International Energy Agency
**Photovoltaic Power Systems Programme**

# IEA PVPS

2025

*Our mission is to facilitate the role of photovoltaic solar energy as a cornerstone in the **transition to sustainable energy systems**.*

Technology Collaboration Programme
by iea

Daniel Mugnier, Chair

*“Solar PV is now at the heart of the global energy transition. At IEA PVPS, we are proud to provide the expertise, data, and international collaboration that support the sustainable growth of PV worldwide, including addressing emerging challenges related to energy valorisation, grid integration, and system flexibility.”*

# ABOUT US

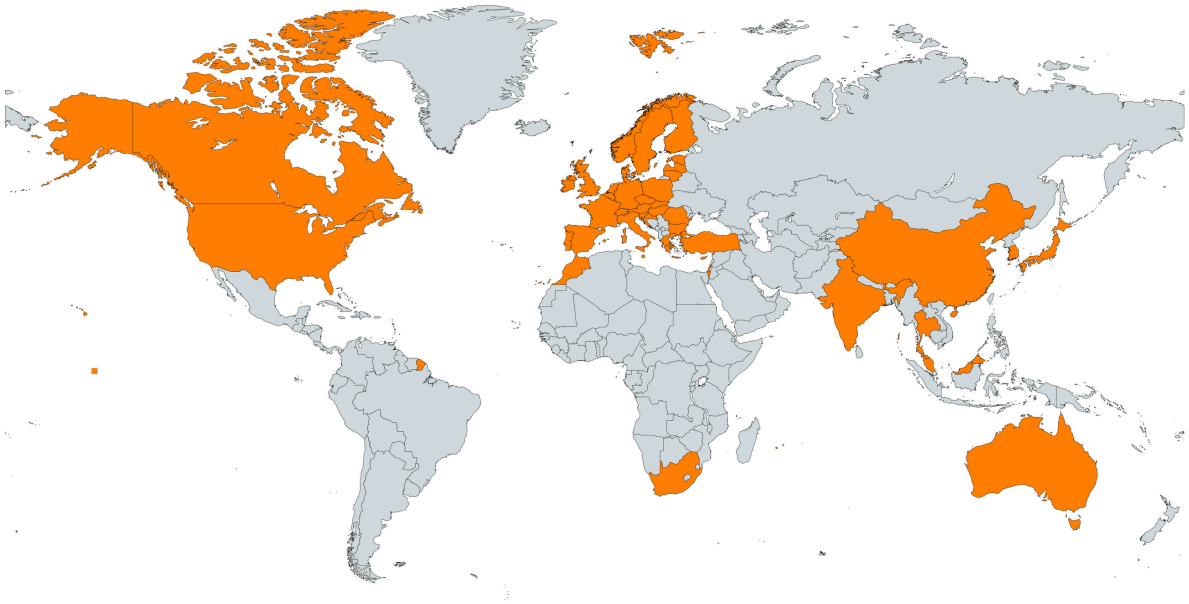
The IEA Photovoltaic Power Systems Programme (IEA PVPS) is one of the Technological Collaboration Programmes (TCP) established within the International Energy Agency (IEA). Since its establishment in 1993, international participants have collaborated on a diverse range of joint projects, all aimed at advancing the application of photovoltaic technology for the conversion of solar energy into electricity.

**11** Research Projects are currently operational

**Around 400** individuals from all over the globe are participating in PVPS

**Around 200** scientific reports have been published since 1998

# OUR MEMBERS



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- Portugal
- Solar Energy Research Institute of Singapore
- Solar Power Europe
- South Africa
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- Sweden
- Switzerland
- Thailand
- Türkiye
- United States
- United Kingdom

# OUR MISSION

- to serve as a **global reference** on PV for policy and industry decision makers;
- to provide a **global network of expertise** for information exchange and analysis;
- to act as an impartial and reliable **source of information** for PV experts and non-experts;
- to provide meaningful **guidelines and recommended practices** for state-of-the-art PV applications;
- to contribute to advancing the understanding and solutions for **integration of PV power systems** in utility distribution grids;
- to establish a fruitful **co-operation between expert groups** on decentralised power supply;
- to provide an **overview of successful business models** in various markets segments;
- to support the definition of **regulatory and policy parameters** for effective PV markets to operate.

# OUR TASKS

The core of IEA PVPS activities lies in its collaborative research projects, known as “Tasks.”

Each Task brings together experts from participating countries to work on a specific topic related to photovoltaic (PV) energy – ranging from technical performance and system reliability to market development, sustainability, integration into energy systems, and emerging applications.

These expert groups work together to produce high-quality reports that reflect the latest findings and international best practices. To support knowledge exchange and stakeholder engagement, the Tasks regularly organise webinars or workshops, helping to inform decision-making across the global PV sector.

## TASK 1 I Strategic PV Analysis and Outreach

Continuously researching the status and drivers of PV market, policy and industry development in IEA PVPS countries and globally.

**Task Managers**

Mr Gaëtan Masson

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Ms Izumi Kaizuka

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**Click or Scan for more information**

## TASK 12 I PV Sustainability Activities

Fostering global collaboration to understand the environmental, resource, safety and social implications of PV systems.

**Task Managers**

Mr Garvin Heath

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Mr Étienne Drahi

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## TASK 13 I Reliability and Performance of PV Systems

Assisting market players to enhance PV component and system reliability and quality across diverse climates and applications.

### Task Managers


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## TASK 15 I Enabling Framework for BIPV

Enabling an equal playing field for BIPV products with respect to mandatory, aesthetic, reliability, environmental and financial issues.

### Task Managers


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## TASK 16 I Solar Resource for High Penetration

Lowering yield uncertainty, planning and investment costs for PV by enhancing the quality of forecasts and resources assessments.

### Task Managers


Mr Jan Remund
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Mr Manajit Sengupta
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## TASK 17 I PV and Transport

Clarifying expected benefits and requirements for PV powered vehicles and charging infrastructure to enhance PV market expansion.

### Task Managers


Mr Keiichi Komoto
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## TASK 18 I Off-Grid and Edge-of-Grid PV Systems

Providing solutions for technical barriers in off-grid and edge-of-grid PV system planning, financing, construction, and maintenance

Mr Michael Müller
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## TASK 19 I PV Grid and Market Integration

Preparing power systems for high solar PV shares through smart integration, technical solutions, and collaboration.

**Task Managers**

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## TASK 20 I Energy Hubs & Green Hydrogen

Advancing hybrid wind-solar-hydrogen systems through shared data, best practices, and location-specific integration strategies.

**Task Manager**

Ms Veronika Vancheri
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## Action Group I Agrivoltaics

Bringing together global expertise to optimise land use, enhance agricultural resilience, and drive support for agrivoltaic solutions.

**AG Managers**

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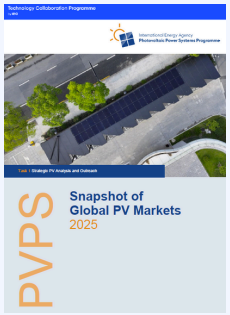
# TASK 1


- **Think Tank and Market Analysis:** serve as the PVPS programme's think tank by identifying and clarifying market evolutions, addressing issues, and advancing knowledge in the PV sector.
- **Research and Policy Analysis:** investigate market and industry development, and analyse support mechanisms and R&D policies.
- **Information Compilation and Dissemination:** compile agreed-upon PV information from PVPS countries and more broadly, and disseminate PVPS information and analyses to target audiences and stakeholders

## Recent Publications

### Snapshot of Global PV Markets

Data from 25+ countries about the development and the drivers of the PV market.

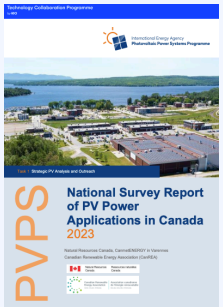



### Trends in Photovoltaic Applications

Most comprehensive overview of the development of the PVsector.


### National Survey Reports

Development of the PV market in a defined country.

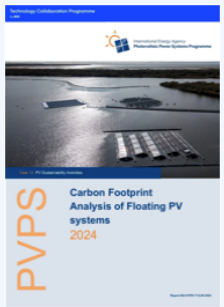


# TASK 12


- **Sustainability and Circularity:** measure and improve the environmental profile of PV electricity to boost sustainability, enabling comparisons with other energy forms, while advancing PV technology and material reuse through innovative analysis.
- **Ecosystem Integrated PV and Broader Sustainability Aspects:** conduct thorough investigations into the environmental and ecosystem impacts of PV systems, improve the understanding of potential social and socio-economic assessment of PV systems, and disseminate findings to experts, policymakers, and the public to enhance informed decision-making on energy.

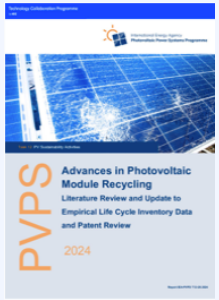
## Recent Publications

### Carbon Footprint of Floating PV Installations

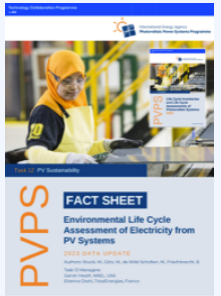



### Advances in Module Recycling

**Literature Review and Update to Empirical LCI Data and Patent Review**




### Environmental Life Cycle Assessment of Electricity from PV Systems

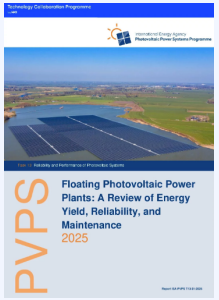


# TASK 13

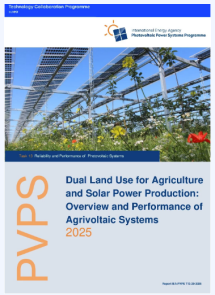
- **Information Gathering:** collect the most current information from member countries and summarise different practices and experiences with various PV technologies and system designs
- **Data Collection:** gather measured data from PV systems worldwide to test and compare data analysis methods for PV degradation, operation & monitoring (O&M), performance, and yield estimation etc.
- **Stakeholder Communication:** technical reports, workshops, webinars, scientific papers at conferences and in journals

## Recent Publications

**Floating PV Power Plants: A Review of Energy Yield, Reliability and Maintainance**




**Dual Land Use for Agriculture and Solar Power Production: Overview and Performance of Agrivoltaic Systems**




**Degradation and Failure Modes in New Photovoltaic Cell and Module Technologies**

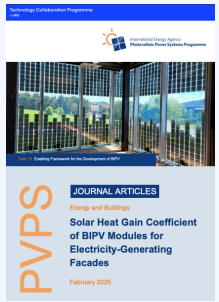
# TASK 15

- **Integration and Multi-functionality:** integrate BIPV into buildings, enhancing energy production, environmental impact, and aesthetics.
- **Innovation and Standards:** foster innovation, establish performance standards, and integrate BIPV into the digital environment for enhanced monitoring and management. Conduct international research on BIPV characterisation and performance.
- **Challenges and Collaboration:** address challenges in a de-carbonised economy, and promote training and stakeholder collaboration.

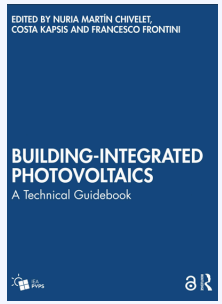
## Recent Publications

**Analysis of Technological Innovation Systems for BIPV in Different IEA Countries**


**Solar Heat Gain Coefficient of BIPV Modules for Electricity-Generating Façades**




**Building-Integrated Photovoltaics: A Technical Guidebook**



# TASK 16

- **Enhancing Accuracy in Solar Resource Assessments:** develop advanced methods to accurately assess solar resources and forecast solar energy production, focusing on reducing uncertainty in data collection and analysis.
- **Establishing Comprehensive Data Integration Practices:** create best practices for integrating data from ground measurements, satellite observations, and numerical weather prediction models to produce more reliable and detailed solar data sets.
- **Supporting Large Solar Projects:** offer reliable data for planning and investment in large-scale solar installations.

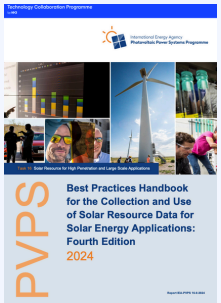
## Recent Publications

**SolarStations.org**

**A global catalog of solar irradiance monitoring stations**


**The added value of combining solar irradiance data and forecasts: A probabilistic benchmarking exercise**


**Best Practices Handbook for the Collection and Use of Solar Resource Data for Solar Energy Applications**

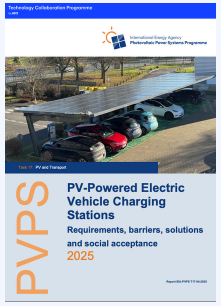


# TASK 17

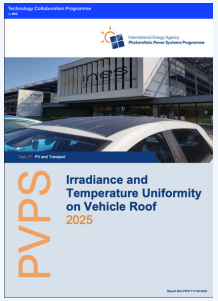
- **Facilitating PV Integration in Transportation:** deploy photovoltaic technology in the transport sector to reduce CO2 emissions and enhance PV market growth.
- **Overcoming Barriers and Identifying Solutions:** address challenges, clarify benefits, and propose strategies for PV-powered vehicles and PV-equipped charging stations.
- **Fostering Stakeholder Collaboration:** accelerate communication and activities among PV industry experts, transport companies, and other stakeholders to advance PV use in transport.

## Recent Publications

**PV-Powered Electric Vehicle Charging Stations: Requirements, barriers, solutions and social acceptance**




**Irradiance and Temperature Uniformity on Vehicle Roof**



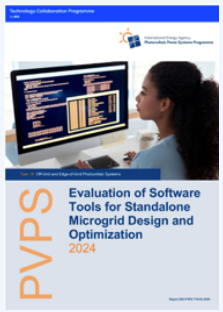

**Expert survey on technical requirements of PV-powered passenger vehicles**

# TASK 18

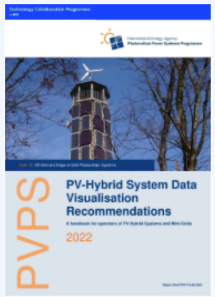
- **Addressing Technical Challenges:** identify and solve issues in planning, financing, designing, and maintaining off-grid and edge-of-grid PV systems.
- **Enhancing System Performance:** improve the reliability, resiliency, and security of these PV systems to ensure consistent and efficient energy supply.
- **Providing Resources and Solutions:** develop and disseminate solutions, tools, guidelines, and technical reports to support the implementation and operation of off-grid and edge-of-grid PV systems globally.

## Recent Publications

**Evaluation of Software Tools for Standalone Microgrid Design and Optimization**




**PV-Hybrid System Data Visualisation Recommendations**



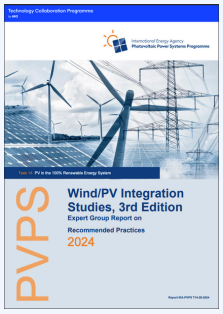

**Blueprint on how to conduct feasibility studies on off-grid and edge-of-grid power systems**

# TASK 19 (started in 2025)

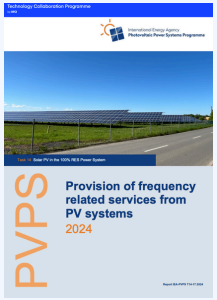
- **Tackling Integration Barriers:** address technical, regulatory, and economic challenges of integrating high shares of PV into electricity grids.
- **Enabling Flexible Power Systems:** support grid stability and efficiency through digitalisation, forecasting, and smart coordination of PV and other resources.
- **Sharing Global Solutions:** develop and share tools, insights, and best practices to advance PV integration in renewable-based power systems.

## Task 19 builds on the achievements of Task 14, which has ended in 2024. Latest Publications from Task 14:

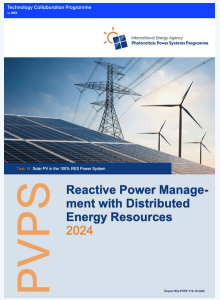
**Wind/PV Integration Studies, 3rd Edition**




**Provision of frequency related services from PV systems**




**Reactive Power Management with Distributed Energy Resources**



# TASK 20 (started in 2025)

A joint activity by the IEA TCPs Wind, Hydrogen and PVPS.

- **Project and Information Management:** manage data and design for hybrid wind-solar-hydrogen plants and recommend best practices for global integration.
- **Digital Hybrid Plant Design:** design wind-solar-hydrogen plants for specific conditions and sites, considering climatic conditions, onshore/offshore locations, grid connection, storage capacity, and size. Quantify the environmental profile of PV and Wind power for green hydrogen using LCA, and address end-of-life management and sustainability issues.
- **Regulatory and Market Issues:** identify local legal and societal challenges, and develop tools to address concerns, aiming to reduce costs and improve project viability.

# Agrivoltaics Action Group (started 2024)

- **Assessing Agrivoltaics Trends:** evaluate the current status and trends in Agrivoltaics through international collaboration.
- **Publishing Key Insights:** release a public report in 2025, detailing sector trends and future recommendations.
- **Standardizing Research:** harmonise definitions and metrics, conduct literature reviews, and organise workshops to support and grow the Agrivoltaics community.
- **Identifying New Research Needs:** provide recommendations for future research to build upon these gaps within the IEA PVPS framework.


## Our approach

### Stakeholder Workshops

Four thematic workshops are being held to unify Agrivoltaics understanding within IEA PVPS. Each workshop has a specific focus, involves experts, and captures key outcomes in summary reports.

**Goals:** establish consistent metrics, foster collaboration, and engage new experts, especially from agriculture and social sciences.

### Report in 2025

The outcome will be a public report titled “Status Quo and Global Trends in Agrivoltaics.”

# More information


## Country Updates

The IEA PVPS Country Updates Report presents concise national overviews of PV policy programmes, research and development activities, and market and industry developments across member countries.

Download it on our website:
www.iea-pvps.org

# Membership

IEA PVPS is a membership-based organisation. We accommodate collaboration among different entities, such as government institutions, universities, research institutes, utilities, and private companies.

Membership is open to any country or association active in solar photovoltaic energy, willing to share their experience and information and to contribute to the IEA PVPS goals.

## How to join for non-member countries:

1. Contact the IEA PVPS Chair.
2. Agree to the terms and conditions of participation at IEA PVPS.
3. Receive a formal letter of invitation from the Executive Committee
4. Sign the Final Agreement

## How to join for entities from current member countries:

1. Contact your country member of the Executive Committee and the Executive Secretary to express your interest.
2. Your possible contributions to IEA PVPS will be discussed.

# Contacts

For information on the IEA PVPS programme or general inquiries, please contact:

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**IEA PVPS Chair**

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For media cooperations and collaborations, please contact:

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