IEEE CSS Technical Committee on Smart Grids (TC-SG)

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SUMMARY

For a recent coverage of the TC-SG activities and achievements, please see pages 19-21 in the December 2013 issue of the Control Systems Magazine.

The next semi-annual meeting of the CSS TC-SG will be held on Thursday, June 5 at the 2014 American Control Conference (ACC), at the Hilton Portland & Executive Tower. Committee meetings include:

- Thursday 5 June, 2:00- 4:00 pm | Location: Salon Ballroom III
  "IEEE Smart Grid Vision for Control Systems": This time is allocated for the 4 subcommittees to meet, if they choose to, and report back during 4-5 pm at the TC-SG meeting.

- Thursday 5 June, 4:00- 5:00 pm | Location Salon Ballroom III
  CSS Smart Grid TC semi-annual meeting

A summary of activities of the TC-SG during December 2013 - May 2014 include:

MEMBERSHIP

- **Outreach and invitation for participation:** Over 450 members of the IEEE Control Systems Society, IEEE Power and Energy Society, and affiliated societies were invited to join the TC-SG, which now has a membership of 127 people. Membership is growing steadily from the genesis of this TC in June 2010: From 58 members in December 2010, to 72 in June 2011, and to 94 in December 2012, and to 127 today.

  The first in-person meeting was held on Thursday, December 16, 2010 at the IEEE Conference on Decision and Control (CDC) in Atlanta, Georgia. Since then, the TC-SG has held seven meetings, at every American Control Conference (ACC) and CDC, with enthusiastic participation of 21 to 58 colleagues per meeting (with the exception of CDC'12 and '13 in Hawaii and Florence, due to travel constraints).

Topics discussed during these meetings and delivered since include:

- Sought participants in organizing sessions, tracks, and activities, including special issues/sections in IEEE journals and workshops/conferences, including Smart Grid tracks and invited sessions at the ACC, IFAC World Congress, and CDC.

- **Collaboration and LinkedIn** – The LinkedIn group open to everyone on the TC-SG roster. Social media CSS and TC-SG on LinkedIn are at www.linkedin.com/groups?gid=1514847 and CSS group members can join the TC-SC subgroup at: www.linkedin.com/groups?gid=3723696

- **CSS and PES Collaboration and Coordination** – Questions were asked regarding CSS and PES interfacing. IT was noted that PES is organizes in a 'Working Groups' structure. The PES main thrust is to create sessions. In some cases, a PES paper can only be four pages long. In general, there can be productive contributions by individuals through both IEEE streams.

- **IEEE SG Newsletter** – Articles of from 800 – 1,200 words on topics are solicited for this widely-read publication, on which Massoud Amin serves as chairman. The June 2014issue marks the 42nd monthly newsletter, which continues to be very well received. To access the May 2014 issue and earlier articles please visit http://smartgrid.ieee.org/may-2014 where over 160 posted articles (for January 2011- May 2014) are available.

- **Smart Grid Vision Project for Control Systems** – As was reported in 2013 TC-SG progress report, under Dr. Anu Anaswamy's leadership, the IEEE Smart Grid Vision for Control Systems (SGV-CS) was successfully completed. It includes a Roadmap. Our main challenges, opportunity and responsibility are to now 'take chunks of it and operationalize it". In addition, we may wish to validate and iteratively optimize certain portions through pilot projects. The next meeting will be held on June 5 at noted above.

- **Webinars**: Four pertinent IEEE webinars are planned, in close partnership with the IEEE Smart Grid. The kickoff webinar will be given by Dr. Massoud Amin on June 11. Three more are planned for July-December, and additional nominations/topics are welcomed. In addition, as discussed in past TC-SG meetings, we'll develop and deliver of CSS-focused webinar series as a vehicle to give virtual seminars on smart grids.

- **Subcommittees Established** – TC-SG is about four years old and well-positioned to address at least 3-4 areas of interest with this committee with much broader engagement opportunities. After discussions during the June 2013 meeting, it was agreed that Subcommittees should be established for key control-centric areas within smart grids.

We are pleased to report that the following four sub-committees have been established:

1. **Integration of Renewable Energy**
   Lead: Prof. Amro Farid <afarid@masdar.ac.ae>
   Mission: To operationalize the IEEE Smart Grid Vision Project for the reliable penetration of renewable energy. To that end, the subcommittee seeks to proceed along following broad thrusts of activity:

   - Gap Analysis and Technology Roadmapping
   - Advocate for adequate funding resources to support technology roadmap
   - Identify key opportunities for translational research and development to industry
   - Liase with other R&D communities related to renewable energy integration.

2. **Energy Storage & Electrified Transportation Subcommittee- please see the attached report**

   Lead: Prof. Scott Moura, UC Berkeley, smoura@berkeley.edu
   Co-Lead: Prof. Javad Mohammadpour, University of Georgia, javadm@uga.edu
   Description: The Energy Storage & Electrified Transportation (ESET) subcommittee provides an organized forum for control engineers and scientists with interests related to Storage and Electric Vehicles interconnected with the Smart Grids. Topics of interest to the subcommittee are pertinent to various aspects of energy storage including (but not limited to):

   - Modeling, control and health monitoring of storage devices (e.g., batteries, ultracapacitors and fuel cells)
   - Vehicle-to-grid systems
   - Charging infrastructure
   - Automated demand response
   - The use of storage in smart buildings
   - Ancillary services (e.g., peak-shaving, frequency regulation)
   - Integration of storage with renewable generation sources
   - Distributed energy storage
   - Public policy and economics of storage

   Expected outcomes include organizing invited sessions at CSS-sponsored conferences, special issues in IEEE CSS transactions, ad-hoc workshops, networking, education & outreach.

3. **Microgrids**
   Leader: Prof. Nicanor Quijano, nquijano@uniandes.edu.co
   Description: microgrid can be seen, from a systemic point of view, as a subsystem that possesses interconnected distributed devices and the associated control systems, which must cooperate with other elements in the electric network to make the electric grid more efficient, flexible, and reliable, while fulfilling energy needs for communities on the scale of neighborhoods, campuses, and the like. This subsystem can operate as a stand-alone or as a grid-connected system. The scope of this subcommittee is to address all applications of dynamics and control to microgrids, including but not limited to: i) the coordination of distributed generation, loads, and storage; ii) islanding and grid-independent operation; iii) active and reactive power transfer depending on the necessities of the microgrids and/or the distribution system; iv) market participation and optimal dispatch of distributed generators; and v) integration of cogeneration and combined heating and power. Expected outputs of this subcommittee include invited and special sessions for CSS conferences, workshops, special issues for CSS publications, and white papers.

   Members

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4. **Net Zero Building (Smart Buildings)**
   Lead: Prof. John James, john.james@usma.edu
   Mission: The IEEE Smart Grid Vision Project has produced a rich set of forward looking use cases and scenarios for the Smart Grid. The intent of the Net Zero Building Subcommittee of the TC on Smart Grids is to (1) identify enabling science and technology to realize the SG Vision for smart buildings, smart campuses, and smart cities of the future, (2) advocate with funding institutions to allocate adequate resources to create the necessary science and technology to realize the vision, (3) assist funding agencies with technical expertise to identify relevant projects for creation and sharing of required science and technology, and (4) advocate with educational institutions to achieve multidisciplinary educational changes needed to create in future graduates and faculty the critical thinking and commitment to sustained innovation needed to achieve the vision.

Next Steps:

- Increase CSS' leadership role and visibility in smart grid education, RD&D:
  - Development of TC-SG website
  - High-visibility events, publications and activities
  - Participate in the organization of pertinent activities, including special issues/sections in the upcoming IEEE journals and in the IEEE workshops/conferences.

2015 CDC in Los Angeles, CA, December 15-17, 2014

- The next semi-annual meeting of the IEEE CSS TC-SG will be held on Monday 15 December 2014 at the 53rd IEEE Conference on Decision and Control at the J.W. Marriott Hotel, Los Angeles, CA.