



सत्यमेव जयते

Ministry of New and  
Renewable Energy  
Government of India

# Renewable Energy Akshay Urja

[www.mnre.gov.in](http://www.mnre.gov.in)

## Green Building MOVEMENT





# WORLD

## RENEWABLE ENERGY TECHNOLOGY CONGRESS Third International Conference and Exhibition 25-27 April 2012 at New Delhi, India



Under the aegis of



*For better life on a greener planet*

**Energy And Environment Foundation**

Organised by



**FOCUS ON THE  
FUTURE**

Second World Renewable Energy Technology Congress and Expo held at Hotel LeMeridien New Delhi from 21st to 23rd April 2011 was a grand success. The congress was attended by 325 delegates, dignitaries and speakers from 33 countries.

### The most inspiring international platform for the global renewable energy sector

25<sup>th</sup> - 27<sup>th</sup>  
April, 2012  
New Delhi  
India

Join us at WRETC 2012, our third annual conference and exhibition. Three days of conference sessions, exhibition and side events will examine and address industry developments in renewable energy sector.

- Registration now open
- Sponsorship options available
- Book your exhibition space



**WRETC Secretariat**

F1-F2, Pankaj Grand Plaza, CSC Complex, Mayur Vihar-I, Delhi-110091, India • Tel: +91 11 24538318. Fax: +91 11 43019379

**Dr. Anil K Garg**, President - World Renewable Energy Technology Congress & Expo-2012

Cell : +91 9971500028 / 9999071071 / 9910135500 • E-mail : dranilgarg2011@gmail.com, dranilgarg@wretc.in

**Punit Singh** : +91 9213901510 • E-mail: punit.nagi@wretc.in

[www.wretc.in](http://www.wretc.in)

A bi-monthly newsletter of the Ministry of New and Renewable Energy, Government of India (Published in English and Hindi)

**Chief Patron**

**Dr Farooq Abdullah**

Minister for New and Renewable Energy, New Delhi

**Patron**

**Deepak Gupta**

Secretary, MNRE, New Delhi

**Editor**

**Dr Arun K Tripathi,**

MNRE, New Delhi

**Editorial Board**

N P Singh, Chairman

Bibek Bandyopadhyay

Praveen Saxena

B Bhargava

D K Khare

B S Negi

D Majumdar

R K Vimal

**Production team**

Sulagna Chattopadhyay, N Prasad, D K Das, Anil Panwar, Nilesh Kumar, IPP Ltd., New Delhi; N Chatterjee, Hon Consultant; N Ghatak, MNRE, New Delhi

**Editorial office**

**Dr Arun K Tripathi,**

Editor, Akshay Urja  
MNRE, Block No. 14, CGO Complex,  
Lodhi Road New Delhi - 110 003  
Tel. +91 11 2436 3035, 2436 0707  
Fax +91 11 2436 3035  
E-mail: akshayurja@nic.in  
Web: www.mnre.gov.in

**Produced by**

**Iris Publication Pvt. Ltd.**

111/9 KG, Aruna Asaf Ali Marg,  
Vasant Kunj, New Delhi -110 070  
Telefax. +91 11 2612 2789, 2689 2275  
E-mail: ipplimited@yahoo.co.in  
Web: www.geographyandyou.com

**Publisher and Printer**

Ministry of New and Renewable Energy,  
New Delhi

**Cover Photos:** GRIHA rated buildings-IIT, Kanpur (T) Unilever, Mumbai, (BL), Fortis, Delhi, (BC) and Suzlon, Pune (BR).

**Disclaimer:** The views expressed by authors including those of the editor in this newsletter are not necessarily the views of the MNRE.

# From the Editor's Desk

## Dear Readers,

At present India is experiencing heavy construction activities in all spheres, which in turn is leading to an increase in the demand for energy. This is due to rapidly growing urbanisation and the increasing affordability of the people. Buildings are major consumers of energy in their construction, operation and maintenance. Globally, about 40 per cent of energy consumption is estimated to be in the building sector.

A Green Building depletes the natural resources to a minimum during its construction and operation, minimises the demand on fossil fuel based energy, maximises the recycle, reuse, renewable energy and energy efficient devices and appliances. It utilises energy efficient building materials, besides, it takes care of water conservation, waste management, energy conservation etc. Green Buildings promote the use of renewable energy systems i.e. solar water heating systems, rooftop PV system, waste recycling for energy generation etc.

Building rating systems are a popular tool for measurement of the greenness of a building under certain guidelines. At present two green building rating systems are in vogue in our country. One is LEED-India which gives buildings ratings of Platinum, Gold, Silver or LEED-certified and the other is the GRIHA rating system which rates buildings on a 1 to 5 star scale, with 5 stars signifying the most energy efficient green buildings.

CPWD, the largest construction Department of the Government of India, has decided to have their future constructions GRIHA rated. Although the government is making efforts to promote Green Building construction in the country, it may not be enough. The support of the private builders and individual house owners is crucial. There is utmost need that all buildings constructed in the future should be green buildings only.

This issue of Akshay Urja has been put together around the theme of Green Buildings. I am sure it will benefit and sensitize you all towards the importance of Green Building construction. Well experienced Green Building and sustainable construction professionals have contributed their wealth of ideas for the issue. Please send your opinions and reactions to enable us to make Akshay Urja a more informative and meaningful publication.



ARUN K TRIPATHI  
<aktrpathi@nic.in>

Published, printed and edited for and on behalf of the Ministry of New and Renewable Energy, Government of India, from B-14, CGO Complex, Lodhi Road, New Delhi, by Dr Arun Kumar Tripathi. Printed at Aravali Printers & Publishers (P) Ltd. W-30, Okhla Industrial Area, Phase II, New Delhi - 110 020, India

I am very much interested in getting the Akshay Urja newsletter as it is very educative. I got a copy of the last issue of the magazine from my friend and it was a great help to me to make projects on the subject of solar and other non conventional energy sources. The project information which I got from this magazine was highly appreciated by others. I therefore request you to regularly send a copy of the bimonthly newsletter/ annual reports to me.

**Khyaati Mittal,  
Mayur Vihar, Delhi**

I came across the Akshay Urja newsletter and found it very interesting and informative. I would like to receive the newsletter regularly, please let me know how I can subscribe to it.

**R A K S Ramalingam,  
Erode, Tamil Nadu**

I would like to receive the Akshay Urja newsletter as I have found it to be very relevant and informative.

**Rambabu Kumar  
rambabu9576@gmail.com**

Please include the name of our company in the subscription/ mailing list of the esteemed publication - Akshay Urja newsletter. We would like to start receiving the newsletter immediately and would appreciate if we could get copies of the last two issues of the newsletter as well.

**Director, World Solar Power Private  
Ltd, solar@worldsolar.in**

Our office in Assam is dedicated to the development of one remote district in an extreme corner of the north eastern part of the country. The Akshay Urja newsletter will help us to learn about and popularise new and non renewable energy technology among the large undeveloped rural population of the district. We therefore request you to kindly send us a copy of the newsletter regularly.

**L D M, United Bank of India  
Tinsukia District, Assam**

I am an engineer and have been dedicated to the cause of renewable energy for the last many years. Currently I am involved in establishing biomass briquette plants and conversion of industrial boilers into briquette ones. I am a life member of the Millennium Institute of Energy and Environment. I would like an annual subscription to the Akshay Urja newsletter and kindly request you to do the needful for the same.

**Bijan Bhattacharjee  
bhattacharjee\_bijan@yahoo.co.in**

Thank you very much for sending me Volume 4, Issue 2 & 3, December 2010 of the Akshay Urja newsletter. I have found this bi-monthly newsletter of the Ministry of New and Renewable Energy, Government of India very pertinent as it gives a lot of information regarding renewable energy. Also, I recently bought your book 'Multiple choice Questions on Energy' from

TERI Press and would like to congratulate you on writing such an educative and good book. I look forward to receiving the Akshay Urja newsletter regularly.

**Er Anirudra Prasad Yadav, MIE  
Kathmandu, Nepal**

निवेदन है कि हमारे द्वारा ग्रामीणों को समर्पित पत्रिका ग्राम समृद्धि का प्रकाशन किया जा रहा है। पत्रिका में ग्रामीणों के लिए बनायी जा रही कल्याणकारी योजनाओं का विस्तृत विवरण और उससे संबंधित आवेदन पत्रों का प्रकाशन किया जा रहा है। कृपया पत्रिका अक्षय ऊर्जा (हिन्दी संस्करण) हमारे पत्र में दिए गए पते पर भेजने की कृपा करें। यदि संभव हो तो अक्षय ऊर्जा के हिन्दी संस्करण के पिछले अंक भी भेजने की कृपा करें।

**डॉ. संदीप नारद  
सम्पादक, ग्राम समृद्धि**

आपके कार्यालय द्वारा प्रकाशित 'अक्षय ऊर्जा' पत्रिका को हमें भेजने का कष्ट करें, और इस पत्रिका का प्रत्येक अंक भेजे। इसके लिए मैं सदा आपका आभारी रहूंगा।

**असमी कुमार खां  
बिरसानगर जमशेदपुर, झारखंड**

आपकी पत्रिका अक्षय ऊर्जा पढ़ने को मिली, पढ़कर बड़ी खुशी हुई कि पत्रिका में प्राकृतिक संसाधन को बचाने के बारे में तथा ऊर्जा के नये स्रोत काम में लाने के बारे में बताया गया है। इस पत्रिका के आने से सौर ऊर्जा, पवन ऊर्जा एवं जैविक ऊर्जा के क्षेत्र में मंत्रालय द्वारा नए-नए शोध अध्ययन, उपाय एवं मिलने वाले स्थान और ऊर्जा के बारे में होने वाले नियमों, शर्तों आदि के बारे में पूरी जानकारी मिलेगी और उसका लाभ हमारे सतना जिले के सभी जनवासियों को होगा।

**दीपक कुमार बुधौलिया  
सतना, मध्य प्रदेश**

**Dear Reader,** Thank you very much for your encouragement. The editorial team of Akshay Urja will make every effort to make this newsletter highly informative and useful to all our readers. We welcome your suggestions and valuable comments to make further improvements in terms of content and presentation. **Editor: Akshay Urja**



## RE News

### National 4-7

- Solar energy based telecom towers
- JV planned in Russia for Solar PV cells
- RRB Energy wind electric generators
- Su-Kam Power to make solar invertors
- Bio waste gasifier
- Zero Energy Building
- Business meet on ETC based solar water heating system at SPRERI
- IFC and GERMI pact for solar power project
- Solar energy to power Gurgaon by 2012
- First floating solar energy plant in India
- Accolade: Mr S K Shukla shortlisted for 'Zayed Future Energy Prize'
- Moventas to set up base in India
- World Bank keen to partner India
- Asian Green City Index rankings
- Nakoda commences wind power plant
- India to cut greenhouse gas emissions by 2020
- Trading begins for Renewable Energy credits
- Solar Mission projects could see ban on imported equipment
- Penalties collected from discoms to help promote wind energy
- IREDA and MNRE sign MoU
- District gets its first solar biometric ATM

### International 8-9

- World Green Building week
- Willing to pay more for green space
- Advanced thin film solar panels
- Solar ambassadors share stories
- Cheaper, more efficient solar cells
- Solar installations on water
- Green Building, Renewable Energy Directories launched
- Largest cogeneration power plant in Mexico
- Indonesia begins embracing wind power
- GE acquires rights to build tall wind towers
- Wind and solar energy growth
- Solar thermal energy calculation



### Cover Story

**10** Building a momentum: Green buildings

### MNRE Event

**18** Development of solar cities: Agra  
**19** Integrating green building concepts in public works  
**20** Rashtriya Urja Jana-Jagriti Abhiyan

### RE Feature

**24** Green building policy and codes  
**33** BEE Star rating for buildings  
**36** Sustainable architecture  
**38** Green building initiatives in India

**44** Tirupati: The green temple

### Case Study

**30** Building a green campus  
**41** Green IRRAD building  
**46** Greening through natural ventilation

**21** RE New Tech

**22** RE Tech Updates

**28** Opinion

**48** RE Term Power

**49** Children's Corner

**50** Web and Book Alert

**51** Forthcoming Events

**52** RE at a Glance



The environment friendly construction techniques and mechanical systems used in the building cost no more than their conventional energy intensive counterparts.



Improvements in energy efficiency are the key to unlocking massive carbon reduction potential. The industry still has some way to go before it can impact the planet.



There was a realisation that simply making green buildings that are efficient users of water, energy and materials would not create a green campus.