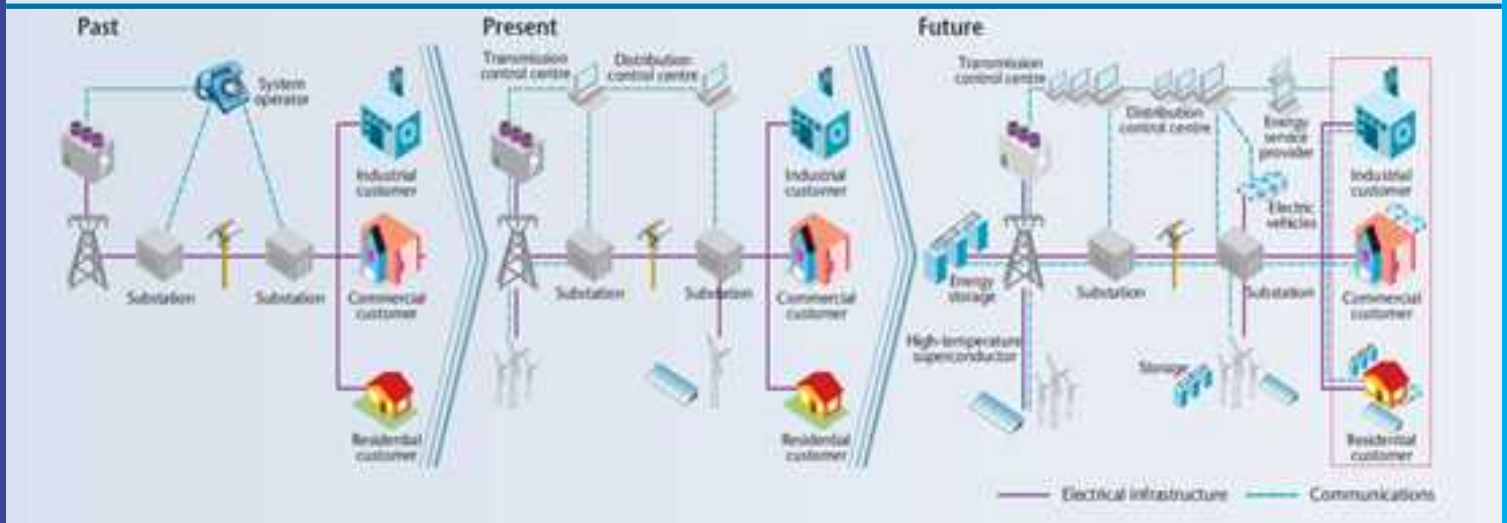


# स्मार्ट ग्रिड - प्रौद्योगिकी एवं अनुप्रयोग पर अल्पावधि पाठ्यक्रम

## Short term course on Smart Grid - Technology and Applications



29 जुलाई से 2 अगस्त तक / July 29 to August 2, 2013



आयोजक / Organised By

विद्युत प्रणाली प्रभाग  
केन्द्रीय विद्युत अनुसंधान संस्थान  
(भारत सरकार की सोसाइटी, विद्युत मंत्रालय)  
प्रो.सर.सी.वी.रामन रोड़, पो.बा.सं. 8066,  
बेंगलूर - 560 080, कर्नाटक, भारत  
Web: [www.cpri.in](http://www.cpri.in)

**Power Systems Division**  
**Central Power Research Institute**  
(Govt. of India Society, Ministry of Power)  
Prof. Sir. C.V. Raman Road, Post Box No. 8066  
Sadashivanagar Post Office,  
Bengaluru – 560 0080, Karnataka, India  
web:[www.cpri.in](http://www.cpri.in)

## ABOUT THE COURSE

All over the world power systems are facing radical change, to replace ageing assets and to make effective use of rapidly developing information and Communication technologies (ICTs). A new approach is needed that increases the efficiency significantly of the entire electrical delivery system but also increases the reliability of the system; reduce the green house emissions also. This new approach is Smart Grid. The smart Grid is an electric power network that utilizes two-way communication and control-technologies to cost efficiently integrate the behavior and actions of all users connected to it. The Smart Grid also allows a much greater utilization of Renewable sources.

A smart grid impacts all the components of a power system. Generation is likely to change with a drive towards more renewable and distributed generation. Of course, some renewables like wind farms are large scale and interface with transmission networks, but many renewable are small-scale, and hence appropriate for interconnecting at the distribution level. Other changes in a distribution system include greater automation and switching, allowing for more physical control over which lines are opened or closed. Smart systems also allow better use of variable capacitor banks or static VAR compensators, automatic reclosers etc.

Transmission will change in a smart grid with several upcoming technologies. First is the use of phasor measurement units (PMUs), which can precisely measure the state of a power grid. This is useful for preventing sudden blackouts or widespread failures. With PMUs in place, we can more safely increase the power transfer capacity while simultaneously knowing more about the risks of wide area grid level failures. The other major change in transmission systems may come from the use of Flexible AC Transmission Systems (FACTS). However, much of the smart grid focus in a power system is at the distribution level. For starters, this is where consumption occurs. Demand is also what drives supply, so managing consumption helps the overall system. It is also the space requiring most effort given the vast distribution of customers and the highly heterogeneous systems typically in place.

Ministry of Power, Government of India has taken different initiatives in the direction of development of Smart Grid technologies in the Indian Power Sector.



## TOPICS

The following topics will be covered in the course;

- \* Smart Grid – Architectures and Models
- \* Demand Response
- \* Power Quality (PQ) issues in Smart Grid
- \* Communication technologies for the Smart Grid
- \* Power Electronics in Smart Grid
- \* Advanced Metering Infrastructure
- \* Trends in Substation Automation-IEC 61850
- \* Grid Integration of Renewable Energy Sources
- \* Smart Grid - Energy Efficiency & Energy conservation
- \* Real Time Digital Simulator for Smart Grid application
- \* Cyber, physical and System Security of Smart Grid
- \* Smart Grid pilot project - Case studies
- \* Distribution and Demand side Management system
- \* Distribution Network Automation-SCADA Systems
- \* Data communications for the Smart Grid
- \* Smart Grid - Standards and Interoperability
- \* FACTs & HVDC Technologies for the Smart Grid
- \* Role of Protective Relaying in the Smart Grid
- \* PMUs and Wide Area Monitoring. Protection and Control (WAMPAC)
- \* PHEVs and Energy storage technologies
- \* Role of Micro grid in Smart Grid
- \* Power trading, market regulation and policies

## WHO SHOULD ATTEND?

The course is aimed at Engineers, Managers responsible for the operation and maintenance of power generation systems, Transmission systems, Distribution systems, Genco's, Transco's, Discoms, transmission planners, consultants, Officers of Power Utilities/Corporations, State Govt./SEBs, Industry professionals, policy makers, entrepreneurs, Energy Planners, Private Entrepreneurs, Manufacturers, consultant, Research/Academic Institutions and Financial Institutions, etc.

## REGISTRATION

Registration fee per participant for the workshop is Rs.25,000/- plus service tax (@12.36%). Group discount for an organization for minimum 3 participants is 10% of the total amount plus service tax and for 4 or more participants is 20% of the total amount plus service tax. Rs. 17,500/- plus service tax (@12.36%) per participant for Utilities/Electricity boards. Rs. 17,500/- plus service tax (@12.36%) per participant for faculty members of Educational institutions & Rs 12,500/- plus service tax (@12.36%) extra per participant for Research scholar/Engg. college students.

Registration form, a part of this brochure, complete in all respect shall be sent to the course coordinator along with the registration fee in the form of crossed DD drawn in favor of Accounts Officer, CPRI, payable at Bangalore.

Participants from international may transfer the fee via Swift code No.: SBININBB425, SBI A/C No. 10270577483, and participant from National may transfer fee to SBI A/C No.10356553310, IFSC code: SBIN0010370. Beneficiary Name: CPRI, Bangalore under intimation to the workshop coordinator.

Kindly use separate form for each participant, Downloaded/ Photo copies of Registration form are acceptable.

The Registration fee includes kit, course material-CD, tea/coffee with snacks and working lunch on both days.

### **TRAVEL & ACCOMMODATION**

- \* Bangalore is well connected by Road, Rail and Air.
- \* Participants have to make their own travel arrangements.
- \* Guest house accommodation on twin share basis can be provided on chargeable basis subject to availability.

### **UTILITY AUTOMATION RESEARCH CENTER / POWER SYSTEMS DIVISION**

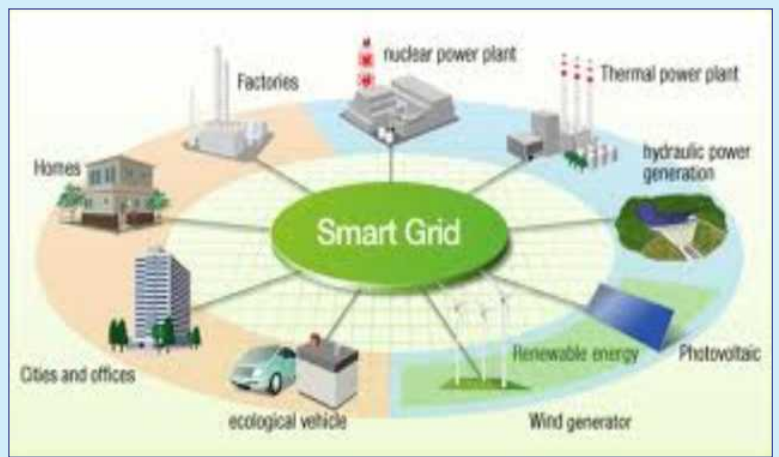
CPRI was awarded the maiden smart grid project in India – The design and development of smart grid pilot for BESCOM supported by USAID. This was followed by Central Power Distribution Company a DISCOM in Andhra Pradesh choosing CPRI as the consultant for their Smart Grid Pilot project. The assignments involved design and development of DPR among other deliverables. CPRI is contributing at the national level Chairman as well as member of working various groups constituted under Smart Grid Task Force and India Smart Grid Forum. CPRI is Chairman of the Working Group on Pilots and Trails in India under the India Smart Grid Task Force. It is also the Chairman of Working Group on Metering under India Smart Grid Forum, Chairman of ETD 13 of BIS on Energy Meter and member of several standardization groups. This laboratory is accredited by UCA IUG as Level A (Third party independent test laboratory).The laboratory services include testing of IEDs for conformance in accordance with IEC 61850, the standard titled "Communication Networks and Systems in Substations".

The protocol laboratory of CPRI is equipped with the facility of conformance testing of IEC 61850 (standard for communication networks and systems in substation) compatible devices. The latest versions of the test tools are used for testing for conformance. This test facility is accredited by Utility Communication Architecture International Users Group (UCA IUG) as Level - A which means CPRI is an independent third party laboratory for testing of server devices for IEC 61850 compliance. CPRI is the first and only Institute in this part of the world to get this accreditation status for IEC 61850 conformance testing. The compliance testing evaluation is carried out to verify that the provisions of DLMS protocol are implemented correctly in the metering device. CPRI has established this comprehensive state-of-the-art Metering Protocol Laboratory for validation. CPRI is a member in DLMS UA (Device Language Message Specification User Association), Geneva. CPRI is empanelled as consultant for SCADA projects under RAPDRP. CPRI is also functioning as SCADA Consultant in Andhra Pradesh and Third Party Independent Evaluation Agency for Energy Accounting (TPIEA-EA) in Karnataka. Besides, CPRI has taken up the important role of initially suggesting standardization in energy meter protocol and more recently, protocol compliance testing of ETV meters meant for R-APDRP Projects.

Power Systems Division with its state-of-the-art facilities and latest software tools offers a wide range of power system simulation services, including real time performance analysis of various types of controllers such as FACTS, HVDC, SVC and protection relays. It has been conducting power system studies for the past two decades for its own needs and at the request of utilities and manufacturers. To carry out such studies the division possesses Real Time Digital Simulator (RTDS), RT Lab and various Power System Analysis Software Packages. Power Systems Division has carried out for the first time in the country the pilot project on "Protection system study and Protection audit" of selected DTL transmission system. Furthermore the Division is accredited by ISO: 9001-2008.

The Relay Testing Laboratory (RTL) is equipped with sophisticated Computerized Relay testing systems for testing of Protection relay for all its characteristics/functions meeting its accuracy requirements as per IS:3231 series and IEC:60255 series of standards. The laboratory conforms to ISO/IEC 17025-2005 requirements. Field testing of protection relays is also carried out for major power stations and utilities and also undertakes pre-dispatch Third Party Inspection (TPI) on Relay and Control panel.

The Relay Testing Laboratory is also established facility for carrying out performance evaluation of Phasor Measurement Unit (PMU) as per Standard IEEE C37.118, 2005.



## CPRI'S Profile

Central Power Research Institute (CPRI) set up in 1960 by the Government of India, functions as a National organization for applied research in power sector and also serves as an Independent Laboratory for testing and certification of power equipment. CPRI is a member of STI (Short Circuit Testing Liaison) of Europe and is accredited by M/s ASTA of UK. CPRI also provides consultancy services on various facets of power sector. CPRI has expertise in the area of Simulation, Diagnostics, System Analysis and Testing. CPRI laboratories have modern equipment needed for Power system simulation, Short circuit testing, Diagnostics of equipment, Materials engineering, Seismic qualification etc. CPRI has experienced faculty in different subjects concerned to power sector with practical experience in their areas of interest, as well as extensive experience in presenting courses/seminars.

Over the period, CPRI officers have gained lot of practical knowledge concerning to testing and operational problems of the industry. CPRI is a leading provider of Training and Continuing Education to Utilities, PSUs across the country for the past 50 years. CPRI is continually setting new standards in training and continuing education from basic theoretical

information to practical hands-on electrical equipment training. CPRI courses have made substantial impact on the level of training and education to India's electricity utilities, manufacturing companies, transmission and distribution companies. By upgrading the occupational skill of technical workers, CPRI training courses have improved the career path of many electrical personnel as well as contributed to an improvement in electricity efficiency, plant productivity, electrical system reliability an overall competitiveness of Indian industry.



**N. Murugesan**, M.Sc (Elec. Engg), MBA (Finance), Post Diploma(Comp.Engg).

He began his career with TNEB in 1978. He worked in CPRI from 1984 to 2008. After a two years' stint with Tata Consulting Engineers, he assumed the charge of Director General of CPRI during March 2010. He has over three decades of association with the power sector in the areas of Power System Simulation studies using HVDC Simulator/TNA, Safety Grounding, Switchgear Testing and Development as per National & International standards, Computer Networking (LAN/WAN), Power System Automation, SCADA, Substation/Distribution Automation, Communication protocol, AMR / AMI / Smart Metering / Grid, etc.



**P. Kaliappan**, B.Sc (Phy), B.Tech (Elect.), M.E. (Instr.)

He has 19 years of experience with CPRI working in the field of Power System Protection. His area of interest includes Synchrophasor Technology & Wide Area Monitoring, Protection & Control (WAMPAC). Presently holding the Post of Engineering Officer Grade 4 with Power Systems Division of CPRI, Bangalore.

*Registration form shall be sent by E-Mail / Fax / Post to*

**Shri. P. Kaliappan**

Co-ordinator

E-Mail: kaliappan@cpri.in, Mobile: +91-9449149924

**Power Systems Division**

**Central Power Research Institute**

(Govt. of India Society, Ministry of Power)

Prof. Sir. C.V. Raman Road, P.B.No. 8066, Bangalore – 560 080, Karnataka, India

Phone: 080 -2360 2919/2360 2829/2360 1454, , Extn: 2446 Fax No.:080 - 2360 4465

Web: www.cpri.in





# REGISTRATION FORM

## CENTRAL POWER RESEARCH INSTITUTE

PROF. SIR. C.V. RAMAN ROAD, PO BOX 8066,  
SADASHIVANAGAR PO, BANGALORE 560 080  
Phone: +91(0)80 2360 4683; Fax: +91(0)80 2360 4683 / 1213

### SHORT TERM COURSE ON “Smart Grid-Technology and Applications”

Date : July 29 to August 2, 2013

Mr. Ms. Mrs. Dr. Prof. Others (please specify) \_\_\_\_\_

Full Name of the Participant \_\_\_\_\_

Designation \_\_\_\_\_ Nationality \_\_\_\_\_

Full address of Organisation \_\_\_\_\_  
(for correspondence) \_\_\_\_\_

Country: \_\_\_\_\_ ZIP/PIN Code: \_\_\_\_\_

Phone/Fax Nos.:(Please Mention Country & STD Code)

Office: \_\_\_\_\_ Res(Optional): \_\_\_\_\_

Fax: \_\_\_\_\_ Mobile/Cell: \_\_\_\_\_

E-mail: \_\_\_\_\_

Enclosed is a Demand Draft No: \_\_\_\_\_ dated \_\_\_\_\_ for Rs. \_\_\_\_\_ drawn on \_\_\_\_\_ bank towards delegate fee drawn in favour of

“Accounts Officer, CPRI” payable at “Bangalore.”

Date: \_\_\_\_\_

Note: Kindly mention your Name, Name of the Company and Name of the workshop behind the Demand Draft

*Completely filled forms & DD shall be sent to:*

Shri N.Murugesan, DG-CPRI &  
Shri P.Kaliappan, Coordinators  
Power Systems Division  
Central Power Research Institute  
Prof. Sir C V Raman Road  
P.B. No. 8066, Bangalore – 560 080  
Karnataka, INDIA  
E-mail: kaliappan@cpri.in

*Delegates may transfer the fee to:*

State Bank of India  
Swift Code No.: SBININBB425  
SBI A/c No.:10270577483 (International)  
SBI A/c No.: 10356553310 (National)  
Beneficiary Name : CPRI, Bangalore  
IFSC code: SBIN0010370

#### CANCELLATIONS & SUBSTITUTIONS

Registration without payment does not confirm the reservation for the event. Request for cancellations must be received in writing, more than 7 working days before the course/conference to get refund. However, Rs.1000/-per delegate will be deducted as handling charges. If the fee has been paid in full, substitutions can be made with prior intimation with no extra cost. In case this event is cancelled, full refund will be made. CPRI reserves the right to postpone or cancel this event.

Kindly use separate form for each participant, downloaded/photocopies of this registration form is acceptable.

**Short term course**  
**on**  
**Smart Grid - Technology and Applications**

**July 29 to August 2, 2013**

To,



*Organised By*  
**Power Systems Division**  
**Central Power Research Institute**  
(Govt. of India Society, Ministry of Power)  
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