

## MINUTES

### IEEE PES HVDC AND FACTS SUBCOMMITTEE MEETING

**Time:** 13:30 - 16:30 on Wednesday, July 29, 2015  
**Location:** Denver Room in Sheraton Tower, Denver, CO.

*Chair: Andrew Isaacs, Electranix ; Vice-chair: Dr. Brian Johnson, University of Idaho*

#### Agenda:

- 1) Welcome and Announcements  
Call to order at 1:30pm by Ben Mehraban, 46 members and guests attended
- 2) Introductions  
Attendees introduced themselves
- 3) Approval of the July 2015 Meeting Agenda  
Approved by acclamation with no modifications or additions
- 4) Approval of the Minutes of the July 30, 2014 subcommittee meeting  
Moved by Gene Wolf and seconded by Mark Reynolds, approved by acclamation
- 5) Election of Dr. Rajiv Varma as new subcommittee Secretary. Moved by Robyn Koropatnick and seconded by Girish Behal.
- 6) Working Group Reports
  - a) WG 15.05.02 Dynamic Performance and Modeling of HVDC Systems and Power Electronics for Transmission Systems  
Ram Adapa reported: 50 persons attended. Working group producing position papers related to HVDC and FACTS modeling and applications.  
Position Paper 1: EMTP-type Models for Conventional DC Systems / Line Commutated Converters. – due July 2016  
Position Paper 2: EMTP-type Models for VSC based FACTS – due Dec 2016  
Position Paper 3: EMTP-type Models for VSC based DC Transmission – due July 2017  
Twelve Bus Benchmark Test Systems to validate HVDC and FACTS – due July 2016  
  
Four technical presentations were made at the WG Meeting.
  - b) WG 15.05.08 HVDC Economics and Operating Strategies  
Mike Henderson reported. Over 120 attendees at GM15.  
Four successful panels held during GM12, GM13, GM14, and GM15 on HVDC and FACTS Refurbishments. 15.05.08 thanks to the contributors and attendees of Everything Old Is New Again!  
The March/April 2016 Power and Energy Magazine Issue entitled “Everything Old Is New Again” will include articles on HVDC and FACTS refurbishments and new technologies.  
Jointly with 15.05.18 and 15.05.19, a tutorial for system planners is proposed for GM16 entitled Planning and Integration of Flexible HVDC into the Modern Grid  
GM16 panel proposed: The Smarter Grid – Operations and Economics of HVDC and FACTS. This panel will discuss HVDC and FACTS refurbishments and plans for HVDC overlays

c) WG 15.05.14 HVDC and FACTS Education

This WG had a combo-session with WG on “HVDC and FACTS Bibliography”. There were 14 attendees. It was proposed to do a Panel Session on “HVDC Transmission” in the IEEE T&D Conference in May 2016. This panel will include both classical and VSC based HVDC technologies together with the system planning aspects. Suggestions for speakers were sought and finalized. The option of preparing an IEEE sponsored e-Learning Tutorial on HVDC and FACTS was also discussed.

d) WG 15.05.17 Bibliography of HVDC and FACTS

Published 2 papers in the PESGM conference proceedings (Bibliography of FACTS 2013–2014, and Bibliography of HVDC Transmission 2013–14). The original bibliographic search yielded 1006 papers on FACTS (45% Journal and 55% conference papers); and 684 papers on HVDC Transmission (45% Journal and 55% conference papers). Only 45% of the above papers were available on IEEE Xplore, the rest were found from other search engines. The number of papers included in the Bibliography papers was restricted to only 5 pages to meet the IEEE prescribed limit. The balance papers will be put up on the WG website.

Mark Reynolds stated that these Bibliographies were appreciated in CIGRE.

e) WG 15.05.18 Studies for Planning of HVDC

Working group 15.05.18 is concerned with studies to be performed during the planning process of HVDC systems. About 22 participants were present. During the working group meeting in Denver, 6 phases of integration of new HVDC systems to the power system were identified:

1. Transmission Extension Plan
2. Feasibility Studies
3. Specification Studies
4. Tender Phase
5. Execution Phase
6. Commissioning Phase

Flow charts were developed for each phase pointing out, which study has to be performed within the according phase. The flow charts will be finalized before the next working group meeting by the members. In the following, each study listed in the 6 flow charts will be described in a brief document as contribution from the working group members. The template for the study descriptions was already developed within the Denver working group meeting.

Anticipated deliverable for the upcoming IEEE PES GM in 2016 is the preparation of a tutorial together with 2 other working groups (15.05.08 and 15.05.19). The outline for this tutorial was also developed within the meeting.

Next meeting of the working group will be in January/February 2016 in Leuven/Belgium together with working group 15.05.19.

f) WG 15.05.19 Practical Technologies for VSC HVDC Systems

A joint meeting of IEEE Working Groups on “Studies for Planning of HVDC” and “Practical Technologies for VSC HVDC Systems” was held in KU Leuven, Belgium, on February 13, 2015, 9:00 – 15:45. 15 attendees participated.

Dirk and Simon did a presentation on the proposed content of the 2 new working groups and general discussion in the group. It was suggested to change the title of working group 1 from “Planning for HVDC” into “Studies for Planning of HVDC”.

There are enough topics to be covered without significant overlap. Meeting should be at same time and location. Work group 1 will have the following leadership: · Chair: Simon Teeuwsen · Vice-Chair: Mike Henderson · Secretary: Kyeon Hur Work Group 2 will have the following leadership: · Chair: Dirk Van Hertem · Vice-Chair: Mike Barnes · Secretary: Sahar Pirooz Azad.

Main deliverables will be the development of a tutorial and the preparation of a panel session on the IEEE PES general meeting.

Scope of Work Main task of working group 1 will be the development of an overview (flow chart and time line) of studies to be performed before tendering, during tendering, and during project execution of HVDC projects. Next step will be then to describe the studies in more detail (data input, approach, expected results, etc.). A first draft of a flow chart was already developed during the meeting.

#### 7) Plans for Panel sessions or Tutorials for 2016

Panel 1: Panel on “HVDC Technology” led by Brian Johnson

Panel 2: Panel on “Refurbishments of Existing Facilities and Applications of HVDC Overlays” led by Mike Henderson

Panel 3: “DC-DC Conversion Technologies” led by Dragan Jovcic.

Tutorial: “Planning and integration of Flexible HVDC into today’s Grid” led by Dirk Van Hertem and Mike Henderson

#### 8) HVDC and FACTS Sub-Committee Website Update

Brian Johnson has updated the website with the help of a volunteer.

#### 9) Award Committee Updates

##### a) Uno Lamm Award Committee

IEEE PES Uno Lamm High Voltage Direct Current Award: Rainer Marquardt

Dennis Woodford requested nominations by Nov.

##### b) Nari Hingorani Award Committee

IEEE PES Nari Hingorani FACTS Award: Richard Piwko

Dennis requested nominations by Nov.

##### c) Nari Hingorani Custom Power Award Committee

IEEE PES Nari Hingorani Custom Power Award: No award:

Dennis requested nominations by Nov.

##### d) CIGRE USNC

Ben Mehraban announced that three awards were presented.

#### 10) HVDC Project Listing Update

Robyn presented -Last update in 2013. Two lists: In Service and ii) Planned projects, as Getting Planned projects is a challenge. Proposed to do only Existing HVDC projects. Agreed by the Subcommittee.

#### 11) Restructuring of PES Technical Committees → potential impact on this subcommittee

Current understanding of the subcommittee is that this change will not be final until spring 2016.

Comments are welcome on the PES website at any time opposing the change, or otherwise, until the end

of Oct 2015. Our current understanding is that the only change will be in the reporting structure at this time, and that the internal structure of the subcommittee will remain intact.

Secretary of Substations Committee: Joel Gravell participated and formally welcomed the HVDC and FACTS Subcommittee in Substations Committee.

12) Reports of Substation Subcommittee

a) Subcommittee I0, WG I4, WG I5, and WG I9

A report was presented

I4: Tutorial planned for SVC. Time to submit a Tutorial proposal is too short. Should be brought up before IEEE Susan Koval

Two new Task Forces have been set up.

New Tutorial on VSC being proposed: Modernization of Transmission Grid with VSC – more on Components and technology

13) Liaison Reports

a) Overhead Lines - HVDC Line Design Guide TF – A report was provided by Ram Adapa.

b) CIGRE B4 – Members provided an update on all of their active B4 working groups, including Mark Reynolds, Andrew Isaacs, Dennis Woodford, and Dirk Van Hertem.

14) New Business

a) Awards nomination committee:

Form a nominating Committee and seek members (long time members). Volunteers are requested. Possible members: Gene Wolf, Mark Reynolds, Mike Henderson, Ram Adapa, Dennis Woodford, Geza Joos, Rajiv Varma, Reigh Walling, Ani Gole, Udaya Annakkage, Brian Johnson, Neil Kirby, Bill Long, Ben Mehraban, Karl Mortensson

Present a list of existing awards and requirements; and scope of the Committee in next GM

Institute new awards in the Subcommittee. Propose an Awards Committee in the next GM.

15) Presentations

a) Frank Kreikebaum: Smart Wires' FACTS Technology Devices

16) General Reports on HVDC and FACTS Projects/Developments

17) Location of the Next Meeting

18) Adjourn

Respectfully Submitted by

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Secretary

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