

IAPWS President's Report at IAPWS Executive Committee Meeting in Banff, Canada, 4th October 2019

Dear Colleagues,

It is a great pleasure for me to talk to you here in Banff at the end of a successful 2019 IAPWS Meeting.

I would like to thank to the Canadian National Committee for their excellent organization of the meeting. Also I would like to thank to the chairs of the IAPWS Working Groups for organizing WG meetings. Finally I would like to thank to all participants for their active role in developing IAPWS deliverables: Releases, Guidelines, and Technical Guidance Documents.

In my speech I would like to turn our attention to future. We live in a time of rapid societal changes. Renewable energy became policy of many nations. While the reduction of fossil fuels has sound reasons, the farewell to nuclear energy that we see in some countries has reasons less rational. These societal changes have significant impact on our work. For example, it is difficult to get funding for research related to thermal power cycles, although there are still many unresolved questions and it is very likely that steam cycles will remain the backbone of power generation in near future. On the other hand, there are new technological challenges relevant to IAPWS, e.g., geothermal power, steam cycles for biomass fuel, and cycles with carbon capture and storage/utilization.

Besides these “external” driving forces acting on IAPWS, maybe even more important are “internal” driving forces, namely qualified and enthusiastic individuals willing to collaborate towards a valuable result. Thanks to this human potential, the Power Cycle Chemistry WG moves ahead very successfully, although it is right this WG which may feel the societal pressure the most.

I recognize two areas of IAPWS expertise, in which it is of vital importance to keep global leadership by producing and spreading documents containing cutting edge knowledge:

- i. Formulations of thermophysical properties and selected physico-chemical properties for water and aqueous systems important in technology, including seawater,
- ii. Guidance for all chemistry-related aspects of steam power cycle operation.

The first area of IAPWS expertise belongs to WG Thermophysical Properties of Water and Steam (TPWS), Subcommittee for Seawater (SCSW) and to WG Physical Chemistry of Aqueous Systems (PCAS). A very important step is starting the development of a new formulation for H₂O thermodynamics, replacing IAPWS-95. This new flagship formulation will become a basis for formulating thermodynamic properties of seawater and other aqueous systems, for formulations of other properties, as well as for algorithms for fast property calculations relevant to IRS. Development of a new equation for seawater using the new ordinary water formulation, and including desalination conditions, is also necessary. New formulations of seawater

properties, as well as clarification of metrological aspects related to salinity, are urgently needed for environmental modeling, in particular the global circulation models, as well as for new technological processes. Accurate formulation of properties of humid air is clearly within the expertise of IAPWS and highly important for applications in geophysics as well as in technology.

The second area of key IAPWS expertise belongs primarily to WG Power Cycle Chemistry (PCC) and partially to PCAS WG. Technical Guidance Documents (TGDs) became a highly important tool for power plant operators and a vehicle by which IAPWS expertise is effectively disseminated. PCC WG reached a leadership in the knowledge concerning Film Forming Substances (FFS) and works on their further spreading to industrial plants. A new TGD on Chemistry Management in Generator Water Cooling during Operation and Shutdown will be published at this EC meeting. PCC has shown that IAPWS platform can be used to organize specialized meetings or series thereof, such as IAPWS Conference on Film Forming Substances, European HRSG Forum and Australasian HRSG Forum organized by the IAPWS Executive Secretary. These activities proved to be tools for inviting new nations to IAPWS or revitalizing inactive national contacts.

The PCAS WG has an important role in supporting both main areas of IAPWS expertise. With TPWS WG it will develop formulations of physico-chemical properties of aqueous systems such as self-diffusion and static dielectric constant of ordinary water. On the other hand, it will support PCC WG by a more fundamental view on FFS, transport properties in nuclear systems etc.

While PCC WG is intimately connected with power plant public, the connection to application is less straightforward for TPWS and PCAS WGs. Here, the IRS WG serves as an important interface with industry. A specific interest of IRS are algorithms for fast calculations which can be used in Computational Fluid Dynamics (CFD).

It is of essential importance that IAPWS has some top researchers and engineers in its areas of excellence. It is of course not possible to attract all relevant persons, but they can also be invited as external collaborators for particular tasks. What can attract distinguished personalities to collaborate with IAPWS? I think that this is the discussion forum, place of friendly collaboration, increased publicity of the results, and the easy interface between industry and research.

Another activity requiring a continuous attention is communication with other standardizing bodies. IAPWS adopts relevant recommendations of other bodies. On the other hand, it is important to attempt that IAPWS top products are adopted by other internationally recognized organizations.

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