IEA INTERNATIONAL ENERGY AGENCY

National Survey Report of PV Power Applications in Belgium

2016

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PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

PVPS

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Foreword

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organisation for Economic Co-operation and Development (OECD) which carries out a comprehensive programme of energy co-operation among its member countries

The IEA Photovoltaic Power Systems Technology Collaboration Programme (IEA-PVPS) is one of the collaborative R & D agreements established within the IEA and, since 1993, its participants have been conducting a variety of joint projects in the applications of photovoltaic conversion of solar energy into electricity.

The participating countries and organisations can be found on the www.iea-pvps.org website.

The overall programme is headed by an Executive Committee composed of one representative from each participating country or organization, while the management of individual Tasks (research projects / activity areas) is the responsibility of Operating Agents. Information about the active and completed tasks can be found on the IEA-PVPS website www.iea-pvps.org

Introduction

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to promote and facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of PV power systems. Task 1 activities support the broader PVPS objectives: to contribute to cost reduction of PV power applications, to increase awareness of the potential and value of PV power systems, to foster the removal of both technical and non-technical barriers and to enhance technology co-operation. An important deliverable of Task 1 is the annual "*Trends in photovoltaic applications*" report. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the country National Survey Report for the year 2015. Information from this document will be used as input to the annual Trends in photovoltaic applications report.

The PVPS website www.iea-pvps.org also plays an important role in disseminating information arising from the programme, including national information.

1 INSTALLATION DATA

The PV power system market is defined as the market of all nationally installed (terrestrial) PV applications with a PV capacity of 40 W or more. A PV system consists of modules, inverters, batteries and all installation and control components for modules, inverters and batteries. Other applications such as small mobile devices are not considered in this report.

For the purposes of this report, **PV installations are included in the 2016 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2016, although commissioning may have taken place at a later date**.

1.1 Applications for Photovoltaics

In Belgium, most PV systems are grid-connected distributed systems on buildings. Land-use density does not allow a significant development of ground-mounted systems. The main off-grid systems are road signs with dynamic display.
The residential segment represents 60 % of the total installed capacity with 404.920 installations (1/11 households). Commercial and industrial segments represent each approximatively 20 %.

1.2 Total photovoltaic power installed

By the end of year 2016, Belgium had about 3.557 installed MWp, an increase of 178 MWp (+5 %) compared to 2015. These number are based on the official statistics from the 3 regional regulators (VREG for Flanders, CWaPE for Wallonia and BRUGEL for Brussels). Some small adjustments can still happen (less than 1%) for systems installed during 2016 but not yet declared.

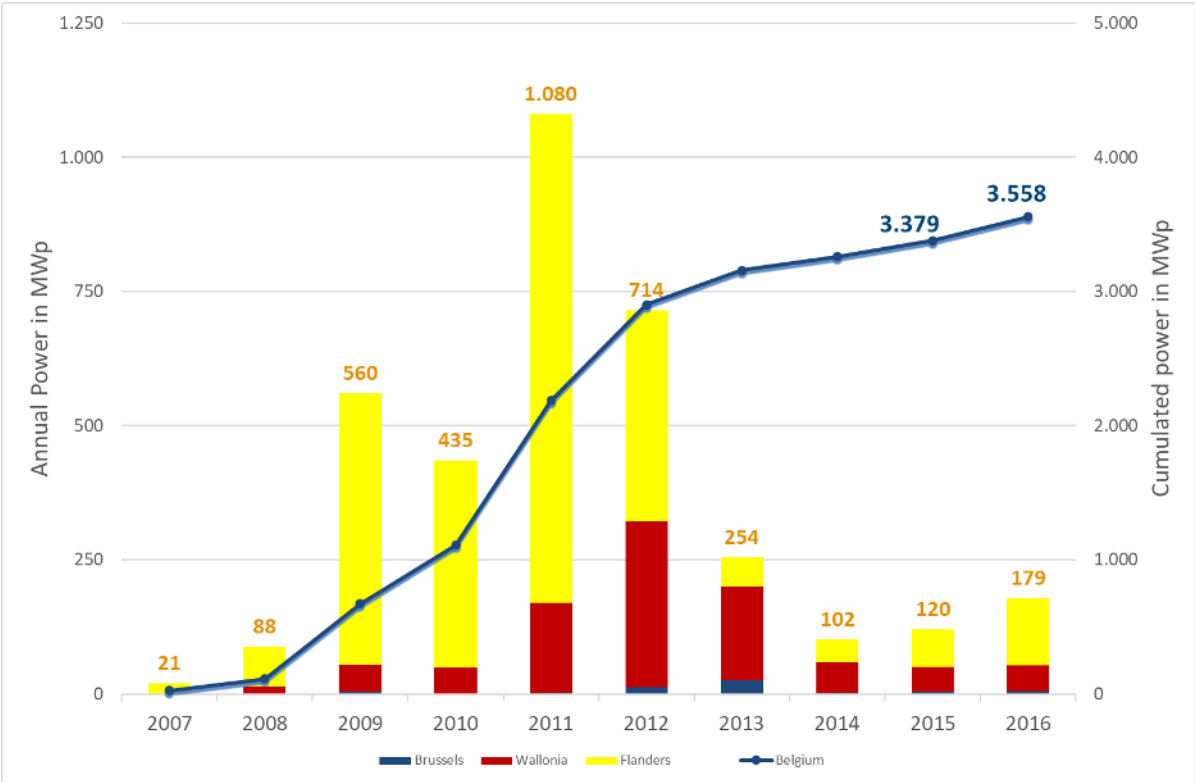

Figure 1 : Annual Installed PV capacity in Belgium and per region

Table 1: PV power installed during calendar year 2016

AC			MW installed in 2016	MW installed in 2016	AC or DC
Grid-connected	BAPV	Residential	179	157	DC
		Commercial		16	DC
		Industrial		6	DC
	BIPV (if a specific legislation exists)	Residential	n.d.		
		Commercial			
		Industrial			
	Ground-mounted	cSi and TF	n.d.		
		CPV			
Off-grid		Residential	n.d.		
		Other			
		Hybrid systems			
		Total		179	DC

Table 2: Data collection process:

If data are reported in AC, please mention a conversion coefficient to estimate DC installations.	For Flanders, data are reported in AC with a conversion coefficient of 110%. Until 2015, the coefficient was 105 %. All the data have been adapted with the new coefficient For Wallonia data are partially reported in DC and in AC. We took the same conversion coefficient. For Brussels, data are reported in DC.
Is the collection process done by an official body or a private company/Association?	APERe (Association)
Link to official statistics (if this exists)	- Wallonia : o < 10kVA : http://www.cwape.be/?dir=6.1.13 http://www.cwape.be/?dir=6.2.08 o >10kVA : http://www.cwape.be/?dir=3.1.08 - Flanders : http://www.energiesparen.be/cijfers/zonnepanelen - Brussels : https://www.brugel.brussels/documents/statistics/rechercher
	Estimate accuracy: 99%.

Table 3: PV power and the broader national energy market.

MW-GW for capacities and GWh-TWh for energy	2016 numbers	2015 numbers
Total power generation capacities (all technologies)	19.031 MW	19.255 MW
Total power generation capacities (renewables including hydropower)	6.423 MW	6.100 MW
Total electricity demand (= consumption)	81,5 TWh	81,5 TWh
New power generation capacities installed during the year (all technologies)	323 MW	377 MW
New power generation capacities installed during the year (renewables including hydropower)	323 MW	377 MW
Total PV electricity production in GWh-TWh	3,19	3.20 TWh*
Total PV electricity production as a % of total electricity consumption	3,9 %	3,9 %

Table 4: Other information's

	2016 Numbers
Number of PV systems in operation in your country (a split per market segment is interesting)	**≤ 10 kVA:** 404.920 systems **> 10 kVA et ≤ 250 kVA :** 6.440 systems **> 250 kVA :** 978 systems **TOTAL** : 412.338
Capacity of decommissioned PV systems during the year in MW	n.d.
Total capacity connected to the low voltage distribution grid in MW	At least 2.182 MWp : All the residential systems. (Some small systems can be connected to MV or HV but it is less than 1 %)
Total capacity connected to the medium voltage distribution grid in MW	n.d.
Total capacity connected to the high voltage transmission grid in MW	At least 731 MWp : All systems > 250 kVA

Table 5: The cumulative installed PV power in 4 sub-markets.

Sub-market	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Stand-alone domestic	n.d.									
Stand-alone non-domestic										
Grid-connected distributed	20	90	456	746	1 572	2 271	2 473	2 567	2 679	2 830
Grid-connected centralized	5	23	217	363	617	631	684	692	699	731
TOTAL (MW)	25	113	673	1 108	2 188	2 903	3 157	3 259	3 379	3 562

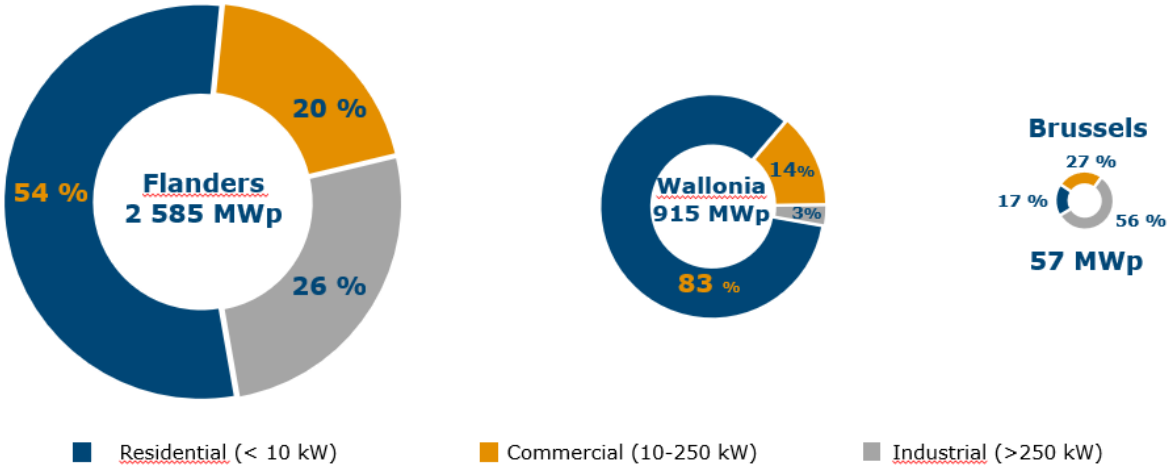

Figure 2 : cumulative installed PV power per submarket and per region

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module prices

There are no official statistics about module prices in Belgium.

Table 6: Typical module prices for a number of years

Year							2016
Standard module crystalline silicon price(s): Typical	No data						
Lowest prices							
Highest prices							

2.2 System prices

Table 7: **Turnkey Prices of Typical Applications – local currency**

Category/Size	Typical applications and brief details	Current prices per W
OFF-GRID Up to 1 kW	n.d.	n.d.
OFF-GRID >1 kW	n.d.	n.d.
Grid-connected Rooftop up to 10 kW (residential)	Range 5 kWp system price	1,3 - 1,8
Grid-connected Rooftop from 10 to 250 kW (commercial)	Range based on CWAPE and VEA stats	1,1 - 1,3
Grid-connected Rooftop above 250kW (industrial)	Range based on CWAPE and VEA stats	1 - 1,2
Grid-connected Ground-mounted above 1 MW	n.d.	n.d.
Other category (hybrid diesel-PV, hybrid with battery…)	n.d.	n.d.

Table 8: National trends in system prices (current) for different applications – local currency

Price (€) /Wp	2008	2009	2010	2011	2012	2013	2014	2015	2016
Residential PV systems < 10 KW	5,8	5,2	4,2	3,4	2,7	2,3	2,0	1,7	1,6
Commercial and industrial	n.d.	n.d.	n.d.	n.d.	n.d.	1,4	1,45	1,35	1,2
Ground-mounted	n.d.	n.d.	n.d.	n.d.	n.d.	1,3	1,3	1,3	1,1

2.3 Cost breakdown of PV installations

It appears not possible to obtain this information for commercial reasons. The members of the different PV federations are reluctant to provide this degree of detail.

2.3.1 Residential PV System < 10 kW

No reliable data

2.3.2 Utility-scale PV systems > 5 MW

No reliable data

2.4 Financial Parameters and specific financing programs

Table 9: PV financing scheme

Average rate of loans – residential installations	1,8 %
Average rate of loans – commercial installations	3 %
Average cost of capital – industrial and ground-mounted installations	No data

2.5 Specific investments programs

Third Party Ownership (no investment)	Several private companies have set up third party ownership solutions for residential, commercial or industrial rooftop PV systems.
Renting	
Leasing	
Financing through utilities	Some utilities have created cooperatives to allow citizens to invest in PV plants they've built
Investment in PV plants against free electricity	No
Crowdfunding (investment in PV plants)	Some cooperatives invest in renewables energy solutions (PV, wind, biomass…). Citizens can buy shares of the cooperative and so indirectly invest in PV systems.
Other (please specify)	

2.6 Additional Country information

Table 12: Country information

Retail Electricity Prices for an household (3,5 MWh/year)	19 – 30 c€/kWh (APERe)
Retail Electricity Prices for a commercial company (500 to 2 000 MWh/year)	11,58 c€ (EUROSTAT 2016 Band IC)
Retail Electricity Prices for an industrial company (20 000 to 70 000 MWh)	7,85 c€/kWh € (EUROSTAT 2016 Band ID)
Population at the end of 2017	11,4 million
Country size (km^2)	30 528
Average PV yield (according to the current PV development in the country) in kWh/kWp	900-950 kWh/kWp
Name and market share of major electric utilities.	ENGIE (Electrabel- GDF-Suez) 65% EDF-Luminus 13 % E.ON : 9 % Others : 13 % (CREG)

3 POLICY FRAMEWORK

This chapter describes the support policies aiming directly or indirectly to drive the development of PV. Direct support policies have a direct influence on PV development by incentivizing or simplifying or defining adequate policies. Indirect support policies change the regulatory environment in a way that can push PV development.

3.1 Direct support policies for PV installations

3.1.1 New, existing or phased out measures in 2016

3.1.1.1 Description of support measures excluding BIPV, and rural electrification

Next to the net-metering on a yearly basis (for small systems), the main support is the system of green certificates (GC). There were some important changes in 2016 depending on the size of the installation and the region where it was installed.

In Flanders

- For small systems (<10 kW):
  Net-metering on yearly basis.
  No green certificates anymore since 2015.
  A "prosumer fee" of around 85 €/KW depending on the Distribution System Operator (DSO) was introduced in July 2015 for all the small PV systems (<10 kW). This fixed fee enables DSO's to charge for the cost of grid use by PV owners, without changing the system of net metering.

- For bigger systems (>10 kW) :
  Big systems have no net-metering or prosumer fee but they benefit from a self-consumption scheme and from an additional green certificate (GC) support scheme to ensure that investors have an IRR of 5 % after 15 years. The support is recalculated every 6 months for new and existing systems.

In Wallonia

- For small systems (<10 kW) :
  The Qualiwatt plan that started in march 2014 was still active : a direct capital subsidy spread on the first 5 years and calculated to obtain a simple payback time of 8 years (5% IRR for a 3kWp installation after 20 years). Besides the financial aspects, this plan also introduces strong quality criteria on the equipment (European norms, factory inspection), the installer (RESCERT trainee) and the installation (standard conformity declaration, standard contract) to give trust back to the new investors. In 2016, there were 5.917 small PV systems installed in Wallonia.
- For bigger systems:
  For big systems, there is since the first of January 2015, a system of GC reservation that controls the development of the market. The amount of GC/MWh is calculated to obtain a 7% IRR on 20years. It depends of the system size and varies between 90 and 130 €/MWh.

In Brussels

The Brussels Region had already adapted its GC mechanism in 2011 to make it more responsive to market changes. An annual revision ensures a payback on investment of 7 years. There were no changes in 2016. The amount of GC for small systems (< 5 kWp) is 3 GC/MWh (270 €/MWh) and 2.4 GC/MWh (216 €/MWh) for all the other systems.

3.1.1.2 BIPV development measures

The Brussels Region could activate an higher support for BIPV in terms of GC but it hasn't been activated yet

3.1.1.3 Rural electrification measures

Nothing specific.

3.1.1.4 Support for electricity storage and demand response measures

Nothing specific.

Table 13: PV support measures (summary table)

	On-going measures residential	Measures that commenced during 2016 - residential	On-going measures Commercial + industrial	Measures that commenced during 2016 Commercial + industrial	On-going measures Ground-mounted	Measures that commenced during 2016 Ground mounted
Feed-in tariffs	No					
Feed-in premium (above market price)	No					
Capital subsidies	Yes	No	No	No	No	No
Green certificates	Yes (Brussels only)	No	Yes	No	Yes	No
Renewable portfolio standards (RPS) with/without PV requirements	No	No	No	No	No	No
Income tax credits	No	No	Yes	No	Yes	No
Self-consumption	Yes	No	Yes	No	Yes	No
Net-metering	Yes	No	No	No	No	No
Net-billing	No	No	No	No	No	No
Commercial bank activities e.g. green mortgages promoting PV	No	No	No	No	No	No
Activities of electricity utility businesses	No	No	No	No	No	No
Sustainable building requirements	Yes	No	No	No	No	No
BIPV incentives	No	No	No	No	No	No

3.2 Self-consumption measures

			Residential	Commercial/industrial
PV self-consumption	1	Right to self-consume	yes	yes
	2	Revenues from self-consumed PV	Savings on the electricity bill	
	3	Charges to finance Transmission & Distribution grids	Capacity based fee (Flanders)*	None
Excess PV electricity	4	Revenues from excess PV electricity injected into the grid	Retail Electricity Prices	Only if a PPA is signed. Otherwise = 0.
	5	Maximum timeframe for compensation of fluxes	One year	None
	6	Geographical compensation	On site only	None
Other characteristics	7	Regulatory scheme duration	Unlimited	Unlimited
	8	Third party ownership accepted	Yes	Yes
	9	Grid codes and/or additional taxes/fees impacting the revenues of the prosumer	Capacity based fee (Flanders)	None
	10	Regulations on enablers of self-consumption (storage, DSM…)	None	None
	11	PV system size limitations	Up to 10 kW (5 kW in Brussels)	Above 10 kW
	12	Electricity system limitations	None	None
	13	Additional features	Green Certificates for the PV production in Brussels	Green Certificates for the PV production

* In Flanders, the capacity based fee so called “prosumer tariff” is collected by the DSO. It varies between 78 and 125 €/KW per year. It is charged for all existing and new PV systems smaller than 10 kW (the one who benefits from the net-metering)
Prosumers can avoid this tariff if they ask to install a new meter that counts separately what goes out and what goes in. In that case, they won’t benefit from the net metering anymore and will have to sell their excess electricity to a retailer.

3.3 Collective self-consumption, community solar and similar measures

Not developed in Belgium

3.4 Tenders, auctions & similar schemes

No tenders, auctions or other schemes are proposed by the regions to install PV

3.5 Financing and cost of support measures

All the support measures (green certificates, net-metering, capital subsidy) are impacting the electricity prices for all the electricity users.

For the green certificates, providers must buy a certain amount of GC depending of a regional fixed percentage of their furniture. The costs are reported directly to their customers.

Net metering and capital subsidy (Qualiwatt in Wallonia) are impacting DSO revenues. They also report their losses directly on the customer's bills. In Flanders, the capacity-based fee so called "prosumer tariff" is collected by the DSO.

The tax credit on investment for non-residential PV is supported by the Federal government.

3.6 Indirect policy issues

In Flanders, the government introduced a measure that force all new buildings to have a minimum share of renewable energy. It can be produced by solar thermal, PV, heat pumps or other renewables systems. For PV, the minimum contribution is about 0.7 kWp. The effect of this measure are already visible and kept a minimal PV market alive.

4 HIGHLIGHTS OF R&D

4.1 Highlights of R&D

R & D in Belgium is a very active sector. For many years, the Belgian PV research activities have mostly been focused on highly efficient crystalline silicon solar-cells, thin film and organic solar-cells.

The involved research organizations and companies participate in various national and European projects as well as in different tasks of the IEA-PVPS TCP (Task 13, 14, 15).

Here is an alphabetical list of the main PV research projects:

Project Name	Description	Belgian R&D partner	Technology	Level
AER II 2014-2016	Industrialization and System Integration of the Aesthetic Energy Roof Concept	Soltech	BIPV	Eur
ArtESun 2013-2016	ArtESun develops highly efficient organic solar cells with an increased lifetime and a decreased production cost. The ultimate goal of the ArtESun project is to OPV towards introduction into the competitive thin-film PV market.	IMEC	Organic PV	Eu
Bfirst 2012-2016	BFIRST project will deal with the design, development and demonstration of a portfolio of innovative photovoltaic products for building integration, based on cell encapsulation within fibre-reinforced composite materials.	Vue sur Mons	BIPV	Eu
CHEETAH 2014-2017	Cost-reduction through material optimisation and Higher EnErgy outpuT of solAr pHotovoltaic modules - joining Europe's Research and Development efforts in support of its PV industry.	IMEC	all	Eu
Hyb2Hyb 2014-2017	Improve storage characteristics of Li -ion battery / super hybrid electrochemical capacitors and their performance with hybrid photovoltaic energy systems	UCL, UMons, ULB	all	Regional
Novacost 2014-2017	Non Vacuum Based Strategies for Cost Efficient Low Weight Chalcogenide Photovoltaics	Advanced Coatings & Construction Solutions	Thin film	
Orga |next | Generationt 2014-	R&D and industrial cluster on Nano-materials and innovative deposition.	IMEC University of Hasselt University of Liège	Organic PV Thin Film	Eu
Pv4Facades 2014-2016	Photovoltaics for High-Performance Building-Integrated Electricity Production Using High-Efficiency Back-Contact Silicon Modules	Eliosys Eternit IMEC Soltech Wienerberger	BIPV	Eur
PV CZTS 2012-2016	Developing research around CZTS identified as high potential PV material.	UCL, FUNDP, UMons, AGC, AC & CS	Thin Film	National
Reinterest	BIPV project developing a toolbox for intelligent renewable and multifunctional of the building envelope.	ULB, UCL, Electrixities, Besix, CETIC, ICEDD	BIPV	National
Smart PV	Demonstrating module technology for thin BC Si-solar cells (level efficiencies>20%, operational lifetime > 25 years) Module-level power converters based on high bandgap materials Increased energy yield of Si-PV modules A holistic design and control approach with the purpose to maximize energy yield	IMEC KU Leuven University of Gent VITO	BC Silicium	Regional

Project Name	Description	Belgian R&D partner	Technology	Level
SIM SOPPOM-program 2010-2018	The objective is to drive down costs of thin-film PV CIGS & OPVthrough • Increasing efficiency at the cell, module & system level • Decreasing cost of productions process	University of Gent University of Leuven University of Atwerpen University of Hasselt IMEC Flamac, Solvay, Umicore	Printed CIGS Organic PV	Regional
Solarcycle 2012-2016	Project working on the recycling process of solar panel	ULB, ULG, RECMA		
Solar PV comice	Solar PV comice is a working group of the Walloon Alliance for Research in Energy (WARE). 23 research units gather their research skills in line with the Joint Programme defined by EERA on Photovoltaic Solar Energy.	- 5 Universities (FUNDP, UCL, ULg, UMons, ULB) - 4 research centers (CRM Group, Materia Nova, Multitel, CSTC) - High schools	Silicon Thin Film Organic Module technology CPV	Regional
Solliance	Solliance is a cross-border cooperation between six research institutes (from the Netherlands and Belgium) that have joined forces in the field of thin-film solar cells. Together with industry, Solliance focuses on the entire value chain – from new materials and concepts to production technology and applications.	IMEC University of Hasselt	Organic PV Thin film CIGS	Eu
Solsthore 2015-2018	SolSThore aims to enable massive deployment of solar energy in the context of Smart Cities. This requires a combination of highly efficient building-integrated PV (both on the level of energy yield and device reliability) and local storage by means of batteries.	University of Leuven, Hasselt, Vito, Imec	BIPV	Regional
Sunflower 2011-2016	Development of highly efficient, long-lasting, cheap and environmentally friendly printed organic photovoltaics.	University of Atwerpen AGFA--GEVAERT	Organic PV	Eu

4.2 Public budgets for market stimulation, demonstration / field test programmes and R&D

Data from the federal energy department (Mio €)

2013	2014	2015	2016
6,881	6,135	6,049	4,836

5 INDUSTRY

TWEED, the Cluster of Energy, Environment and Sustainable Development technologies in the Walloon Region has developed a map of the activities in all the value chain of PV in Wallonia and Brussels. (http://en.rewallonia.be/les-cartographies/solar-photovoltaic/interactive-view/)
IMEC also did a similar job focused on the value chain of PV in Flanders.

The following information is based on these two initiatives.

5.1 Production of feedstocks, ingots and wafers (crystalline silicon industry)

No productions of feedstocks, ingots or wafers in Belgium.

5.2 Production of photovoltaic cells and modules (including TF and CPV)

Module manufacturing is defined as the industry where the process of the production of PV modules (the encapsulation) is done. A company may also be involved in the production of ingots, wafers or the processing of cells, in addition to fabricating the modules with frames, junction boxes etc. The manufacturing of modules may only be counted to a country if the encapsulation takes place in that country.

There are 4 companies active in modules production in Belgium: Soltech (since 1989), Issol (since 2006), Reynaers (since 2008) and Final 24 (since 2014). Soltech, Renaers and Issol produce BIPV solutions (on-demand size and color), Final 24 makes classical modules.

All cells are imported.

Total PV cell and module manufacture together with production capacity information is summarised in Table 16 below.

Table 16: Production and production capacity information for 2016

Cell/Module manufacturer (or total national production)	**Technology** (sc-Si, mc-Si, a-Si, CdTe)	**Total Production (MW)**		**Maximum production capacity (MW/yr)**	
		Cell	Module	Cell	Module
Wafer-based PV manufactures					
1 Issol	Si		12,5		20
2 Finale24 (Evocells)	Mono-Si Poly-Si		2,37 0,13		10
3 Soltech	Mono-Si Poly-Si		0,6 0,2		10
Total					
Cell/Module manufacturer (or total national production)	**Technology** (sc-Si, mc-Si, a-Si, CdTe)	**Total Production (MW)**		**Maximum production capacity (MW/yr)**	
		Cell	Module	Cell	Module
Thin film manufacturers					
none					
Cells for concentration					
none					
TOTALS			**15,8**		**40**

5.3 Manufacturers and suppliers of other components

Here is a list of active companies in other components

5.3.1 Materials & substrates integration:

Agc, Agfa-Gevaert, Amos, Bekaert, Centexbel, Cookson Electronics,Coretec Engineering, CRM Group, Cytec, Dow Corning, Drytec, Ducatt, Elsyca, Esco Drives, Multitel, OCAS, Saint-Gobain, Solvay, Sibleco, Umicore.

5.3.2 Cell & Modules:

3M, BASF, Cenareo, Derbigum, Ecostream, Fabricom (GDF Suez), Icos Vision System, Issol, IPTE, IZEN, Soltech, Total.

5.3.3 (Smart)PV – Modules:

Eliosys, Laborelec, Melexis, NXP, OnSemi, Soltech.

6 PV IN THE ECONOMY

6.1 Labour places

There is no direct way to have the exact amount of labor places generated by PV in Belgium. No in depth study has been realized yet to determine it.

Nevertheless, we can estimate it based on some parameters from other countries. We see the amount of FTE per MWp in similar European countries varies between 10 and 20. With 179 MWp installed in 2016 we can estimate that there was about of 2.685 direct full-time employment (FTE) jobs.

Table 17: Estimated PV-related labour places in 2016

Research and development (not including companies)	No breakdown
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	
Distributors of PV products	
System and installation companies	
Electricity utility businesses and government	
Other	
Total	2.685

6.2 Business value

Table 18: Value of PV business

Sub-market	**Capacity installed *in 2016* (MW)**	**Price per W** *(from table 7)*	**Value**	**Totals**
Off-grid domestic	-	-	-	-
Off-grid non-domestic	-	-	-	-
Grid-connected distributed	**172,8**	**1,56**[1]	*172,8 x 1,56*	*269,6 Million €*
Grid-connected centralized	**6,0**	**1,1**	*6,0 x 1,1*	*6,6 Million €*
				276,2 Million €
Export of PV products				-
Change in stocks held				-
Import of PV products				-
Value of PV business				*276,2 Million €*

[1] Based on table 7. Weighted average price

7 INTEREST FROM ELECTRICITY STAKEHOLDERS

7.1 Structure of the electricity system

The Belgian electricity landscape is based on a liberalized market with separation between producers (private and cooperatives), one Transmission System Operators (ELIA – private company designed by the federal state) and eight Distribution System Operators (Mixed companies: public – municipalities - and private).

The electricity retailers (sometimes also producers) have to source a portion of their electricity supplies from renewable energies (RPS system). This portion is different for each region.

Belgium has one federal regulator, the Commission for Electricity and Gas Regulation CREG, and three regional regulators:

- The Walloon Energy Commission (CWaPE) in Wallonia; (renewable electricity quota of 32,4 % at the end of 2016, 37,9% at the end of 2024)
- Brussels Gas and Electricity (BRUGEL) in the Brussels-Capital Region; (Green certificates quota of 8,2 %at the end of 2016, 14% at the end of 2024))
- The Flemish Electricity and Gas Regulator (VREG) in Flanders. (Renewable electricity quota of 20,5% in 2018)

7.2 Interest from electricity utility businesses

Distributed renewable energies as PV, just like rational energy use, generates a loss of income for retailers, historical producers, TSOs and DSOs. So you could think they would naturally try to slow down the development of PV and other renewables.

However, some DSOs are proactive and implement PV business models for their municipalities. It is for example the case of RESA that has developed a new **cooperation agreement** to support municipalities with their "green" strategies.

Other DSOs (Infrax, ORES) are more active in **research programs** on PV: How to integrate high shares of PV in the net, smartgrid and PV.

As prosumers represents now a consequent market (405.000 clients), retailers start to develop specific products to attract them. For example, Eneco developped a solar tariff where the electricity price is always at night tariff for those who has PV on their roof.

7.3 Interest from municipalities and local governments

The development of renewables energies is a regional competence. The main barriers and key drivers are decided at this level.

Nevertheless, many local initiatives have emerged at municipality level. Municipalities install PV on their roofs thanks to third party ownership. (Auderghem for example)
Other municipalities install PV on their roof with the help of cooperatives, giving the opportunity to their citizens to own a share of the PV installation.

8 HIGHLIGHTS AND PROSPECTS

The Belgian National renewable energy action plan fixed a target of 1,34 GWp installed in 2020 in order to reach the national target of 13 % renewables in 2020 set by the European directive. This objective had already been reached in 2011.

In November 2015, and after long negotiations, this national objective was translated into regional targets. In 2016, each region adapted their existing roadmaps to reach these objectives.

In Flanders, the government defined indicative production objectives for each renewable energy source with the overall objective to reach a share of 10.5% renewable energy in the total final energy consumption by 2020. For PV, the target in 2020 is a production of 2670 GWh which translates into about 3 GWp installed. In 2016, about 2246 GWh were produced by the Flemish PV park. Annual growth should be around 106 GWh/year (128 MWp) to reach the objective of 2020.

In Wallonia, the government want to produce 13% of the region energy consumption from renewable energy sources by 2020. End of 2015, the government planned a mean annual growth of 73 GWh (81 MWp) until the end of 2020. This annual objective is split between small systems (43 GWh – 48 MWp) and big systems (30 GWh – 33 MWp).

In Brussels, the objective is to produce 91 GWh of solar electricity at the end of 2020 which means a growth of approximatively 17 GWh a year (18 MWp) which is more than tripling the installation rhythm of 2016.

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