PV in the Netherlands 2006

IEA PVPS National Survey Report
of
PV Power Applications in The Netherlands
2006


IEA-PVPS

International Energy Agency

CO-OPERATIVE PROGRAMME ON PHOTOVOLTAIC POWER SYSTEMS

Task 1
Exchange and dissemination of information on PV power systems

National Survey Report of PV Power Applications in The Netherlands 2006

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IEA-PVPS

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i 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 nineteen participating countries are Australia (AUS), Austria (AUT), Canada (CAN), Denmark (DNK), France (FRA), Germany (DEU), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Mexico (MEX), the Netherlands (NLD), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), the United Kingdom (GBR) and the United States of America (USA). The European Commission and the European Photovoltaic Industry Association are also members.

The overall programme is headed by an Executive Committee composed of one representative from each participating country, 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.

ii Introduction

The objective of Task 1 of the IEA Photovoltaic Power Systems Programme is to facilitate the exchange and dissemination of information on the technical, economic, environmental and social aspects of photovoltaic power systems. An important deliverable of Task 1 is the annual ***Trends in photovoltaic applications*** report. This report gives information on trends in PV power applications in the PVPS member and other countries and is largely based on the information provided in the National Survey Reports which are produced annually by each Task 1 participant. The public PVPS website also plays an important role in disseminating information arising from the programme, including national information. This template is intended to assist national experts and other participants of Task 1 in the preparation of their annual PVPS National Survey Reports.

As the ***Trends in photovoltaic applications*** report is based on the National Survey Reports it is important that experts follow this template when preparing their national reports. The ***Trends*** report is an external publication of the IEA-PVPS Implementing Agreement so it must not contain confidential information. Similarly, the National Survey Reports are now presented on the public PVPS website and Task 1 participants should make their own arrangements with their sources on how to treat confidential information (e.g. by ensuring anonymity of the data).

National Survey Reports should be produced before the end of May to enable the ***Trends*** report to be published by the end of August.

When preparing their national reports, experts must ensure that all the data are as accurate and correct as possible and follow the definitions given in this template. All sections must be completed as comprehensively as possible.

ii Definitions, Symbols and Abbreviations

For the purposes of the 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^{o}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.

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 systems 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, utilities 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.

Please specify the currency that is used throughout the NSR - countries of Euroland must use the euro (EUR). Please ensure that your NSR follows the recommendations of the internal PVPS report *Writing numerical values, quantities, units and symbols according to International Standards*. This will reduce confusion when preparing the ***Trends*** report, and will reduce the need for editing of material for consistency before loading on to the website.

1 Executive summary

Installed PV power

In 2006 the implementation of PV in the Netherlands decreased further with 8,5 % from 1,66 MW (2005) to 1,5 MW. This was mainly caused by the 20 % decrease in the market of distributed grid connected systems, which was partly compensated by 0,160 MW of new centralised grid connected systems.

With the 1,5 MW, installed in 2006, the total installed power in the Netherlands grew to 52,7 MW, which is still significant and within the world top 5 countries, when measured in W per capita.

Costs & prices

The end-user costs for PV modules returned to the 2004 level of € 3,5 – € 4,5, after a short increase to € 4,0 - € 5,0 in 2005. System prices also regained their decreasing line, but did not return to the 2004 level yet. In 2006 the prices were around € 5,0 per W for grid connected systems and around 6,5 for off-grid systems.

PV production

Manufacturing of PV components in 2006 in the Netherlands consisted mainly of cell production and some small module production. The two players in this field are Solland Solar (cells: 18 MW) and Ubbink Solar (modules: 2,6 MW). Furthermore, two Dutch companies, Mastervolt and Exendis, produce PV inverters, mainly for the export market.

Budgets for PV

The policy for PV in the Netherlands is focussed on cost reduction through research and development. This is well reflected in the budgets spend on PV in 2006: 94 % (€ 9 400 000) of the total national spending for PV went to research and development, while only 0,6 % and 5,4 % were spend on respectively tax and green certificate incentives for implementation. Besides the national funding, investment subsidies of € 1,- to € 3,- were provided by local and regional authorities. The total budget for is not available, but can be estimated to be between € 1 000 000,- and € 3 000 000,-.

Future Outlook

A PV Transition Path has been formulated. This again has lead to a clear role for PV in the new Working Programme “Clean and Efficient” of the Ministry of VROM (Housing, Spatial Planning and the Environment). The implementation target for PV within this programme is expected to be above 10 MW per year. These may not have a direct impact in 2007, but are expected to result in growth of the PV market in 2008 and after.

2 *The implementation of PV systems*

2.1 Applications for photovoltaics

Though small, the Dutch PV market is still dominated by grid connected systems. In 2006 these were mainly small domestic systems in the range between 0,5 and 2,5 kW. Apart from that e few larger systems (2,5 – 10 kW) were installed on utility and office buildings.

As the Dutch electricity grid covers almost the whole Dutch territory, off-grid domestic systems are rarely installed in the Netherlands. The market for off-grid non-domestic PV applications consists mainly of small, 1 – 2 panel - systems for caravans, campers and (sailing) boats and a few sluices, buoys and similar applications.

2.2 Total photovoltaic power installed

In Table 1 the total cumulative installed PV power is given for each of the sub-markets on 31 December of each year from 1992 onwards.

Table 1 The cumulative installed PV power in 4 sub-markets.

Sub-market/ application	31-12-1993 [kW]	31-12-1994 [kW]	31-12-1995 [kW]	31-12-1996 [kW]	31-12-1997 [kW]	31-12-1998 [kW]	31-12-1999 [kW]	31-12-2000 [kW]	31-12-2001 [kW]	31-12-2002 [kW]	31-12-2003 [kW]	31-12-2004 [kW]	31-12-2005 [kW]	31-12-2006 [kW]
Off-grid domestic + non-domestic*	1 594	1 849	2 133	2 554	3 002	n.n.	3 886	4 080	4 330	4 632	4 678	5 112	5 435	5 713
Grid-connected distributed	47	114	267	703	1 034	n.n.	5 309	8 499	13 699	19 214	38 759	41 250	42 590	43 673
Grid-connected centralized	0	0	0	0	0	0	0	180	2 480	2 480	2 480	3 159	3 159	3 319
TOTAL	**1 641**	**1 963**	**2 400**	**3 257**	**3 002**	**n.n.**	**9 195**	**12 759**	**20 509**	**26 326**	**45 917**	**49 521**	**51 184**	**52 705**

Notes:
* as the off-grid domestic application in the Netherlands is almost negligible, this category mainly refers to the off-grid non-domestic applications

PV installed in 2006

In 2006 the implementation of PV in the Netherlands decreased further with 8,5 % from 1,66 MW (2005) to 1,5 MW. This was mainly caused by the 20 % decrease in the market of distributed grid connected systems, which was partly compensated by 0,160 MW of new centralised grid connected systems. The remaining market of distributed grid connected systems (1,08 MW) was mainly generated by local and regional incentive schemes, which provided investment subsidised of up to € 3,00 per W. Though the market for off-grid systems also lost 14 % it appeared to revive at the end of 2006.

Cumulative installed power

With the 1,5 MW, installed in 2006, the total installed power in the Netherlands grew to 52,7 MW, which is still significant and within the world top 5 countries, when measured in W per capita.

New Initiatives and Promotional Activities

For photovoltaic solar energy the government mainly sees a role in the longer term, after 2010. Therefore the government does not specifically support the implementation of PV, but rather focuses on research and development aimed at PV cost reduction in the longer term. In 2006 however the Sustainable Electricity Production Platform appointed PV as one of the energy transition paths. This may result in a renewed interest in PV in 2007, and possibly in a limited implementation support scheme in order to enable the market players to prepare for the future large scale implementation of PV.

Some initiatives were organised by local authorities and utilities. Some examples: The municipality of Zeist supported PV installations with a subsidy of € 1,00 per W; The Municipality of Alkmaar supported PV installations with a subsidy of € 3,00 per W; The electricity company Delta supported PV with a subsidy of € 1,00 per W for inhabitants of the province of Zeeland.

Utility and public perceptions

PV is still considered one of the most attractive renewable energy options in the Netherlands. Especially building integrated PV is seen as a significant contributor to the future Dutch electricity production. As the price of an PV kWh however is still around € 0,50, the public is waiting for the PV prices to go down or an incentive to start, before purchasing a PV system.

The Utilities also see the future possibilities of PV. Two actually invested in PV in 2006: NUON took over the Heliantos thin film silicon cell pilot plant from AKZO and Delta invested in a new ECN spin of company called GS Development.

2.3 PV implementation highlights, major projects, demonstration and field test programmes

Fig. 1: applicants jostling for Sunstroke 2006 subscription forms at the Bessling front office desk

As mentioned earlier, only 1,5 MW was installed in the Netherlands in 2006. Most of the new systems were realised with the support of local or regional support schemes. A good example is the Action Sunstroke 2006 in municipality of Alkmaar, where a support of € 3,00 per W led to an implementation of 163 kW (> 10% of the 2006 Dutch market)

At national level the energy demonstration programme, EOS – Demo (Energy Research Subsidy – Demonstration), which was opened in 2005 was available for renewable energy demonstration projects. In 2006 however no PV projects were funded (though 1 was submitted). The BANS (public administration agreement new stile) agreement, which supports municipalities and provinces to stimulate energy reduction, resulted in several initiatives of local authorities to support amongst others the implementation of PV (see $ 2.2). Apart from these some

generic sustainability support measures included the application of PV. These include two feed-in regulations and one tax rebate regulation:

- The MEP scheme (Environmental quality of Electricity Production), which provided long term subsidy contracts for the production of solar electricity at € 0,097 / kWh (on top of the possible revenues from electricity sales). This scheme however closed on the 18th of August.
- Net metering, which obliged utilities through an amendment in the Dutch electricity law to purchase renewably produced electricity up to 3000 kWh per year from private producers at the consumer electricity price (around € 0,18 / kWh).
- The EIA (Energy Investment Rebate), allowing a tax deduction of 44% for investments in energy efficiency and renewable energy. This EIA scheme however is only applicable for enterprises

Due to some administrative issues, such as the approval of the system and the membership fee for the MEP, and the required change of electricity meters for the net-metering however these measures appeared not to be very attractive for the standard 0,1 – 1,0 kW systems.

2.4 Highlights of R&D

The RTD activities in the field of PV maintained a high level in both quality and diversity. Six new projects were initiated, of which two in the field of thin film Silicon, two in the field of crystalline Silicon, one addressing a new CIS concept and one on organic solar cells. The issues addressed include quantum cutting, light management, low temperature processes (for ultra thin plastic substrates) and the use of rear earth traces. An organic solar cell collaboration project of the university of Groningen, the university of Eindhoven and ECN, aims to double the efficiency of polymer solar cells towards 8%, through the development of multi-junction polymer solar cells.

Based on the ECN research on RGS processes a new company, RGS Development, was erected aiming at the opening of a pilot RGS wafer production line in 2007. The Heliantos project, which was taken over from AKZO by the energy company NUON, proceeded in the optimisation and completion of the thin film Silicon role-to-role production process and expects to be in full production in 2009.

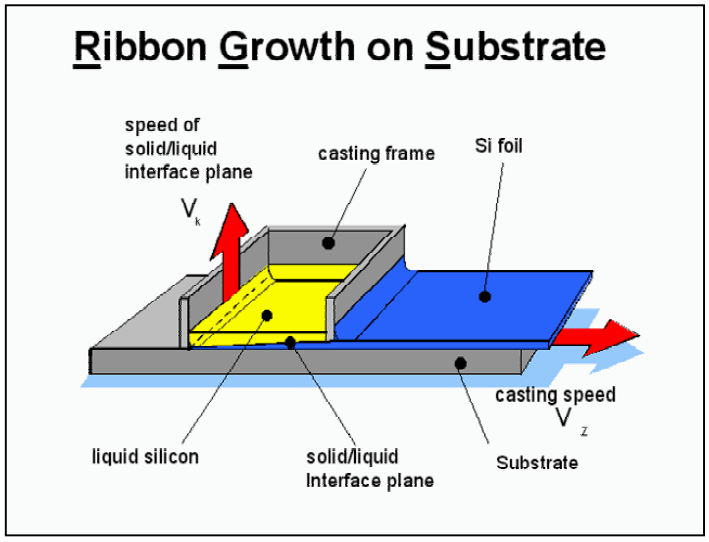

Fig. 2: RGS process, as applied by RGS Development

Scheuten Solar started the erection of a 10 MW pilot line for her new CIS concept. This concept, which is based on CIS cells on 0,2 mm glass spheres, homogeneously distributed over a thin metal grid, will consume far less energy than the conventional methods for CIS cell production, and will enable the production of very large homogenous cells.

Main players in the Dutch PV RTD activities are ECN, TNO, the Universities of Utrecht, Eindhoven, Groningen and Delft and the companies Scheuten Solar, NUON and Solland Solar and AST (Advanced Surface Technology)

At the international level, Dutch PV RTD centres and industries collaborate in several networks, such as the CrystalClear project, which is coordinated by ECN and started in 2003. This project, in which several outstanding EU research facilities and the most important European PV industries cooperate in pre-competitive research in the field of crystalline Silicon cell technology, aims to reduce PV module costs to below 1 EUR/W. The environmental activities within CrystalClear were merged with the new IEA PVPS Task 12 on Environmental, Health and Safely issues of PV.

Due to the limited size of the Dutch PV market, little R&D work was initiated in the field of BOS.

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

As mentioned earlier the Dutch policy with respect to PV focussed on R&D aiming at cost reduction for implementation on the long term. In line with this policy a considerable support of 9,4 M€ was given to PV R&D and technology transfer activities and little to no national support was available for market stimulation. As no significant growth of the Dutch PV market was expected in the near future, no proposals for PV demonstration or field test projects were submitted. The remaining PV market of 1,5 MW was mainly generated by local and regional support schemes, offering investment subsidies of € 1,00 - € 3,00 per W. A complete overview of the total subsidy given in 2006 is not available, but it is estimated at 1,0 to 3,0 M€. Apart from these, two general support schemes gave some small contributions to the implementation of PV. The IEA, a tax rebate scheme provided a tax reduction of totally € 60 000,- and the MEP, a green certificate scheme, supporting the production of electricity from renewable sources with € 0,097 per kWh, paid out approximately € 540 000,- for around 5 600 MWh, representing 15% of the total installed capacity.

Table 2 Public budgets for R&D, demonstration/field test programmes and market incentives.

	R & D [M€]	Demo/Field test [M€]	Market [M€]
National/federal	9,4	0,0	0,06 (IEA) 0,54 (MEP)
State/regional	0,0	0,0	1,0 – 3,0
Total	9,4	0,0	1,6 – 3,6

3 Industry and growth

3.1 Production of feedstock, ingots and wafers

Though the erection of a wafer production pilot plant was started in 2006, no actual production of feedstock, ingots or wafers was realised in the Netherlands in 2006

Table 3: Production and production capacity information for the year for silicon feedstock, ingot and wafer producers

Producers	Process & technology	Total Production	Maximum production capacity	Product destination	Price
none	Silicon feedstock	*0 tonnes*	*0 tonnes/year*	n.a.	n.a.
none	sc-Si ingots.	*0 tonnes*	*0 tonnes/year*	n.a.	n.a.
none	mc-Si ingots	*0 tonnes*	*0 tonnes/year*	n.a.	n.a.
none	sc-Si wafers	*0 MW*	*0 MW/year*	n.a.	n.a.
none	mc-Si wafers	*0 MW*	*0 MW/year*	n.a.	n.a.

3.2 Production of photovoltaic cells and modules

Though several initiatives are on the way, still only two Dutch companies are involved in the production of PV cells and modules: Solland Solar (cells) and Ubbink Solar (modules). Solland Solar produced to almost full capacity in 2006 and started the erection of a second 20 MW/yr production line. Ubbink Solar started one shift production in March 2006 and realised 25% of its full three shift capacity of 10 MW/yr. In 2007 Ubbink will grow towards full three shift production. Based on the early signals of an upcoming market incentive scheme in the Netherlands Ubbink Solar furthermore plans to expand the capacity with another 5 MW/yr. NUON Heliantos (formerly AKZO Heliantos), after a short pause during the takeover, continued the optimisation and completion of the role-to-role a-Si cell pilot production line and expects to be in full production in 2009.

Table 4: Production and production capacity information for the year for each manufacturer (*a-h, x, y are examples)*

Cell/Module manufacturer	**Technology** (sc-Si, mc-Si, a-Si, CdTe)	**Total Production (MW)**			**Maximum production capacity (MW/yr)**		
		Cell	Module	Concentrators	Cell	Module	Concentrators
Solland Solar	mc-Si	***18***	***0***	***0***	***20***	***0***	***0***
Ubbink Solar	mc-Si	***0***	***2,6***	***0***	***0***	***10***	***0***
TOTALS		**18**	**2,6**	**0**	**20**	**10**	**0**

Though production during 2006 was limited in the Netherlands, Dutch companies participated strongly in the international trade of PV components, generating a total turnover of around 160 million Euro, with an in and export both in the range of 20 – 25 MW

The end-user costs for PV modules returned to the 2004 level of € 3,5 – € 4,5, after a short increase to € 4,0 - € 5,0 in 2005. System prices also regained their decreasing line, but did not return to the 2004 level yet. In 2006 the prices were around € 5,0 per W for grid connected systems and around 6,5 for off-grid systems.

Table 4a: Typical module prices for a number of years

YEAR	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Module price(s): Typical *	9,5	7,0	7,5	6,0	5,0	4,8	4,7	4,7	4,6	6,0	4,5	5,0	4,5
Module price(s): Best price **	nn	nn	nn	nn	nn	nn	nn	nn	nn	nn	nn	3,8	3,3

notes:
* Typical: small flat- or pitched roof mounted systems (not integrated) of 0,1 to 1,0 kW.
** Best price: large roof mounted (not integrated) or ground based systems of > 10 kW

3.3 Manufacturers and suppliers of other components

Because of the wide coverage of the electricity grid in the Netherlands, the Dutch market is mainly a market of grid connected systems. Little activity will therefore be seen in the field of BOS components for stand-alone applications. As only few grid connected PV systems were installed in the Netherlands in 2006, little activity was developed in the field of BOS components for grid connected systems as well.

- PV inverters and other electronic and electro technical components:
  Mastervolt and Exendis continued their activities with strong positions in Germany, Spain, Italy and South Korea. Production and sales followed the worldwide market growth of around 30%, but continuous innovation was needed to maintain this position.
  In the field of storage batteries, battery charge controllers, DC switchgear no notable activities can be reported.
- Supporting systems:
  In the field of supporting systems very little happened in the Netherlands in 2006.

3.4 System prices

Prices in the Netherlands are relatively low. This may be a consequence of the collapse of the PV market in 2003, causing strong competition among the remaining suppliers. The 2006 end of year prices are given in table 5.

Table 5: Turnkey Prices of Typical Applications

Category/Size	Typical applications in your country and brief details	Current prices € / W
OFF-GRID Up to 1 kW	One 87 W panel, incl. camper roof connection material and charge controller (no battery)	6,7
OFF-GRID >1 kW	n.n.	nn
GRID-CONNECTED Specific case	Do-it-yourself 4 panel 0,52 kW system incl. on top roof mounting materials and 0,6 kW inverter	6,3
GRID-CONNECTED Up to 10 kW	flat roof, on-top PV system	5,5
GRID-CONNECTED >10 kW	flat roof, on-top PV system	4,8

Most of the systems installed in the Netherlands are small 0,1 to 1,0 kW add-on rooftop systems. The prices for these systems decreased slightly with respect to the 2005 peak prices, but did not return to the pre – 2005 prices yet.

Table 5a: National trends in system prices (current) for small (0,1 – 1,0 kW) grid connected flat roof, on – top PV systems

YEAR	1999	2000	2001	2002	2003	2004	2005	2006
Price /W:	4,75	4,75	4,75	4,6	4,5	4,5	5,7	5,5

3.5 Labour places

Though the PV market decreased in 2006, the Dutch activity in this field increased. The number of labour places grew with 65% from 141 in 2005 to 232 in 2006. The main growth was seen in production (Solland Solar and Ubbink Solar) and in other jobs, probably related to the strong growth in import and export. The employment figures per section for 2006 are:

a) Research and development (not including companies): 28
b) Manufacturing (including company R&D): 92
c) All other: 112
Total: 232

3.6 Business value

Table 6: Value of PV business

Sub-market	Capacity installed *in 2006* (kW)	Price per W *(from table 5)*	Value	Totals
Off-grid domestic and non-domestic	*278*	*6,7*	*1 862 600*	
Grid-connected distributed	*1 083*	*5,5*	*5 956 500*	
Grid-connected centralized	*160*	*4,8*	*768 000*	
				8 587 100
Export of PV products	*25 667 kW a € 3,0 / W + 15 400 kW a € 2,3 / W*			*112 421 000*
Change in stocks held	*- 1 955 kW a € 3,0 / W*			*- 5 865*
Import of PV products	*- 26 533 kW a € 2,8 / W*			*- 74 292 400*
Value of PV business				***46 709 835***

4 Framework for deployment (Non-technical factors)

Please complete the following table to summarize what PV support measures were in place in your country during 2006:

Table 7: PV support measures

	National / Regional (State) / Local
Enhanced feed-in tariffs	none
Direct capital subsidies	local and regional from € 1,- to € 3,- per W
Green electricity schemes	MEP: € 0,097 / kWh (up to 18-08-2006)
PV-specific green electricity schemes	none
Renewable portfolio standards (RPS)	none
PV requirement in RPS	none
Investment funds for PV	Green mortgages, green investment: 1% rent rate decrease
Tax credits	EIA (Energy Investment Rebate): rebate of 44% of investment from fiscal profit
Net metering	national for private grid connections up to 3000 kWh/yr
Net billing	none
Commercial bank activities	ABN-AMRO bank, in collaboration with Seinen Construction and the municipality of Groningen, developed a financing scheme, in which financing of energy efficiency and renewable energy applications in buildings could be included in the mortgage, and could be financed on top of the calculated allowable maximum of the mortgage.
Electricity utility activities	regional € 1,- per W
Sustainable building requirements	PV provides points for a required building energy performance coefficient

4.1 New initiatives

A new scheme, the EOS-ES (Energy Research Subsidy – Energy Collaboration Subsidy) was put in place as the energy specific version of the IS (Innovation Collaboration Subsidy) scheme. The EOS-ES appeared to be much more fruitful for energy-, and in particular PV-proposals: 2 projects were granted in 2006, with an average support of 1,2 M€ per project. Furthermore the Energy Transition Platform for Sustainable Electricity Provision, which is one of five transition platforms under the Energy Transition scheme, appointed PV as one of

so far 5 transition paths. This led to the formation of a PV transition working group, which formulated a strategy for deployment of PV in the Netherlands, including a recommendation for a market implementation support scheme.

4.2 Indirect policy issues

In 2006 two important developments, possibly influencing the future deployment of PV in the Netherlands should be mentioned

a) Energy Transition Programme

The Energy Transition Programme, which started in 2005, brings together stakeholders from industry, authorities, research en NGO's to jointly work on the transition towards a sustainable energy supply. Platform and working groups define so called Transition Paths for a selected number of technologies. PV was selected as one of these technologies and a PV Transition Path was formulated. Support of PV implementation through a feed-in-tariff scheme will most likely be one of steps in this PV Transition Path.

b) PV Policy Group

The Netherlands participated in the PV Policy Group EC project. One of the deliverables of the PV Policy Group was a set of National Position Papers and National Action Plans towards support for PV Implementation. These documents were composed by a National Core Group and used by the PV Working Group, of the Energy Transition Platform for Sustainable Electricity Supply for the formulation of the PV Transition Path.

4.3 Standards and codes

In the Netherlands three national standards/codes have to be considered:

- National Grid code:
  The technical regulations for PV-systems are incorporated in the National Grid Code. PV is not specifically mentioned, but considered as a standard feed-in grid application. Systems should be reported to the grid operator.
- Dutch Technical Agreement NTA 8493:
  Smaller systems (< 2,25 A) can be connected without notice, but should comply with the Dutch Technical Agreement NTA 8493, on Small Grid-connected Photovoltaic Systems.
- Bouwbesluit 2003 (Building Code 2003):
  In the "Bouwbesluit 2003, the Dutch building directive, on the other hand a minimum energy efficiency is prescribed. This requirement stimulates the implementation of PV, and will do so even more with the foreseen sharpening thereof.

Furthermore all relevant CENELEC and IEC codes apply. Except for the grid connection regulations, no other requirements, such as an approval of building inspection authorities, are necessary for PV. When complying with the regulations, PV electricity producers are entitled to grid connection by law.

5 Highlights and prospects

Though the 2006 PV market in the Netherlands was still low, several signals of future change can be recognised:

- Solland Solar and Ubbink Solar are expanding their production capacity
- Two new initiatives for PC cell and wafer production have been announced
- A PV Transition Path has been formulated. This again has lead to a clear role for PV in the new Working Programme “Clean and Efficient” of the Ministry of VROM (Housing, Spatial Planning and the Environment). The implementation target for PV within this programme is expected to be above 10 MW per year.

These may not have a direct impact in 2007, but are expected to result in growth of the PV market in 2008 and after.

Annex A Method and accuracy of data

Most data for the NSR were acquired by the Central Bureau for Statistics. Stakeholders are obliged to reply, and give adequate figures. Still a minority does not answer or provides incomplete data. The accuracy of the data is estimated at +/- 5%.

Data concerning prices (tables 4b, 5, 5a) were collected through interviews. Here the error is estimated at +/- 10%. This of course directly influences the contents of table 6: “Value of business”, where the total error is estimated at +/- 15%

Annex B Country information

Background information about the national environment in which PV is being deployed. Data are not guaranteed to be 100 % accurate nor intended for analysis. The reader should do their own research if they require more detailed data.

1) retail electricity prices:
   household: € 0,17 - € 0,19, depending on the utility
   small business: € 0,13 - € 0,17, depending on the utility
   large business: by contract
   The difference between the different tariff groups is mainly caused by the difference in energy tax:
   x < 10 000 kWh/yr: € 0,0852
   10 000 kWh/yr < x < 50 000 kWh/yr: € 0,0439
   x > 50 000 kWh/yr € 0,0121

2) typical household electricity consumption:
   3600 kWh/yr

3) typical metering arrangements and tariff structures for electricity customers:
   choice between single or double metering. Double metering refers to different tariffs for day and night periods.

4) typical household income
   average 2004: € 28 500 ,-

5) typical mortgage interest rate
   between 4,3 % and 6,0 %, depending on the bank and the fixed rate period

6) voltage:
   household: 50 Hz, 240 V
   MV distribution network: 50 Hz, 10 kV (also: 20, 25 and 50 kV)
   HV distribution network: 50 Hz, 110, 150, 220 and 380 kV

7) electricity industry structure and ownership:
   used to be vertically integrated in regional utilities. unbundling is taking place. HV grid now owned by Tennet, which is a 100 % government owned company. Production plants and MV and LV distribution grids still owned by utilities.

8) price of diesel fuel:
   € 0,85 – € 1,11 depending on company and region

9) typical values of kWh / kW for PV systems in parts of your country:
   750 kWh/kW