

Status and outlook for building integrated photovoltaics (BIPV) in relation to educational needs in the BIPV sector

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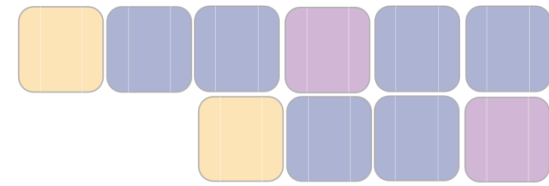


Agenda

- Introduction to Dem4BiPV project
- Status and Outlook to BIPV Market
- Educational needs - Stakeholder survey
- Conclusion



Source: AVANCIS



The Dem4BIPV project: Development of innovative educational material for Building-Integrated Photovoltaics

Dem4BIPV started in **September 2015** and will run until **August 2018**. The project is funded by the Erasmus+ programme of the European Commission.

Consortium



Utrecht University

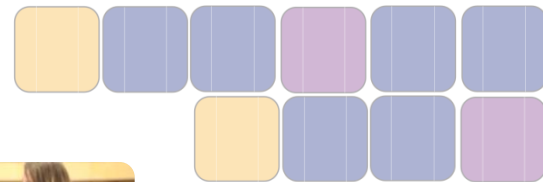


University of Cyprus
PV Technology



Source: AVANCIS

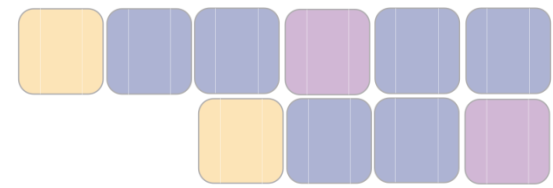




Project activities

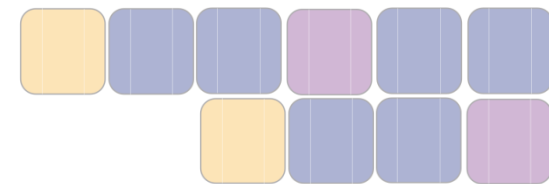
- **Analysis of the existing and future market needs in terms of BIPV system integration and education needs in this field**
- Development of high-quality didactic content on BIPV for higher education
- Development of a virtual learning environment for the practical aspects of the course (i.e. lab work of experimental nature)
- Deployment of remote laboratories
- Pilot testing of the course and refinement





BIPV Market - Status and Outlook





Global BIPV Market perspective and the recent past of annual installation capacity from 2014 to 2020

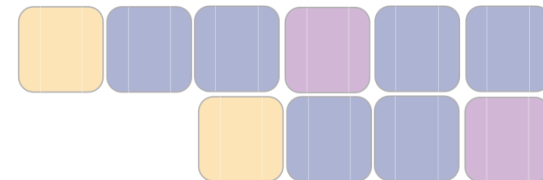
The global market is estimated at **2.3 GW in 2015** compared to 1.5 GW in 2014.

Region/Country	2014	2015	2016	2017	2018	2019	2020	CAGR (%)
Asia/Pacific	300	492	772	1,159	1,672	2,329	3.134	47.8
Europe	650	967	1,441	2,103	2,929	3,807	4,838	39.7
Rest of world	81	125	184	263	355	451	561	37.9
USA	319	476	675	917	1,200	1,491	1,766	33.0
Canada	42	61	86	119	157	190	228	32.6
Japan	143	201	268	349	434	520	612	27.5
Total (GW)	1.5	2.3	3.4	4.9	6.7	8.8	11.1	

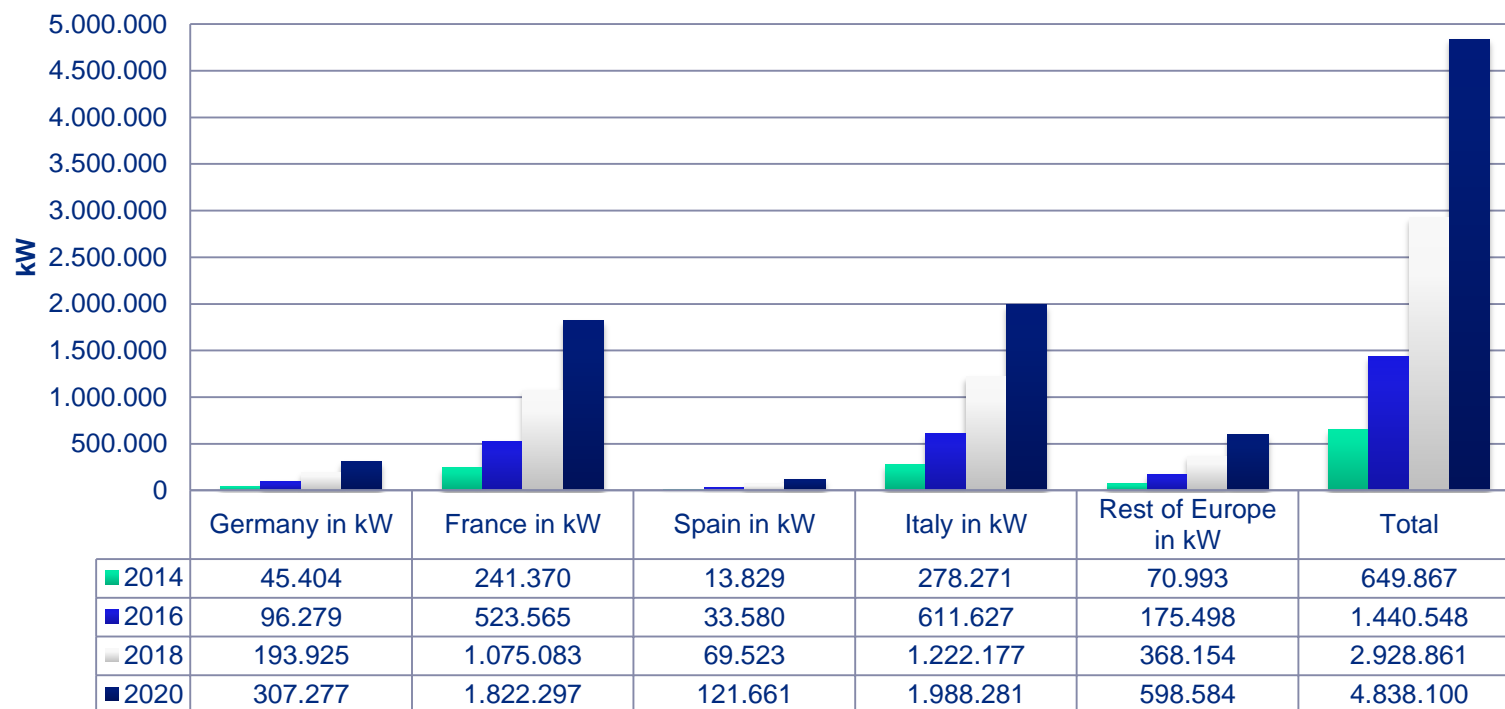
Source: (Global Industry Analysts, 2015)

CAGR-compounded annual growth rate





France, Germany, Italy, Spain and rest of Europe market analysis and forecast of annual installation capacity in kW for years 2014 to 2020

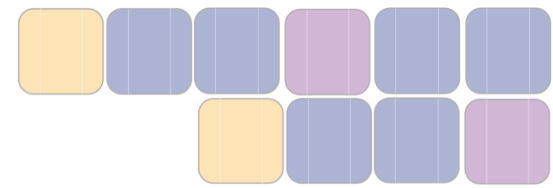


Source: (Global Industry Analysts, 2015)

Rest of Europe include Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, Greece, Hungary, Ireland, The Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey and the UK.

Error tolerance for the data is 10%(+/-)

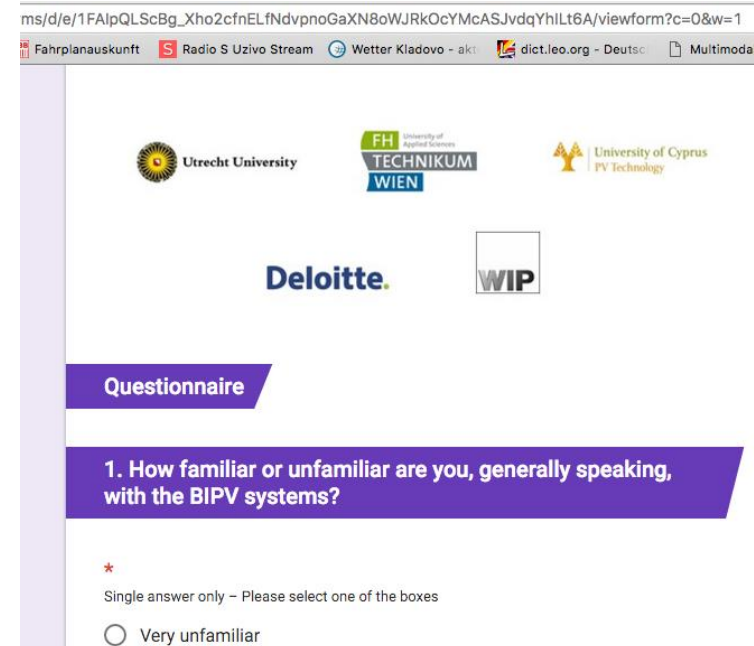




Status and outlook for BIPV in relation to educational needs in the BIPV sector through - **Stakeholder survey**




Survey Design



- The Dem4BiPV - Consortium defined the Stakeholder groups and the topics
- Participants in the questionnaire were able to state their opinion on a 4-points scale (no need, not so strong need, fairly strong need, very strong need), besides ‘don’t know’
- Questionnaire was available on the Internet (Google forms) from **February to April 2016.**
- A total number of **100 participants** took part in the survey



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 Utrecht University  FH University of Applied Sciences **TECHNIKUM** WIEN  University of Cyprus PV Technology

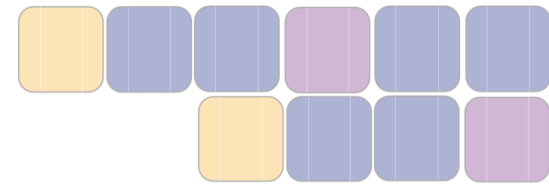
 Deloitte.  WIP

Questionnaire

1. How familiar or unfamiliar are you, generally speaking, with the BiPV systems?

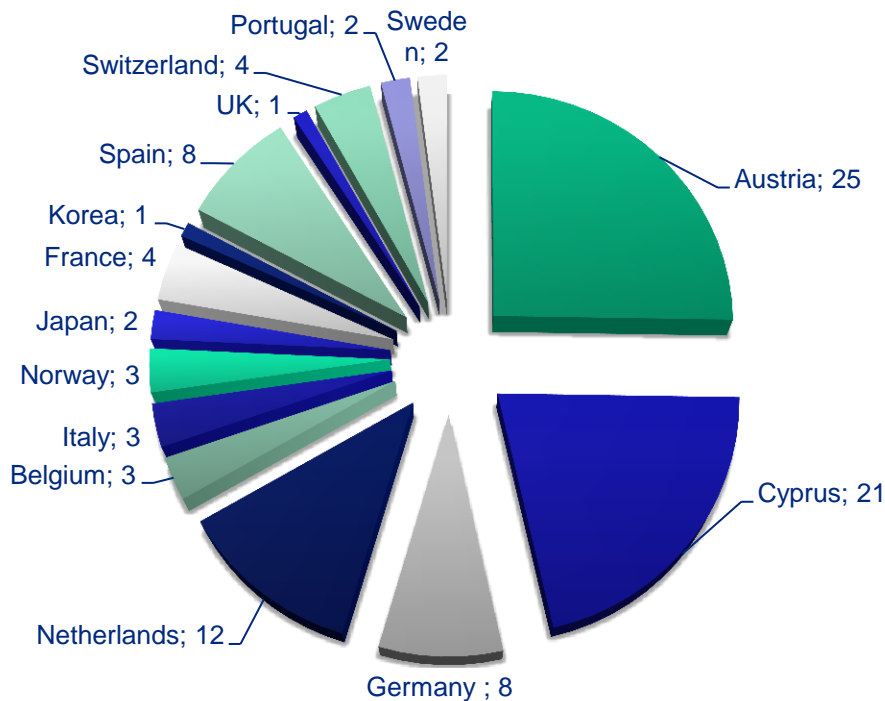
*
Single answer only – Please select one of the boxes

Very unfamiliar



Portrayal of participating Stakeholders and Countries

Number of response in total per country



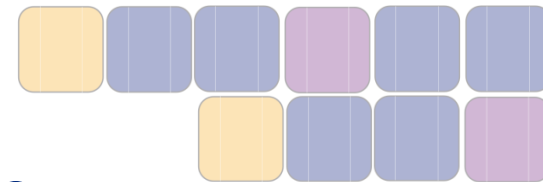
Percentage of response per Stakeholder group

The **majority** of the participants are from **R&D**, followed by **architects**.

About 10% are **PV installer, BIPV producer and consultant**.
Facade manufacturer and educational sector share about 5%.

Facade installer, electrician and buildings planners were in focus of the survey, no response was received.

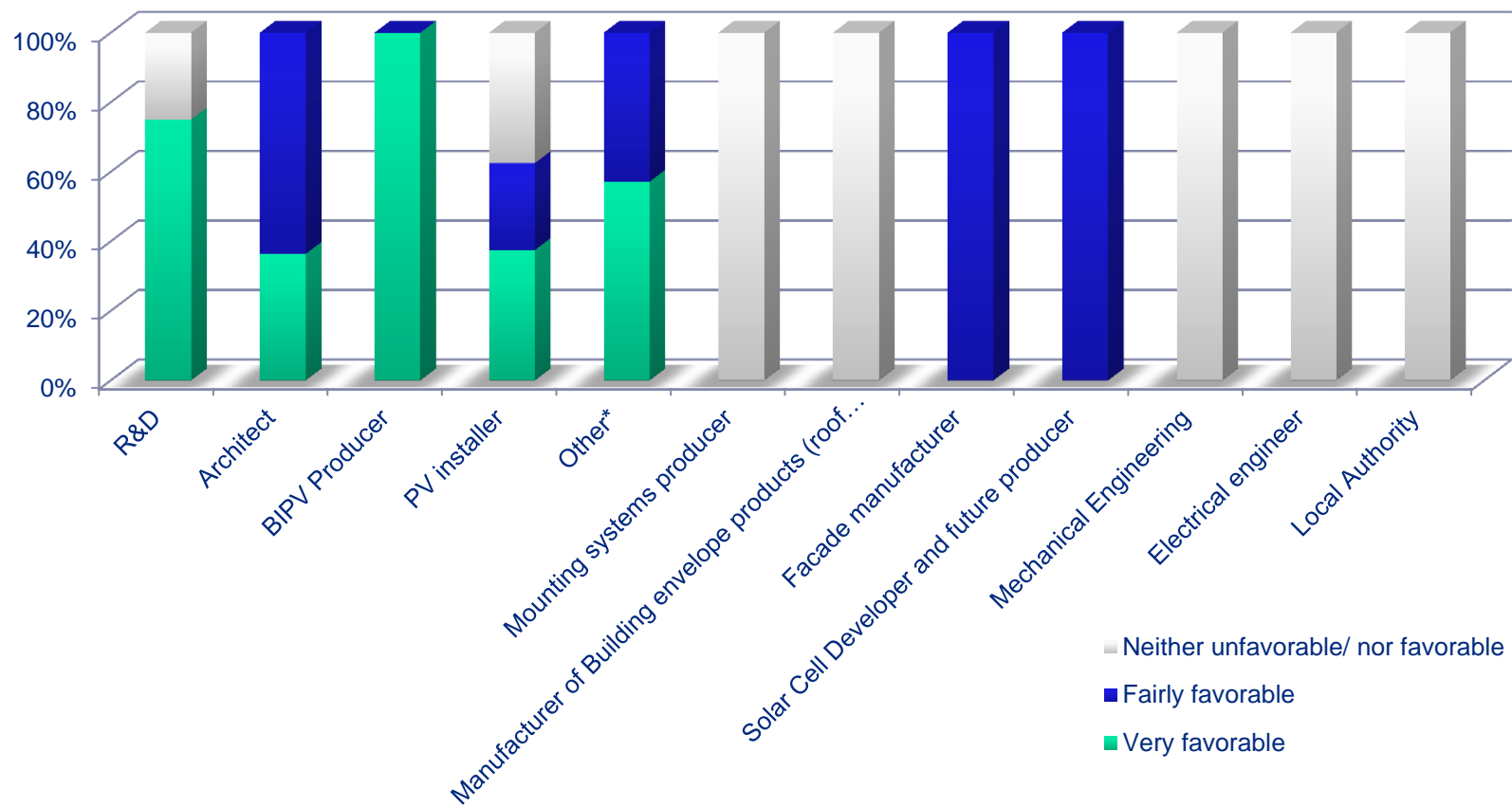


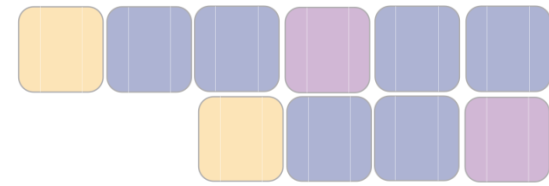


Attitude towards BIPV systems

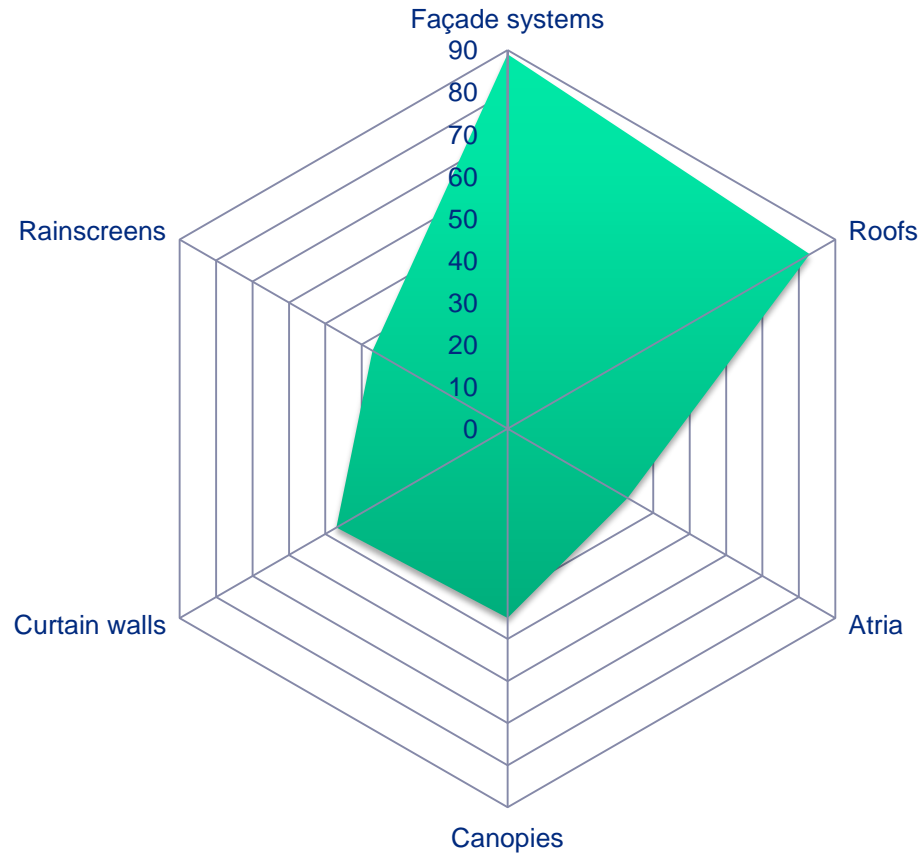
Stakeholder response in categories

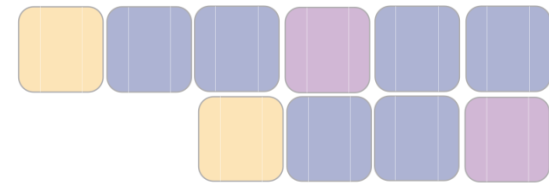
Very favourable, fairly favourable, "Neither unfavourable/ nor favourable"



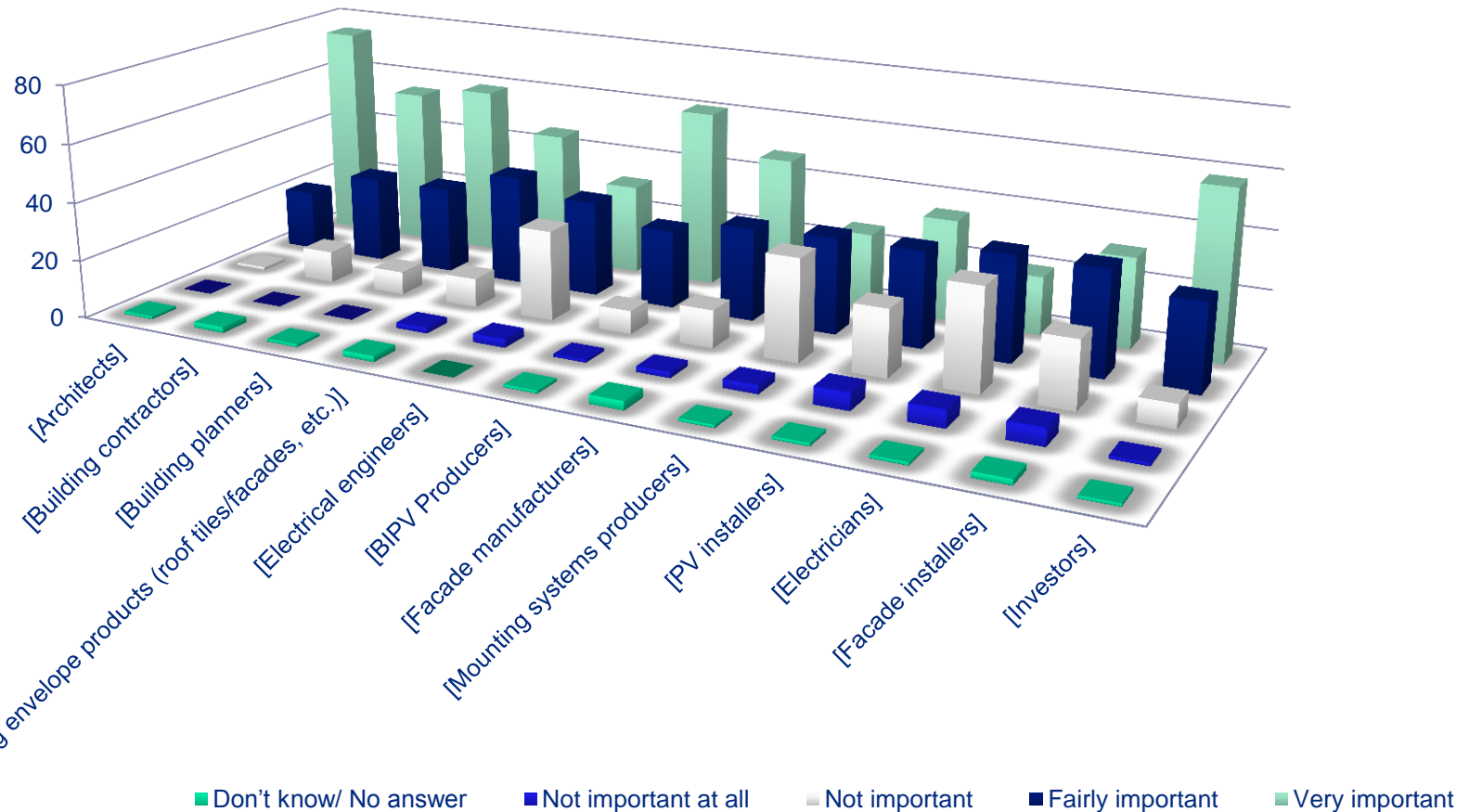


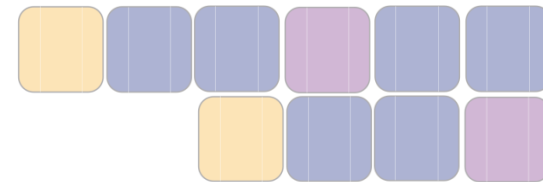
Envision of the integration of BIPV systems in the building envelope environment of all respondents; n=100



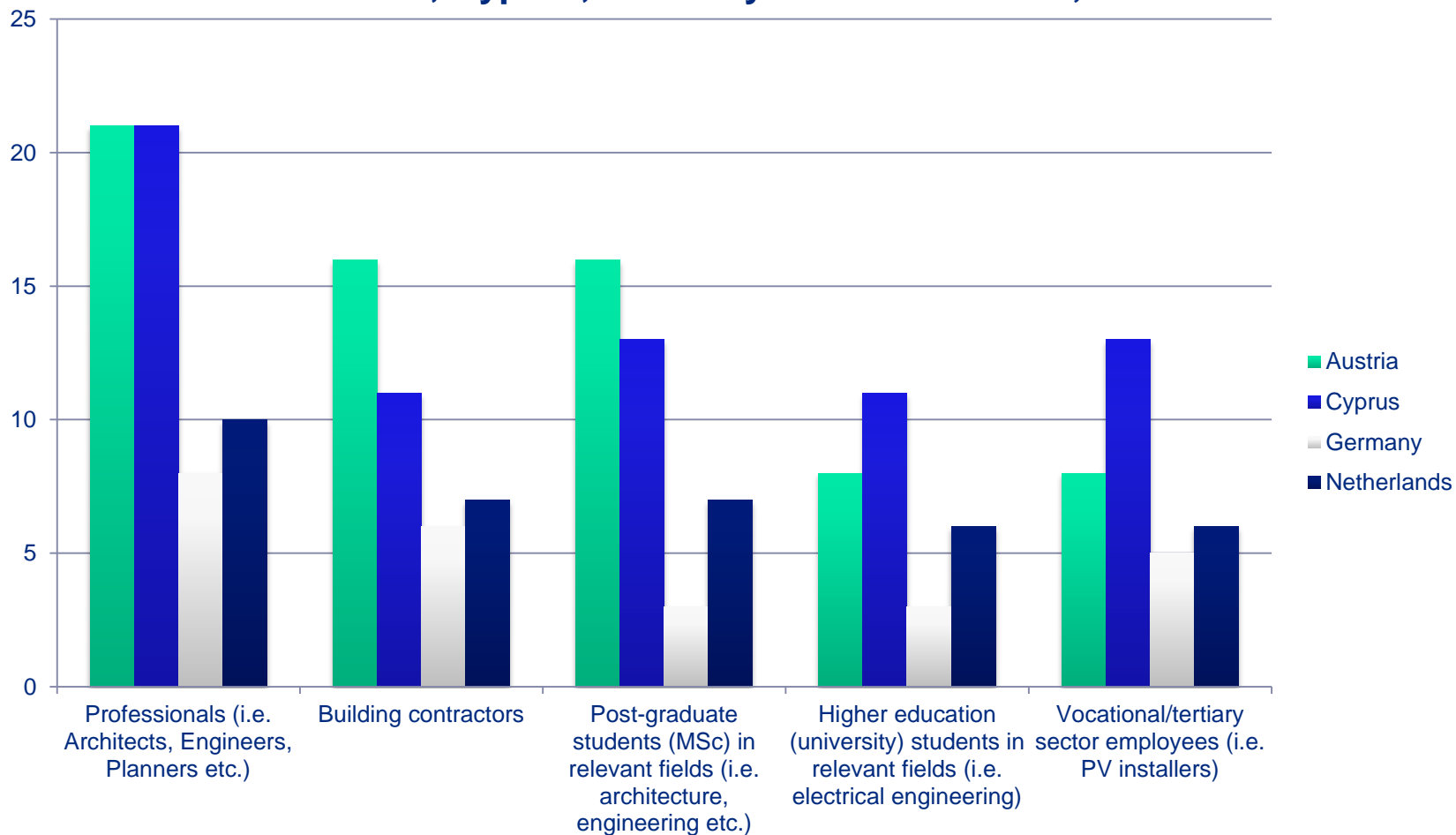


Stakeholder groups have an important role in wider deployment of BIPV; all correspondents; n=100

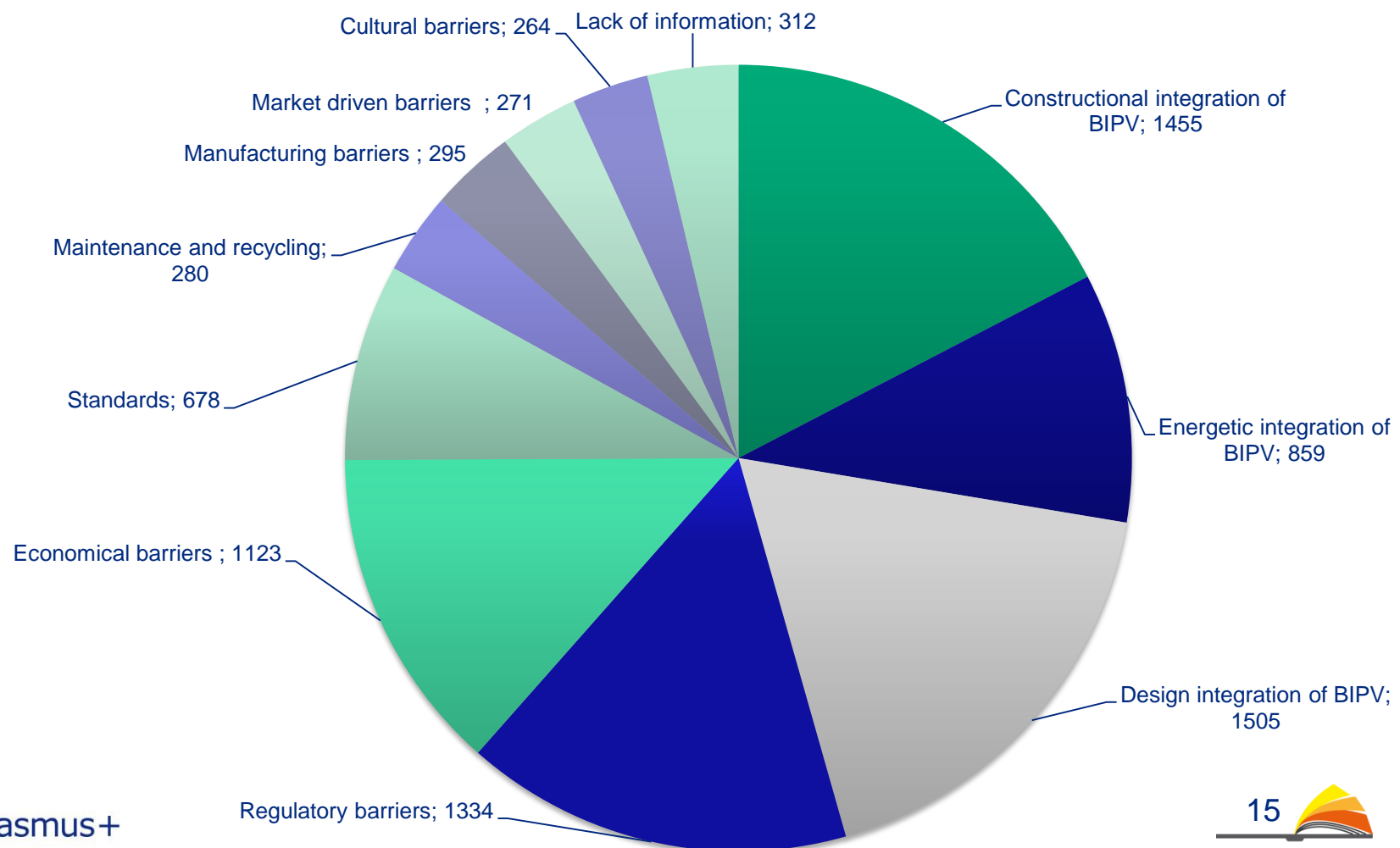


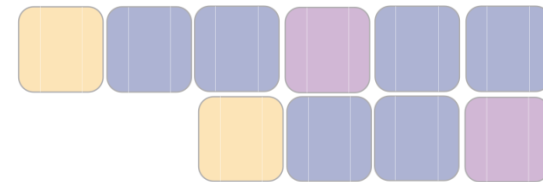


Educational need for groups of students and/or professionals in Austria, Cyprus, Germany and Netherlands; n=66

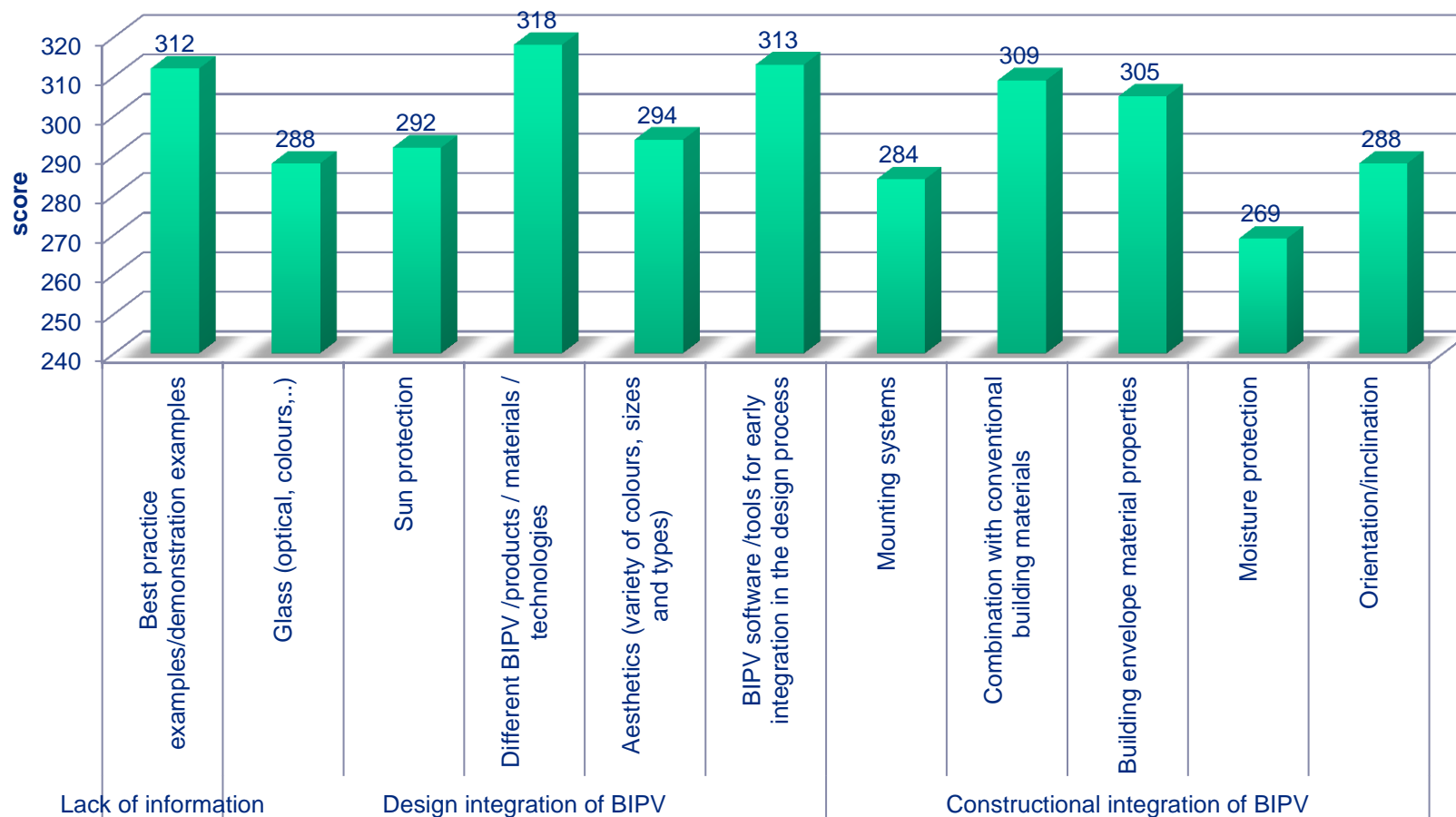


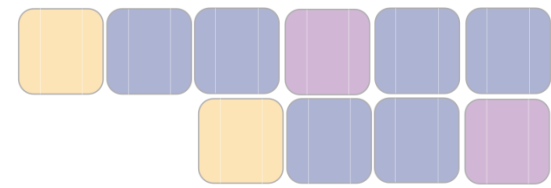
Sum of the educational requirement towards BIPV of all respondents; n=100





Educational needs for the groups - design integration, constructional integration and lack of information





Conclusion (1/2)

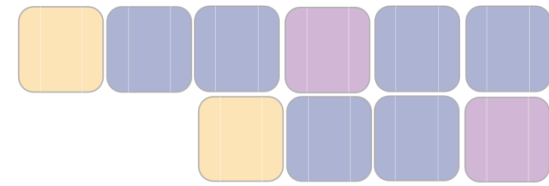
- from 1.5 GW in 2014 to 2.3 GW in 2015 global BIPV market increase: about 40%.
- Forecast: 4,8 GW for 2020 in Europe (11.1 GW global).
- **Positively impacted** by the **regulatory framework**. the European level the Directive on Energy Performance in Buildings (EPBD) (Directive 2010/31/EU) and the **Renewable Energy Directive (1/77/EC)** was set up by the European Union (EU).



Conclusion(2/2)

- **Main group of Stakeholder for educational need** is identified as the **professionals** (i.e. Architects, Engineers, Planners etc.), followed by **building contractors and post-graduate students (MSc)** in relevant fields (i.e. architectural, engineering, etc.).
- Three main topics with high priority for education: **design integration, regulatory and constructional topics**
- Especially on **mounting systems and building, envelope materials properties, different BIPV products/materials/technologies, BIPV software, laws and directives**
- **Architects, building contractors, building planers, façade and mounting systems producers**, as well as investors **play an important** role in the future.



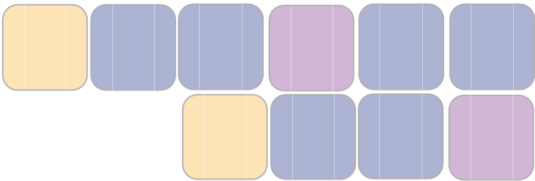
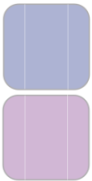


Future work

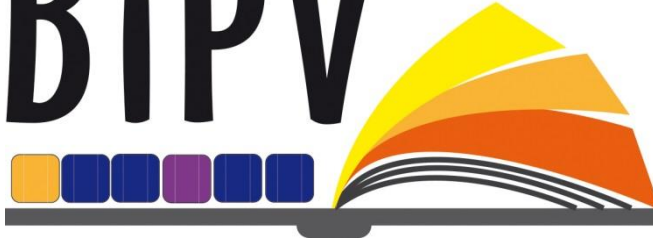
Based on outcomes of survey:

- Development of educational material in a modular way
- To accommodate different levels of background knowledge and interest
- Virtual labs for experimenting with BIPV will be operational in Austria, Cyprus and The Netherlands





Dem 4 BiPV



Thank you for Your Attention

www.dem4bipv.eu

