

**THE INTERNATIONAL ASSOCIATION
FOR THE PROPERTIES OF
WATER AND STEAM**

MEMBERS

Australia
Britain and Ireland
Canada
Czech Republic
Germany and Switzerland
Japan
New Zealand
Scandinavia (Denmark, Finland, Norway, Sweden)
United States of America

ASSOCIATE MEMBERS

Argentina and Brazil
China
Egypt
France
Greece
India
Israel
Italy

EXECUTIVE SECRETARY

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Minutes of the Meetings

of the

Executive Committee

of the

International Association for the Properties of

Water and Steam

**Turin, Italy
4th and 8th September 2023**

Prepared by Barry Dooley



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Minutes of the Meetings
of the
Executive Committee
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International Association for the Properties of Water and Steam

4th and 8th September 2023

Plenary Session. Monday, 4th September 2023. 9:00am

At 9:00am the new President of IAPWS, Dr. Dan Friend welcomed the Executive Committee (EC) and other IAPWS members to the EC Meeting. He first thanked the Chair of the Italian National Committee, Ms. Simona Lago, for hosting the 2023 IAPWS meetings. He then asked Mr. Vito Fericola, Senior Researcher and INRIM Board of Directors Member, to welcome the EC to Turin, Italy. Fericola thanked the sponsors of this IAPWS meeting. The President then officially opened the 2023 EC Meetings by introducing the National Delegates. All of the IAPWS Members were in attendance as well as the delegates from Associate Member countries Greece and Italy. In total there were 44 people assembled for the EC meeting.

1. Adoption of Agenda

Provisional agendas had been e-mailed to all IAPWS members by the Executive Secretary in April 2023. There were no additions and the final agenda forms Attachment 1 of these minutes.

2. IAPWS Business and Appointment of Committees

2.1 IAPWS Business Since Last EC Meeting in Rotorua, New Zealand, November 2022

The Executive Secretary reported that during the year since the last IAPWS EC Meeting in New Zealand no documents had been forwarded to IAPWS members for review or approval.

2.2 IAPWS Highlights and Press Release

The President asked Cook to chair the development of the Highlights/Press Release on the IAPWS proceedings during the week. It was also suggested that a person from Italy assist in this development and in this regard Lago agreed to assist Cook. The Clerks of Minutes from each WG were asked to provide input. The Press Release is discussed in Minute 17.1 and is Attachment 9.

2.3 Evaluation Committee on International Collaboration.

The Executive Secretary indicated that no proposal had been received prior to the meeting, and that any suggestions from a Working Group (WG) should be given to the Executive Secretary by the end of day. The President then reminded the EC that the Committee to review any proposals received would consist of the WG Chairmen, with the President and Executive Secretary as ex. officio members. A chairman would be chosen by the Committee.

2.4 IAPWS Awards Committees for 2024

2.4.1 Honorary Fellow Award Committee

A committee of Kretzschmar (Chairman) and Harvey were selected for the 2024 Honorary Fellow award with the President and Executive Secretary as ex. Officio members.

Action: Nominations are due to the Executive Secretary by 31st January 2024.

2.4.2 Helmholtz Award Committee

The Executive Secretary reminded the EC that the Helmholtz Award selection committee for the 2024 award would consist of a member from Canada (Chair), Czech Republic, Germany/Switzerland, Japan and New Zealand. These countries were requested to provide the name of the member for this committee to Chairman Cook before the Friday EC meeting.

Action: Nominations are due to the Executive Secretary by 31st January 2024.

2.4.3 Gibbs Award Committee

The President reminded the EC that the Gibbs Award is awarded about every five years at each ICPWS and asked the Chair of the Selection Committee to provide the results of the nomination committee. Okita indicated that the selection committee with one person from each Working Group had met electronically a number of times and had unanimously selected Dr. Rainer Feistel as the 2024 IAPWS Gibbs Awardee. Feistel had agreed to the selection and to provide the Gibbs Award lecture at the 18th ICPWS.

2.5 Update Report on 18th ICPWS

The President, as co-chair of the 18th ICPWS, provided an update of the status of arrangements:

- The U.S. National Committee will host the ICPWS between 23rd and 28th June 2024 in Boulder, Colorado in conjunction with the triennial Symposium on Thermophysical Properties (STP).
- Harvey and Friend will be Co-Chairs.
- The call for papers was issued recently and the website for submissions is <https://na.eventscloud.com/eSites/759400/Homepage>
- Housing will be available on the Colorado University (CU) campus and at local hotels.
- There will be sessions for ICPWS, Symposium, and special joint sessions.
- Planning is still in progress for the IAPWS EC and General Meetings and the social events.
- Approximately 600 people are expected for the symposium and about 100 for ICPWS.

2.6 Situation in Ukraine

The President indicated that there had not been any changes to the aggression and suggested to the EC that there were no reasons to change the suspended membership.

The EC approved this unanimously.

2.7 Dues Structure Task Group

The President reported that in response to the approval of the German-Swiss joint membership at the 2022 annual meeting a committee (Friend, Addison and Neilsen) had been formed to review the fairness and effectiveness of the current dues structure and to recommend changes, as appropriate. He then reviewed the history of the dues structure with the monetary standard of the Association being the Swiss franc. The Statutes and By-Laws indicate that the dues are apportioned according to the gross economic product of the member country. Dues for new Members are assessed on this principle using the scale of dues paid by existing Members and there is a minimum annual rate below which dues are not apportioned. The dues structure has been unchanged for 30 years. The committee reviewed various alternate calculation procedures and determined that the current system was fair and adequate and had been able to address any IAPWS expenditures, and thus suggested no change.

The EC approved this unanimously.

2.8 Registration and Other Fees Associated with an IAPWS Annual Meeting

The President reported that a number of IAPWS individual members had let the Executive Secretary know that the overall costs (registration, accommodation, etc.) of attending an annual IAPWS meeting had been increasing over the years. It had become more difficult for senior/retired persons to attend. The President indicated that these costs are the responsibility of the national committee organizing the annual meeting and that efforts are needed to keep the events as cheap as possible. He also mentioned that IAPWS does not support individual members to annual meetings.

2.9 Refreshment of IAPWS Website

The President indicated that the Executive Secretary had received notes indicating that the IAPWS Website was not secure (:https) and that the website could be upgraded to improve the “look and feel”. This led to some discussion from EC members which eventually resulted in the President proposing a Task Group to report back at the Friday EC meetings. The following members were selected: McCann (BIAPWS) as Chair, Cook (Canada), Addison (New Zealand) and McAllister (Australia).

2.10 Other Business Requiring Extensive Discussions

No other business was raised by the EC.

3. EC Mandate to Working Groups and Membership

The following mandates were discussed with the WG Chairmen for action during the week.

3.1 Releases, Guidelines and Certified Research Needs.

The President indicated that one main purpose of the annual meetings was to produce documents (guidelines, Technical Guidance Documents, ICRNs, etc.) and urged the Working Groups to review the strategy and provide a report at the Friday EC meeting on the schedule for production. The Executive Secretary indicated that no ICRNs needed attention by the Working Groups during the week.

3.2 Working Group Directions.

The President emphasized that each WG Chairmen should only report to the EC on Friday about those activities that need approval or discussion by the EC.

4. Preview of the IAPWS Week’s Activities

President Friend indicated that there would be the IAPWS Symposium on Wednesday 6th September 2023. The details are included in Attachment 2. He then asked each WG Chair to provide an outline of activities during the week.

Following this item, the President closed the opening session of the EC at 10:10 am.

Activities During the Week

The first day activities of the Executive Committee were followed by Working Group meetings and the IAPWS Symposium. The schedule of the IAPWS week is shown in Attachment 3.

Executive Committee Meeting. Friday, 8th September 2023

President Friend opened the continuation of the EC Meeting at 9:00 am. All of the IAPWS Members were in attendance as well as Associate Member countries Greece and Italy. In total there were 22 people assembled for the EC meeting.

Friend asked the EC if there were any additional items that should be added to the EC Agenda. None were suggested.

5. Acceptance of Minutes of Previous Meeting

President Friend asked for comments and changes to the minutes of the EC meeting held in Rotorua, New Zealand in November 2022. No changes were noted; thus the 2022 Minutes were accepted.

6. President's Report

President Friend provided his report. This is provided in these minutes as Attachment 4.

7. Thermophysical Properties of Water and Steam (TPWS) Working Group (WG)

Minutes of the TPWS WG conducted during the week are in Attachment 5. TPWS Chairman Meier discussed the following items with the EC:

7.1 Replacement of the IAPWS-95 Formulation.

Planning is beginning on what will be a large project to replace IAPWS-95. The first step will be organization and evaluation of available experimental data. No responses were received to ICRN-31 on a call for experimental data. The task group was expanded by Lago (as a vice-chair), Albo and Kayukawa to motivate experimental work, and by Caupin to cover the metastable water region.

7.2 New Model for Thermodynamic Properties of Mixtures.

The Chair reported that Hrubý had proposed a new equation of state model for mixtures, which overcomes the problem of incorrectly represented composition dependence of virial coefficients. It requires that the metastable regions of the pure components (particularly of water) are properly represented.

7.3 Second Cross Virial Coefficients of Aqueous Gas Mixtures.

The Chair indicated that Hellmann had reported a new theoretically calculated second and third virial coefficients and transport properties for water-argon system. A Task Group will develop an IAPWS guideline providing enhancement factors for solubility of water vapor in important gases at elevated pressures. As a pilot project, one system (presumably water-argon) will be chosen.

7.4 Future of the Subcommittee on Seawater (SCSW).

TPWS Chair, Meier, reported that Seitz had written a Distress Flyer on the situation in the SCSW and distributed it to potentially interested public. Four positive responses were received. Friend suggested that presentations on seawater topics at 18th ICPWS could encourage the activity. Albo agreed to co-chair a conference session on sea water and Seitz agreed to assist.

Pawlowicz and Feistel remain formally Chair and Vice-chair respectively of SCSW.

The TPWS working group thought that ICRN 16 (Thermophysical Properties of Seawater) should be reconsidered after a new SCSW Chair and Vice-chair have been elected.

7.5 TPWS Membership and Officers.

The TPWS Chair informed the EC that there was no change in membership or officers.

8. Industrial Requirements and Solutions (IRS) Working Group.

The Chair and Vice Chair of IRS had not attended the meetings during the week, so past Chair Okita had stood in. Minutes of the IRS WG conducted during the week are in Attachment 6.

8.1 Task Group Updates.

Okita provided the EC with updates on five Task Groups. None needed EC approval.

- Task Group on Categories of industrial requirements. Extend new topics such as hydrogen combustion, clouds micro and macrophysics related to aviation to be discussed to cooperate with ASME or other groups.
- Task Group on Wet Steam properties calculation. Connect expert for measurements in Škoda, Dr. Hoznedl, with Dr. Schatz. Consider cooperation and/or universities involvement. A new task group was formed on “Translation of IF97 Fortran routines into other programming languages” with members: Nový, di Mare, Harwood and Sachssendahl.
- Task Group on Wet Steam Data from operating turbines. The key is to understand the film forming on stator blade and droplets forming from the water film. The TG will search for all public available measurements worldwide.
- Task Group on ICRN for acid gas dew points. Possible TGD to maintain reliability was considered instead of an ICRN. Draft white paper for the TGD to be prepared by the next annual meeting. A new task group was formed on “A white paper for acid gas dew points” with members: Okita, Addison, Yoshida (+ one PCC member).
- Report of the joint Task Group on White paper on geothermal plant issues. A second draft is expected soon by PCC and possible approval of final document in 2024.

8.2 Future Direction of the IRS Working Group.

Okita next provided the EC with short-term and longterm directions. None needed EC approval.

Short-term:

- Next industrial calculation needs for steam properties (for CFD etc.)
 - Translation of IF97 Fortran routines into other programming languages
 - Task Group set up for defining issues.
- ICRN for acid gas dew points
 - White paper toward TGD for reliable GTCC operation against corrosion.
- Discussion on wet steam data
 - Summarizing existing research and researchers.
- “Categories of industrial requirements or interests” to be focused on IAPWS documentation and cooperation with ASME for H₂ combustion.
 - Try again ASME Turbo Expo 2025 or other cooperation.

Longterm:

- New calculation needs for mixture with H₂O and other medium for geothermal or renewables including CO₂ cycle, H₂ combustion etc.
 - “EOS-CG” is one optional EOS to evaluate collaborated with TPWS on demand.
 - TG for formal guideline will be set up.

8.3 IRS Members.

The IRS Chair proposed one new WG member:

- Aurel Ranniste Sachssendahl, Siemens Energy, Germany

The EC approved this WG member change unanimously.

9. Sub-Committee on Seawater (SCSW)

Unfortunately, the SCSW Chair, Pawlowicz, could not be present for the EC meeting. The TPWS Working Group included SCSW activities.

10. Physical Chemistry of Aqueous Systems Working Group (PCAS)

Minutes of the PCAS WG conducted during the week are in Attachment 7.

IRS Chairman Yoshida discussed the following items with the EC:

10.1 New Task Group on Ionization of Water.

A PCAS Task Group to work on developing a revised formulation for the water ionization constant (K_w) proposed by Arcis and Tremaine. There is the need for accurate water ionization constant formulation at near-critical and supercritical conditions for the purpose of future Advanced Modular Reactors (AMR) water cooling circuit chemistry modeling.

- New flow conductivity derived water ionization constant data have been reported under near-critical and supercritical conditions.
- To address possible systematic uncertainties, revised correlations for the limiting conductivity of fully ionized water have been derived based on a critical assessment of the literature.
- The flow conductivity derived water ionization constant data have been revised.
- K_w database has been reevaluated, taking into account the new conductivity data.
- Parameters for Bandura and Lvov (IAPWS K_w release 2019) function have been revised.

The evaluation is planned to be carried out before the IAPWS Meeting in 2024 and the Evaluation Task Group members are: Harvey (Chair), Anderko and Corti.

- A new PCAS Task Group was proposed by Arcis and Tremaine on developing a revised formulation for the water ionization constant (K_w). A joint PCAS/TPWS Evaluation Task Group is also proposed to first review the revised formulations derived to represent the limiting conductivity of ionized water, and second to evaluate the upcoming revised correlation for K_w . The following members were suggested: Harvey, Palmer, Corti and Wang.

10.2 Other On-going Activities.

The PCAS Chair informed the EC of the following activities:

- Guideline on self-diffusion coefficient. Led by Yoshida, in collaboration with TPWS. Development is underway and will be continued.
- White Paper on acid dew point. Collaboration with PCC and IRS. Development is underway and will be continued.
- White Paper on Geothermal. Collaboration with PCC and IRS. Development is underway and will be continued.
- ICRN on FFS. Collaboration with PCC. Development is underway and will be continued.
- Possibility of extending PCAS activities to radiation chemistry. Efforts to connect international young researchers and experts are progressing. PCAS is organizing the session “Nuclear Reactor and Fuel Cycle Chemistry” in the 18th ICPWS.

11. Power Cycle Chemistry Working Group (PCC).

Minutes of the PCC WG conducted during the week are in Attachment 8.

PCC Chairman Addison discussed the following items with the EC:

11.1 Technical Guidance Documents (TGD).

The PCC Chair indicated that the following documents are in preparation:

1. Film Forming Substances for Nuclear Plants (has been delayed due to business and health pressures).
2. Monitoring Corrosion Products in Flexible (cycling and two-shifting) Plants. Updated draft white Paper including initial Proxy Processes and Decay Map was developed on 19th September 2019 (Dooley/Thomsen). The International Collaborative Projects (ICPs) on Monitoring for the Decay Map and Round Robin (2022 and 2023) were completed. Current Sub-Task Group (STG) (Dooley, Thomsen, Nielsen, Vepsalainen, Addison and McCann) with new members Skovbjerg, McAllister and Leidich will work on deciding what needs to be developed with a target of the end of October 2023.
3. Flue Gas Condensation First draft of White Paper (SIAPWS, March 2022) was reviewed by PCC. The STG (Fogh, Dooley and SIAPWS team plus new member Daal) will develop next stage of White Paper and then circulate again to PCC to determine if the white paper should be converted to a TGD.
4. Geothermal Steam Chemistry has ongoing work between NZAPWS and JAPWS – white paper draft for circulation soon.
5. Electrode Boiler Chemistry. Initial NZAPWS interface with SIAPWS expanded to make international. Proposal is to publish technical papers and move straight to basic TGD and identify possible ICRN areas. (STG: Addison, Nielsen and Dooley).
6. Dew Point of Low Sulphur Gas. Joint White Paper/TGD development with PCAS (Okita) with McCann and Addison providing PCC support.

11.2 International Collaboration Projects (ICP).

The PCC Chair informed the EC that no new collaborations had been proposed but indicated the status on the following two ICP:

- Boiler Corrosion – Canada/NZ – work continuing with expanded project.
- Corrosion Products. The two projects are completed and the results presented as PCC Keynote. The results will be used in the TGD revision project (Section 11.1).

11.3 PCC Improvements and Process Changes.

The PCC Chair informed the EC that there was a need to improve the PCC reach to help with new members and awareness of IAPWS. There had been a PCC workshop to go over this and collate comments and thoughts. The key outcomes were:

- TGDs are a key part of PCC and key deliverable – critical to maintain quality.
- PCC is a great group – global collaborations, knowledge sharing, leading edge.
- But is very slow at producing TGDs which is a complex and difficult process.
- Time between productive meetings is long so it's hard to make progress in between.
- Hard for outsiders to know about and understand PCC.
- IAPWS PCC penetration into North America market is poor.
- Need to continue to grow PCC and be exposed to new members and new industries.

The Chair then made the following requests and comments:

- First Request is for PCC to have a PCC page on the IAPWS website providing more public background information on PCC and information on PCC functions and activities – to increase awareness. This led to much discussion by the EC with a final motion of: “A working group (WG) product could be on the WG Page within the IAPWS website as long as it had been approved by the WG and reviewed by the Editorial Committee”.

The EC Approved this Unanimously

- PCC are going to hold four public webinars on the “best of PCC” leading up to ICPWS and will also provide information on IAPWS and PCC with 30-40 minutes on presentation and time for Q&A. Dooley will kick off these webinars.
- PCC internal action/status/progress calls will be held every two months to assist with support and encouraging progress on TGDs etc.
- PCC to try a little bit of LinkedIn to share information about IAPWS PCC and have a presence – to be managed by PCC officers.
- Second Request for EC to consider better IAPWS file sharing/collaborative work tools possibly as part of IAPWS website refreshment (discussed in Section 17.3).

11.4 ICPWS 2024.

The PCC Chair outlined the plans for PCC activities at the 2024 meetings:

- PCC TGD work and administration will take place on the first Sunday after IAPWS EC meeting in focused session.
- Rest of ICPWS will be related presentations.
- PCC members to submit abstracts and solicit presentations.
- Need suitable meeting space as well as the Sunday at ICPWS. This will be discussed with the ICPWS committee.

11.5 White Papers and International Collaboration Project (ICP) Report.

Chairman Addison raised the following items:

- These documents are outside of the normal IAPWS release process but in case of white papers critical to TGD development and need to circulate inside/outside of PCC for review/comment.
- The ICP reports are part of the ICP process but not currently published anywhere.
- White papers exist in a “behind the scenes” IAPWS space.
- As part of PCC webpage, the update is intended to include a short summary of draft white papers in a state to be circulated and ICP reports with contact to email for a copy.
- PCC (Addison/Dooley) also to draft “cover/template first page” for these documents including disclaimer about them not being guidance documents etc.
- In summary, the PCC Chair requested the EC that a proper process was needed to manage these documents going forward (see Section 17.3).

11.6 PCC Membership and Officers.

The PCC Chair proposed the following new WG members:

- Mikko Vepsäläinen, Finland
- David De Vos, Belgium
- Antony Senecat, Belgium
- Ronny Wagner, Germany
- Antonios Thanos, Greece

The EC approved these new WG member changes unanimously.

The PCC Chair next indicated that Taro Ichihara, Japan was nominated by the PCC WG as a third PCC Vice Chair.

The EC approved this new PCC officer arrangement unanimously.

12 Editorial Committee Report

Editorial Committee Chairman Harvey reported that in the preceding year, the Editorial Committee (Harvey, Cook and Cooper) had not reviewed any IAPWS Documents prior to publication.

13. Membership and Associates

13.1 Report on Membership.

The Executive Secretary reported that only Canada had not paid the 2023 dues by the end of August 2023.

The Head of the Canada National Committee, Cook, indicated that because of internal budgeting at the sponsor of the Canadian National Committee the dues will be processed before the end of 2023.

13.2 Reports on Current Associate Members.

The Executive Secretary reported on contacts with Associate Members on their IAPWS status.

Status Report on IAPWS Associate Member, Greece. Mr. Antony Thanos, Chair of HIAPWS, indicated that in 2022-2023 the effort for expanding interest on IAPWS activities in Greece was continued. Currently, there are 54 participants in the Hellenic Association including one from Cyprus. HIAPWS is exploring options for type and content of Statutes and By-Laws for the Greece national committee and are starting to consider options and opportunities for financing, such as sponsoring, closely related with the legal form of the Association. For these reasons, the Hellenic National Committee requests the IAPWS Executive Committee for an extension of the status of Greece as an Associate Member, for another 3 years, in order to properly shape Statutes and By Laws and to identify potential resources for financing the National Committee and, eventually, the participation of Greece as a Full Member of IAPWS.

The EC Approved Unanimously the Extension of the Associate Membership.

Status Report on IAPWS Associate Member, Italy. The delegate of the Italian National Committee, Ms. Simona Lago, reported that the Italian National Committee has contacted numerous organizations. They have experienced several administrative (and bureaucratic) issues, which did not allow them to complete the legal process for the constitution of the Italian Committee. Lago then requested the EC for an extension of one year as Associate Member before applying for IAPWS full Membership.

The EC Approved Unanimously the Extension of the Associate Membership.

Status Report on IAPWS Associate Member, Israel. The Head of ISRAPWS, (Yitzhak Nussbaum) could not be in Turin so sent a report to the Executive Secretary. He reported that ISRAPWS continue to maintain an annual symposium for the members with information sharing and raising of problems through direct personal contacts and presentations sessions. They hope to manage a strong committee and influence the community in the coming year with much more financial strength. Until then they request the EC to extend the Associate Membership for another three years.

The EC Approved Unanimously the Extension of the Associate Membership.

Status Report on IAPWS Associate Member, China. The new head of the China National committee (Long) had provided a Work Report to the Executive Secretary. This reported that the China electric power plant chemical standardization technical committee became an Associate member of IAPWS in May 2017. This group is composed of nearly 40 experts from various research institutes in China. It mainly carries out the formulation and revision of China's standards in Power plant chemistry and

organizes some academic activities of power plant chemistry. It had met twice since December 2022. A motion from the US Delegate, Harvey, was given to extend the Associate Membership of China for three years.

The EC Approved Unanimously the Extension of the Associate Membership.

Other IAPWS Associate Members. The Executive Secretary provided short status reports as follows:

- Egypt. The initial chair of this national committee, Mr. Moataz Khalifa, had moved jobs and country location. The new chair, Mr. Mohamed A. ElSherif, has been trying to reconvene the national committee.
- India. The initial chair of this national committee, Dr. Bikasendu Bhattacharya, had been killed in a road accident. The new contact, Mr. Aditya Kanetkar, has gradually been organizing officers for the national committee and planning a virtual meeting to reconvene the committee.
- France. A number of attempts have been made to reconstitute the national committee in France.

A motion from the US Delegate, Harvey, was given to extend these Associate Memberships for three years and for the Executive Secretary to provide continuing interface with each and report at the 2024 EC meeting.

The EC Approved Unanimously the Extension of these Associate Memberships.

- Argentina and Brazil. The Executive Secretary indicated that no contact had been made with Dr. Horacio Corti the last head of the national committee. However as indicated in Minute 10.1, Corti is a proposed member of a PCAS Task Group.

A motion from the US Delegate, Harvey, was given to extend this Associate Membership for one year for the Executive Secretary to contact Corti and report at the 2024 EC meeting.

The EC Approved Unanimously the Extension of this Associate Membership.

14 Executive Secretary's Report

14.1 IAPWS Bank Accounts, Financial, Auditors and IAPWS Dues

The Executive Secretary reported that IAPWS is on a sound financial footing with currently about £90,000.00GBP in total in the UK and US bank accounts. The status as at 30th August 2023 in the bank accounts had been provided to the Head of each IAPWS Member country prior to the EC meeting.

The Executive Secretary next reported that the 2022 financial statements had been forwarded to the IAPWS Auditors in January 2023 (Professor Savarik in Czech Republic and Dr. Delfs of VDI in Germany). Professor Savarik had reviewed and approved the financial statements. But Dr. Delfs was away from the office and had not reviewed the statements. The Head of the Germany-Swiss national committee had checked with Delfs who indicated that he would be able to review the statements soon and was prepared to remain as an IAPWS auditor.

The IAPWS President motioned that the second audit report should be forwarded to the heads of IAPWS members when available with a postal ballot vote for acceptance of the IAPWS financial situation.

The EC Approved these Actions Unanimously.

The Executive Secretary proposed that these organizations be re-appointed to act as auditors.

The EC Approved this proposal Unanimously.

The Executive Secretary proposed to the EC that the dues structure for member countries remains unchanged for 2024 as had been approved in Minute 2.7.

14.2 Time and Place of the 2024 and 2025 IAPWS Meetings.

2024 IAPWS Meetings. The annual meetings will be held in conjunction with the 18th ICPWS which was discussed in Minute 2.5.

2025 IAPWS Meetings. The Head of SIAPWS, Nielsen, briefly reviewed the initial details to host the meeting in Helsinki, Finland between 22 – 27 June 2025. The meetings will be held at Hanaholmen. As well as the normal IAPWS EC and WG activities there will be a technical visit to VTT, Technical Research Center of Finland.

2026 IAPWS Meetings. The Executive Secretary indicated that preliminary discussions have occurred with three IAPWS countries. It is expected that the location of the 2026 annual IAPWS meetings will be consolidated by the next annual meeting in 2024.

14.3 Succession Planning for the IAPWS Executive Secretary Position.

President Friend informed the EC that the Executive Secretary had suggested that a succession plan should be developed for this IAPWS executive position. Friend indicated that this appeared sensible and could involve finding a deputy. All other WG officer positions had vice chairs. This led to much EC discussion with the President indicating that each national committee should deliberate with their committee members to provide a suggested path forward on succession for the Executive Secretary position. Suggestions and comment should be sent to the President and Executive Secretary. He then proposed a motion to appoint a Task Group consisting of the heads of IAPWS member national committees with the President as chair.

The EC Approved this Motion Unanimously.

The President indicated that he would send a note to the Heads of national committees to start the process and provide a timeframe.

15. Guidelines, Releases, Certified Research Needs, and International Collaborations.

The President indicated that ICRNs had been discussed within the WG Reports, so no further action was required by the EC. There had not been any International Collaborative Projects suggested. The President wanted to encourage everybody to think about collaborative projects for 2024 and that proposals should be submitted as early as possible before the annual meetings.

16. IAPWS Awards

The President reported that there was no 2023 Helmholtz Award which was very disappointing.

The Helmholtz Award Committee for 2024 had been initially discussed in Minute 2.4.2 and would consist of the following members: Canada (Cook as Chair), Czech Republic (Hruby), Germany/Switzerland (Hellmann), Japan (Kayukawa) and New Zealand (Addison).

There was also no Honorary Fellow Award for 2023. The committee for 2024 is found in Section 2.4.1.

The Gibbs Award had been discussed at the Monday EC meeting (Minute 2.4.3).

17. New Business

17.1 Press Release

The President mentioned that Cook (Chair) and Lago had been asked at the EC meeting on Monday to develop a Press Release. This was developed with input provided by each WG. Cook indicated that a document had been prepared. The final version is Attachment 9. The President indicated that this release will be sent to all NCs and WGs of IAPWS and it should be distributed as widely as possible and sent to any journals and publications.

17.2 Reports from National Committees.

Written reports on progress in member countries provided during and after the EC meeting are attached to these minutes as follows:

Australia	Attachment 10
Czech Republic	Attachment 11
Germany-Swiss	Attachment 12
Japan	Attachment 13
New Zealand	Attachment 14
SIAPWS	Attachment 15
USA	Attachment 16

17.3 Refreshment of IAPWS Website.

The President requested the chair of the Task Group, McCann, selected at the Monday EC meeting to provide the EC with the feedback.

McCann informed the EC on the following points:

- The IAPWS website works fine and it is relatively easy to find the basic information.
- It is hosted by GoDaddy and there are no indications of any problems supporting it.
- Harvey has administration rights.
but.....
- The http domain is not secure and it may be blocked by modern IT security.
- Overall the website is out-of-date in terms of appearance and functionality.
- There is no possibility to use it for collaborative working.
- It provides the first interface with IAPWS for users and thus doesn't create the best impression.
- There is limited information about Working Groups.

McCann next provided three proposals for the EC to consider. Each was discussed in turn.

1. The existing website domain must be changed to https to ensure it remains compatible with modern IT security. This is an immediate priority and should be easy to do in conjunction with GoDaddy at minimum cost. But if not, then IAPWS needs a new website as proposed in proposal 3.

The President proposed to the EC that this item should proceed as soon as possible.

The EC approved this activity unanimously.

2. For the existing website, the PCC WG requested (Minute 11.3) its own webpage to provide public facing information about what the WG does. The other WGs were interested and in agreement. This is a short-term priority. These website changes can be addressed by Harvey within the existing structure before the next IAPWS meeting.

The President proposed to the EC to establish web pages for each WG and that each WG should provide descriptions of the content.

The EC approved this activity unanimously.

The President proposed that the descriptions should be available by the end of November 2023

3. The Task Group recommends that IAPWS has a new modern website developed to improve branding and enable collaborative working. The following are the desired outcomes and it is recognized that this may take up to two years.
 - Improves collaborative and efficient working.
 - Modernisation of graphics and branding.
 - Provide information management and file storage.
 - The cost is expected to be in the range of 3 - 6k USD by an external professional website designer.

The President developed the motion that a Task Group is established to scope the project and come back to the EC with a proposal at the next annual meeting in the US.

The EC approved this proposal unanimously.

The Task Group will consist of McCann, Addison, Harvey, McAllister and Albo. The President indicated that there is no current commitment from the EC for expenditure of IAPWS funds.

17.4 Italy National Committee Feedback on the 2023 EC and WG Meetings.

The Head of the Italy National Committee, Lago, thought the IAPWS symposium had been a great success. There had been 72 people attending the meetings from 19 countries. It had been very difficult to predict the number of participants.

The IAPWS President thanked Lago for organizing the IAPWS week in Turin. Applause from EC in appreciation.

17.4 Participants

Attachment 17 provides a list of participants at the IAPWS Meetings in Turin, Italy in September 2023.

17.5 List of Members

An up-dated list of members of the Executive Committee, Working Groups, and Honorary Fellows will be developed by the Executive Secretary following the EC Meeting. This will be forwarded electronically to the Head of each National Committee and the Working Group Chairs.

19. Closing Remarks and Adjournment

No further business was raised by the EC. The President thanked everybody for participating at this EC meeting. The 2023 EC meeting was closed at 12:25 pm.

**AGENDA for the EXECUTIVE COMMITTEE of IAPWS
Torino, Italy. 3rd – 8th September 2023**

Monday, 4th September 2023. Opening Plenary Session (9:00 – 10:15 am)

Opening Remarks, Welcome and Introductions by IAPWS President D. Friend

1. Adoption of Agenda.
2. IAPWS Business and Appointment of Committees
 - 2.1 IAPWS Business since Last EC Meeting December 2022
 - 2.2 IAPWS Highlights / Press Release
 - 2.3 Evaluation Committee on International Collaboration
 - 2.4 IAPWS Awards for 2024 (Honorary Fellow, Helmholtz, Gibbs)
 - 2.5 Update Report on 18th ICPWS (ICPWS Chairman Friend)
 - 2.6 Situation in Ukraine
 - 2.7 Dues Structure Task Group (IAPWS 2022 Minutes 13.1)
 - 2.8 Registration Fees for IAPWS Annual Meetings
 - 2.9 Refreshment of IAPWS Website
 - 2.10 Other business requiring special/extensive discussions.
3. EC Mandate to Working Groups and Membership
 - 3.1 Releases, Guidelines and ICRNs.
4. Preview of Week's WG Activities by WG Chairmen.

Friday, 8th September 2023. Executive Committee Meeting. (9:00am – 1:00 pm)

5. Acceptance of Minutes of Previous IAPWS EC Meeting
6. President's Report
7. Report and Recommendations of Joint TPWS and IRS (including SCSW)
8. Report and Recommendations of Separate IRS Meetings
9. Report and Recommendations of Separate SCSW Meetings (if any)
10. Report and Recommendations of PCAS
11. Report and Recommendations of PCC
12. Editorial Committee Report
13. Membership and Associates
 - 13.1 Report on Membership and Members Defaulting on Dues
 - 13.2 Reports of Associate Members (China, Greece, Israel and Italy)
14. Executive Secretary's Report
 - 14.1 IAPWS Bank Accounts, Financials, Auditors and Dues
 - 14.2 Time and Place of 2024 (USA) and 2025 (Finland) Meetings.
15. Guidelines, Releases, Certified Research Needs, and International Collaborations
 - 15.1 International Collaborations (if any)
16. IAPWS Awards
 - 16.1 Helmholtz Award Committee
 - 16.2 Honorary Fellowship
 - 16.3 Gibbs Award
17. New Business
 - 17.1 Press Release
 - 17.2 Italy National Committee feedback on 2023 Annual Meeting
 - 17.3 IAPWS Website
 - 17.4 Other items raised during the IAPWS week.
18. Adjournment



Barry Dooley 7th September 2023

IAPWS Symposium

6 September 2023

“Underpinning the seawater science”

09:00 – 9:30

Oceanic in situ long term O₂ times series: challenges & solution

Dominique Lefèvre (Centre National de la Recherche, CNRS, France)

09:30 – 10:00

Brief state of the art in density/absolute salinity measurements seawater

Marc Le Menn (Service hydrographique et océanographique de la marine, SHOM, France)

10:00 – 10:30

The role of metrology into the value chain of ocean observations

Paola Fiscaro (Laboratoire National de Métrologie et d'Essais, LNE, France)

10:30 – 10:45

Coffee Break

10:45 – 11:15

In-situ measurement of seawater properties

Christoph Waldmann (University of Bremen, WMO member)

11:15 – 11:45

Ab initio calculation of virial coefficients: from noble gases to water

Giovanni Garberoglio (Fondazione Bruno Kessler-ECT, FBK-ECT, Italy)

Allan Harvey (National Institute of Standards and Technology, NIST, USA)

11:45 – 12:15

From concept definition to full scale prototype of a hybrid wave energy converter to produce fresh water and electricity

Marcello Rava (Politecnico di Torino, Italy)

12:15 – 12:25

Picture of IAPWS meeting participants

12:25 – 13:40

Lunch

13:40 – 14:10

On the measurement of the absolute salinity of seawater: state-of-the-art and emerging trends

Rajesh Nair (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, OGS, Italy)

14:10 – 14:35

INRiM activity in the field of metrology for the determination of CO₂ in atmosphere and seawater

Francesca Rolle (Istituto Nazionale di Ricerca Metrologica, INRiM, Italy)

14:35 – 15:00

Acoustic thermometry in the atmosphere and the ocean

Roberto Gavioso (Istituto Nazionale di Ricerca Metrologica, INRiM, Italy)



Schedule of IAPWS Meetings Torino, Italy. 3rd – 8th September 2023

(All technical meetings will be at the Starhotels Majestic)

Sunday 3 Sept.	6:00 – 8:00 pm	Welcome Reception and Registration Starhotels Majestic
Monday 4 Sept.	9:00 am	Executive Committee - Opening Plenary Session
	10:15 am	Coffee / Tea Break
	10:30 am	TPWS/SCSW/IRS Joint Meeting
	(To set agendas for the week and to conduct IAPWS Business, thus allowing remainder of week for technical matters)	
	10:30 am	PCAS and PCC Separate Meetings
	(To conduct IAPWS Business, thus allowing remainder of week for technical matters)	
	12:00 pm	Lunch
	1:30 pm	TPWS/SCSW/IRS Joint Meeting
	1:30 – 3:15 pm	PCC and PCAS Joint Meeting
	3:30 pm	PCC and PCAS Separate Meetings
Tuesday 5 Sept.	9:00 am	PCAS and TPWS Joint Meeting
	9:00 am - Noon	PCC WG Meeting
	9:00 am	SCSW/IRS Joint Meeting
	10:30 am	PCAS Separate Meeting
	12:00 pm	Lunch
	1:30 pm	PCAS/PCC Joint Meeting.
	1:30 pm	TPWS/SCSW Joint Meeting
	3:30 pm	PCC, PCAS and IRS Separate Meetings
Wednes. 6 Sept.	9:00 – 3:30 pm	IAPWS Symposium “Underpinning the Seawater Science”
	4:00 - 5:30 pm	Egyptian Museum guided visit
	7:00 pm.	IAPWS Dinner/Banquet. (Stupinigi Palace)
Thurs. 7 Sept.	9:00 am	TPWS, SCSW and IRS Separate WG Meetings
	9:00 am	PCC and PCAS Separate WG Meetings
	12:00 - 1:00 pm	Separate meetings of Working Groups (if needed)
	1:00 pm	Lunch
	2:30 - 4 pm	IAPWS Technical Visits to INRiM (Humidity, Density & Speed of Sound, Acoustic Thermodynamics)
Friday 8 Sept .	9:00 am	Executive Meeting (9:00am - 1:00pm) (Will include at least one member from each National Member Delegation)

TPWS - Thermophysical Properties of Water and Steam WG
 SCSW - Subcommittee on Seawater
 IRS - Industrial Requirements and Solutions WG
 PCAS - Physical Chemistry of Aqueous Solutions WG
 PCC - Power Cycle Chemistry WG

Barry Dooley
 2nd September 2023