# Innovative climate research for guiding policy-making

## Professor Phoebe Koundouri leads AE4RIA and UN SDSN Global Climate Hub, participating in innovative climate research impact projects

In the face of the climate crisis, a challenge that intertwines ecological balance with socio-economic stability, initiatives like the Alliance of Excellence for Research and Innovation on Aephoria (AE4RIA) and the UN SDSN Global Climate Hub (GCH) are instrumental.

These organizations foster innovative research and actionable solutions to navigate the complexities of climate change and drive global efforts towards a sustainable and resilient future, and co-ordinate a science-based, holistic response to the climate crisis, supporting not only environmental integrity but also socio-economic resilience. As we navigate the complexities of a warming planet, initiatives like AE4RIA and GCH are crucial, harnessing collaborative expertise to drive the global agenda towards a sustainable and equitable future for all.

### AE4RIA: Building a sustainable and equitable future

The AE4RIA, founded and directed by myself, embodies a cross-disciplinary approach towards addressing climate change and promoting sustainable development. Through a network of more than 200 experts, we stand at the nexus of this transformational effort, by participating in a wide range of project categories, including: SDG-ESG Measurement and Sustainable Finance; Sustainable Pathways for Climate Neutrality and Resilience; Sustainable Pathways for Seas and Oceans; Sustainable Land Use and WFE (Water-Food-Energy) Nexus; and Innovation Acceleration Education, Upskilling/ Reskilling.

### United Nations SDSN GCH: Scientific modelling across major systems

In response to the complex issues caused by climate change, the United Nations Sustainable Development Solutions Network has established the United Nations SDSN GCH. It employs scientific knowledge to create fair and inclusive plans for a stronger, carbon- neutral future.

At the center of GCH's approach is the integration of scientific modelling across major systems like energy, transport, land, and oceans, focusing on both mitigation and adaptation at a national scale. The Hub also constructs socio-economic narratives to ensure justice and equity in the application of these scientific strategies.

Engaging a broad spectrum of national stakeholders, including scientists, policy-makers, the finance sector, and civil society, the GCH emphasizes co-designed, participatory approaches to ensure widespread investment in these pathways. Additionally, it employs

advanced AI technology to facilitate the uniform combination, organization, and visualization of data and models, reinforcing its comprehensive climate action framework.

## A nine-unit framework to combat climate change

The GCH synergizes with AE4RIA's mission by deploying a nine-unit framework, each with a targeted focus on combating climate change and fostering sustainability:

1. Data Platforms & Digital Applications
2. Atmospheric Physics & Climatology
3. Systems Nexus Modeling Unit: Land-Water-Food-Biodiversity-Marine Nexus
4. Energy Systems & Emissions Modeling
5. Climate, Environment and Health
6. Innovation & Acceleration
7. Policy, Finance & Labour Markets for Just Transition
8. Transformative & Participatory Approaches co-designing climate actions with stakeholders
9. Education, Training, Upskilling & Reskilling

The Hub leverages advanced modelling tools, like the BALMOREL model for energy and transport system analysis, and the FABLE Calculator for sustainable land-use and food systems projections. These tools provide crucial data for policy development and inform various reports published by the GCH, shaping international climate action dialogues. In COP28, we presented, the "Modelling Net-Zero Pathways" report, an assessment of effective Integrated Assessment Models (IAMs) and the description of a first set of sustainable pathways on the EU energy sector, Southeast Asia's renewable energy transition, and Greece's land-use and food systems.

The BALMOREL and FABLE models are integral components of the Hub's suite of advanced modeling capabilities. BALMOREL focuses on analyzing the electricity and heat power sectors, playing a crucial role in energy and transport systems modeling, aiding in developing sustainable energy strategies, crucial for decarbonization efforts. On the other hand, the FABLE Calculator is central to the Land-Water-Food- Biodiversity Nexus, and Marine Modeling unit, as it helps the evaluation of sustainable land-use and food systems, providing insights into agriculture's impact on land use and greenhouse gas emissions. Together, these models exemplify the GCH's diverse approach, addressing various climate change aspects, from energy systems to food security and public health.

The Education, Training, Upskilling, and Reskilling unit works closely with the SDG Academy to align educational programmes with sustainability and digitalization. The white paper "Twin Skills for the Twin Transition: Defining Green Digital Skills and Jobs" written jointly with HUAWEI, demonstrates our engagement to preparing current and future workers for future jobs, 85% of which are estimated to be new inventions.

## The Sustainable Development Report (SDR)

Further, we have adapted the UN SDSN's national SDG assessment methodology to improve sub-national, regional, and corporate SDG performance measurement. The Sustainable Development Report (SDR) examines SDG achievement since 2015, and the 2023 edition emphasises development finance and global financial system change to promote SDGs. GCH also contributes to the European Sustainable Development Report, which uses SDSN's SDG Index and Dashboards to assess SDG achievement since 2015.

For SDG initiatives, this paper recommends improving development finance and restructuring the global financial system in 2023. GCH assessed Greek Regions' SDG achievements in 2022, highlighting sustainability leaders and obstacles in reaching the 17 SDGs and emphasises the importance of local players in SDG implementation, as 65 targets require regional and local interaction.

Moreover, in GCH we have developed an SDG performance measurement methodology for corporations, showing how ESG momentum affects international equity returns and financial asset portfolio SDG alignment. This study used mathematics to weight SDG indicators and KPIs to integrate the SDG framework into ESG concerns. These measures are used to calculate SDG scores and risk profiles for portfolios, showing that ESG-performing enterprises have higher market returns. GCH takes a multidisciplinary approach to climate change, helping to policy and a sustainable future through these multiple activities.

Overall, the GCH influences policy through its research, tailored to address specific local needs and actively involving diverse stakeholders. This process ensures that policies informed by GCH's research are not only based on interdisciplinary scientific excellence but are also relevant to the realities and needs of various communities. This approach enhances the practicality and impact of policies, making them more effective in addressing the intricate challenges of climate change and sustainable development.

## Fostering a sustainable future

In summary, the work of AE4RIA and GCH, is a testimony to an interdisciplinary, evidence-based approach to climate change, underscoring the necessity for research-informed policymaking that is adjusted to both sustainability and the complex, dynamic nature of global challenges.

Through these initiatives, we are shaping a future where research, innovation, and sustainability are intrinsically linked, ensuring a just transition to a resilient and climate-neutral world. Together, AE4RIA and GCH coordinate a multidisciplinary effort to address climate change, underscored by the need to inform policy, inspire innovation, and integrate sustainable practices into the framework of global economies and societies.

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