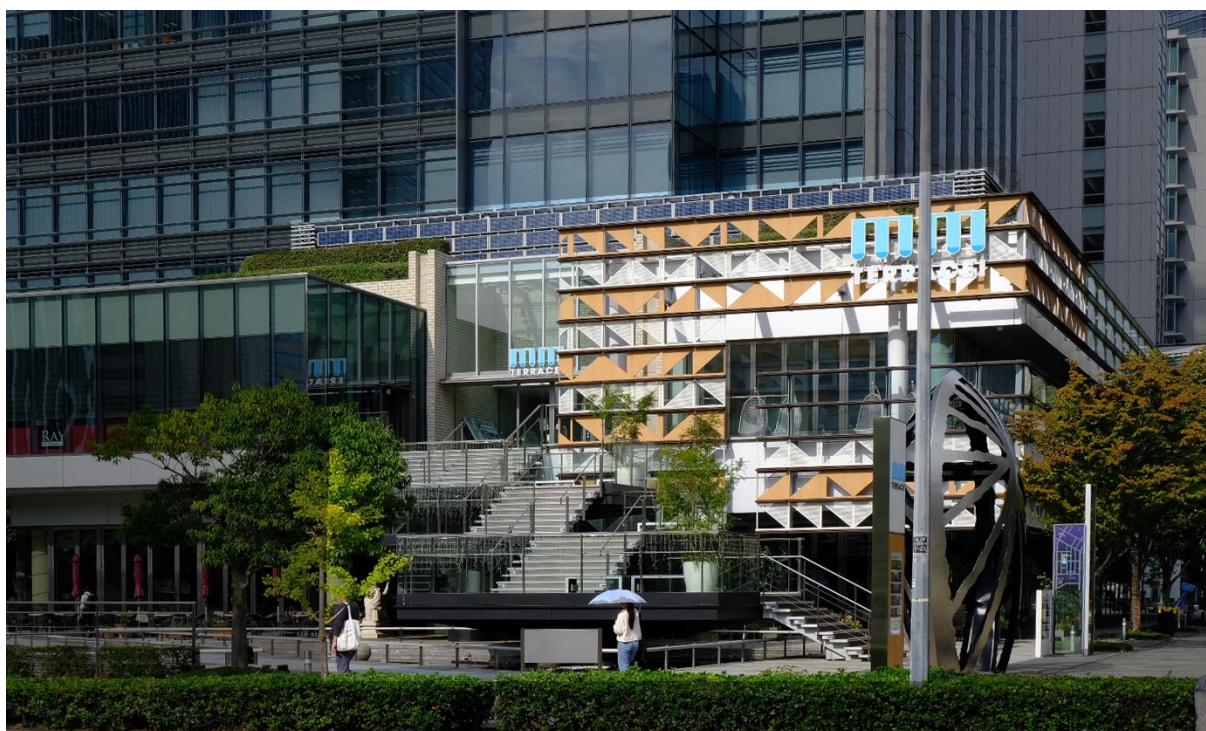




Annual report dated 20.11.2023

IEA PVPS T15

Enabling framework for the acceleration of BIPV – 2024-2027



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Via Flora Ruchat-Roncati 15, CH-6850, Mendrisio
www.isaac.supsi.ch

Authors:

Francesco Frontini, SUPSI-ISAAC, francesco.frontini@supsi.ch

SFOE project coordinators:

Stefan Oberholzer, Swiss Delegate ExCo IEA-PVPS, stefan.oberholzer@bfe.admin.ch

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The authors bear the entire responsibility for the content of this report and for the conclusions drawn therefrom.



Résumé

L'objectif de la Task 15 PVPS est de créer un cadre permettant d'accélérer la pénétration des produits BIPV sur le marché mondial des énergies renouvelables, afin de mettre sur un pied d'égalité ces produits, les produits BAPV et les composants habituels de l'enveloppe du bâtiment, tout en respectant les questions obligatoires, esthétiques, de fiabilité, environnementales et financières. La Task 15 contribue à l'ambition de construire des bâtiments et des environnements bâtis à énergie zéro. Son champ d'application couvre à la fois les bâtiments neufs et existants, les différentes technologies photovoltaïques, les différentes applications, ainsi que les différentes échelles, des habitations unifamiliales aux applications BIPV à grande échelle dans les bureaux et les bâtiments utilitaires. La SUPSI est impliquée dans la tâche en tant que Task co-manager et avec plusieurs experts de différentes disciplines y contribuent.

La tâche 15 entre actuellement dans la nouvelle phase du plan de travail qui durera jusqu'à la fin de l'année 2027. Basée sur les résultats des phases précédentes, la tâche aborde les problèmes existants et les obstacles à la mise en œuvre généralisée du BIPV en échangeant les connaissances et l'expérience, et en offrant la possibilité de combler les lacunes entre toutes les parties prenantes du BIPV. En avril 2024, une réunion de tout le partenaire a été organisée, lors de laquelle tous les membres de la tâche PVPS ont pu lancer les différentes nouvelles activités et finaliser les rapports restants de la phase 2. Plusieurs réunions bilatérales sur les tâches conjointes ont également été organisées au cours de la première année du projet. En octobre 2025, une assemblée générale en ligne a également été organisée afin de mettre à jour le plan de travail et de préparer la deuxième phase du projet.

Des réunions et des discussions avec les parties prenantes nationales et internationales ont été organisées afin de développer correctement les nouvelles activités, de finaliser le plan de travail et d'impliquer les experts concernés. De nouveaux experts suisses ont également manifesté leur intérêt à se joindre à la tâche et à y contribuer.

La collaboration avec les organismes de normalisation au sein de l'IEC TC 82, en particulier le JWG 11 de l'IEC/ISO sur le BIPV, et le CENELEC TC 82 s'est poursuivie également en 2024. Plusieurs participants sont membres du JWG. Les participants européens et la SUPSI ont contribué activement à la révision de l'EN 50583. Lors de la dernière réunion de l'ExCo au Japon, il a également été discuté de nommer un expert représentatif pour le programme PVPS afin d'assurer la coordination avec les différents comités techniques et d'agir en tant que personne de liaison. Yves Poissant du Canada a été nommé pour cela. Dans le cadre de la tâche 15, un expert actif dans la sous tâche B sera également nommé.



Summary

Task 15's objective is to create an enabling framework to accelerate the penetration of BIPV products in the global market of renewables, resulting in an equal playing field for BIPV products, BAPV products and regular building envelope components, respecting mandatory, aesthetic, reliability, environmental and financial issues. Task 15 contributes to the ambition of realizing zero-energy buildings and built environments. The scope of Task 15 covers both new and existing buildings, different PV technologies, different applications, as well as scale difference from one-family dwellings to large-scale BIPV application in offices and utility buildings. SUPSI is involved in the task as Task co-manager and several experts in different activities.

Task 15 is currently entering the new working plan phase that will last till end of 2027. Based on previous phases and results the task is addressing existing issues and barriers for the widespread implementation of BIPV by exchanging research, knowledge and experience, and offering the possibility to close gaps between all BIPV stakeholders. An all-tasks meeting has been organized in April 2024 where all PVPS Task member had the chance to kick-off the different new activities and finalize the remaining reports of phase 2. Several joint tasks bi-lateral meetings have been also organized during the first year of the project. In October 2025 an online general assembly meeting was also organized in order to update the workplan and prepare the ExCo meeting organized in Japan in November 2025.

Meetings and discussion with international and national stakeholders have been organized to properly develop the new activities and finalize the workplan and involve relevant experts. New swiss experts have also demonstrated interest to join the task and to contribute.

The collaboration with standardization bodies within IEC TC 82, particularly the IEC/ISO JWG 11 on BIPV, and CENELEC TC 82 continued also in 2024. Several participants are members of the JWG. European participants and SUPSI contributed actively to the revision of EN 50583. During the last ExCo meeting in Japan it was also discussed to nominate a representative expert for PVPS program to keep the coordination with the different technical committee and acting as liaison person. Yves Poissant from Canada was appointed for that. Within task 15 an experts active in Sub.task B will be also nominated.



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Abbreviations

BIPV	Building Integrated Photovoltaic
ExCO	Executive Committee
GA	General Assembly
OA	Operating Agent
ST	Sub-Task
TIS	Technology Innovation System
TcM	Task co-Manager



1 Introduction

1.1 Background information and current situation

The task has already gone through and successfully concluded two work phases, involving numerous countries and experts. A new phase has been kicked off in 2024.

As BIPV is related both to electric technology and construction technology, the approach followed in this Task is based on a *value-added approach* in which BIPV is not only related to PV (covering energy, environmental, and PR aspects) but as well to the building as a whole and to the building industry (covering aesthetics, building energy performance, and multi-functionality of the building envelope). The scope of this Task covers both new and existing buildings, different PV technologies, different building applications.

Collaboration with other IEA PVPS tasks was established, especially with Task 1 and Task 13 as also with international standardization bodies of IEC and ISO. Collaboration with Task 12 is also foreseen to tackle the LCA and sustainability issues related to BIPV and building component.

Most recent reports and publications of the project can be found at: <https://iea-pvps.org/research-tasks/enabling-framework-for-the-development-of-bipv/>

The status report of the task, as submitted the ExCo representatives, can be found in the annex, as also the new workplan approved for the next phase 2024-2027.

1.2 Purpose of the project

Within the PVPS Programme, Task 15 aims to create an enabling framework to accelerate the penetration of BIPV products in the global market of renewables, resulting in an equal playing field for BIPV products, BAPV products and regular building envelope components, respecting especially economic, technological, legal, aesthetic, reliability and normative issues. The third phase of the task started in early 2024 and will end in December 2027.

The third phase of Task 15 is structured into 5 subtasks:

A: Challenges and opportunities of BIPV in a de-carbonised and circular economy

B: BIPV characterization & performance: pre-normative international research

C: BIPV in the digital environment

D: BIPV products, projects and demos: innovation and long-term behaviour

E: BIPV training, dissemination and stakeholders' collaboration

All sub-tasks are clearly organized and a sub-task leader or two sub-task leaders have been identified.

SUPSI is actively involved mainly in ST-B, ST-C and ST-E with some specific role in ST-A (market analysis and social aspect) and in ST-D (Demo-cases and new products).

Francesco Frontini (SUPSI) has been appointed as Task Co-Manager also for the new phase with the support of Jose Maria Vega de Seoane (Becquerel Spain) in the management and organization of the Task.



2 Activities and results

Together with the Task 15 co-management, the project partner SUPSI participated in the various sub-task meetings and general assembly (GA) meeting in Sophia Antipolis (France) from 9th – 11th April 2024 and in the online meeting organized by SUPSI in October 2024 before the ExCo meeting. Moreover, from 5th till 9th November an ExCo meeting was organized in Yokohama (Japan).

The meeting in France was organized by CSTB. About 30 experts participated physically and 20 connected online. A workshop with local stakeholders was organized the third day with involvement of stakeholders.

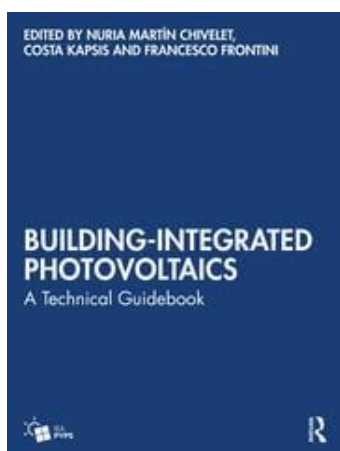


Figure 1: IEA PVPS Task 15 experts during the Kick-off plenary meeting in April 2024 at CSTB (France)

All subtasks are running properly under the guidance of nominated leaders, regular teleconferences in all subtasks are organised monthly and teleconferences between TcoM and subtask leaders are planned every two months to coordinate activities properly.

Seven reports and one fact sheet were published on the IEA-PVPS website in 2024. Francesco Frontini was responsible for reviewing the reports with the support of various experts.

Several scientific publications have been prepared and published (as a result of the Phase 2 activities). We expect to complete all remaining Phase 2 reports by the end of 2024.



The BIPV guidebook has been finalized and published.

The BIPV guidebook is available at this link:

<https://www.taylorfrancis.com/books/oa-edit/10.1201/9781003432241/building-integrated-photovoltaics-nuria-mart%C3%ADn-chivelet-francesco-frontini-costa-kapsis>

Thanks to the support of the founding agencies and institution the guidebook is now released open access.

The book is edited by Nuria Martín Chivelet (Spain), Costa Kapsis (Canada) and Francesco Frontini (Switzerland).

Six chapters are included and SUPSI has contributed to most of them.

As active expert in Sub-Task BIPV characterization & performance: pre-normative international research SUPSI contributed to the following activities:

B1 – Fire Safety of BIPV: This activity is led by Xabier Olano, Ragni Fjellgaard, and Reidar Stolen. The team is currently engaged in gathering national regulations pertinent to BIPV rainscreen facades. An Excel survey was prepared to collect data from various countries. Additionally, B1 is compiling PV fire experimental data through another survey, where participants indicate the type of data they possess and the extent to which it can be shared. Although commercial test results are often confidential, some data may be shared if anonymized or aggregated to protect individual products or manufacturers.

B4 – Coloured BIPV – Performance Modelling and Characterization: This activity, led by Markus Babin and Gabriele Eder, involves a modelling round-robin for coloured BIPV systems. Data gathering is in progress, and the team is also collecting information on commonly used characterization methods for coloured PV from manufacturers and testing labs. A survey has been distributed to facilitate this data collection. SUPSI has contributed to the preparation of the survey and provided valuable input as accredited laboratory. Contact and discussion with Swiss manufacturers also provided input to the activity.

B5 – Shading Resilience of BIPV Modules and Installations: Under the leadership of Carlos Clement, this activity focuses on gathering data on BIPV sites and their shading mitigation strategies. An Excel file has been distributed among participants, with contributions already received from several countries. The team is also developing a statistical approach to describe and quantify different shadows. We plan to use GIS models to generate datasets of shadows and calculate the resultant power loss of BIPV facades under these conditions.

These activities collectively aim to enhance the safety, performance, and integration of BIPV systems, addressing key challenges and paving the way for broader adoption and innovation in the field.

Within **ST-C BIPV in the digital environment** Tian-Shen Liang (SUPSI) attended the different meetings in which the first collection of experiences have been collected. STC starts from activity 1: BIPV information model for open BIM exchange via IFC. C2 has not started yet. The preliminary plan has been discussed and will be reported in the upcoming task meeting.

Within **ST-D BIPV products, projects and demos: innovation and long-term behaviour** SUPSI has contributed to the collection of data about innovative BIPV products and solutions. The platform www.solarchitecture.ch will serve as one of the main source of information for the activity.

As responsible of Sub-Task E **BIPV training, dissemination and stakeholders' collaboration** SUPSI has initiated the different activities.

**ACTIVITY E.1: BIPV Stakeholders Mapping and Collaboration**

The team completed the initial phase of mapping existing BIPV-related initiatives, identifying key conferences, workshops, and industry events. This sets the foundation for a strategy to promote BIPV market integration and cross-sector collaboration.

ACTIVITY E.2: Solar Professionals Training and Re-skilling

An in-depth review of global BIPV training courses was conducted, highlighting gaps in knowledge transfer between the solar and construction sectors. This is crucial for developing a skilled BIPV workforce.

ACTIVITY E.3: Dissemination and Outreach

Experts presented task achievements at the EUPVSEC in Austria and organized workshops on topics like PV integration, BIPV opportunities in India, and social acceptance of integrated photovoltaics.

These activities aim to create synergies in the BIPV ecosystem and prepare professionals for future challenges.

In November 2025, Francesco Frontini represented Task 15 at the ExCo meeting organised in Japan. As TcM he reported on the main achievements and activities of the Task to the other Task Managers and to the ExCo.

During the meeting the possibility of organising the next meeting in Canada was discussed: The Task 15 meeting was confirmed for 16-17 June. A joint Task meeting with Task 1 and Task 13 is also planned for the Friday before, immediately after the IEEE PVSEC conference, which may end on Thursday. A public event with local stakeholders will be organised after the Task 15 meeting.

During this first year, for Switzerland, we had the opportunity to have a contribution from Thomas Friesen, CTO of Kromatix, on the state of the art of coloured modules and the main challenges to implement this technology. Thomas Friesen is interested in continuing to contribute to this task. Recently, in November 2025, TcM was approached by Gilles Destiaux from Hepia and asked to contribute and participate mainly in ST-A, providing valuable skills and experience in solar potential calculations and also providing case studies.

2.1 Overall progress and issues concerning the Task 15

The overall progress and results achieved in 2024/3 can be found in the annex: IEA_PVPS Task 15 Status report 2024.

3 Evaluation of results to date and next steps

Sub-tasks A, B, C, D and E have been properly started during the last year. It should be mentioned that only a few deliverables from Phase 2 are still outstanding and will be finalised within the next 2 months.

Coordination with standardisation bodies has also been undertaken.

Task 15 experts participated in several conferences, such as the EUPVSEC in Vienna with poster and oral contributions, the Solares Bauen workshop in Basel, where fire issues and standardisation for BIPV were also discussed.

SUPSI, acting as Swiss coordinator and with the role of co-task manager, has the ambition to gather further interests of Swiss companies to participate in the task and to strengthen the BIPV value chain in Switzerland with the plan of new activities on training and dissemination in the next projects.



Collaboration with other IEA TCP programmes is envisaged. We are encouraged to reach out to other TCP programmes (Cities, Users, EBC, SHC) without needing formal approval from the PVPS Secretary or Chair.

4 National and international cooperation

Contacts with Swiss architects, engineers, tool developers, producers of solar systems and products, as well as the participation at national workshops / events/projects helps to continuously expand the network and enrich the BIPV community and activities in Switzerland. The activity with the platform www.solararchitecture.ch is also relevant in this framework. Moreover, also the activation of a Pilot+Demonstration program with BFE related to dynamic solar shadings for transparent facades allowed us to provide further interactions with some sub-tasks and technical details and information regarding the installation. Together with SUPSI, also arch. Karl Viriden (Viriden&Partners), Thomas Friesen (Kromatix) participated in the last meetings in Sophia Antipolis (France). Swissolar, through the *Solaresbauen* group have been informed about the project activities.

A working group has been settled up and SUPSI has offered its experience and competences in testing and assessing fire reaction of BIPV products and systems to support both Task 15 activities and Swiss projects.

Joint discussion among H2020 project SEAMLESS-PV (coordinated by TecNALIA and SUPSI as technical manager) and MC2.0 (Coordinated by TNO) continued the last year and joint event has been organized in Florence end of November 2024. Several other Swiss BIPV experts and manufacturers have been invited such as: CSEM, EPFL, 3S, Sunage.

The participation of SUPSI in the IEA PVPS Task 15 meetings, as well as the contacts with experts, made it possible to establish important contacts with experts from all over the world by presenting Swiss innovation and to better focus Swiss objectives in an international framework perspective.

Bi-lateral workshops and meetings have been organized also with the following stakeholder in Switzerland, to further develop the new workplan: 3S Swiss Solar Solution, Sunage SA, Zurich Soft Robotic, Kromatix SA.

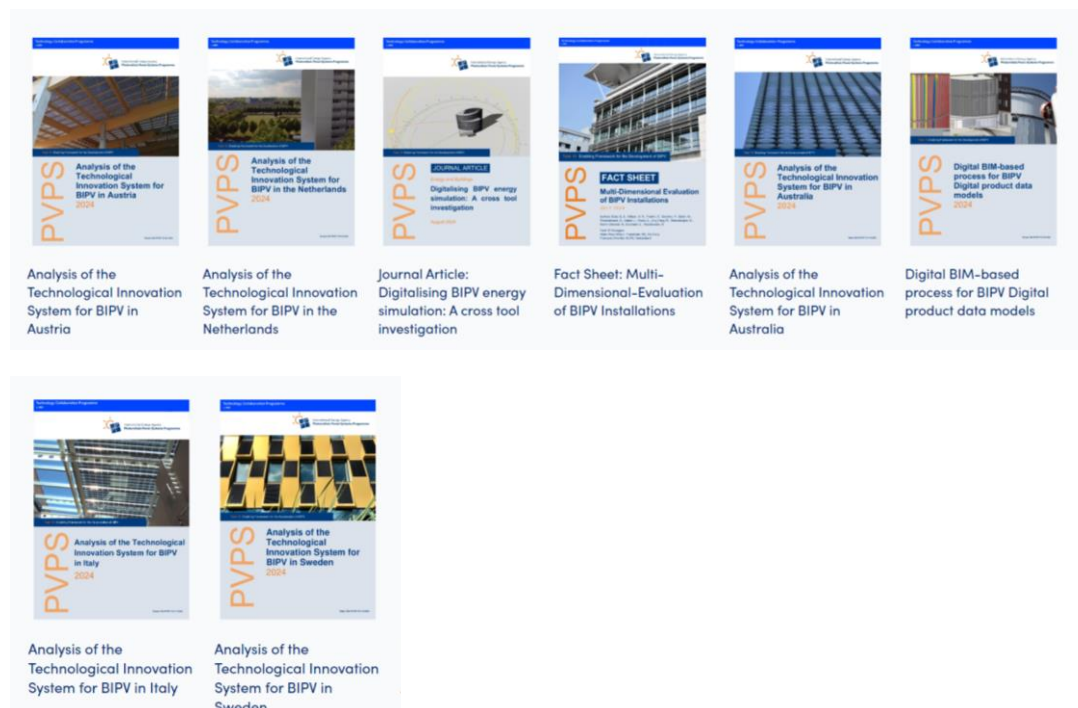
SUPSI has also contributed to the following National and regional event:

- Swiss PV Tagung, Bern. Participation in scientific committee, session organization.
- Swissolar, Solar plants and master plans
- 6. Symposium Solares Bauen 10. September 2024, Kongresshaus Zürich



5 Publications

Available on IEA PVPS web-site:



Other publications:

Martin Chivelet, N., Kapsis, C., & **Frontini, F.** (Eds.). (2024). Building-Integrated Photovoltaics: A Technical Guidebook (1st ed.). Routledge. <https://doi.org/10.1201/9781003432241>

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