Building Integrated Photovoltaics – from best practice examples to large-scale market penetration

Peter Illich, MSc.
Operating Agent IEA PVPS Task 15
University of Applied Sciences Technikum Vienna – Renewable Energy Systems

EU PVSEC 2020 Parallel Event, 8. September 2020, 8:30 – 12:30 CEST

Welcome

Welcome to all participants of the EU PVSEC parallel event!

"Building Integrated Photovoltaics – from best practice examples to large-scale market penetration"

We are meeting online -

- Please mute your microphone when not talking
- Discussions / questions will be possible after the presentations (panel discussion)
- Please write into the chat / Q&A tool if you have specific questions / want to contribute to a discussion
- We need to strictly stick to the agenda timetable

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Overview Agenda

- 08:30 – 08:50

Introduction presentation – From status quo towards our vision of IEA PVPS Task 15 & challenges and barriers for a large-scale market penetration of BIPV
→ **Peter Illich**, Operating Agent Task 15, UAS Technikum Vienna

- 08:50 – 09:10

Technological Innovation System Approach for BIPV
→ **Michiel van Noord**, Task 15, RISE Sweden

- 09:10 – 09:30

Bridging two worlds – Standards for BIPV
→ **Helen Rose-Wilson**, Task 15, Fraunhofer ISE

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Overview Agenda

- 09:30 – 10:15

Best practice examples – BIPV market, its boundary conditions and identification of existing challenges / barriers

  - Onyx Solar – Spain → **Juan Luis Lechón**
  - Kioto Solar – Austria → **Markus Feichtner**
  - Soltech Energy – Sweden → **Anna Svensson**

- 10:15 – 10:35 Coffee Break

Overview Agenda

- 10:35 – 11:00

One year of independent BIPV consultancy – experiences, examples and lessons learned
→ **Björn Rau**, PVcomB, HZB

- 11:00 – 11:20 BIPV – part of the renewable energy system in Vienna
  → **Stefan Sattler**, City of Vienna, Municipal Department 20

- 11:20 – 12:30 Panel Discussion & Questions
  → together with all speakers

From status quo towards our vision of IEA PVPS Task 15 - challenges and barriers for a large-scale market penetration of BIPV

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What is IEA PVPS TCP?

- The International Energy Agency (IEA), founded in 1974, is an autonomous body within the framework of the Organization for Economic Cooperation and Development (OECD).
- The **Technology Collaboration Programme** was created with a belief that the future of energy security and sustainability starts with global collaboration. The programme is made up of thousands of experts across government, academia, and industry dedicated to advancing common research and the application of specific energy technologies.
- The IEA **Photovoltaic Power Systems Programme (PVPS)** is one of the Technology Collaboration Programme established within the International Energy Agency in 1993
- **32 members** - 27 countries, European Commission, 4 associations
- ***"To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems"***

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What is IEA PVPS Task 15?

IEA PVPS Task 15 – Enabling Framework for the Development of BIPV

Objective:

- 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 issues, regulatory issues, aesthetic issues, reliability and financial issues.

SonnenparkPLUS
Wetzikon-arento AG
Architekturbüro

© ertex solar (partner within IEA PVPS Task 15)

What is IEA PVPS Task 15?

Task 15 - Enabling Framework for the Development of BIPV

Approach:

- 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, … 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).

Scope:

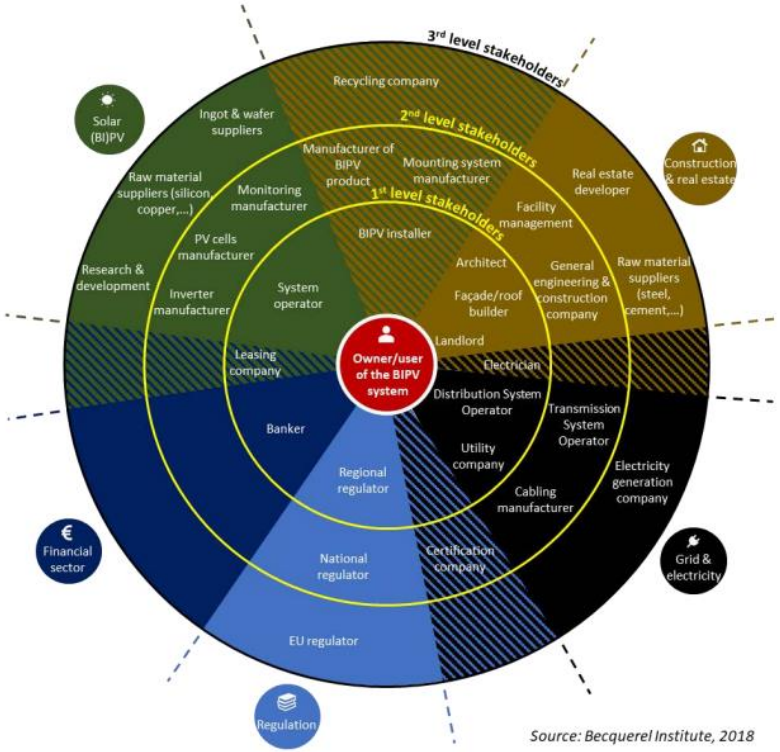
The scope of this Task covers both new and existing buildings, different PV technologies, different applications, as well as scale difference from 1-family dwellings to large-scale BIPV application in offices and utility buildings, etc.

What is IEA PVPS Task 15?

Task 15 - Enabling Framework for the Development of BIPV

Aim:

- Help stakeholders from the building sector, energy sector, the public, governmental and financial sector to
- overcome technical and non-technical barriers in the implementation of BIPV in the built environment by the
- development of processes, methods and tools that assist them.



Source: Becquerel Institute, 2018

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Who is IEA PVPS Task 15?

- Over 40 experts coming from 17 countries
- Experts coming from different sectors: e.g. R&D, BIPV industry, building sector, architecture, associations, etc.

The following countries have been involved in the development of the work plan of Task 15 and will contribute to the Task work:

- Australia, Austria, Belgium, Canada, China, Denmark, France, Germany, Italy, Japan, Korea, Norway, Singapore, Spain, Sweden, Switzerland, The Netherlands

Task 15 Meeting in Tokyo

Task 15 Meeting in Vienna

“Buildings of the future” and potential for BIPV

“BIPV allows us to redesign the world and integrate energy into our built environment and landscapes”

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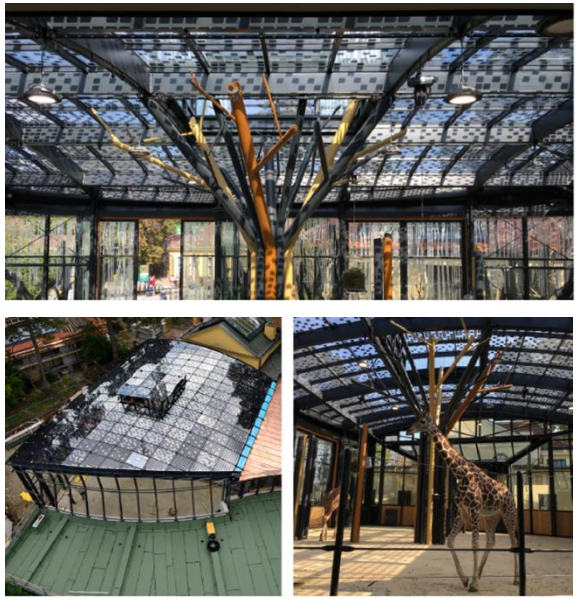
“Buildings of the future” and potential for BIPV

The **building sector** is responsible for **36% of global end-use energy consumption** and nearly **40% of total direct and indirect CO_2 emissions**. Goals and specific targets have been set up globally to reduce the environmental impact of the built environment. Political statements and directives have been moving further towards zero-energy buildings, communities and cities.



Building with BIPV roof with high transparency, Zoo Schönbrunn in Vienna; © ertex solar (partner within IEA PVPS Task 15)

“Buildings of the future” and potential for BIPV

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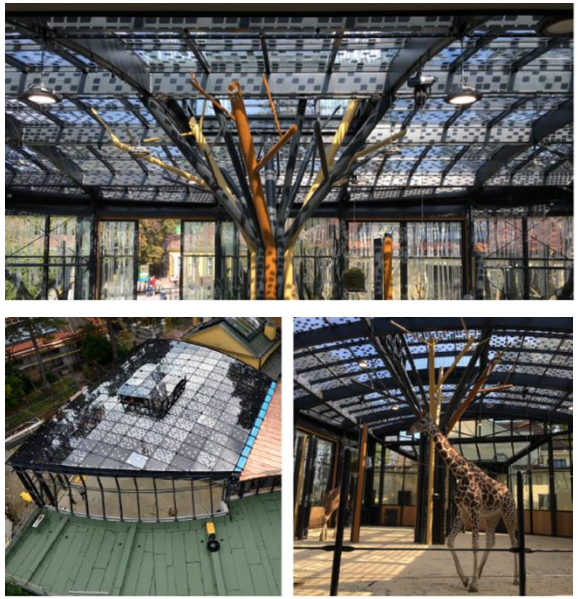
The building sector as a major cause of “the problem” & potential source of “solutions” via BIPV:

- → Large technical and economic potential of building skins for photovoltaic energy conversion
- → Multi-functionality, “energy active” building envelopes, use of already built environment
- → Self-consumption & local generation of electricity close to the consumer
- → Built environment with active role in the energy system, new services, business models, etc.



Building with BIPV roof with high transparency, Zoo Schönbrunn in Vienna; © ertex solar (partner within IEA PVPS Task 15)

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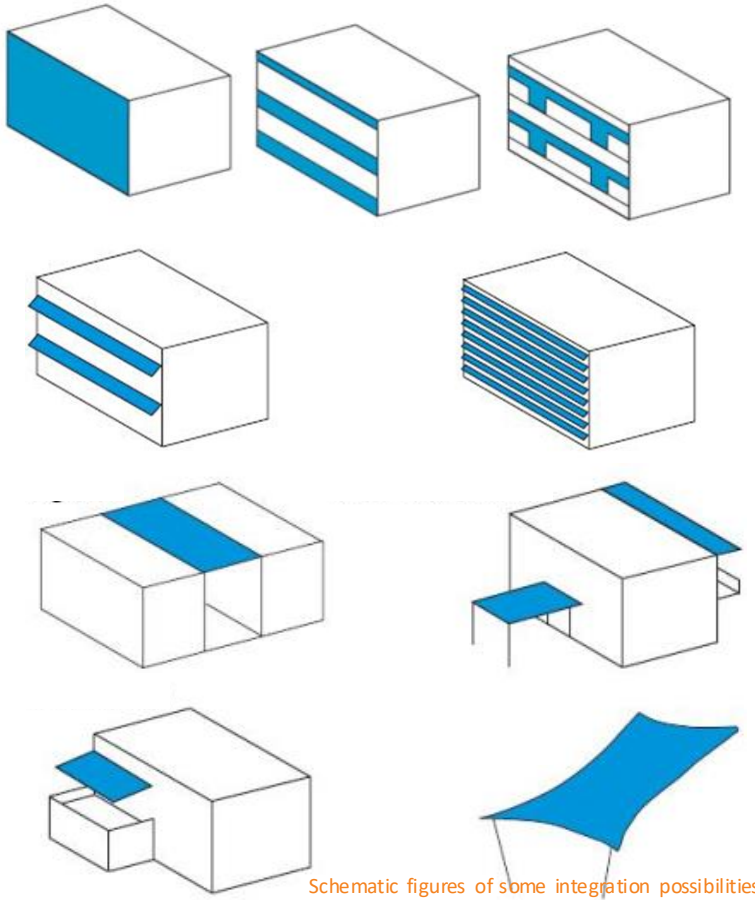
“Buildings of the future” and potential for BIPV

These boundary conditions create a very promising background for BIPV market uptake. However, a major fraction of the potential remains unused:

The presence of…

- (1) **proven (diversity of) technology**,
- (2) numerous **successful examples**,
- (3) new **innovative BIPV products** with a larger **degree of design freedom** for architects and
- (4) an increasing **need for energy conversion at the building level**,

…is still not sufficient to foster a large and self-sustaining BIPV market

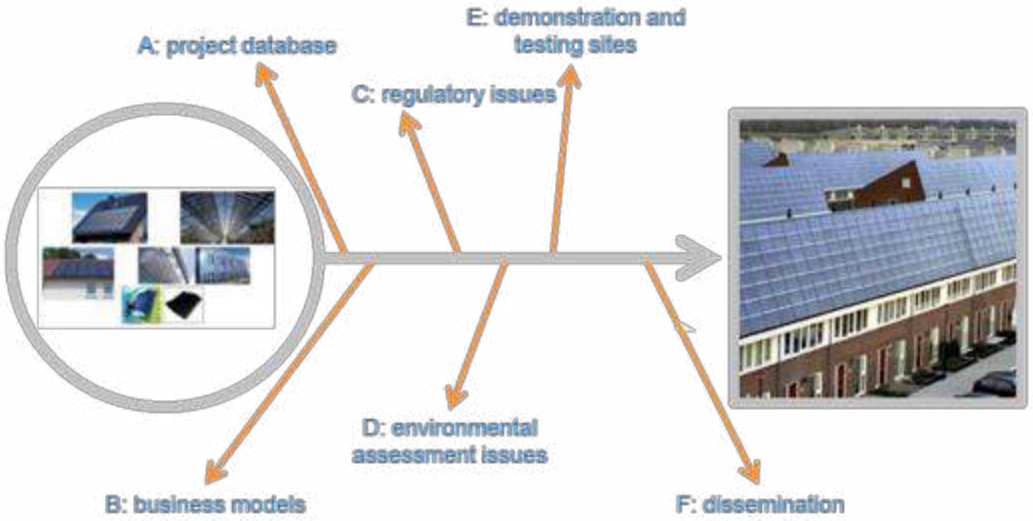


Schematic figures of some integration possibilities of PV in the built environment, source: Task 15

Task 15 – Working Phases and Results

The **first phase of Task 15** was running from 2016 to 2019 dealing with topics, such as:

- Product diversity, reliability, technology
- Standardization and legal framework
- Digitalization and BIM
- Assessment of environmental impact
- Profitability, business models
- Collection and evaluation of best practice example projects



Task 15 Phase 1 (ZUYD)

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Task 15 – Working Phases and Results

- One major outcome of the first working phase are several **IEA PVPS publications**

→Link to Task 15 Homepage: https://iea-pvps.org/research-tasks/enabling-framework-for-the-development-of-bipv/

- The currently running, **second phase of Task 15** started at the beginning of 2020 and runs until 2023.

Vision of Task 15 Working Phase 2

Vision	**BIPV contributes significantly to renewable energy system and sustainable buildings**						
	BIPV **economically rewarding** for buildings all over the world	BIPV-systems **well-planned** with regard to multi-functionality	BIPV-systems **constructed correctly** and optimized for multi-functional purposes	Useful **digital information** available during the whole life cycle	**Clear normative framework** for BIPV	BIPV with very **low environmental footprint**	Information and **knowledge** about BIPV easily accessible

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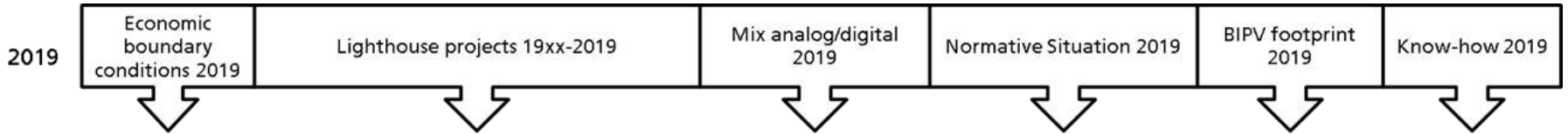
Vision of Task 15 Working Phase 2



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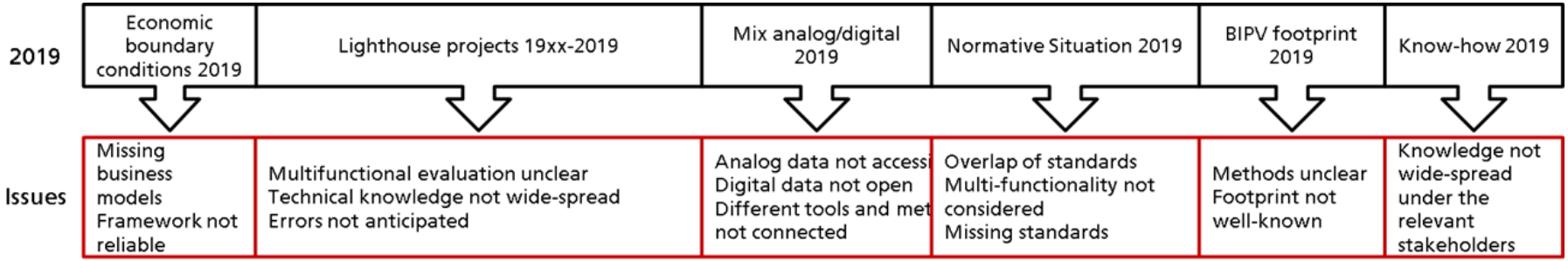
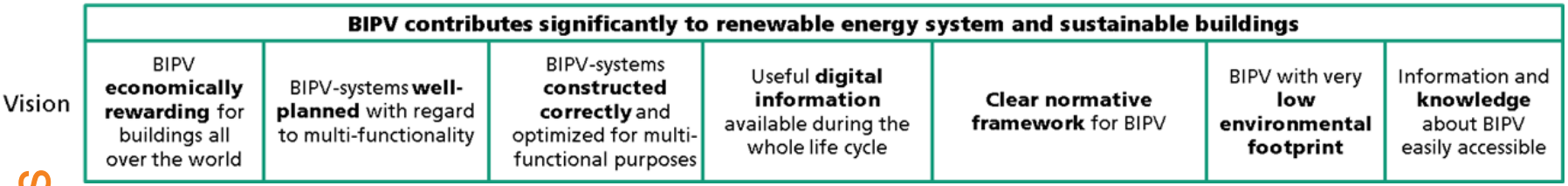
Vision of Task 15 Working Phase 2





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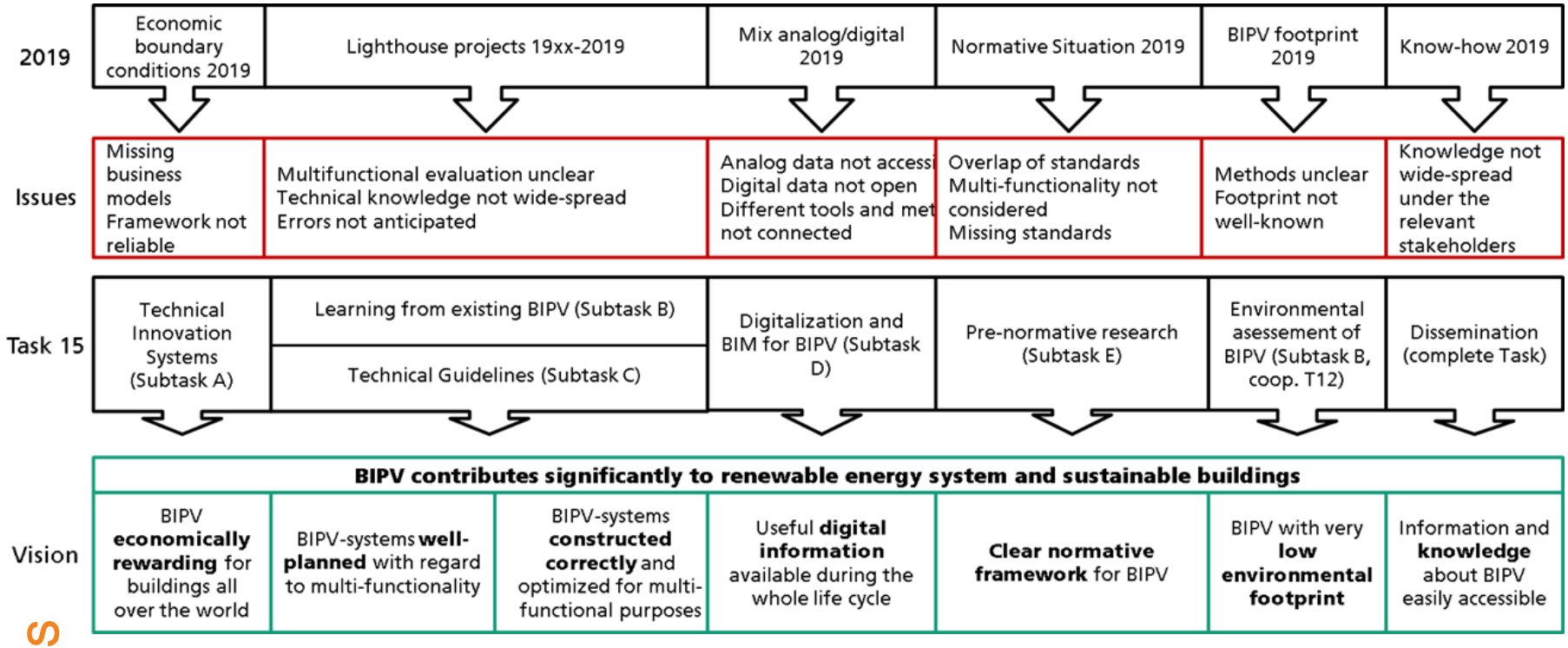
Vision of Task 15 Working Phase 2



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Overview Task 15 Phase 2 – Subtasks

- **Subtask A: Technical Innovation System (TIS) Analysis for BIPV**
  - Identifying measures to increase implementation of BIPV, clear action and business plan, etc.
- **Subtask B: Cross-sectional analysis: learning from existing BIPV installations**
  - Analysis and comparison of the multi-functionality of BIPV (energy relevant, economic, environmental, visual impact)
- **Subtask C: BIPV Guidelines**
  - Guidebook and technical presentation that provide a complete pathway from BIPV design to installation, maintenance and safety
- **Subtask D: Digitalization for BIPV**
  - Using the opportunities of digitalization to make BIPV more easily accessible, more reliable and cheaper
- **Subtask E: Pre-normative international research on BIPV characterization methods**
  - Optimized characterization methods, facilitate local/national building component approval of BIPV, contribute to international alignment of normative requirements on BIPV products and systems

Thank you!

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