sustainable Energy-2016 (PESTSE)* at Amrita University, Bengaluru Campus. The conference will be held during 21-23 January, 2016 at Bengaluru. Mr. Shahid Ali Khan paper title is “Relevance of power from small wind turbines: A case study for torque-speed characteristics of small vertical axis wind turbine for Kota region of Rajasthan”. Mr. Sagar Patel paper title is “Social acceptance of a biomass plant in India”. Ms. Sonali Chundawat paper title is “Levelized electricity cost of two grid connected biomass power plants”. And Ms. Tahira Bano paper title is “The effect of solar PV module price and capital cost on the levelized electricity cost of the solar PV power plant in the context of India”.



VISIT OF M.TECH. (RET) STUDENTS TO 10 MW SOLAR POWER PLANT AT KOLAYAT, BIKANER



C. Workshops/Conferences Attended:

1. Mr. Rakesh Kumar Dabkeya attended the *International Conference on Recent Advances in Bio-Energy Research (ICRABR)* during 14-17 March, 2015 at SSS NIRE, Kapurthala, Punjab.
2. Five students namely Mr. Sagar Patel, Mr. Akshay Lele, Mr. Dhanesh Jain, Mr. Norat Mal Swarankar, and Mr. Royal Roshan along with Prof. K.V.S. Rao participated in international conference ICETEST 2015 at Thrissur, Kerala during 09-11 December, 2015.
3. Ten students of M.Tech (RET) semester I, attended national conference on *Advanced Functional Materials and their Application 2015, (AFMA)* during 11-12 December, 2015. The conference was organized by Govt. Women Engineering College, Ajmer.



PAPER PRESENTATIONS IN INTERNATIONAL CONFERENCE ON PROGRESSIVE DEVELOPMENTS IN MECHANICAL ENGG. UNDER ICETEST-2015 AT GOVT. ENGG. COLLEGE, THRISSUR, KERALA



D. Industrial Visits and Educational Tours Conducted:

1. Eighteen students, namely Mr. Ankur Kumar, Ms. Aditi Pareek, Ms. Divya Modani, Mr. Gaurav Sen, Ms. Nishi Swal, Mr. Rakesh Kumar Dabkeya, Mr. Sagar Patel, Ms. Sonali Singh, Ms. Tahira Bano, Mr. Akshay Lele, Ms. Ayushi Khandelwal, Mr. Dhanesh Jain, Ms. Gitika Dadhich, Mr. Norat Mal Swarankar, Mr. Rajendra Kumar, Mr. Ronak Sharma, Mr. Royal Roshan and Mr. Santosh Kumar Saraswat visited solar power plant of NVR Infrastructure Pvt. Ltd. (Atha group) at Kolayat (Bikaner) on 16th April, 2015. They also visited wind farms of Inox Wind at Dangri (Pokhran) on 17th April, 2015. On 18th April, 2015, students visited wind farms of Suzlon Energy Ltd. at Jaisalmer.
2. Five students namely Mr. Sagar Patel, Mr. Akshay Lele, Mr. Dhanesh Jain, Mr. Norat Mal Swarankar, and Mr. Royal Roshan along with Prof. K.V.S. Rao visited Vivekananda Kendra in Kanyakumari, Wind Turbine Test Station and wind farms at Kayathar, and Kudankulam Nuclear power project at Kudankulam near Kanyakumari, Tamil Nadu, during 12-20 December, 2015.

E. Workshop Organized

Two days national workshop on “*Simulation based engineering science: A scientific approach to Engineering*” was jointly organized by MNIT, Jaipur and RTU, Kota on 20-21 April, 2015 at MNIT Jaipur. Prof. J.S. Rao and Prof. I. K. Bhat were the eminent speakers of conference. Dr. K.V.S. Rao, Head, Centre for Energy and Environment, RTU was the convener of workshop.

F. Expert Lectures Organized at the Department

Prof. S. L. Soni from MNIT Jaipur was invited to deliver the expert lecture on *Alternate fuels for IC Engines* at the department on 04th April, 2015.



VISIT OF M.TECH. (RET) STUDENTS TO NUCLEAR POWER PLANT AT KUDANKULAM, TAMIL NADU



G. Seminars Presented by Students at the Department:

Following students of M.Tech. (Renewable Energy Technology) third semester 2013-2015 batch, presented their seminars on 31st March, 2015 and submitted seminar report as per the requirement of M.Tech third semester:

S. No.	Roll No.	Students Name	Seminar Topics	Seminar Guides
1.	13ECERE600	Aamir Khan	Solar energy policies: Central and state perspectives	Dr. Namrata Sengar
2.	13ECERE601	Aditi Pareek	Measuring & collecting data from solar system	Dr. Lata Gidwani
3.	13ECERE602	Ankur Kumar	Improving stability in wind energy conversion system	Dr. Lata Gidwani
4.	13ECERE604	Divya Modani	Maximum power point tracking for photovoltaic panels	Dr. Vivek Shrivastav
5.	13ECERE606	Gaurav Sen	High altitude wind energy system application	Dr. K. V. S. Rao
6.	13ECERE607	Manpreet Kaur	Electricity production in Rajasthan through various sources	Dr. Namrata Sengar
7.	13ECERE608	Nishi Swal	Performance of solar cell	Dr. Vivek Shrivastav
8.	13ECERE609	Rakesh Kr. Dabkeya	Application of biomass gasifiers	Dr. Mahendra Lalwani
9.	13ECERE610	Sagar Patel	Social acceptability of renewable energy technology	Dr. K. V. S. Rao
10.	13ECERE613	Sonali Singh Chundawat	Optimization of parameters of solar chimney power plant	Dr. K. V. S. Rao
11.	13ECERE614	Tahira Bano	Optimization of solar systems	Dr. K. V. S. Rao



VISIT OF M.TECH. (RET) STUDENTS TO WIND TURBINE TEST STATION AT KAYATHAR, TAMIL NADU



DEPARTMENT OF RENEWABLE ENERGY

Following students of M.Tech. (Renewable Energy Technology) third semester 2014-2016 batch, presented their seminars on 07th November 2015 in the department:

S. No.	Roll No.	Students Name	Seminar Topics	Seminar Guides
1.	14ECERE601	Akshay Lele	Application of MCFC for CO ₂ capture from different industries.	Mr. B.K. Saxena
2.	14ECERE603	Ayushi Khandelwal	Hydrogen production methods and their comparison.	Mr. B.K. Saxena
3.	14ECERE604	Dhanesh Jain	Fault analysis methods of solar photo voltaic power plant.	Mr. B.K. Saxena
4.	14ECERE605	Gitika Dadhich	Achieving 100% renewable energy system economy via smart energy system.	Mr. B.K. Saxena
5.	14ECERE606	Jyoti	Vertical axis wind turbines.	Mr. B.K. Saxena
6.	14ECERE608	Norat Mal Swarnkar	A comparative study of MPPT of a solar PV system.	Prof. K.V.S. Rao
7.	14ECERE611	Rajendra Kumar	Study of wind speed and power forecasting methods.	Prof. K.V.S. Rao
8.	14ECERE612	Ronak Sharma	Study and analysis of Protection Techniques available for smart grids supplied by wind farms.	Prof. K.V.S. Rao
9.	14ECERE613	Royal Roshan	Status of renewable energy in SAARC countries.	Prof. K.V.S. Rao
10.	14ECERE614	Sandeep Singh Bhullar	Plug-in hybrid electric vehicles.	Prof. K.V.S. Rao
11.	14ECERE615	Santosh Kumar Saraswat	Photovoltaic thermal system.	Prof. K.V.S. Rao



PARTICIPATION OF M.TECH. (RET) STUDENTS IN AFMA-2015 AT GOVT. WOMEN ENGG. COLLEGE, AJMER



H. Thesis Examination and Viva-Voce Conducted at the Department :

M.Tech. dissertation examinations of Ms. Kumari Sanno and Ms. Zainab Akhtar were held on 04th April, 2015 in the department. Ms. Kumari Sanno's thesis title was "*Effect of air density on estimation of wind power extraction of kites flying at high altitudes: Comparison of five mathematical models*" and Ms. Zainab Akhtar's thesis title was "*Study of feasibility of solar chimney power plant in India*". Both the theses were done under the supervision of Prof. K. V. S. Rao.

M.Tech. dissertation examinations of Mr. Shahid Ali Khan and Mr. Sachin Jain were held on 21st November, 2015 in the department. Mr. Shahid Ali Khan's thesis title was "*Torque-Speed Characteristics of Small Vertical Axis Wind Turbine for Kota Region*" and it was done under the supervision of Prof. K. V. S. Rao. Mr. Sachin Jain's thesis title was "*Comparative Theoretical and Experimental Studies of Hot Box Solar Cookers of Three Different Shapes and Different Absorber Surfaces*". It was done under the supervision of Dr. Namrata Sengar and Prof. K. V. S. Rao.

III. Summary of the Annual Report

- One research paper was published as an online open access paper in a *SpringerOpen* Journal "*Renewables: Wind, Water, and Solar*".
- One research paper was presented in an International Conference at Kalavakkam, Chennai and was made available online in Applied Mechanics and Materials.
- One research paper was presented in an International Conference at Tiruvannamalai, Tamil Nadu.
- One research paper was presented in an International Conference at Mumbai and is available online on *IEEE Xplore Digital Library*.
- One research paper was published in International Journal of Science, Environment, and Technology.
- One research paper was presented in an International Conference at Kollam, Kerala and is available online on *IEEE Xplore Digital Library*.
- One research paper was published in International Journal of Wind and Renewable Energy.
- One research paper was presented in an International Conference at Kota, Rajasthan
- One research paper was published in International Research Journal of Engineering and Technology.
- One research paper was published in International conference at Pollachi, Tamil Nadu.
- One research paper was presented in an International Conference at Pune.
- Two research papers were presented in an International Conference at Thrissur, Kerala.
- One paper poster was presented in a national conference at Ajmer.
- Thus during the year 2015, Department has published fourteen papers.
- Students of the department participated in three different conferences/ workshops and two educational tours during this year.
- Department has jointly organized with the Mechanical Department of MNIT, a two days national level workshop on 20-21th April 2015 at MNIT, Jaipur.
- Four students completed their M.Tech. (RET) programme in the year 2015.



DEPARTMENT OF RENEWABLE ENERGY



PARTICIPATION IN PDME-2015 AT GOVT. ENGG. COLLEGE, THRISSUR, KERALA



VISIT OF M.TECH. (RET) STUDENTS TO 200 MW INOX WIND FARM AT DANGRI (POKHRAN) IN JAISALMER, RAJASTHAN