



Working Group 21



Report to IUPAP, September 2023

WG21: *Physics for Climate Change and Sustainable Development*, name to be confirmed

1. Background

Issues around climate change are set to grow in the coming years. These challenges are intimately connected with the need for energy security, food security, water security, and sustainability of the environment, and if not addressed will impact negatively on poverty, inequality, mass migration, and the human condition. These are global problems that require a global effort, including a transdisciplinary endeavour across all sciences, engineering, human and social sciences, law, health sciences, and basic sciences. The 2021 Nobel Prizes emphasised that there are roles for physics.

The proposal to establish a new Working Group on *Physics and the Green Economy* was supported by the General Assembly on 14 July 2022 and approved by the IUPAP Executive Council on 21 September 2022.

The WG is on the agenda for the Executive Committee and Commission Chairs meeting and General Assembly for October 2023.

The task of the WG is to promote and grow the unique role that physics is, and should be, playing in the green economy, climate change and sustainable development.

2. Alignment

There is alignment of this initiative with, among others,

- IYBSSD, the International Year of Basic Sciences for Sustainable Development, Chair of Steering Committee: Michel Spiro, <https://www.iybssd2022.org/>
- The call to action issued by IoP, the Institute of Physics, London <https://www.iop.org/strategy/physics-climate-change-sustainability/global-green-economy>
- The long-standing actions of ISC, the International Science Council <https://council.science/publications/the-international-council-for-science-and-climate-change/>
- The proclamation by the United Nations General Assembly of 2024 to 2033 as the "International Decade of Sciences for Sustainable Development (IDSSD) <https://www.iybssd2022.org/en/an-international-decade-of-sciences-for-sustainable-development/> .

3. Members

A call to all member liaisons was issued, and closed on 28 February 2023.

Prof Nithaya CHETTY	South Africa	Chair IUPAP Vice-President for Membership and Development University of the Witwatersrand, Johannesburg
Prof. Irvy (Igle) GLEDHILL	South Africa	Secretary Past Chair, IUPAP Working Group on Women in Physics; University of the Witwatersrand, Johannesburg
Prof. Fida Younus KHATTAK	Pakistan	Pak-Austria Fachhochschule: Institute of Applied Sciences and Technology

		Khanpur Road Mang, Haripur (Khyber Pakhtunkhwa, Pakistan)
Dr. Hyunjung LEE	Korea	Korea Institute of Fusion Energy
Prof. Jon SAMSETH	Norway	Oslo Metropolitan University; chair SCOPE - Scientific Committee of Problems of the Environment; member, IUPAP WG6 on Energy; chair, IUPAP WG12 on Energy
Prof. Jean-Louis SCARTEZZINI	Switzerland	Former Director, Director of EPFL Solar Energy and Building Physics Laboratory, École Polytechnique Fédérale de Lausanne
Dr. Tomás M. SINTES	Spain	University of the Balearic Islands, Palma de Mallorca
Dr. Gry Merete TVETEN	Norway	Expert Analytics AS, Oslo
Prof. Carolina VERA	Argentina	Vice-Chair of WG1 Bureau of the IPCC (Intergovernmental Panel for Climate Change) in the 6th Cycle (2016-2023); Director, Argentinean-French Institute for Climate Studies and its impacts

Membership is still to be completed, particularly in terms of low- and low-middle income countries and island states. Bringing diverse voices to the table is critical.

4. Meetings

For the present, the WG meets virtually. Most work will take place between meetings, offline.

The first meeting was held on 4 September 2023. All members were present. After introductions, Michel Spiro set high expectations, Jens Vigen outlined the structure of IUPAP, and Nithaya Chetty set out the background and aims. Superb introductions to gaps relevant to physics were presented by Carolina Vera, for Climate science, and by Jon Samseth, in sustainable energy. The working group engaged with the breadth of the aims of the working group, and proposed the name *Physics for Climate Change and Sustainable Development*, to be confirmed. The second meeting will be before the end of 2023.

5. Conference and funding

WG21 is planning a major conference in 2025/26. An international bid to host the conference will be run, and the organisers will be expected to raise funds from international sources.

It is therefore essential that IUPAP allocates funds for this conference.

6. Current activities

6.1 Conference on Physics and Sustainable Energy, Kathmandu, Nepal

The IUPAP Int. Conf. on Physics and Sustainable Energy took place in Kathmandu, Nepal, 22-23 September 2023, under the aegis of the Nepal Physical Society (NPS) and WG21, and with IUPAP sponsorship. Nepal is in the process of joining as an IUPAP Associate Territorial Member, a category with an expectation that the member will undertake to develop physics in its territory; the NPS chose the topic, and IUPAP assisted in conference organisation through the International Advisory Committee:

Michel Spiro, President, IUPAP, Chair of the Steering Committee for the International Year of Basic Sciences and Sustainable Development, France; Nithaya Chetty, VP Membership and Chair, WG21; Irvy (Igle) Gledhill, Secretary WG21; Jens Vigen, Secretary General; Gillian I Butcher, VP and Gender Champion; Kuijuan Jin, Chair C13, Physics for Development; Joe Niemela, Vice-Chair C13; Sunil K Gupta, Institute of Fundamental Research, India.

The conference was organised within 3 months of the first suggestion, by NPS President Nilam Shrestha. The conference was opened by the Chief Guest: Prof. Dr. Shiv Lal Bhusal, Rector, Tribhuvan University, Kirtipur, Nepal. There were over 90 participants, of whom approximately 20% were women. The welcome was provided by IUPAP President Michel Spiro, and talks on IUPAP were given by Jens Vigen and Igle Gledhill.

WG21 members Carolina Vera and Gry Tveten provided background on climate change and sustainable energy. About 15 oral papers and 20 poster papers were given, with student prizes attached. The Memorandum of Understanding between the NPS and IUPAP (pending acceptance of the revision of the IUPAP Articles and Internal Regulations accommodating the new category of Associate Territorial Members) was signed by Nilam Shrestha as President of NPS, and Jens Vigen, Secretary General IUPAP.



6.2 Inter Commission Symposium: collaboration

A proposal has been made for an Inter Commission Symposium in conjunction with the GA in 2024, based on the title "IUPAP Joint Activity for the Future of Planet Earth". The proposal is made by Pietro Ubertini & Andreas Burkert on behalf of C19. The topic is likely to be the role of physics in climate change and sustainable development, and WG21 will be involved in organising the symposium.