IEA INTERNATIONAL ENERGY AGENCY

National Survey Report of PV Power Applications in Belgium
2013

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 23 member countries. The European Commission also participates in the work of the Agency.

The IEA Photovoltaic Power Systems 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 24 participating countries are Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), China (CHN), Denmark (DNK), France (FRA), Germany (DEU), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Malaysia (MYS), Mexico (MEX), the Netherlands (NLD), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), Thailand (THA), Turkey (TUR), the United Kingdom (GBR) and the United States of America (USA). The European Commission (EC), the European Photovoltaic Industry Association (EPIA), the US Solar Electric Power Association (SEPA), the US Solar Energy Industries Association (SEIA) and the Copper Alliance are also members.

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 2013. 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 2013 statistics if the PV modules were installed and connected to the grid between 1 January and 31 December 2013, although commissioning may have taken place at a later date**.

1.1 Applications for Photovoltaics

The majority of PV systems are grid-connected distributed systems on buildings. The main off-grid systems are road signs with dynamic display. Land-use density does not allow a significant development of ground-mounted systems. The residential segment represents 61 % with almost 350 000 installations (1/13 households)

1.2 Total photovoltaic power installed

By the end of year 2013, Belgium had about 3.009 installed MW, an increase of 236 MW (+8 %) compared to 2012. These number are based on the official statistics of 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 2013 but not yet declared.

Table 1: PV power installed during calendar year 2013

AC			**MW installed in 2013 (mandatory)**	**MW installed in 2013 (optional)**	**AC or DC**
Grid-connected	BAPV	Residential (<10kVA)	236.521	155.891	DC
		Commercial (10 to 250 kVA)		34.357	DC
		Industrial (>250 kVA)		46.273	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	n.d.		
		Hybrid systems			
		Total	236.521		DC

Table 2: Data collection process:

If data are reported in AC, please mention a conversion coefficient to estimate DC installations.	105 % for Flanders and Wallonia. Brussels Region give information 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 o >10kVA : http://www.cwape.be/?dir=3.1.08 - Flanders : http://www.vreg.be/maandelijkse-statistieken-groene-stroom

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

MW-GW for capacities and GWh-TWh for energy	2013 numbers	2012 numbers
Total power generation capacities (all technologies)[1]	20.072 WM	19.662 MW
Total power generation capacities (renewables including hydropower)	5.227 MW	4.375 MW
Total electricity demand (= consumption)[2]	80,7 TWh	81 TWh
New power generation capacities installed during the year (all technologies)	852 MW	1.647 MW
New power generation capacities installed during the year (renewables including hydropower)	852 MW	983 MW
Total PV electricity production in GWh-TWh	2,61 TWh	2,21 Twh
Total PV electricity production as a % of total electricity consumption	3,23%	2,73%

[1] Data source : CREG + update APERe for renewables

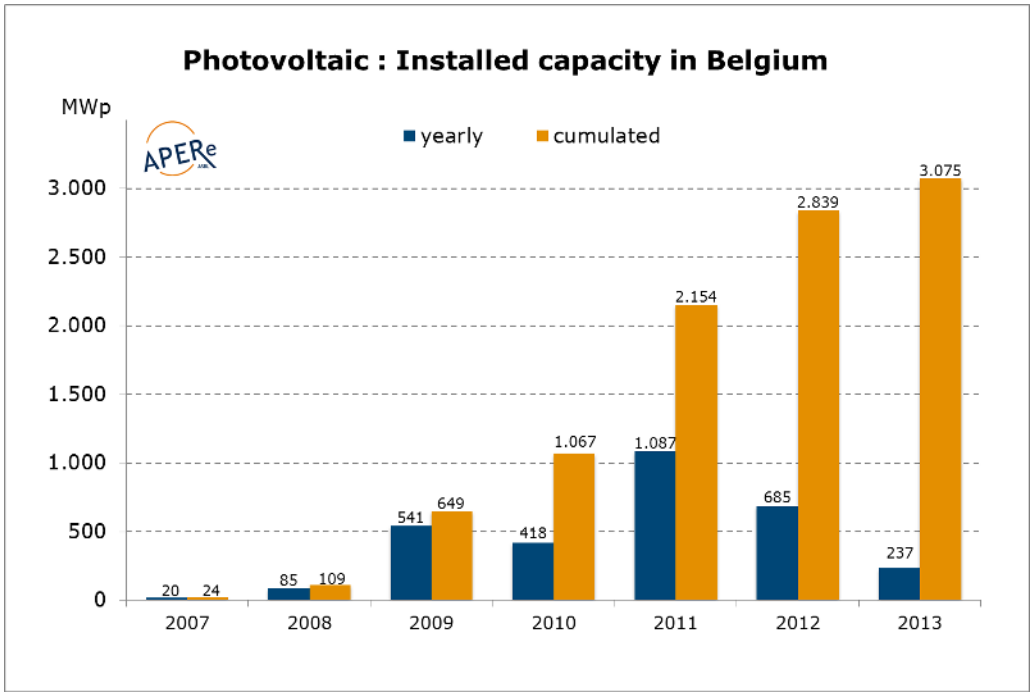
[2] Data source : Synergrid

Table 4: Other informations

	2013 Numbers (optional)
Number of PV systems in operation in your country (a split per market segment is interesting)	**≤ 10 kVA:** 348.733 systems **> 10 kVA et ≤ 250 kVA :** 5.544 systems **> 250 kVA :** 925 systems
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 1820 MW (≤ 10 kVA)
Total capacity connected to the medium voltage distribution grid in MW	n.d.
Total capacity connected to the high voltage transmission grid in MW	n.d.

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

Sub-market	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Stand-alone domestic	-	-	-	-	-	-	-
Stand-alone non-domestic	-	-	-	-	-	-	-
Grid-connected distributed (>250 kVA)	19,04	86,52	442,79	722,00	1.,504,47	2.178,90	2.369,15
Grid-connected centralized (>250 kVA)	4,68	21,86	206,16	345,21	583,37	593,53	639,80
TOTAL (MW)	23,71	108,37	648,95	1.067,22	2.087,84	2.772,43	3.008,370



- In Flanders, the market crashed in 2013. After a 20 % growth in 2012 which was the lowest since 2006, market growth in 2013 was only of 2,1 %. The reduction of support schemes and the introduction of a new specific network fee (around 60 € per kWp and per year for 20 years) were the two main factors explaining this crisis in Flanders. Installed capacity increased from 2.079 MWp to 2.124 MWp.
- In Wallonia, 2013 was marked by the crisis of the green certificates mechanism and the creation of a new support plan: Qualiwatt. This plan started in march 2014 and was preceded by a transition period that limited the impact of the crisis. Installed capacity increased from 606 MWp to 763 MWp.
- In Brussels, market boomed as in 2012, thanks to the stable legislation context and high support scheme guaranteeing a 7-year ROI. Installed capacity increased from 19 MWp to 43 MWp mainly thanks to the big installations (> 10 kVA) that receive the same amount of green certificates as the small ones.

2 COMPETITIVENESS OF PV ELECTRICITY

2.1 Module prices

No data

Table 6: Typical module prices for a number of years

Year	1992						2013
Standard module price(s): Typical							
Best price							
PV module price for concentration (if relevant)							

2.2 System prices

Table 7: **Turnkey Prices of Typical Applications**

Category/Size	Typical applications and brief details	Current prices per W
OFF-GRID Up to 1 kW	n.d.	
OFF-GRID >1 kW	n.d.	
Grid-connected Rooftop up to 10 kW (residential)	Typical price for a 5 kW rooftop installation (excluding VAT)	1,8 €/Wp
Grid-connected Rooftop from 10 to 250 kW (commercial)	Typical price for a 100 kW rooftop installation (excluding VAT)	1,4 €/Wp
Grid-connected Rooftop above 250kW (industrial)	Typical price for a 250 kW rooftop installation (excluding VAT)	1,1 €/Wp
Grid-connected Ground-mounted above 1 MW	n.d.	
Other category existing in your country (hybrid diesel-PV, hybrid with battery…)	n.d.	

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

Price/Wp	2009	2009	2010	2011	2012	2013
Residential PV systems < 10 KW	5,5	5	4	3,5	2	1,8
Commercial and industrial	n.d.	n.d.	n.d.	n.d.	n.d.	1,4
Ground-mounted	n.d.	n.d.	n.d.	n.d.	n.d.	1,1

2.3 Financial Parameters and programs (leasing…)

Table 9: PV financing scheme

Average Cost of capital	3-5 %
Description of a specific PV financing scheme (leasing, renting…)	

2.4 Additional Country information

The Belgian electricity market split in 2007 into generation (several producers), transmission (High voltage: ELIA) and distribution (several Grid Operators). A federal Regulator (CREG) and three regional regulators (Vreg, CWaPE, Brugel) control the proper functioning and transparency of the market.

Table 10: Country information for 2013

Retail Electricity Prices for an household	19,3 €/kWh (3.500 kWh simple tariff)[3]
Retail Electricity Prices for a commercial company	18,1 €/kWh (50.000 kWh simple tariff)[3]
Retail Electricity Prices for an industrial company	9,1 c€/kWh (2 000 MWh)[4]
Population at the end of 2013 (or latest known)	11.161.642
Country size (km^2)	30 528 km^2
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.	Not significant. Almost all PV systems are private.

[3] CREG – April 2014 : http://www.creg.info/Tarifs/composanteenergie.pdf

[4] Eurostat

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

Table 11: PV support measures (summary table)

	On-going measures	Measures that commenced during 2013
Feed-in tariffs (gross / net?)		
Capital subsidies for equipment or total cost	In Brussels only for passive and low-energy houses	
Green electricity schemes		
PV-specific green electricity schemes	Green certificates support	Reviewed in 2013
Renewable portfolio standards (RPS)		
PV requirement in RPS		
Investment funds for PV		
Income tax credits	Not for private installations	Reviewed in 2013
Prosumers' incentives (self-consumption, net-metering, net-billing…)	Self-consumption (on annual base) and net-metering	
Commercial bank activities e.g. green mortgages promoting PV	Some banks have established specific energy loans	
Activities of electricity utility businesses		
Sustainable building requirements		

3.2 Direct Support measures

3.2.1 Support measures existing in 2013

3.2.1.1 Description of support measures excluding prosumers, BIPV, and rural electrification

Next to the net-metering on a yearly basis, the main support is the system of green certificates (GC). There were big changes in 2013 depending on the size of the installation and the region where it was installed.

In Flanders

The GC system was completely reconsidered. The new system is more dynamic than the fixed retribution of 90 €/MWh during 10 years applied during the last 6 month of 2012. PV systems will have a certain amount of GC/MWh during 15 years to reach a financial goal of 5% of IRR. This amount will be recalculated every 6 month and applied to the PV systems installed after 31/12/2012. In 2013, the amount for small PV systems (<10 kW) was 21 €/MWh for the first 7 month and 26 €/MWh for the 5 last month.

For systems between 10 and 250 kW, the support was higher because they do not benefit from the net-metering support. It was respectively 59 and 67 €/MWh. For larger systems (>250 kW), the amount was 46 €/MWh then 53 €/MWh[5].

In Wallonia

As an answer to the Green certificate crisis[6] the Walloon government lowered its support to the sector in April 2013: 1.5 GC/MWh (97.5 €/MWh) during 10 years for installations between 0 and 5 kWp and 1 GC/MWh (65 €/MWh) during 10 years for installations between 5 to 10 kWp.

For systems between 10 and 250 kW, the support[7] was 4 GC/MWh (260 €/MWh) if the following conditions were met: 50 % of self-consumption and a cogeneration study. If it was not the case, the support decreased to 1 GC/MWh (65 €/MWh)

For larger systems (>250 kW), the support was fixed to 1 GW/MWh (65 €/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 was one change of the amount of GC in August 2013: from 4 GC/MWh (340 €/MWh) to 2.4 GC/MWh (204 €/MWh).

The support does not change in function of the size of the PV installation. This adaptation is foreseen in 2014. There will also be a bigger support for BIPV.

3.2.1.2 Prosumers' development measures

Self-consumption of PV electricity is allowed in Belgium for all systems.

The electricity that is not self-consumed and injected into the grid benefits from a net-metering system on an annual basis. It is a physical compensation (meters turn backward) of the PV production volume over the consumption volume during a set period of one year. This has never changed since 2007. PV installations whose power is smaller than 10 kVA (max AC power) can benefit from this support. In Brussels, the limit is fixed at 5 kVA.

3.2.1.3 BIPV development measures

There is a new measure in Brussels foreseen in 2014 that will help BIPV. The amount of Green Certificates will be higher than for classic PV systems.

3.2.1.4 Rural electrification measures

N.A.

3.2.1.5 Other measures including decentralized storage and demand response measures

N.A.

[5] More information can be found on the website of the Flemish regulator VREG : http://www.vreg.be/overzicht-bandingfactoren

[6] See National Survey Report of PV Power Applications in Belgium2012, p 17 : http://www.iea-pvps.org/index.php?id=93&eID=dam_frontend_push&docID=1824

[7] More details : http://energie.wallonie.be/fr/panneaux-photovoltaiques-d-une-puissance-superieure-a-10-kw.html?IDC=8141

3.2.2 Support measures phased out in 2013

N.A.

3.2.3 New support measures implemented in 2013

Since the beginning of 2013, Flanders introduced an annual net fee for all PV owners during 20 years. This tariff was fixed without taking into account the percentage of injection and varied depending on the DSO.

End of 2013, the specific network fee was cancelled by the Court of Appeal following legal action brought by the PV federation (PV Vlaanderen).

3.2.4 Measures currently discussed but not implemented yet

A net fee or another system to reduce the impact of the net-metering system on the incomes of DSO's are studied by the Walloon Region but not yet applied.

3.2.5 Financing and cost of support measures

The financial cost of all these support measures (green certificates, net-metering) are directly impacting the electricity bill of all the electricity users.

3.3 Indirect policy issues

3.3.1 International policies affecting the use of PV Power Systems

3.3.2 The introduction of any favorable environmental regulation

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.

3.3.3 Policies relating to externalities of conventional energy

N.A.

3.3.4 Taxes on pollution (e.g. carbon tax)

N.A.

3.3.5 National policies and programmes to promote the use of PV in foreign non-IEA countries

N.A.

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 national and international projects. The involved research organisations and companies participate in various national and European projects as well as in different tasks of the IEA-PVPS Programme (Task 13 and 14).

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

Project Name	Description	Belgian R&D partner	Technology	Level
ArtESun	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	European
Bfirst	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	European
cleanoptic	Cleanoptic works on self-cleaning nano-composite coatings, anti-icing and anti-reflection coating deposited by a completely green process on glass panels for PV modules.	University of Louvain-la-Neuve University of Liège University of Namur CERTECH	All	Regional
CHEETAH	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	European
Guide2dye	The aim of this project lies in the development of a new kind of cost effective prototype concentrator module. This concentrator combines hybrid (refractive/diffractive) receiver, waveguide, and Dye cells. The innovation consists in the splitting of the solar spectrum towards two different cells in order to enhance the efficiency of the module.	University of Liège SIRRIS	Concentra-ted PV	Regional
NANEL + Nano-structuring	The NANEL joint exchange project aims to establish long-lasting research cooperation between Portuguese, Bulgarian, Belgian, Belarusian and Russian scientists in the field of electrochemical synthesis of advanced nano-structured materials. The partners bring the complementary experiences and experimental facilities which are essential for effective development and testing of the nano-materials for to be applied in sensors and photovoltaics.	VUB	Nano-PV	International
MetaPV	MetaPV is a research and demonstration project on grid hosting capacity for variable renewable power.8, funded by the European Commission It is the first practical demonstration of a European photovoltaic Smart Grid, implemented in Belgium on Infrax low and medium voltage distribution grids.	3E Infrax	All	European

[8] www.metaPV.eu

Project Name	Description	Belgian R&D partner	Technology	Level
Organext	R&D and industrial cluster on Nano-materials and innovative deposition.	IMEC University of Hasselt University of Liège Tweed	Organic PV Thin-Film	European
PVCROPS	PVCROPS addresses 3 key objectives of the call topic: 1) Improvement of performance, reliability and lifetime 2) Cost reduction of PV systems 3) Better integration of PV into grid	APERe	All	European
PV-GUM	The PV-GUM project aims at developing new manufacturing technologies and equipments which will produce a low cost highly efficient flexibly BIPV solar cell on a bituminous roofing membrane	Imperbel	BIPV	European
SBO-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
SIM SOPPOM-program	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
Solar Flare	The goal of the Solar Flare project is to support regional projects to develop thin film solar energy with higher efficiency and lower cost.	IMEC University of Hasselt	Thin-film	European
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
Solarrok	SOLARROK promotes a resource efficient Europe by boosting innovative capacities and cooperation of European Photovoltaics clusters striving for enhanced PV efficiency on production and system level.	IMEC	All	European
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	Organic PV Thin-film	European

Project Name	Description	Belgian R&D partner	Technology	Level
SmartBlind	The SMARTBLIND project aims at developing an Energy Efficient Smart Window including a hybrid film constituted of an electrochromic LC film and a photovoltaic film both printed on the same long-lasting flexible substrate.	VUB	Thin-film	Regional
Sunflower	Development of highly efficient, long-lasting, cheap and environmentally friendly printed organic photovoltaics.	University of Atwerpen AGFA--GEVAERT	Organic PV	European

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

Public budgets for 2013 are not yet available.

For 2012, the only data available are the funds going to research in solar PV in Wallonia

There are no data for Flanders and Brussels.

Table 12: Public budgets for R&D, demonstration/field test programmes and market incentives.

	R & D	Demo/Field test
Flanders	*nd*	*nd*
Wallonia (2012)	*3.150.000 €*	*50.000 €*
Brussels	*nd*	*nd*
Federal	-	-
Total	3.200.000 €	

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. (www.pvmapping.be)
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 such activities in Belgium.

Table 13: Production information for the year for silicon feedstock, ingot and wafer producers

Manufacturers (or total national production)	Process & technology	Total Production	Product destination (if known)	Price (if known)
	Silicon feedstock	tonnes		
	sc-Si ingots.	tonnes		
	mc-Si ingots	tonnes		
	sc-Si wafers	MW		
	mc-Si wafers	MW		

Describe briefly the overseas activities of any key companies also operating in other countries.

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

Module manufacturing is 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.

No production lines of classical cells are active on Belgian territory anymore. The last Belgian cell producer, Photovoltech, a spin-off of IMEC, went bankrupt in October 2012 and 267 jobs were lost. Solartec (Mexican producer) bought the production line.

Issol is the last producer of classical modules, but it is not their main activity. With Soltech, they are the two main companies focussing on BIPV applications.

A new company, Final 24, is planning to open two lines of classical modules production at the end of 2014. Their production capacity is not known yet.

Total PV cell and module manufacture together with production capacity information is summarised in Table 9 below.

Table 14: Production and production capacity information for 2013

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		a		b	
2		c	d	e	f
3 etc					
Total					
Thin film manufacturers					
1		x	*x*	y	*y*
2					
Cells for concentration					
1		g		h	
TOTALS		**a+c+x+g**	**d+x**	**b+e+y+h**	**f+y**

List of companies active in Belgium in PV modules components

5.2.1 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.

5.2.2 Cell & Modules:

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

5.2.3 (Smart)PV – Modules:

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

5.3 Manufacturers and suppliers of other components

6 PV IN THE ECONOMY

6.1 LABOUR PLACES

There is no direct way to have the exact amount of labour places generated by PV in Belgium.

Nevertheless, we can estimate it based on some parameters taken from EPIA fact sheet[9]. With 236 MW installed last year we can estimate that there was a minimum of 2.310 direct full time employment (FTE) jobs and 5.192 indirect jobs[10]. The whole PV sector (direct + indirect) probably represented more than 7.500 FTE jobs in 2013.

Table 15: Estimated PV-related labour places in 2013

Research and development (not including companies)	*n.d.*
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	*n.d.*
Distributors of PV products	
System and installation companies	
Electricity utility businesses and government	*n.d.*
Other	*n.d.*
Total	±7.500

6.2 Business value

Table 16: Value of PV business

Sub-market	**Capacity installed *in 2013* (MW)**	**Price per W** *(from table 7)*	**Value**	**Totals**
Off-grid domestic	*n.d.*	*n.d.*	*n.d.*	*n.d.*
Off-grid non-domestic	*n.d.*	*n.d.*	*n.d.*	*n.d.*
Grid-connected distributed	**190**	**1,72**[11]	*190 x 1, 72*	*326,8 Million €*
Grid-connected centralized	**46**	**1,1**	*46 x 1,1*	*50,6 Million €*
				377,4 Million €
Export of PV products				*n.d.*
Change in stocks held				*n.d.*
Import of PV products				*n.d.*
Value of PV business				*377,4 Million €*

[9] http://www.epia.org/news/fact-sheets/

[10] Direct jobs: 10 FTE /MW installed during the year. / Indirect jobs: 22 FTE/MW

[11] 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), 1 Transmission System Operators (ELIA – private company designed by the federal state) and 8 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 19,4% in 2013, 37,9% in 2020)
- Brussels Gas and Electricity (BRUGEL) in the Brussels-Capital Region; (Green certificates quota of 3,5% in 2013, 8% in 2025)
- The Flemish Electricity and Gas Regulator (VREG) in Flanders. (Renewable electricity quota of 14% in 2013, 20,5% in 2025)

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 TECTEO 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,…

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. The European project PVGRID (www.pvgrid.eu) described it for Belgium.

Nevertheless, many local initiatives have emerged at municipality level. One of them is the project led by the Flobecq Municipality (Wallonia).Flobecq has developed a third-party investor project that allowed 30% of its population to be equipped with solar panels for free (300 systems). Users get the green electricity and the municipality gets the green certificates. Flobecq was rewarded with the title of "capital of PV" in the Renewable Energies championship.

This initiative led to a new project from the grid operator. ORES is now analysing how the grid reacts to this unique penetration of PV.

8 STANDARDS AND CODES

Belgium follows EC norms and standards.

All PV systems have to follow the Synergrid (federation of the Belgian DSO's) C10/11 prescriptions. Synergrid also edited a document "What to do if my PV install often disconnect from the grid?[12]"

A non-exhaustive list of norms and regulations is downloadable here (French – p 12)

9 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.

This national target has been translated into regional objectives. There are no concrete objectives for PV at this level except for Wallonia that wants to reach 1250 GWh of yearly PV production in 2020.

If PV is doing better that the early objectives to reach these 13%, the study "2020 keep on track"[13] still gives worrying conclusions for Belgium.

However a study[14] made by ICEDD, VITO and the Federal planning Bureau shows that Belgium could reach 100% of renewable energy sources by the year 2050. In the different tested scenarios, PV reaches 50 and even 170 GW.

[12] http://www.synergrid.be/index.cfm?PageID=16832#

[13] http://www.keepontrack.eu

[14] http://www.icedd.be/I7/index.php?option=com_k2&view=item&id=1228&lang=en

Definitions, Symbols and Abbreviations

For the purposes of this and all IEA PVPS National Survey Reports, the following definitions apply:

PV power system market: The market for all nationally installed (terrestrial) PV applications with a PV power capacity of 40 W or more.

Installed PV power: Power delivered by a PV module or a PV array under standard test conditions (STC) – irradiance of 1 000 W/m^2, cell junction temperature of 25°C, AM 1,5 solar spectrum – (also see 'Rated power').

Rated power: Amount of power produced by a PV module or array under STC, written as W.

PV system: Set of interconnected elements such as PV modules, inverters that convert d.c. current of the modules into a.c. current, storage batteries and all installation and control components with a PV power capacity of 40 W or more.

CPV: Concentrating PV

Hybrid system: A system combining PV generation with another generation source, such as diesel, hydro, wind.

Module manufacturer: An organisation carrying out the encapsulation in the process of the production of PV modules.

Off-grid domestic PV power system: System installed to provide power mainly to a household or village not connected to the (main) utility grid(s). Often a means to store electricity is used (most commonly lead-acid batteries). Also referred to as 'stand-alone PV power system'. Can also provide power to domestic and community users (plus some other applications) via a 'mini-grid', often as a hybrid with another source of power.

Off-grid non-domestic PV power system: System used for a variety of industrial and agricultural applications such as water pumping, remote communications, telecommunication relays, safety and protection devices, etc. that are not connected to the utility grid. Usually a means to store electricity is used. Also referred to as 'stand-alone PV power system'.

Grid-connected distributed PV power system: System installed to provide power to a grid-connected customer or directly to the electricity grid (specifically where that part of the electricity grid is configured to supply power to a number of customers rather than to provide a bulk transport function). Such systems may be on or integrated into the customer's premises often on the demand side of the electricity meter, on public and commercial buildings, or simply in the built environment on motorway sound barriers etc. They may be specifically designed for support of the utility distribution grid. Size is not a determining feature – while a 1 MW PV system on a rooftop may be large by PV standards, this is not the case for other forms of distributed generation.

Grid-connected centralized PV power system: Power production system performing the function of a centralized power station. The power supplied by such a system is not associated with a particular electricity customer, and the system is not located to specifically perform functions on the electricity grid other than the supply of bulk power. Typically ground mounted and functioning independently of any nearby development.

Turnkey price: Price of an installed PV system excluding VAT/TVA/sales taxes, operation and maintenance costs but including installation costs. For an off-grid PV system, the prices associated with storage battery maintenance/replacement are excluded. If additional costs are incurred for

reasons not directly related to the PV system, these should be excluded. (E.g. If extra costs are incurred fitting PV modules to a factory roof because special precautions are required to avoid disrupting production, these extra costs should not be included. Equally the additional transport costs of installing a telecommunication system in a remote area are excluded).

Field Test Programme: A programme to test the performance of PV systems/components in real conditions.

Demonstration Programme: A programme to demonstrate the operation of PV systems and their application to potential users/owners.

Market deployment initiative: Initiatives to encourage the market deployment of PV through the use of market instruments such as green pricing, rate based incentives etc. These may be implemented by government, the finance industry, electricity utility businesses etc.

Final annual yield: Total PV energy delivered to the load during the year per kW of power installed.

Performance ratio: Ratio of the final annual (monthly, daily) yield to the reference annual (monthly, daily) yield, where the reference annual (monthly, daily) yield is the theoretical annual (monthly, daily) available energy per kW of installed PV power.

Currency: The currency unit used throughout this report is €

PV support measures:

Feed-in tariff	an explicit monetary reward is provided for producing PV electricity; paid (usually by the electricity utility business) at a rate per kWh that may be higher or lower than the retail electricity rates being paid by the customer
Capital subsidies	direct financial subsidies aimed at tackling the up-front cost barrier, either for specific equipment or total installed PV system cost
Green electricity schemes	allows customers to purchase green electricity based on renewable energy from the electricity utility business, usually at a premium price
PV-specific green electricity schemes	allows customers to purchase green electricity based on PV electricity from the electricity utility business, usually at a premium price
Renewable portfolio standards (RPS)	a mandated requirement that the electricity utility business (often the electricity retailer) source a portion of their electricity supplies from renewable energies
PV requirement in RPS	a mandated requirement that a portion of the RPS be met by PV electricity supplies (often called a set-aside)
Investment funds for PV	share offerings in private PV investment funds plus other schemes that focus on wealth creation and business success using PV as a vehicle to achieve these ends
Income tax credits	allows some or all expenses associated with PV installation to be deducted from taxable income streams

Compensation schemes (self-consumption, net-metering, net-billing…)	These schemes allow consumers to reduce their electricity bill thanks to PV production valuation. The schemes must be detailed in order to better understand if we are facing self-consumption schemes (electricity consumed in real-time is not accounted and not invoiced) or net-billing schemes (the electricity taken from the grid and the electricity fed into the grid are tracked separately, and the electricity account is reconciled over a billing cycle). The compensation for both the electricity self-consumed and injected into the grid should be detailed. Net-metering schemes are specific since they allows PV customers to incur a zero charge when their electricity consumption is exactly balanced by their PV generation, while being charged the applicable retail tariff when their consumption exceeds generation and receiving some remuneration for excess electricity exported to the grid
Commercial bank activities	includes activities such as preferential home mortgage terms for houses including PV systems and preferential green loans for the installation of PV systems
Activities of electricity utility businesses	includes 'green power' schemes allowing customers to purchase green electricity, operation of large-scale (utility-scale) PV plants, various PV ownership and financing options with select customers and PV electricity power purchase models
Sustainable building requirements	includes requirements on new building developments (residential and commercial) and also in some cases on properties for sale, where the PV may be included as one option for reducing the building's energy foot print or may be specifically mandated as an inclusion in the building development