

# International Tutorial (Online)

Under the aegis of CIGRE NSC B4 on DC Systems & Power Electronics

17 – 18 December 2020

Day 1 - Topic

Technology Selection and Specification of HVDC

Day 2 - Topic

Protection and local control of HVDC grids

## TIMINGS

Tutorial-1

17:00 – 18:30 hrs.

Tutorial-2

15:00 – 16:30 hrs.

## CIGRE INTERNATIONAL SPEAKERS

### TUTORIAL 1



MR. BRUNO BISEWSKI  
CANADA

### TUTORIAL 2



MR. KEES KOREMAN  
NETHERLANDS



MR. WILLEM LETERME  
BELGIUM

### TAKEAWAYS

The key factors that the participant will take away from the tutorial is an understanding of the many considerations encountered when planning and specifying an HVDC system that will meet the requirements of the project. The material presented is based on long time experience on many projects in many countries will cover practical questions encountered while planning a new HVDC project including technology selection, cost, footprint, losses, maximum rating, and fault recovery performance that may be decisive in the selection of one technology as well as other factors which may not be decisive but could still influence the decision in favour of one technology over the other.

The tutorial will also cover selected topics related to specification of both LCC and VSC technology including ratings, performance requirements and testing.

#### JOIN CIGRE TO CONNECT WITH GLOBAL POWER SYSTEM COMMUNITY

Please Contact:-

Mr. Vishan Dutt, Chief Manager-Tech., CIGRE-India

Mob: 9811431554, E-mail: [vishandutt@cbip.org](mailto:vishandutt@cbip.org)

### TAKEAWAYS

The webinar will inform the participants about protection and local control systems in HVDC grids. First, the fault response of converters with and without fault blocking capability is compared. Then, various strategies for clearing DC-side faults are discussed. Examples of short circuit calculations examples are given for both monopole and bipole HVDC grids. Thereafter, various principles in fault detection and localisation are explained and compared. Finally, the basic operation of DC Circuit Breakers is described.

Participants will get:

- Information about the different HVDC converter technologies.
- Short circuit phenomena in DC grids.
- Basic requirements on protection and local control.
- Fault clearance strategies.
- Protection system components such as measurement and detection systems.
- DC Circuit Breakers and fault localisation techniques.

The obtained knowledge can be used in the future development, engineering, design and operation of meshed DC networks, both offshore and onshore. It will allow for the design of protection systems including the selection of fault clearance strategies that will be applied.

ORGANIZER



IN ASSOCIATION WITH



TUTORIAL CONDUCTED ON



## ABOUT INTERNATIONAL SPEAKERS



**Bruno Bisewski** is an HVDC and EHV-AC Specialist with more than thirty-five year's experience in all aspects of the electrical transmission industry. He has wide experience in front-end engineering system studies and equipment design studies, preparation of specifications, calculation of electrical effects, design review, cost estimates, tender evaluation and negotiation, equipment testing and commissioning of AC and HVDC transmission systems.

Mr. Bisewski has worked on many HVDC projects in all aspects from front end engineering and project conceptualization down to design review, factory testing and detailed design including development of specialized software for HVDC studies and design. He has also provided engineering services for implementation of reactive compensation and FACTS projects including ac line series capacitors and shunt reactors, SVC, STATCOM and synchronous condensers.



**Kees Koreman** received his master degree electrical engineering in 1980 at the Eindhoven University of Technology. He joined KEMA in the electrical research department where he became the Principal Protection Engineer. In 1990 he joined TenneT as lead Protection and Local Control. In 1994 he became the technical responsible for the engineering and design of the NorNed HVDC cable connection between Norway and The Netherlands. He was involved in all DC interconnector systems in The Netherlands and Germany. He was the chairman of JWG B4/B5.59 Protection and local control of HVDC grids.



**Willem Leterme** received the M.Sc. and Ph.D. degrees in electrical energy engineering from KU Leuven, Leuven, Belgium, in 2012 and 2016, respectively. He is currently a Research Expert with KU Leuven/EnergyVille. In 2015, he visited the University of Manchester as a Ph.D. student, and in 2018, he was with Imperial College London as a Visiting Postdoctoral Researcher. His research interests include power system protection and modeling for electromagnetic transient studies with a focus on HVDC systems. He is an active member of the International Council on Large Electric Systems (CIGRE).

## FACILITATION CHARGES

The duration for online training will be of 1 hr. 30 min. will be for tech. session followed by 30 min. for question/ answer session.

Category	Charges in INR	
	Members (CBIP/CIGRE)	Non Members
Individual Login	2,000/-	2,400/-
Institution Logins		
Up to 10 Login	18,000/-	22,000/-
Up to 15 Login	26,000/-	30,000/-
Up to 25 Login	40,000/-	44,000/-
Students	750/- per login	
First 25 students will be given one year membership of CIGRE to have access to 10,000 Technical Report available on e-CIGRE library.		
Note: 18% GST extra for all categories.		

The program is limited to 200 participants, which will be on First cum First serve basis.

## TO REGISTER

The perspective participants, desirous of attending the above training may register themselves by sending the following details to CIGRE-India along with necessary facilitation charges:

Title of Training \_\_\_\_; Name: \_\_\_\_; Designation: \_\_\_\_; Organization: \_\_\_\_; Mailing address: \_\_\_\_; Phone / Fax/E-mail: \_\_\_\_

Note: After registration, the participants will be provided the link 1 day prior to the session. Registered participants may please contact for link to join the program at:

Mr. Uttam Rawat, Software Engineer, Mob: 9818981610; Mrs. Rohini, Office Coordinator, Mob: 8860874012

Vender Name: (GST No. 07AAA0260A1Z1) THE COMMITTEE FOR THE INTL CONF ON LHVES, Bank Name: Canara Bank, 7/48, Malcha Marg, Chanakyapuri, New Delhi-110021, Account: Saving; Bank Account No.: 0157101031491; IFSC: CNRB0000157; MICR: 110015007; PAN: AAAA0260A; Swift: CNRBINBDDFS

## ADDRESS FOR CORRESPONDENCE

Sh. A.K. Dinkar, Secretary, CIGRE-India & CBIP

Sh. A.K. Bhatnagar, Director, CIGRE-India & CBIP

Nodal Officer: Mr. Vishan Dutt, Chief Manager-Technical, CIGRE-India, Mob: 9811431554, E-mail: [vishandutt@cbip.org](mailto:vishandutt@cbip.org)

Mr. S.K. Batra, Chief Manager-Technical, CBIP, Mob: 9811943812, E-mail: [batra@cbip.org](mailto:batra@cbip.org)

Central Board of Irrigation & Power, Malcha Marg, Chanakyapuri, New Delhi - 110021

Phone: 011 26115984/26116567, Fax: 011 2611 6347; E-mail: [cbip@cbip.org](mailto:cbip@cbip.org)

## INDIAN REPRESENTATIVE IN CIGRE SC B4 ON DC SYSTEMS AND POWER ELECTRONICS



**Mr. Anil Kumar Arora**

Executive Director, Engg.-HVDC  
Power Grid Corporation of India