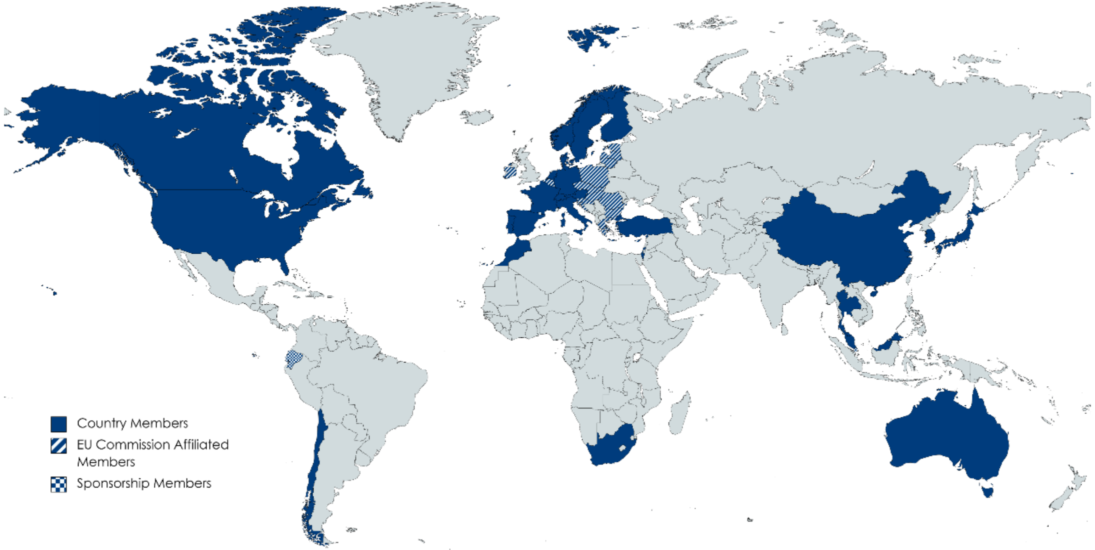
Photovoltaic Power Systems TCP

Daniel Mugnier, Chair

IEA Wind “Hydrogen in a 100% Renewable Energy System” Topical Expert Meeting #106

IEA PVPS Overview

- 30 years of operation
- 31 members including 25 countries, plus EC and 5 sponsors
- 8 currently active Tasks
- 20 reports in past year 2022
- Working across topics of **PV technologies, applications, markets and policies**.



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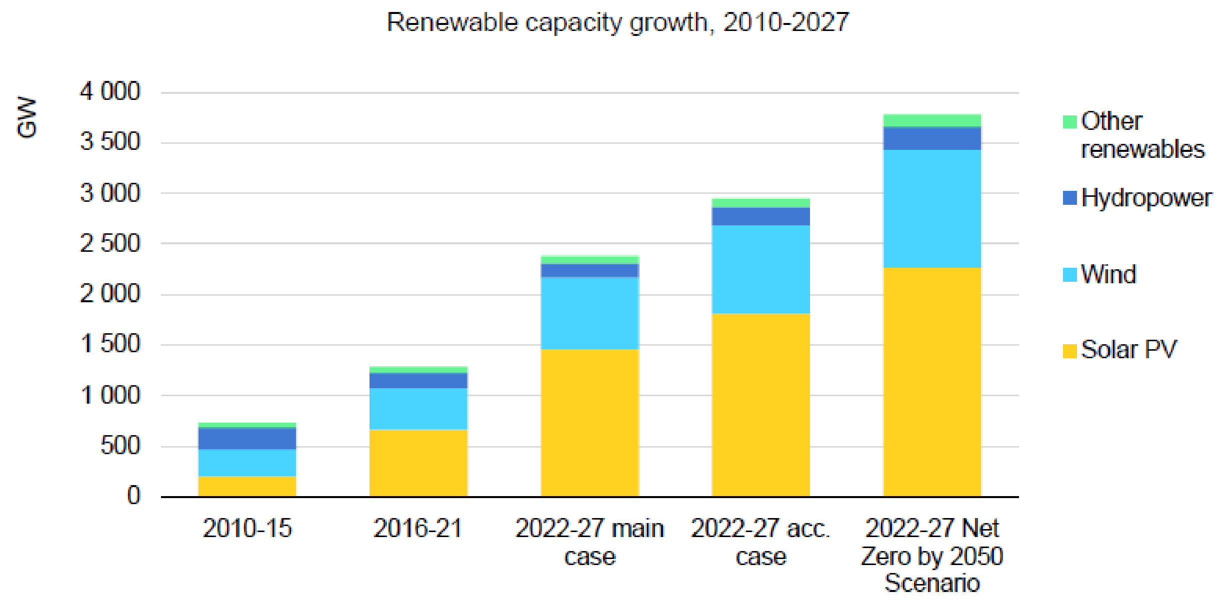
Solar PV is set to lead global markets

Improved policies can further narrow the gap with net zero by 2050



Faster permitting, addressing grid and system integration issues and enabling affordable financing in developing countries could unlock 25% additional capacity in the accelerated case narrowing the gap with net zero by 2050

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PV Industry Status

- **Global PV markets expanding rapidly**, significantly over **230 GW** by end 2022
- **Decentralised market growing**, as well as new applications (AgriPV, floating PV)
- Climate change mitigation in 2022 = **3% of global emissions saved**
- Cost competitive → **removal of subsidies**, sale of “merchant PV”
- Initiatives to diversify global PV manufacturing **supply chain**
- Increasing **grid congestion**, need for flexible generation, demand side response
- Need to focus on **social acceptance** (land use concerns, circularity)
- **Complexity of policies** needed to frame PV will increase, especially with regard to grid costs and contribution to system stability.

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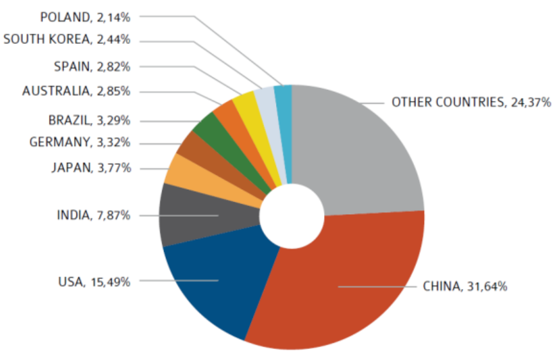
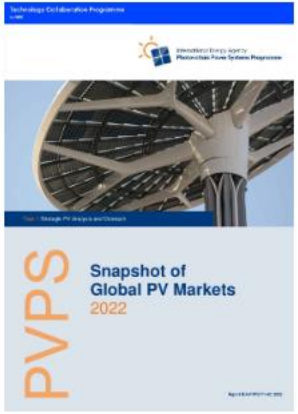
Task 1 - Strategic PV Analysis and Outreach

- Foundational never-ending Task
- Participation by **all PVPS Members**
- **Systematic analysis of PV market development**, costs, industry trends, support policies & business models
- Annual publication of:
  - **Trends in Photovoltaic Applications**
    - 27 years
  - Snapshot of Global PV Markets
  - National Survey Reports

FIGURE 2.5: GLOBAL PV MARKET IN 2021





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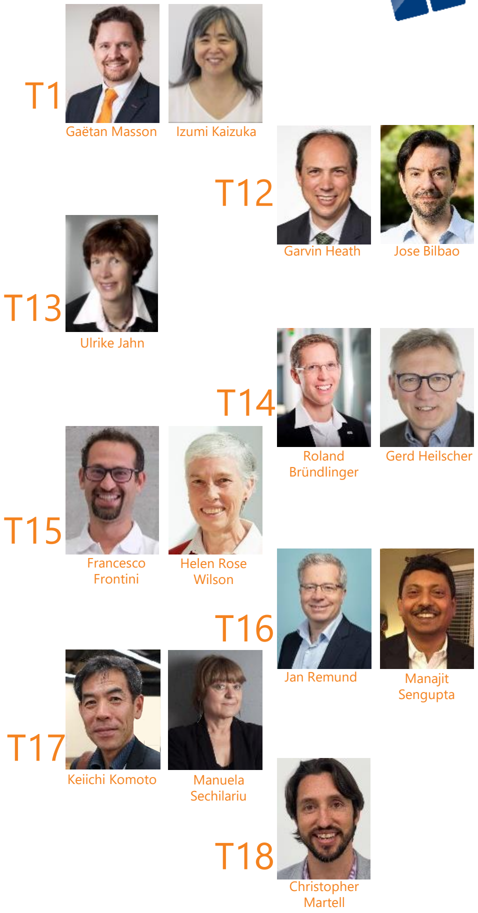
Evolution of Top 10 PV Markets (from Trends report 2022)

RANKING	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	ITALY	GERMANY	CHINA	CHINA	CHINA	CHINA	CHINA	CHINA	CHINA	CHINA	CHINA
2	GERMANY	ITALY	JAPAN	JAPAN	JAPAN	USA	INDIA	INDIA	USA	USA	USA
3	CHINA	CHINA	USA	USA	USA	JAPAN	USA	USA	INDIA	VIETNAM	INDIA
4	USA	USA	GERMANY	UK	UK	INDIA	JAPAN	JAPAN	JAPAN	JAPAN	JAPAN
5	FRANCE	JAPAN	ITALY	GERMANY	INDIA	UK	TURKEY	AUSTRALIA	VIETNAM	GERMANY	GERMANY
6	JAPAN	FRANCE	UK	SOUTH AFRICA	GERMANY	GERMANY	GERMANY	TURKEY	AUSTRALIA	AUSTRALIA	BRAZIL
7	BELGIUM	AUSTRALIA	ROMANIA	FRANCE	KOREA	THAILAND	KOREA	GERMANY	SPAIN	KOREA	AUSTRALIA
8	UK	INDIA	INDIA	KOREA	AUSTRALIA	KOREA	AUSTRALIA	MEXICO	GERMANY	INDIA	SPAIN
9	AUSTRALIA	GREECE	GREECE	AUSTRALIA	FRANCE	AUSTRALIA	BRAZIL	KOREA	UKRAINE	SPAIN	KOREA
10	GREECE	BULGARIA	AUSTRALIA	INDIA	CANADA	TURKEY	UK	NETHERLANDS	KOREA	NETHERLANDS	POLAND
RANKING EU	1	1	2	3	3	4	5	4	2	2	2
MARKET LEVEL TO ACCESS THE TOP 10											
	426 MW	843 MW	792 MW	779 MW	675 MW	818 MW	944 MW	1 621 MW	3 130 MW	3 492 MW	3 710 MW

Overview of currently active Tasks

Task:	Topic:	Running:
• Task 1	"PV market analysis"	29 years
• Task 12	"PV sustainability activities"	15 years
• Task 13	"PV Reliability & Performance"	12 years
• Task 14	"PV Grid Integration"	12 years
• Task 15	"Building-Integrated PV"	7 years
• Task 16	"Solar Resource Forecasts"	45 years*
• Task 17	"PV & Transport"	4 years
• Task 18	"Off-Grid & Edge-of-Grid PV"	2.5 years



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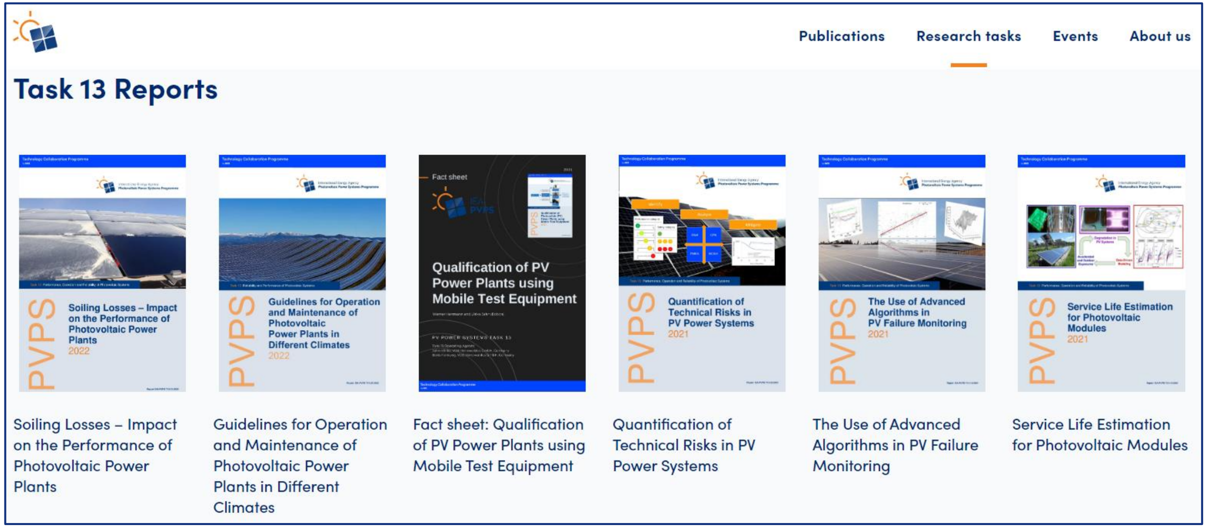
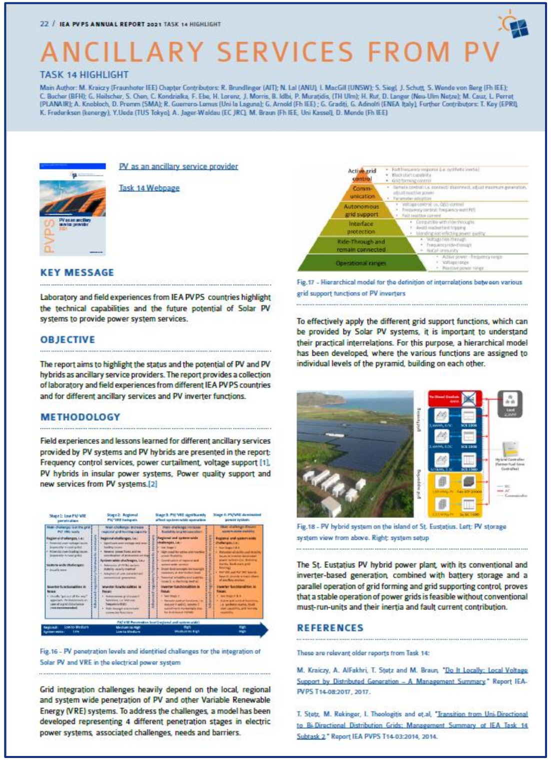
* Task 16 was part of SHC from 1977 until 2017, when it moved across to PVPS.

More information on Tasks

- Technical report highlights in PVPS Annual Report
- Task overview pages on PVPS Website
- Task publications available on PVPS Website





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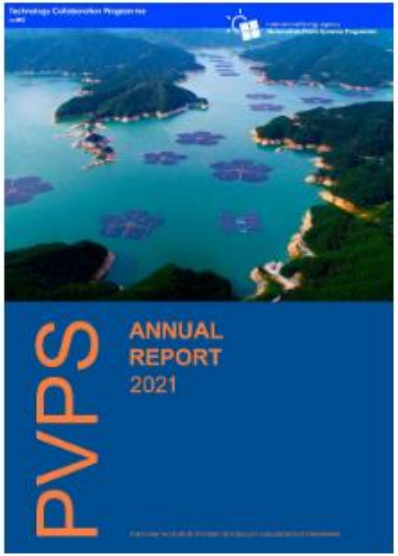
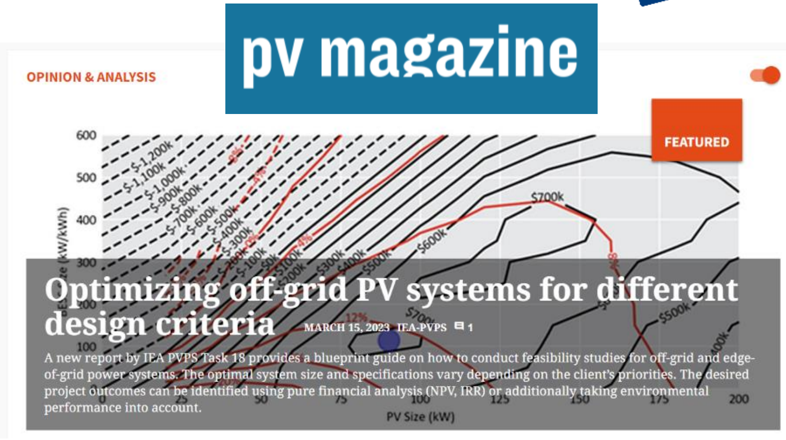
Communications and Outreach

- Monthly featured articles in PV Magazine
- Workshops & Exhibitions
- Annual report, Newsletters, Social Media





PVPS and Green hydrogen

- Green energy targets very high worldwide (100% RES-energy systems)
- Several possible answers for PV grid integration : <u>curtailment</u> but not only…
- Green H2 is a very promising solution
- ….but often adapted at commercial level for large green electricity production

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PVPS and Green hydrogen

- **Several challenges** of interest for PVPS :

  - Perspectives for small to medium size electrolysers (TRL ?) adapted for PV

  - H2 electrolysis dynamics : how to conciliate variable PV production and Green H2 production in a commercial and cost competitive approach ? Complexity of integration ?

  - Seasonal management very interesting for Green H2 but difficulties to compete with battery storage at distribution grid level

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