

# Preface

EESD series provides a forum for accessing to the most up-to-date and authoritative knowledge from both industrial and academic worlds, sharing best practice in the field of energy and environment. The First International Conference on Energy, Environment and Sustainable Development (EESD2011) was held in Shanghai, China, between October 21 and 23, 2011 with the participation of scientists from the Asia-Pacific region, Europe and the United States. The first conference was organized by Shanghai University of Electric Power, Xinjiang University and Hebei United University. Following the success of the inaugural conference, the 2012 International Conference on Energy, Environment and Sustainable Development (EESD 2012) took place in Jilin, China, October 12-14, 2012. This event was organized by Northeast Dianli University and Shanghai University of Electric Power. The conference program covered invited, oral, and poster presentations from scientists working in similar areas to establish platforms for collaborative research projects in this field. This conference brought together academicians, researchers, engineers, policy makers, governmental officials, end users, and people involved in the energy and environmental industries and provided a platform to the participants to present their papers, share their expertise, establish new contacts, and discuss a range of energy and environmental technologies for sustainable development.

This book contains the selected accepted manuscripts from the subject areas of environmental chemistry, biology and technology, environmental materials and processes, environmental safety and health, environmental planning and assessment, environmental analysis, modelling and monitoring, environmental restoration engineering, pollution control (air, water, solid), waste disposal and recycling, water supply and drainage engineering, sound, noise and vibration control, clean production process, hydrology and water resources engineering, architectural environment, soil and water conservation and desertification control, eco-environmental protection, forest cultivation and conservation, plant protection and biotechnology, geographic information and remote sensing science, land resources environment and urban planning. This book provides new information/ methods on possibilities of managing the energy crisis and protecting the environment sustainably in the growing economies to the broader public, especially students and researchers who are interested to involve in the research in this area.

We express our gratitude to the members of the International Scientific Committee for their significant support in organizing the Conference and for reviewing the papers of the participants. We are also grateful to the all invited reviewers as well as to the participants.

***The editors***

The 2nd International Conference on  
Energy, Environment and Sustainable Development  
(EESD 2012)

**Organized by:**

Northeast Dianli University, China

**Co-organized by:**

Shanghai University of Electric Power, China

**Conference Organization**

**Chairman**

Prof. Guoqing Li, Northeast Dianli University, China

**Co-Chairmen**

Prof. Guowei Cai, Northeast Dianli University, China

Prof. Weiguo Pan, Shanghai University of Electric Power, China

Prof. Qunjie Xu, Shanghai University of Electric Power, China

**International Scientific Committee**

Academician Prof. Kefa Cen, Zhejiang University, China

Prof. Hexing Li, Shanghai University of Electric Power, China

Prof. Jun Ma, Harbin Institute of Technology, China

Prof. Dongming Ren, Energy Research Institute National Development and Reform Commission

Prof. Guangjun Wang, Chongqing University, China

Prof. Peihong Wang, Southeast University, China

Prof. Guoqing Li, Northeast Dianli University, China

Prof. Guowei Cai, Northeast Dianli University, China

Prof. Yong Li, Northeast Dianli University, China

Prof. Zhiming Xu, Northeast Dianli University, China

Prof. Jianguo Wang, Northeast Dianli University, China

Prof. Yanzhong Ju, Northeast Dianli University, China

Prof. Gangui Yan, Northeast Dianli University, China

Prof. Mojie Sun, Northeast Dianli University, China

Prof. Xiaohui Guan, Northeast Dianli University, China

Prof. Yingjie Zhang, Northeast Dianli University, China

Prof. Jingli Xu, Shanghai University of Engineering Science, China

Prof. Jinglong Bu, Hebei United University, China

Prof. Wenbin Cai, Fudan University, China

Prof. Zhenqian Chen, Southeast University, China

Prof. Haozhong Cheng, Shanghai Jiao Tong University, China

Prof. Ming Dong, Shanghai Jiao Tong University, China

Prof. Boxue Du, Tianjin University, China

Prof. Yang Fu, Shanghai University of Electric Power, China

Prof. Honghua Ge, Shanghai University of Electric Power, China

Prof. Jingtao Han, University of Science & Technology Beijing, China

Prof. George A . O'Doherty, Northeastern University, USA

Prof. Tetsuro Majima, Osaka University, Japan

Prof. Zhongyang Luo, Zhejiang University, China

Prof. Yunfeng Lu, University of California, Los Angeles, USA

Prof. Jummy C. Yu, The Chinese University of Hong Kong, HK

Prof. Zhengyi Jiang, University of Wollongong, AU

Prof. Yongguang Li, Shanghai University of Electric Power, China

Prof. Boqiang Lin, Xiamen University, China

Prof. Yongdi Liu, East China University of Science and Technology, China

Prof. Lianguang Liu, North China Electric Power University, China

Prof. Xiaoming Jia, Hebei United University, China

Prof. Jianmin Chen, Fudan University, China

Prof. Jinping Jia, Shanghai Jiaotong University, China

Prof. Xuesong Jin, Southwest Jiaotong University, China

Prof. Yongfa Zhu, Qinghua University, China

Prof. Yiming Xu, Zhejiang University, China

Prof. Shaojian Ma, Guangxi University, China

Prof. Sihai Jiao, Research Institute, Baosteel, China

Prof. Dongdong Li, Shanghai University of Electric Power, China

Prof. Yungang Li, Hebei United University, China

Prof. Shanqing Li, Research Institute, Baosteel, China

Prof. Yongchen Lin, Central South University, China

Prof. Xianghua Liu, Northeastern University, China

Prof. Lian'guang Liu, South China Electric Power University

Prof. Zifeng Ma, Shanghai Jiao Tong University, China

Prof. Weiguo Pan, Shanghai University of Electric Power, China

Prof. Jianxing Ren, Shanghai University of Electric Power, China

Prof. Shigang Sun, Xiamen University, China

Prof. Wenlei Sun, Xinjiang University, China

Prof. Zhong Tang, Shanghai University of Electric Power, China

Prof. Kaiming Wu, Wuhan University of Science and Technology, China

Prof. Jun Wang, Northeastern University, China

Prof. Fushuan Wen, Zhejiang University, China

Prof. Qiang Wang, Jinan University, China

Prof. Jiang Wu, Shanghai University of Electric Power, China

Prof. Yongyao Xia, Fudan University, China

Prof. Qunjie Xu, Shanghai University of Electric Power, China

Prof. Gang Xu, Guangzhou Institute of Energy Conversion, CAS

Prof. Yongping Yang, South China Electric Power University

Prof. Shaohui Yin, Hunan University, China

Prof. Bo Zhang, South China University of China, China

Prof. Hong Zhang, Nanjing University of Technology, China

Prof. Hao Zhang, Shanghai University of Electric Power, China

Prof. Guohua Zhao, Tongji University, China

Prof. Feng Zhao, Institute of Urban Environment, CAS

Prof. Daquan Zhang, Shanghai University of Electric Power, China

Prof. Jianmin Zeng, Guangxi University, China

Prof. Qunzhi Zhu, Shanghai University of Electric Power, China

Prof. Qi Zhou, Tongji University, China

Prof. Junxi Zhang, Shanghai University of Electric Power, China

Prof. Heinz-Gunter, Brokmeier, Technische Universitat Clausthal, Germany

Prof. Sagar Kamarthi, Northeastern University, USA

Prof. Christian Kloc, Nanyang Technological University, Singapore

Prof. George A. O'Doherty, Northeastern University, USA.

Prof. Tetsuro Majima, Osaka University, Japan

Prof. Yunfeng Lu, University of California, Los Angeles, USA

Prof. Jimmy C. Yu, The Chinese University of Hong Kong, Hong Kong

Prof. AKM Nurul Amin, International Islamic University, Malaysia

Dr. Chunsheng Lu, Curtin University of Technology, Australia

Prof. Geun Jo Han, Dong-A University, Korea

Prof. Ken-ichi Manabe, Tokyo Metropolitan University, Japan

Prof. Indra Putra Almanar, Universiti Sains Malaysia

Prof. Kyung-Man Moon, Korea Maritime University, Korea

Prof. Walid Mahmoud Shewakh, Beni Suez university, Egypt

Prof. Christian Kloc, Nanyang Technological University, Singapore

## **Local Organizing Committee**

Prof. Yanzhong Ju, Northeast Dianli University, China

Prof. Gangui Yan, Northeast Dianli University, China

Prof. Mojie Sun, Northeast Dianli University, China

Prof. Yong Li, Northeast Dianli University, China

Prof. Yingjie Zhang, Northeast Dianli University, China