The Academies

The German National Academy of Sciences Leopoldina

The Leopoldina is a classical scholarly society and has 1,600 members from almost all branches of science. In 2008, the Leopoldina was appointed as the German National Academy of Sciences and, in this capacity, is invested with two major objectives: representing the German scientific community internationally, and providing policymakers and the public with science-based advice.

The United States National Academy of Sciences

The National Academy of Sciences (NAS) is a private, non-profit society of distinguished scholars. Established by an Act of Congress, signed by President Abraham Lincoln in 1863, the NAS is charged with providing independent, objective advice to the nation on matters related to science and technology. The mission of the National Academy of Sciences is to provide leadership in science for the nation and the world by recognizing and elevating the best science, and fostering its broad understanding, as well as by producing, and promoting adoption of, independent, authoritative, trusted scientific advice for the benefit of society.

The Israel Academy of Sciences and Humanities

The Israel Academy of Sciences and Humanities, established by law in 1961, is the preeminent scientific institution in Israel. It acts as a national focal point for Israeli scholarship in all branches of the sciences, social sciences, and humanities. The Academy comprises 149 of Israel’s most distinguished scientists and scholars who operate in two divisions—the Sciences Division and the Humanities Division. It is tasked with promoting Israeli scientific excellence; advising the government on scientific matters of national interest; publishing scholarly research of lasting merit; and maintaining active contact with the broader international scientific and scholarly community.

Contact

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Energy Solutions

Research and Industry-Related Developments in Energy Production, Storage, Conversion, Transmission and Distribution

Trilateral symposium of the German National Academy of Sciences Leopoldina, the U.S. National Academy of Sciences and the Israel Academy of Sciences and Humanities

October 11 – 12, 2023
German National Academy of Sciences Leopoldina
Jägerberg 1 | 06108 Halle

www.leopoldina.org | www.nasonline.org | www.academy.ac.il
Energy is arguably the most crucial sector for achieving climate-friendly and sustainable development. Power generation is the primary contributor to greenhouse gas emissions, with most of the fuels being of fossil nature, mainly oil, coal and natural gas. Currently, renewables, including hydropower, solar power, and wind power, represent approximately 13% of the total energy mix in the world and are steadily increasing. Projections indicate that global demand for fossil fuels will likely reach its peak around 2023-2025, with global greenhouse gas emissions peaking around 2030. It is, therefore, highly probable that the target of limiting global warming to 1.5°C will be significantly missed. Consequently, the path to achieving net-zero emissions remains the main route to mitigate global warming and enhance sustainability. To accomplish this, a comprehensive, innovation-based and transformative approach is necessary, encompassing various aspects of energy. The following areas will be addressed during the symposium:

- Decarbonization and defossilization of energy production and consumption;
- Conversion and storage technologies, and integrated systems;
- Smart and resilient grids, and energy distribution systems, including AI-based solutions;
- Negative emissions technologies, carbon dioxide removal, EOL cycle and materials;
- Scaling and commercialization of innovations arising from basic and applied research.

Scientific committee

German National Academy of Sciences Leopoldina
- Gerald Hug
  - President, German National Academy of Sciences Leopoldina
- Jutta Hanson
  - Technical University of Darmstadt

U.S. National Academy of Sciences
- Granger Morgan
  - Carnegie Mellon University
- Yi Cui
  - Stanford University

The Israel Academy of Sciences and Humanities
- Aner Rothchild
  - Technion – Israel Institute of Technology
- Liva Etgar
  - The Hebrew University of Jerusalem

Energy Solutions

Program

Wednesday, October 11, 2023

Keynote session: Setting the scene
09:00 – 10:15
Greetings by
- David Hanf
  - President, The Israel Academy of Sciences and Humanities, Jerusalem, Israel

Keynotes

Energy transition in a global perspective
- Mary Burce Warlick
  - International Energy Agency, Paris, France

How we replace fossil by renewable energy: A German perspective on a global challenge
- Robert Schlegl
  - Fritz Haber Institute of the Max Planck Society, President of Alexander von Humboldt Foundation, Berlin, Germany

Chair: Dan Yakir
- Weizmann Institute of Science, Rehovot, Israel

Session 1: Energy production, renewables
10:15 – 11:30
- Bernd Nech
  - Helmholtz Centre Berlin, Germany
- Eva Schill
  - Karlsruhe Institute of Technology, Germany
- Jay Apt
  - Carnegie Mellon University, Pittsburgh, U.S.A.
- Iris Visscher-Fisher
  - Ben-Gurion University of the Negev, Beer Sheva, Israel

Chair: Jutta Hanson
- Technical University of Darmstadt, Germany

11:30 – 11:45 | Coffee break

Session 2: Decarbonization and defossilization
11:45 – 13:15
- Markus Oles
  - ThiessenKrupp, Essen, Germany
- Carla Soledi
  - BASF, Ludwigshafen, Germany
- Patricia L. Hidalgo-Gonzalez
  - University of California San Diego, U.S.A.

Chair: Lisette Eger
- The Hebrew University of Jerusalem

13:15 – 14:15 | Lunch break

Session 3: Energy supply, consumption and storage, batteries
14:15 – 15:45
- Yang Shao-Horn
  - Massachusetts Institute of Technology, Cambridge, U.S.A.
- Daron Acarbac
  - BAE Systems, Ramat Gan, Israel
- Daniel Sharon
  - The Hebrew University of Jerusalem, Israel
- Dirk Uwe Sauer
  - RWTH Aachen University, Germany

Chair: Jutta Hanson
- Technical University of Darmstadt, Germany

15:45 – 16:15 | Coffee break

Session 4: Energy conversion, hydrogen, e-fuels
16:15 – 17:45
- Peidong Yang
  - University of California, Berkeley, U.S.A.
- Uri Banin
  - Technion – Israel Institute of Technology, Haifa, Israel

Chair: Aner Rothchild
- Technion – Israel Institute of Technology, Haifa, Israel

Thursday, October 12, 2023

Session 5: Energy transmission, distribution, grids, AI
09:00 – 11:00
- Jutta Hanson
  - Technical University of Darmstadt, Germany
- Despina Diamant
  - Georgia Tech – Georgia Institute of Technology, Atlanta, U.S.A.
- Yoash Levinon
  - Technion – Israel Institute of Technology, Haifa, Israel
- Jeff Nugent
  - Pacific Northwest National Laboratory, Richland, U.S.A.

Chair: Aner Rothchild
- Technion – Israel Institute of Technology, Haifa, Israel

11:30 – 13:00 | Lunch break

Session 6: Negative emissions, CCS, EOL/recycling, materials
13:30 – 15:00
- Jennifer Wilcox
- Gideon Friedman
  - Ministry of Energy and Infrastructure, Jerusalem, Israel
- Niklas von der Allman
  - RWTH Aachen University, Germany

Chair: Granger Morgan
- Carnegie Mellon University, Pittsburgh, U.S.A.

15:30 – 16:00 | Conclusions and outlook

Session 7 Roundtable: From fundamental research to scaling to systemic integration
14:00 – 15:30
- Christopher Hobbing
  - Fraunhofer Institute for Solar Energy Systems, Freiburg, Germany
- Ulrike Dehner
  - Fraunhofer Institute for Environmental, Safety and Energy Technology, Oberhausen, Germany
- Ted Sargent
  - Northwestern University, Evanston, U.S.A.
- Yoel Sasso
  - The Hebrew University of Jerusalem, Jerusalem

Chair: Yi Cui
- Stanford University, U.S.A.

16:15 – 17:45
- Peidong Yang
  - University of California, Berkeley, U.S.A.
- Uri Banin
  - Technion – Israel Institute of Technology, Haifa, Israel

Chair: Jutta Hanson
- Technical University of Darmstadt, Germany

18:00 – 20:30
- Dan Yakir
  - Weizmann Institute of Science, Rehovot, Israel

18:00 – 20:30
- David Hanf
  - President, The Israel Academy of Sciences and Humanities, Jerusalem, Israel

18:00 – 20:30
- Jutta Hanson
  - Technical University of Darmstadt, Germany

Wednesday, October 11, 2023