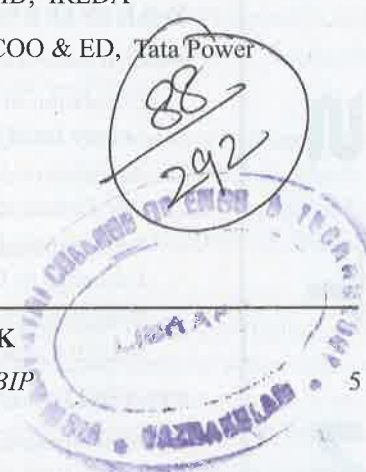


# CENTRAL BOARD OF IRRIGATION & POWER OFFICE BEARERS

<b>President</b>	:	<b>Mr. S. Masood Husain</b> , Former Chairman, CWC
<b>(i) Vice President</b>	:	<b>Mr. P.S. Mhaske</b> , Chairperson, CEA
<b>(ii) Vice President</b>	:	<b>Mr. K.S. Popli</b> , Former CMD, IREDA
<b>(iii) Vice President</b>	:	<b>Mr. Ashok Sethi</b> , Former COO & ED, Tata Power
<b>Secretary</b>	:	<b>Mr. V.K. Kanjlia</b>
<b>Director</b>	:	<b>Mr. P.P. Wahi</b>
<b>Director (WR)</b>	:	<b>Dr. G.P. Patel</b>
<b>Director (Energy)</b>	:	<b>Mr. A.K. Bhatnagar</b>



- The statements and opinions expressed in this Journal are not necessarily of Central Board of Irrigation & Power.
- Reproduction of articles from Water and Energy International is subject to approval of the Editor.
- Interested authors from India and abroad are requested to contribute their articles to this Journal and send the same to Secretary, Central Board of Irrigation & Power, well in advance.

All communications should be addressed to :

Secretary  
Central Board of Irrigation & Power  
Malcha Marg, Chanakyapuri  
New Delhi 110 021  
Ph. : 91-11-2611 5984  
Fax : 91-11-2611 6347  
E-mail : [cbip@cbip.org](mailto:cbip@cbip.org)  
Website : [www.cbip.org](http://www.cbip.org)

**Total Pages 84**

Monthly Subscription ₹ 200/-  
Annual Subscription ₹ 2400/-

### FROM EDITOR'S DESK

**V.K. Kanjlia**, Secretary, CBIP

### NEWS LETTER

#### Energy Section

- International Conference on Energy Storage (including Pumped Storage), 27-28 June 2019, New Delhi 6
- Energy Section**
- Need for Grid Flexibility, International Experiences & Applications in the Indian Context – *R.N. Nayak* 14
- Flow Batteries : The Most Promising Stationary Energy Storage Battery Technology – *Sachin Gupta* 18
- Second Life of Li-ion Batteries of Electrical Vehicles in Grid Connected Energy Storage Applications  
– *R.K. Chauhan, Dr. Subir Sen, Manish Kumar Tiwari and Ankur Chakraborty* 24
- Future of Energy Storage in India  
– *Dr. Rahul Walawalkar* 27
- Battery Energy Storage System – Case Study by Tata Power DDL – *R.K. Rastogi, Nilesh Kane and Karunakar Jha* 30

### INTERNATIONAL EDITORIAL ADVISORY BOARD

**V.C. Patel** - Distinguished Professor and Director,  
University of IOWA, U.S.A.

**Donggi Zuo** - Prof. & President's Advisor of Hohai University,  
Ministry of Water Resources, People's Rep. of China,

**K.G. Ranga Raju** - Former Professor of Civil Engineering  
University of Roorkee (Now IIT Roorkee)

**Secretary General**, CIGRE, France,

**Jose M. Martin Mendiluce** - Doctor Ingeniero de  
Carminos ASINC, S.L., Spain,

**Alison Bartle** - Editor, Aqua-Media International Ltd.,  
United Kingdom.

Publisher, Printer and Editor Mr. V.K. Kanjlia on behalf of Central Board of Irrigation and Power, Printed at M/s Chandu Press, D-97, Shakarpur, Delhi, published from Central Board of Irrigation and Power, Malcha Marg, Chanakyapuri, New Delhi 110 021

S  
T  
N  
E  
T  
N  
O  
C

# CONTENTS

(contd.)

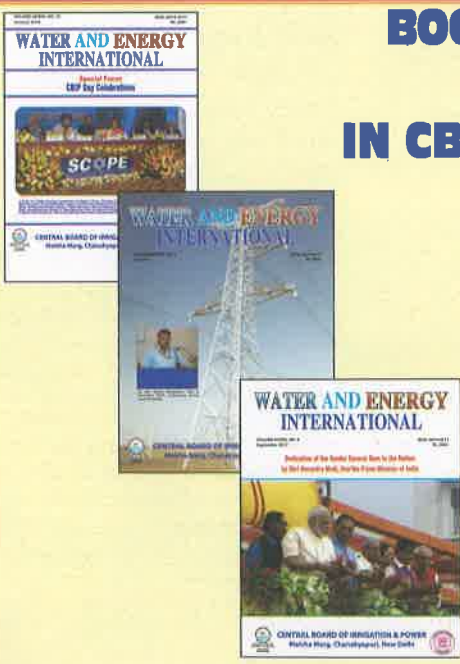
- Energy Storage in the Distribution Grid – <i>Abhishek Ranjan, Sugandhita Wadhera and Naveen Nagpal</i>	35
- Pumped Storage Plants: An Alternative Energy Storage – <i>Madhwi Kumari</i>	37
- Frequently Asked Questions & Answers – (SPARK Ignited to share – A Power Engineers WhatsApp Group)	41
<b>W&amp;E INTERNATIONAL</b>	
<b>Water Resources Section</b>	
- Estimation of Q-value and Deformation Modulus of Rock Mass using Seismic Refraction Survey for Hydropower Project– <i>Senthil P., Alex Varughese, Hari Dev and Nripendra Kumar</i>	48
- Assessment of Ground Water Quality for Rural Areas of Paradeep-City – <i>Hemanta Meher, P.K. Behera, S.N. Panda and Ashish K. Sarangi</i>	52
- Pre Treatment of Raw Water Through the Coagulation Process, Filtration, Absorption, and Ion Exchange in Drinking Water – <i>Setyo Purwoto, Rusdiyantoro and Budi Prijo Sembodo</i>	61
- Economical Analyses of a Canal-Based Hydro Power Project : A Case Study of Sakarda Branch Canal – <i>Shilpesh C. Rana and Jayantilal N. Patel</i>	66
<b>STATISTICAL DATA</b>	
• <i>Water Resources Section</i>	73
• <i>Energy Section</i>	75
<b>WATER &amp; ENERGY ABSTRACTS'</b>	
• <i>Energy Section</i>	77
• <i>Water Resources Section</i>	78
<b>FAR &amp; NEAR IN WATER AND ENERGY</b>	
• <i>News - Energy Section</i>	79
• <i>News - Water Resources Section</i>	82

## BOOK ADVERTISEMENT

### TODAY

## IN CBIP W&E INT. JOURNAL

**(Monthly Issue)**



**Tariff**

Back Cover	Rs. 35,000/-*
2nd/3d Cover	Rs. 25,000/-*
Inner Pages	Rs. 15,000/-*

**\*GST 5% extra**

*For Advertisement Please Contact :*

**Secretary**  
**Central Board of Irrigation and Power**  
 Malcha Marg, Chanakyapuri, New Delhi 110 021  
 Phone: 91-11-26115984/1294/26116567  
 Fax: 91-11-2611 6347 E-mail : [cbip@cbip.org](mailto:cbip@cbip.org)