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 Austria 2008

Final Version 02

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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.
- 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.
- Currency: The currency unit used throughout this report is EUR

- PV support measures:

Enhanced feed-in tariff	an explicit monetary reward is provided for producing PV electricity; paid (usually by the electricity utility) at a rate per kWh somewhat higher 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, usually at a premium price
PV-specific green electricity schemes	allows customers to purchase green electricity based on PV electricity from the electricity utility, usually at a premium price
Renewable portfolio standards (RPS)	a mandated requirement that the electricity utility (often the electricity retailer) source a portion of their electricity supplies from renewable energies (usually characterized by a broad, least-cost approach favouring hydro, wind and biomass)
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
Net metering	in effect the system owner receives retail value for any excess electricity fed into the grid, as recorded by a bi-directional electricity meter and netted over the billing period
Net billing	the electricity taken from the grid and the electricity fed into the grid are tracked separately, and the electricity fed into the grid is valued at a given price
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
Electricity utility activities	includes 'green power' schemes allowing customers to purchase green electricity, large-scale utility 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

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 21 participating countries are Australia (AUS), Austria (AUT), Canada (CAN), Denmark (DNK), France (FRA), Germany (DEU), Israel (ISR), Italy (ITA), Japan (JPN), Korea (KOR), Malaysia, Mexico (MEX), the Netherlands (NLD), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey, 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

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. In parallel, National Survey Reports are produced annually by each Task 1 participant. This document is the Austrian National Survey Report for the year 2008. 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 EXECUTIVE SUMMARY

1.1 Installed PV power

After a 2 years slump, the domestic PV market in 2008 more than doubled compared to 2007. In 2008, off-grid and grid connected PV systems with a total PV power of 4,7 MW have been installed, which represents a 121% growth of the domestic market compared to the year before. Despite this positive development, the domestic PV market is still far from its historical maximum of 6,5 MW achieved in the year 2003.

The overall installed PV capacity in Austria reached 32,4 MW at the end of 2008. On grid applications more and more dominate the market for PV, with grid-connected systems (GCS) accounting for more than 89% of the total installed capacity at the end of 2008.

As during the previous years, the off-grid sector plays a minor role in the Austrian PV market. In 2008 only 0,13 MW were installed in this sector. In total estimated 3,4 MW off-grid systems for domestic and non-domestic applications were installed at the end of 2008.

On a 10 years basis, an average market growth of 22% per year for all PV installations and 26% for grid-connected installations can be reported.

1.2 Costs & prices

With the dominating German PV market in its direct neighbourhood, PV prices in Austria are closely linked to the prices which are achieved on the German market.

Compared to the previous years, module prices dropped considerably in 2008, following the international trend. The average wholesale price in 2008 was 3,22 EUR/W, the average sales-price of Austrian PV module producers was 3,11 EUR/W.

In 2008, turnkey prices for installed PV systems fell slightly compared to the previous years. However, with only 5%, the reduction was still low, following the continued high demand of the European PV market and the stringent supply of PV modules on the world market. Turnkey prices for typical on-grid systems varied between 5 EUR/W and 5,8 EUR/W, depending on the used PV-technology, size and type of the installation.

1.3 PV production

Despite the small home market, Austrian PV industry could again expand their business in 2008. The most important products manufactured in Austria include PV inverters, PV modules and tracking systems as well as back-sheet laminates for module encapsulation or PV Ribbon Wires.

Domestic PV module manufacturers again reported a significant growth of their output. The overall PV module production in Austria in 2008 amounted to 65,4 MW (2007: 47,4 MW), which represents an increase of 38% compared to the previous year.

Austria's PV inverter industry also reported an 80% increase of the production of inverters for grid-connected applications. In 2008, PV inverters with a capacity of approximately 448 MW a.c. nominal power (2007: 250 MW) were produced. More than 99% of the production was exported.

The world wide leading manufacturer of back sheet laminates used for encapsulation of solar cells likewise reported ongoing growth of its PV business.

The world market leader of large scale two-axis tracking systems also reported an increase of the production, which rose to 31 MW in 2008 (2007: 29 MW).

In 2008 the first companies started industrial scale production of solar cells, which marks the next step in the development of Austrian PV industry.

1.4 Budgets for PV

The nationwide feed-in tariff system for electricity from RES introduced in the national Green Electricity Act is financed by all consumers of electricity via supplements on the electricity price and an obligatory purchase price for Green Electricity which has to be paid by electricity dealers. The feed-in tariffs paid for PV in 2007 amounted to approximately 10,4 MEUR (2007: 9,5 MEUR).

Besides the feed-in support, also further short-term incentives in form of rebates for new PV installations are provided on the national (National Fund for Climate and Energy) as well as provincial level. The total funds spent for this purpose in 2008 were 14,6 MEUR.

There is no national R&D programme dedicated to PV, however, two national programmes "New Energy 2020" by the national Fund for Climate and Energy as well as "Buildings of Tomorrow Plus" by the Ministry of Transport, Innovation and Technology were launched in 2008 and include PV with a focus on PV building integration as a side issue. In the absence of a dedicated programme, R&D is mainly funded on a project base.

Public funding for PV related RTD can be estimated to 1,6 MEUR in 2007 (2008 data not available yet).

2 THE IMPLEMENTATION OF PV SYSTEMS

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.

For the purposes of this report, PV installations are included in the 2008 statistics if the PV modules were installed between 1 January and 31 December 2008, although commissioning, in particular of the grid connected installations, may have taken place at a later date.

2.1 Applications for photovoltaics

As in most of the other IEA countries, Off-grid installations were the first economic alternative for PV systems. Small autonomous systems provide electricity to technical systems or for domestic use in Alpine areas or mountain huts far away from the grid. But not exclusively in remote areas, also on urban sites PV is an option to supply infrastructure like traffic surveillance systems, communication systems, parking meters and a variety of other applications.

With the introduction of favourable support schemes On-grid Distributed Systems have meanwhile become a common place in public's interest. In Austria this sector now stands for more than 89% of the installed capacity.

With the support schemes limited to small, residential scale systems, Grid-Connected Centralized Systems in form of PV Power plants play a minor role, so far approximately 1,8 MW are installed.

2.2 Total photovoltaic power installed

Approximately 32,4 MW of PV power has been installed in Austria by the end of 2008 (2007: 27,7 MW), with approx. 4,7 MW installed during 2008.

After the slump during the years 2006 and 2007 this figure marks a turnaround in the development of the domestic PV market. From 2007 to 2008, the annual market more than doubled for both, grid-connected as well as off-grid applications (Figure 1).

However, the historical maximum of 6,5 MW of annually installed capacity has still not been reached in 2008. Compared to this maximum, the market has since then declined by approx. 6% per year.

On a 10 years basis, an average market growth of 22% per year for all PV installations and 26% for grid-connected installations can be reported.

On grid applications more and more dominate the market for PV, with grid-connected systems (GCS) accounting for more than 89% of the total installed capacity at the end of 2008.

Table 1 shows the PV power installed in 4 sub-markets during 2008.

Table 1: Total PV power installed during 2008 in 4 sub-markets.

Sub-market/ application	off-grid domestic	off-grid non-domestic	grid-connected distributed	grid-connected centralized	Total
PV power installed in 2008 (kW)	133 kW		4 553 kW	0 kW	4 686 kW

To highlight the development of the national PV market over the last 10 years, Figure 1 shows the annually installed capacity from 1998 until 2008.

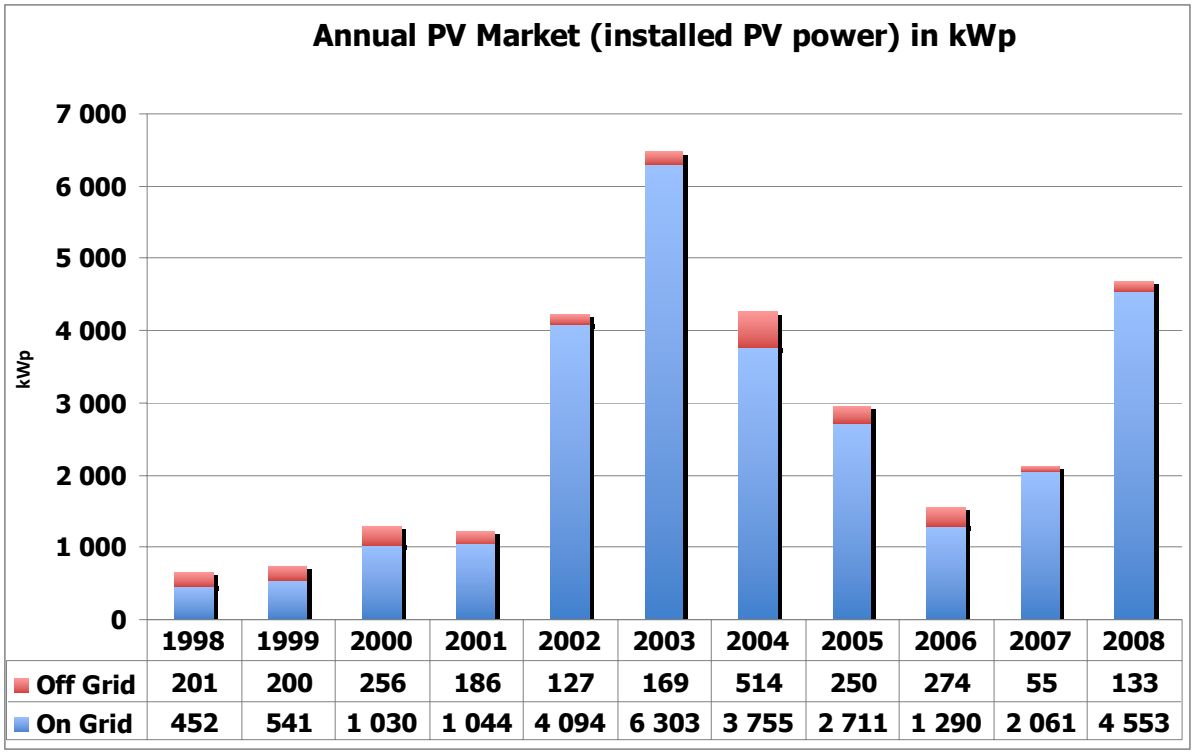

Figure 1 Annual installed PV power in Austria from 1998 until 2008. Data source until 2006: Faninger (2007); 2007: arsenal research; Graph: arsenal research

In addition, table 2 and Figure 2 indicate the total **cumulative** installed PV power for each sub-market on the 31 December of each year from 1998 onwards until 31 December 2008.

Table 2: The cumulative installed PV power in 4 sub-markets.

	Cumulative installed capacity as at 31 December										
Sub-market	Up to 1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Stand-alone	1 213	1 413	1 671	1 857	1 984	2 173	2 645	2 895	3 169	3 224	3 357
Grid-connected distributed	1 648	2 119	3 063	4 440	7 857	13 507	17 262	19 973	21 263	23 721	27 274
Grid-connected centralised	70	140	140	241	476	1 153	1 153	1 153	1 153	1 756	1 756
TOTAL (kW)	2 861	3 672	4 874	6 120	10 341	16 833	21 060	24 021	25 585	27 701	32 387

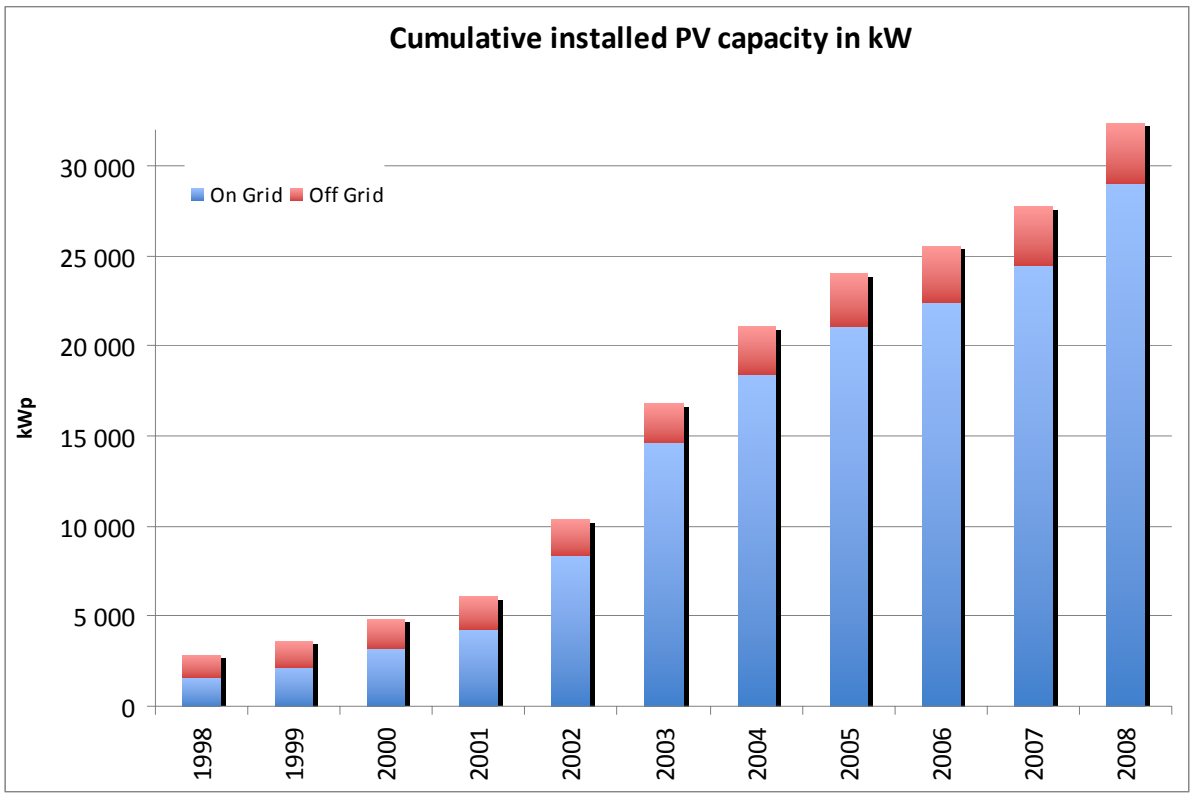

Figure 2 Cumulative installed PV power in Austria from 1992 until 2007. Data source until 2006: Faninger (2007); From 2007: arsenal research; Graph: arsenal research

Details on the support schemes and market incentives for PV can be found in section 4.1.

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

PV implementation

Until today PV implementation programmes in Austria have been mainly characterized by discontinuity.

In 2008, the federal feed-in tariff scheme, governed by the Green Electricity Act (GEA) from 2006 provided the basic – but very limited – framework for PV implementation (see section 4 for details).

Besides the federal feed-in tariff scheme, a new short-term initiative was launched by the newly founded national *Fund for Climate and Energy*. The initiative, which provides rebates to newly installed private PV systems up to 5 kW has been launched in August 2008 with a first tender and a total budget of about 10 MEUR.

To further complicate the situation, a number of provinces (4 out of 9) are still running regional rebate-programmes, and aim at overcoming the limitations of federal incentives. In most cases the support is subject to limited budgets and is linked to further requirements. Generally, the regional support is only granted in case the installation is not supported by the federal feed-in tariff scheme.

Demonstration and field test programmes

In 2008, no PV field test or demonstration programmes have been running.

Regarding new PV projects a major trend observed in the last years – optimal architectonical integration of BIPV in newly constructed as well as refurbished buildings – also continued during 2008. Several installations with innovative design aesthetically integrated into buildings document this.

Major PV projects

ENERGYbase - Office complex of the future

Figure 3 ENERGYbase office building (photo courtesy WWFF Vienna)

ENERGYbase is the showcase project of a new generation of office properties, which has been realised in 2008 in the city of Vienna.

The building concept is based on three cornerstones:

- Energy efficiency
- Application of renewable energy sources
- Highest level of comfort for occupants

One of the innovative features of ENERGYbase is the exclusive use of renewable energies. The passive house standard makes it possible to keep energy requirements at a particularly low level.

ENERGYbase meets its total energy requirements for heating and cooling purposes from renewable energies – primarily heat extracted from the ground. The generated geothermal energy completely covers all heating and cooling needs.

ENERGYbase uses the power of the sun in a two-fold manner: An approximately 400m² photovoltaic facility (about 50 kW) located on the south facade supplies roughly 42 000 kWh of solar electricity. 300 m² of solar thermal collectors supply the solar cooling system with energy in the summertime, whereas the thermal energy is used to support the heating system during the winter season. The passive use of solar energy is made possible by the special shape of the south façade, which only allows direct solar radiation into the building during the winter.

For the first time, plants are being integrated into an office complex as a so-called green buffer zone. During the winter months, they ensure a particularly pleasant room climate through the ecological, controlled humidification of the air being supplied. Humidifying the air in winter and during transition periods between seasons, these plants represent a truly innovative approach. They function as closed moisture generating systems which, for the first time, can be integrated as adjustable, precisely controlled and calculable units into building engineering systems.

The layout of ENERGYbase and the south facade concept makes it possible to supply the entire building with daylight, which helps minimize the need for artificial light. In comparison, conventional offices require 40% artificial lighting. In addition to these measures, special light directing blinds also channel daylight into the depths of the rooms, which in turn ensures more intense room brightness.

2.4 Highlights of R&D

Currently Austrian PV research activities are mostly focused on a project basis: The involved research organisations and companies are participating in various national and European projects as well as in different tasks of the IEA PVPS Programme as well as concerning grid interconnection in the IEA ENARD Implementing Agreement. The RTD development and approach is widespread located and decentralised orientated.

In 2008, two national research programmes "New Energy 2020" by the Austrian Climate and Energy fund as well as "Buildings of Tomorrow Plus" again by the Ministry of Transport, Innovation and Technology were launched. Both programmes cover research on energy technologies including PV with a focus on PV building integration. Although PV research is addressed only in a small subpart of the programme, research in PV systems as well as in distributed generation with many aspects relevant to PV is supported within this well designed activity.

On the European level, the Austrian ministry of transport, innovation and technology actively supports ongoing initiatives to increase the coherence of European PV RTD programming (PV-ERA-NET).

A new trend to be noted in 2008 is the involvement of Austrian electricity companies, which are investing more and more in renewable power generation. For this purpose, subsidiaries were founded to establish businesses through investments in new and existing renewable electricity resources. However, due to the insufficient national support for Renewables, the main investments are made outside Austria in other European countries. With respect to PV, most relevant activities were headed by "ARP – Austrian Renewable Power", a subsidiary of Austria's largest electricity company, Verbund. In 2008, ARP has installed two PV systems with a total capacity of 3 MW in Spain mainly equipped with Austrian technology.

In addition to these general description, the following paragraphs highlight some of the specific PV RTD activities and trends in Austria:

New and improved cell technologies:

- At the University of Salzburg, initiatives are focused on solar cells based on sulfosalt crystals. In 2008 the Christian Doppler Laboratory "Applications of Sulfosalts in Energy Conversion", headed by Herbert Dittrich, succeeded in the development of a deposition process for the worldwide first all-sputtered sulfosalt thin film solar cell. Efficiencies are still low but the increase will be a task of the near future. New sulfosalt phases with specific crystal structures have been discovered and the study of their physical properties is subject of the ongoing work.
- At the Atom institute of the Austrian Universities in Vienna academic research focuses on the improvement of photovoltaic solar cells made from multi-crystalline silicon.
  Ongoing research in 2008 focused on the development of a new electrode for the front side of crystalline cells. The aim is to replace the conventional screen-printing of silver contacts by other chemical or electrical plating techniques and thus save the silver, which is not sufficiently available for Terawatt scale cell production. First tests show promising results with even lower losses as conventional silver contacts.
  Research on new, stringing techniques without soldering for new silicon solar cells resulted in a new cell concept, where the usual ribbons are replaced by numerous thin wires. First tests indicate that this will increase the output power of the PV modules produced with this technology.
  Furthermore, new etching techniques for crystalline silicon solar cells were transferred to the industrial scale (Company Falconcell, see section 3.2).
- Academic R&D at the Linz Institute for Organic Solar Cells (LIOS, headed by Professor Niyazi Serdar Sariciftci) focuses on Plastic Solar Cells based on thin films of Conjugated Polymers. The year of 2008 was dominated by the international symposium "Towards Organic Photovoltaics" which took place in February 6-8, 2008 and attracted over 300 experts. In March 2008, a new project has been started together with Swiss and Germany partners. The "Solar Fuel" project addresses important problems of the renewable electrical energy production: the storage of energy and the transport of energy. The idea is to recycle captured CO2 to an artificial fuel by using renewable energy such as photovoltaics
- Konarka Austria GmbH successfully continued the research efforts on highly efficient organic solar cells.

BOS components, system aspects quality assurance and training:

- Industrial research and development activities carried out by the large manufacturers are focused on optimization of PV inverters, tracking systems and encapsulation materials.

Cost reduction and optimization of new solutions for building integrated PV are addressed within several EU projects.

- A large Austrian glass industry has intensified its activities in PV, mainly in addressing architectural building design.
- The Austrian research and testing centre arsenal research offers accredited qualification and type approval tests of crystalline as well as thin-film PV modules according to EN/IEC 61215, EN/IEC61464 and the new EN/IEC 61730 standard. In 2008 R&D activities in this field are focused on lifetime assessment and reliability issues of PV modules. Furthermore arsenal research has further expanded its Certified PV Training programme with trainings for installers and planners in order to improve the quality of the installed systems. In addition, arsenal research is conducting extensive research on PV inverter specification (MPP, fault-ride-through, performance assessment…) attracting world wide inverter manufacturers for collaboration.
- Smart electricity networks are the main focus of several national and European R&D projects, with a national technology platform launched in May 2008. Even though PV interconnection is not yet the main technology driver, it is part of the game. Activities in this field are coordinated by arsenal research and jointly carried out by academic and applied research institutions, industry and utilities.
- Socio-economic research concerning the integration of PV is internationally well positioned at the Technical University of Vienna.
- The national PV Technology Platform was established in September 2008 bringing together the 10 leading industries in PV manufacturing.
- The Energybase, home of the new Bacc. and MSc. Programmes "Renewable Urban Energy Technologies" (University of Applied Science Technikum Vienna) with the largest passive solar office building, was opened in summer 2008, featuring a 45 kW highly innovative PV Facade
- A Master of Building Science at the Danube University in Krems is dedicated to Solar-Architecture where the lectures and the scientific work are focusing more and more on PV Building integration.

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

The major institution dealing with research and development policy is the Federal Ministry of Transport, Innovation and Technology (BMVIT). This ministry is the major organizer and facilitator for public R&D activities in Austria. The majority of public R&D programmes operate under the BMVIT and there are several programmes which focus on energy-related fields. There is no programme specifically dedicated to PV R&D, instead PV R&D is mainly funded within the framework of the energy R&D programmes such as the "Energy of Tomorrow".

Until May 2009, no data on the public spending for Energy R&D in 2008 were available, therefore the following numbers refer to data for the year 2007.

In 2007 renewable energy received about 46,5% of the Austrian Energy R&D budget of 31,9 MEUR (+7% in terms of budget compared to 2006). The majority of the RES funds (79,3%) was spent on bioenergy related R&D. The second-highest priority is laid on solar energy, which comprises solar thermal, cooling and PV. Total funding for all solar energy

R&D was equal to about 16,9% of the renewable energy R&D budget. PV research accounts for 63,5% of the solar energy R&D budget.

In 2007 the overall public spending for PV research and development was about 1,59 MEUR (2006: 0,54 MEUR). This represents a more than 3-fold increase of public funding compared with the year 2006 and is roughly the same figure as 2005.

Not included in these figures is the return from European Community (EC) R&D projects. As a member of the European Union, Austria contributes to the EC R&D framework programmes (FP), hence the return can be ultimately regarded as a part of public spending. However, no reliable data was available on these funds in 2007.

There are no specific figures available for the share of Demonstration or Field Test activities but as there was no demonstration or field test programme running in 2008, it can be assumed that the share of these activities is negligible.

The total governmental budget allocated for PV R&D, Demonstration and market incentives is shown in Table 3.

Table 3: Public budgets for R&D, demonstration/field test programmes and market incentives.

	R & D (MEUR)	Demo/Field test (MEUR)	Market incentives (MEUR)
National/federal	1,56 [1]	-	10,87 [2]
State/regional	0,03 [1]	-	3,68 [3]
Total	1,59 [1]	-	14,55 [4]

[1] 2007 figures;
[2] PV rebate programme of Fund for Climate and Energy; not including feed-in-tariffs.
[3] PV rebate programmes in Lower Austria, Vienna, Burgenland and Vorarlberg; not including co-funding of feed-in-tariff.
[4] Not including feed-in tariffs.

From 2003 the support for electricity from RES has been governed by the Green Electricity Act. The feed-in tariff system is funded by supplements on the electricity price and an obligatory purchase price for Green Electricity which has to be paid by electricity dealers. Because of the fact that this system is not financed by a public body, but instead by all consumers of electricity the according figures have not been included in Table 3 under "Market".

The total amount of feed-in tariffs paid for PV in 2007 was approximately 10,4 MEUR (2007: 9,5 MEUR), which represents a 9% increase compared to the previous year. The average feed-in tariff paid for PV was 60,1 Eurocent/kWh (2006: 62,4 Eurocent/kWh) which represents a 3,7% reduction compared to the previous year. From these funds, 0,8 MEUR were provided by the federal provinces. This figure includes the 50%-share of co-funding according to the GEA (see section 4) as well as the aliquot share of the costs for balancing power.

Besides the feed-in support, also the federal Fund for Climate and Energy (founded in 2007) provided a limited incentive in form of a non-refundable rebate for new installations up to 5 kW. The total funds spent for this purpose in 2008 were 10,9 MEUR.

In addition to the federal incentive governed by the Green Electricity Act, some provinces (Lower Austria, Vienna, Burgenland and Vorarlberg) continued running their regional support in form of rebates on the costs of the PV system (investment subsidies) in 2008. The figure stated in Table 3 under "regional" represents the total budget spent for this purpose 2008 in these 4 provinces.

3 INDUSTRY AND GROWTH

3.1 Production of feedstocks, ingots and wafers

No production facilities for silicon feedstock or wafers existed in Austria in 2008.

Table 4: Production and production capacity information for the year for silicon feedstock, ingot and wafer producers

Manufacturers	Process & technology	Total Production	Maximum production capacity	Product destination	Price
	Silicon feedstock	tonnes	tonnes/year		
	sc-Si ingots.	tonnes	tonnes/year		
	mc-Si ingots	tonnes	tonnes/year		
	sc-Si wafers	MW	MW/year		
	mc-Si wafers	MW	MW/year		

3.2 Production of photovoltaic cells and modules

Despite the small home market, Austrian PV industry could again expand their production in 2008. In total, Austrian module manufacturers could again considerably increase their output compared to the previous year. The total module production in 2008 amounted to 65,4 MW. Compared to 47,4 MW in 2007 this figure represents a growth of more than 38% (see Figure 4).

Currently six Austrian companies are involved into the production of PV-modules namely:

- **Solon-Hilber Technologie**, since 2005 a 100% subsidiary of German *Solon AG*, is manufacturing framed laminates exclusively for the use on the "SOLON Mover" tracking systems. The cells (crystalline silicon) are delivered by the German SOLON AG.
- **PVT AUSTRIA**, which started the production in 2002, manufactures standard and tailor-made PV-Modules. The single and multi-crystalline silicon cells are purchased from various manufacturers, mainly Germany, Spain, the U.S. and Taiwan.
- **Energetica Energietechnik GmbH**, located in Klagenfurt, Carinthia, is producing standard framed laminates and glass-glass laminates based on single and multi crystalline silicon cells. The cells are imported from various sources.
- **KIOTO Photovoltaics GmbH**, formerly RKG-Photovoltaik GmbH, is affiliated to Europe's largest manufacturer of Solar Thermal Collectors, GREENoneTEC Solar Industries Ltd. The company is manufacturing standard modules based on imported cells.
- **Ertex-Solar**, affiliated to Ertl Glas AG, a large manufacturer of safety glass products, is producing tailor made modules for BIPV, especially façade integration. The cells are imported from Germany.
- **SED**, focuses on the production of PV-roof tiles and small size modules for special applications.

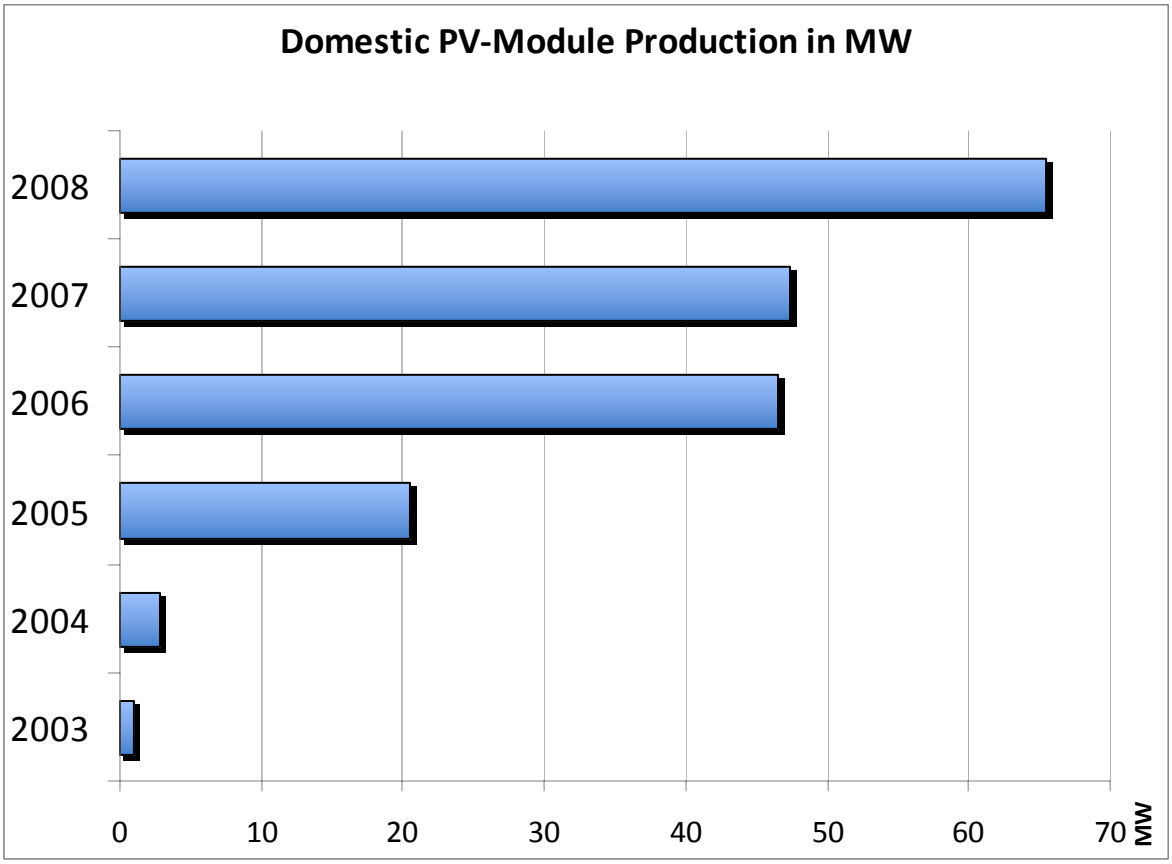

Figure 4 Development of domestic PV module production in Austria since 2003; Data source and graph: arsenal research

Most of the modules produced include cells imported from various countries, such as Germany, Spain, The U.S., Taiwan, China and others.

Virtually the whole production is exported, either directly or indirectly via distributors. According to the Austrian PV industry, the main export markets in 2008 (according to nominations) are Germany, Italy, Spain and Switzerland.

In 2008 the first companies started industrial scale production of solar cells, which marks the next step in the development of Austrian PV industry.

- **Blue Chip Energy GmbH**, founded in spring 2006 and since 2007 in a strategic partnership with German SOLON AG, the Dutch company Econcern and I-SolVentures, the venture capital company of SOLON co-founder Alexander Voigt has built up a production for high-efficiency single crystalline silicon solar cells (Blue Chips) in the municipality of Güssing.
  The first production line with a capacity of 100 MW/a has been installed during the second half of 2008. According to the plans, full production is scheduled to be reached in 2010.
- The company **FalconCell** has finalised building up the cell production line with a capacity of 15-20 MW per year and started series production in April 2008. The products include standard multi-crystalline cells as well as design cells with diagonal busbars. Individually designed cells are manufactured in collaboration with the company **Powerquant.** Falconell is linked to the first Austrian PV-Module manufacturer PVT-Austria, which encapsulates the cells in its PV modules.

Total PV cell and module manufacture in Austria for 2008 together with production capacity information is summarised in Table 5 below.

Table 5: Production and production capacity information for 2008 for each manufacturer

Cell/Module manufacturer	**Technology** (sc-Si, mc-Si, a-Si, CdTe)	**Total Production 2008 (2007 figures) (MW)**		**Maximum production capacity 2008 (2007 figures) (MW/yr)**	
		Cell	Module	Cell	Module
Wafer-based PV manufactures					
BlueChip Energy	sc-Si	N/A	-	N/A	-
FalconCell	mc-Si	N/A	-	N/A	-
SOLON Hilber Technologie	mc-Si / sc-Si	-	31,2 (25)	-	N/A (29)
PVT Austria	mc-Si / sc-Si	-	15,0 (10)	-	N/A (N/A)
Energetica	mc-Si	-	10,75 (7,0)	-	N/A (N/A)
KIOTO Photovoltaics (former RKG)	mc-Si	-	8,0 (5,0)	-	N/A (N/A)
ERTEX Solar	mc-Si / sc-Si	-	0,40 (0,37)	-	N/A (N/A)
SED	mc-Si / sc-Si	-	0,113 (0,033)	-	N/A (1)
Thin film manufacturers					
-	-	-	-	-	-
Cells for concentration					
-	-	-	-	-	-
TOTALS		N/A	65,4 (47,4)	N/A	N/A

3.3 Module prices

Table 6 indicates the typical module prices for the year 2008 as quoted by the manufacturers and installation companies. The price range reflects the prices for different module types for typical orders (5+ kW).

Compared to the previous years, module prices dropped considerably in 2008, following the international trend. The average wholesale price in 2008 was 3,22 EUR/W, the average sales-price of Austrian PV module producers was 3,11 EUR/W.

Table 6: Typical module prices for a number of years

Year	2002	2003	2004	2005	2006	2007	2008
Standard module price(s): Typical (EUR/W)	4,50	3,10 – 3,20	3,60 – 3,70	3,60 – 3,90	3,60 – 4,30	3,60 – 4,30	3,00 – 3,50
Best price (EUR/W)	N/A	N/A	N/A	N/A	N/A	N/A	3,00
PV module price for concentration (EUR/W)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

3.4 Manufacturers and suppliers of other components

Austria has a long tradition as one of the largest inverter producing countries in Europe. Following the overall expansion of the world-wide PV market, the large manufacturers could again extend their output in 2008. In total 77 000 inverters (2007: 101 500) with a capacity (rated AC output capacity) of approximately 448 MW(a.c.) (2007: 450 MW) were produced. The increased power, but reduced production numbers of inverters clearly highlight the international trend towards larger system sizes.

- Austria's only producer of inverters, **FRONIUS INTERNATIONAL GmbH**. has been engaged in solar-electronics for a long time and is now Europe's second largest manufacturer of inverters for grid connected PV systems.
  More than 99% of the production were exported.

Besides inverter manufacturing, Austria hosts some of the largest manufacturers of specialised BOS and other components for the production of PV modules.

- **ISOVOLTA AG** is the world market leader for flexible composite materials used for encapsulation of solar cells. The ICOSOLAR back sheet laminates are available in various colours and are used by many module manufacturers in the world.
- **SOLON Hilber Technologie**, the world market leader for tracking systems for PV power plants, a 100% subsidiary of German SOLON AG. In 2008, more than 3 800 (2007: 3 300) "MOVER" tracking systems for PV installations with a capacity of 31 MW (2007: 29 MW) were produced.
- **Ulbrich Austria Gmbh**, a subsidiary of U.S. American Ulbrich Corp. is manufacturing string- and bus-wires for PV Cells and modules with a total capacity of more than 1,5 GW.
- **PLANSEE-WERKE** in Tyrol is manufacturing metallic base materials for thin film solar cells.

3.5 System prices

In 2008, turnkey prices for installed PV systems fell slightly compared to the previous years. However, with only 5%, the reduction was still low, following the continued high demand of the European PV market and the stringent supply of PV modules on the world market.

In 2008 turnkey prices for typical on-grid systems varied between 5 EUR/W and 5,8 EUR/W, depending on the used PV-technology, size and type of the installation.

The according figures for typical PV applications are shown in Table 5. The considered installations are domestic, rooftop systems.

Remark: Prices for specific building integrated systems are typically considerably higher and depend on the specific case. Therefore, these are not reported here.

A summary of typical system prices is provided in the following tables.

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

Category/Size	Typical applications and brief details	Current prices EUR/W
OFF-GRID Up to 1 kW	Basic electricity supply for mountain huts.	6 to 15 *)
OFF-GRID >1 kW	AC Electricity supply for larger mountain huts. System size between 1 and 8 kW.	6 to 15 *)
On-Grid 1 kW	Small domestic roof-top system	5,8
ON-GRID Specific case	5 kW roof-mounted system.	5,1
ON-GRID 10 kW	Typical roof-mounted system for a multifamily house.	4,8
ON-GRID >10 kW	Larger system for commercial / industrial applications. PV-power plants	4,8 to 5,5
GRID – CONNECTED (centralized, if relevant)	Not relevant in Austria	N/A

Prices do not include VAT. All figures are estimated based on information provided by installation companies.

*) For off-grid systems prices vary widely depending on the application (DC appliances or AC island grid) and the mounting-site.

Table 7a shows the development of turnkey prices (excluding VAT) for a typical residential, grid-connected roof-mounted system with a power of 2 kW to 3 kW (now 5 kW) since 2001.

Table 7a: National trends in turnkey system prices (EUR/kW) for a typical grid connected PV system

YEAR	2001	2002	2003	2004	2005	2006	2007	2008
Turnkey price EUR/W:	7 500	7 000	6 000	5 500	5 500	5 400	5 400	5 100

3.6 Labour places

With the continued expansion of their business Austrian PV manufacturers again significantly extended their workforce in 2008. In total it can be estimated that at the end of 2008 more than 1 700 jobs (2007: 1 200 jobs) were directly linked to PV R&D, manufacturing and installation in Austria.

No precise numbers can be given on the number of labour places in the various sectors. The following figures (Table 8) represent a rough estimation, based on information from the manufacturing companies and R&D institutions.

Table 8: Estimated PV-related labour places in 2008

Research and development (not including companies)	50
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	
Distributors of PV products	
System and installation companies	1700
Utilities and government	N/A
Other	N/A
Total	1750

3.7 Business value

In 2008 about 4,7 MW (2007: 2,1 MW) of PV systems were installed in Austria which provides an estimated value of the national market of 25 MEUR (2007: 12 MEUR), based on average turnkey prices for off-grid and grid connected systems.

The domestic production has meanwhile become a significant factor and now outweighs the domestic demand by a factor of more than 10.

The value of exported PV components was calculated by multiplying the capacity of products produced (PV modules, inverters, tracking systems and encapsulation materials) with their specific gross-sales price. For 2008 this figure can be estimated to be approximately 500 MEUR (2007: 383 MEUR).

Imports of PV products consist of solar cells used for the module production and complete systems as well as modules. This figure can be estimated to 200 MEUR.

Raw- and intermediate products not considered as "PV products", such as electronic components for inverter manufacturing are not included in this calculation.

Eventual changes of stocks held were not considered, as it was not possible to obtain detailed figures from the manufacturers.

Table 9 provides an overview on the estimated value of PV business in Austria, total Export and Import of PV products as well as the domestic market. The figures presented are a rough estimate based on the Gross Domestic Product approach which can be used to demonstrate the development of PV business in Austria. The numbers should not be seen as exact figures.

Table 9: Value of PV business

Sub-market	**Capacity installed *in 2008* (MW)**	**Price EUR/W** *(from table 7)*	**Value (MEUR)**	**Totals (MEUR)**
Off-grid domestic	*0.13*	*8*	*1*	
Off-grid non-domestic				
Grid-connected distributed	**4.6**	**5.3**	*24*	
Grid-connected centralized				
				25
Export of PV products *(including information from Tables 4 & 5)*				*500*
Change in stocks held *(including information from Tables 4 & 5)*				*N/A*
Import of PV products *(including information from Tables 4 & 5)*				*-180*
Value of PV business				***300***

4 FRAMEWORK FOR DEPLOYMENT (NON-TECHNICAL FACTORS)

Table 10 lists the main support measures (definitions at start of guidelines) for PV which have been effective during 2008 in Austria. Further details on these are to be provided on the following pages.

Table 10: PV support measures

	On-going measures	Measures that commenced during 2008
Enhanced feed-in tariffs	National level, Green Electricity Act	-
Capital subsidies for equipment or total cost	In selected (4 out of 9) provinces.	National level: Short-term initiatives
Green electricity schemes	Various	-
PV-specific green electricity schemes	UZ46, green electricity scheme established on the national level.	-
Renewable portfolio standards (RPS)	-	-
PV requirement in RPS	-	-
Investment funds for PV	-	-
Income tax credits	-	-
Net metering	Selected DNOs	-
Net billing	-	-
Commercial bank activities e.g. green mortgages promoting PV	-	-
Electricity utility activities	-	-
Sustainable building requirements	-	-

Until today public support schemes for PV in Austria have been mainly characterized by discontinuity:

While until 2003 the Austrian framework for renewable energy support had been based on diverse local and regional incentives, the implementation of the federal Green Electricity Act (Ökostromgesetz) marked an important turning point. The support in form of preferential feed-in tariffs for electricity from renewable sources together with a purchase obligation for green electricity created a very attractive environment for investment into green electricity in general and PV in detail.

Due to the fact that the availability of the PV feed-in tariffs was capped to a national limit of 15 MW – which had been reached already during the first weeks after the GEA has become effective – the role of PV in the future electricity scenario was limited from the very beginning.

After a period of about 3 years with no federal support for PV, Austria's parliament passed a revision of the green-electricity act in May 2006, which has been effective since October 2006.

The key conditions in the framework during 2008 were:

- The GEA 2006 governs the support for green electricity as well as for electricity from combined heat and power generation. Also the larger hydro power plants (50-100 GWh/a) are considered.
- The GEA 2006 sets a target to meet 10% of the public national electricity demand with electricity generated from 'new' renewable energy sources by 2010 (RES (not including hydropower) as well as additional 9% by small hydropower until 2008, respectively.
- RES are supported via long-term guaranteed feed-in tariffs to achieve the above mentioned political target quotas. The feed in tariffs are stated by the federal Ministry for Economics and financed by a supplementary charge per "metering point", which depends on the network connection level and a fixed price purchase obligation for electricity dealers.
- In addition specific shares for energy sources are defined. About 30% of the support are dedicated to solid biomass and waste with high share of biomass, additional 30% to biogas. Wind as well shall be supported with 30%. Remaining 10% are reserved for all other sources, including PV, liquid biomass, co-firing power plants and others.
- The total funds for the feed-in tariffs for new installation are limited on a per year basis. The available budget (for all new RES installations) remained constant and amounted to 17 MEUR in 2008.
- Uniquely for PV, the provinces are requested to double this federal subsidy, which makes the support system even more complex.
- For installations supported under the feed-in tariff scheme 100% of the source/size specific tariff is paid for the first 10 years. Afterwards, the tariff is cut to 75% in year 11 and finally 50% in year 12. After this period, only the gross sales price for electricity is paid.

Photovoltaic-Feed-in-tariffs for new installations are defined on a yearly basis in a separate Feed-in Decree. According to the 2008 Feed-in Decree tariffs ranged from 45,99 €Cent/kWh for installations < 5kW down to 29,99 €Cent/kWh for >10kW systems and remained on the same level as in 2007:

	2008 (€cent/kWh)	2007 (€cent/kWh)	2006 (€cent/kWh)
up to 5 kW	45,99	46	49
above 5 kW up to 10 kW	39,99	40	42
above 10 kW	29,99	30	32

Besides the federal feed-in tariff scheme, a new initiative was launched by the newly founded national *Fund for Climate and Energy*. The initiative, which provides rebates to newly installed private PV systems up to 5 kW is launched on an intermittent base. In August 2008 the first tender with a total budget of about 10 MEUR was opened, which led to about 800 new installations up to now.

However, Austrian stakeholders generally do not see these singular, short-term initiatives as an appropriate basis to develop a sustainable domestic PV market.

To further complicate the situation, a number of provinces are still running regional rebate-programmes, and aim at overcoming the limitations of federal incentives. In most cases the support is subject to limited budgets and is linked to further requirements. Generally, the regional support is only granted in case the installation is not supported by the federal feed-in tariff scheme.

In 2008 the following programmes provided support for PV installations:

- Lower Austria offered a specific support scheme for PV-installations. The incentive is based on a rebate of up to 3 000 EUR per kW installed, which is granted for residential installations up to 5 kW. In 2008, a capacity of 1,1 MW was supported. The total budget spent for this purpose was 2,9 MEUR.
- In the capital Vienna, in the framework of the Green electricity support programme investment subsidies were granted to new installations, including PV. The support is limited to 2 400 EUR per kW (max. 40%) of the total investment. In 2008, installations with a capacity of 0,3 MW were supported by a total of 0,5 MEUR.
- Burgenland offered a rebate in the range of 750 EUR to 1000 EUR per kW installed, which – unlike the other provinces – was granted in addition to the federal feed-in tariff. In 2008, installations with a capacity of 0,7 MW were supported by a total of 0,3 MEUR.
- Vorarlberg provided an incentive which added up to the federal rebate programme funded by the national Fund for Climate and Energy. In 2008, about 0,04 MW were supported by funds of 0,02 MEUR.

In the remaining 5 provinces (Upper Austria, Carinthia, Salzburg, Styria and Tyrol) only the federal schemes were available in 2008.

4.1 Indirect policy issues

As in most of the other countries, the reduction of greenhouse gas emissions according to the targets of the Kyoto-Protocol is the major indirect policy issue for the deployment of RES. For Austria the reduction target is 13% from today's 7,6 tons per capita and year towards around 6,6 tons per capita and year in 2010.

However, it can be doubted whether PV will be a part of the measures to contribute to a sustainable energy supply in the long term.

On the European Union (EU) level, increasing the share of renewable energy for electricity generation has a high priority. In this context, the "Directive on the promotion of electricity produced from RES (RES-E Directive)" was published in September 2001 by the European Commission. The goal set in the directive is to increase the share of RES-E in the European Union to 22,1 % until 2010. For Austria the individual target is to reach a share of 78,1 % of electricity from RES. However, currently only 65% of the electricity demand in Austria is covered by RES.

Furthermore, a new EU directive now sets targets for the share of RES in the total energy consumption. For Austria, this target has been set to 34%.

4.2 Standards and codes

Generally European PV Standards are likewise applied in Austria. Grid-interconnected PV applications are covered in detail by the national standard ÖNORM/ÖVE E 2750, which

defines all safety relevant aspects regarding planning, installation, grid-interconnection, requirements for components and operation of grid connected PV installations.

In 2008 no new developments on national standards and codes were reported.

5 HIGHLIGHTS AND PROSPECTS

5.1 PV Industry & production

By far the largest share of the Austrian PV production is exported to those European Union countries, where attractive and stable incentives created a substantial market for PV. It is expected that the ongoing positive development of the international PV market will provide the basis for a further ongoing growth of the Austrian PV manufacturers and will help to strengthen the position of Austria as an important supplier of components for PV systems.

New industry activities in the field of cell production and further extension of module production and product portfolio clearly document this trend.

Following the national PV Roadmap as first step in a continuous PV technology development process (issued 2007 by the Ministry of Transport, Innovation and Technology), the National PV Technology Platform was founded in September 2008 along with the 6th Austrian PV conference. The PV Technology Platform brings together the 10 leading industries in order to discuss their needs for a long term strategy towards an international competitive positioning on the growing world market. This initiative was again launched by the Department of Energy and Environment of the Ministry of Transport Innovation and Technology.

5.2 Stakeholder initiatives and awareness raising

Photovoltaic Austria the National Photovoltaic Association has significantly expanded their activities by creating a national network for dissemination of information on PV and initiating awareness raising activities. By fostering the political contacts, intensive political lobbying work and a broad series of articles in newspapers for PV, the association aims at changing the legislative frame conditions for PV by introducing stable and supportive PV market incentives; preferably based on feed in tariffs.

By the end of 2008, more than 100 companies and people involved in the PV business were Association members, which is about four times as much as at the end of 2005.

The annual National Photovoltaic Conference 2008 (a two days event), organised by some of the main PV stakeholders and supported by the Ministry of Transport, Innovation and Technology, was once again a great success, with more than 220 experts participating. This conference is now established as THE annual come together of the Austrian PV stakeholders. The foundation of the new PV technology platform and the great industrial potential for Austrian companies was discussed this year at the event.

5.3 Market & deployment initiatives

When looking at the domestic market, the situation of PV in Austria remains unsatisfactory mainly because of the complex, unstable and primarily insignificant frame conditions. The 2006 revision of the main nationwide framework, the Green Electricity Act (GEA) currently in force does not provide any substantial support for PV and further complicated the situation

in comparison to the period before. Moreover, also the 2008 revision of the Green Electricity Act, which is still (as of May 2009) pending for approval by the European Commission and has not become effective yet is not expected to provide significant improvement for PV development in Austria.

Short-term initiatives such as the rebate programme of the national *Fund for Climate and Energy* announced for 2009 will provide temporary incentives for the market. Nevertheless, due to the limited time horizon of these measures, no substantial PV market development can be expected. Hence the situation for PV in Austria will remain unclear also for the year to come.

ANNEX A: REFERENCES, METHODS AND ACCURACY OF DATA

The market statistics on installed capacity, share of grid-connected and off-grid applications as well as the industry data has been collected by Natalie Glück and Simon Stukelj, arsenal research, supported by Hubert Fechner, University of Applied Science Technikum Wien, under the coordination of Peter Biermayr, TU Wien by order of the Federal Ministry for Transport, Innovation and Technology (BMVIT).

The data is based on a data provided by manufacturers, retailers and importers of PV components (see Figure 5). In the annual report ("Erneuerbare Energie in Österreich, Marktentwicklung 2008") PV applications are divided into Off-grid installations (including domestic and non-domestic applications), and Grid-connected systems (including centralised and distributed systems). No further breakdown is made in the study between centralized and distributed systems. Therefore the share of grid-connected centralized systems had to be determined by summarizing all large PV-installations which are dedicated as power-plants.

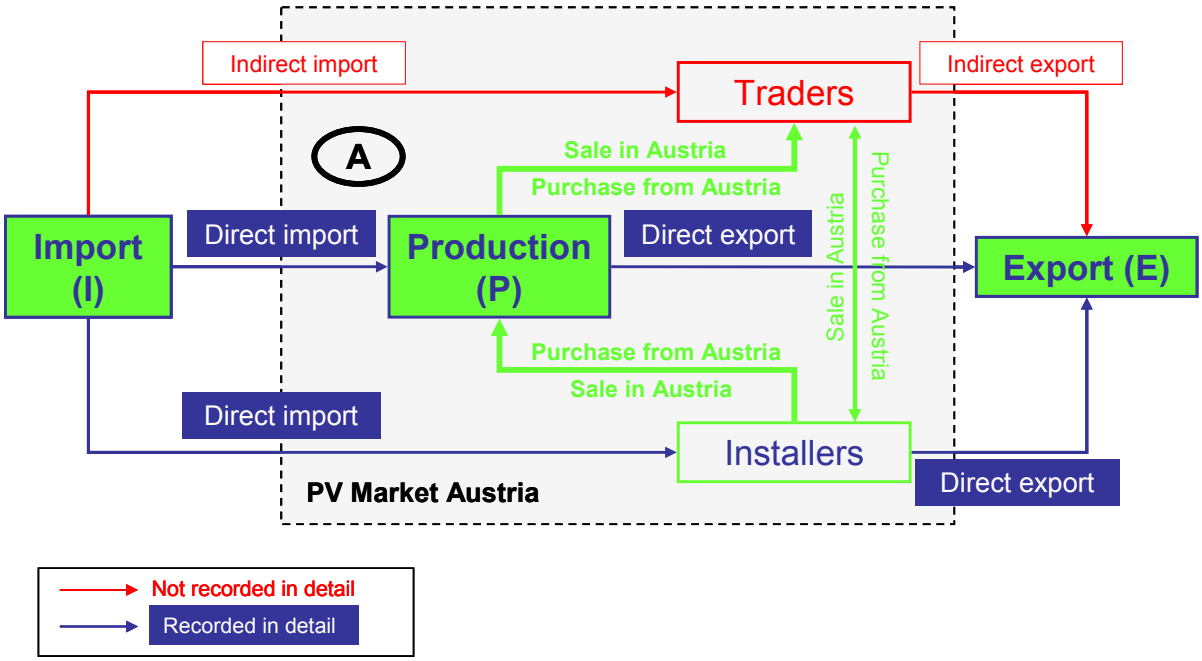

Figure 5 Structure of the Austrian PV Market

With the establishment the new organisation managing the feed-in tariff scheme, all statistics on renewable energy installations funded under the feed-in tariff scheme are now reported by OeMAG. Data on the total amount of budget spent for PV feed-in tariffs is provided by OeMAG. However, as a considerable share of new PV installations is installed outside this feed-in tariff framework, data on these systems, which are supported by regional initiatives or other programs, are not included in the national Energy Statistics, since the capacity of these installations is below 1 MW. Thus the installations reported by OeMAG do not provide a complete picture of the situation in Austria.

The uncertainty of the figures related to the installed capacity is estimated to be about ± 10%.

Due to the changes in the method as from 2007 as well due to further companies which are now included in the of data collection, minor inconsistencies between pre-2007 and 2007 data cannot be avoided.

Data on funding for PV R&D is taken from the report "Energieforschungserhebung 2007, Ausgaben der öffentlichen Hand in Österreich, Erhebung für die IEA" compiled by the Austrian Energy Agency by order of the Federal Ministry for Transport, Innovation and Technology (BMVIT).

Industry data on actual production, production capacity, workforce, new products, prices and other market figures is based on information provided by manufacturers, and installation companies. An estimation of the corresponding accuracy cannot be provided.

ANNEX B: COUNTRY INFORMATION

This annex provides some background about the national environment in which PV is being deployed. The data are not guaranteed to be 100 % accurate nor intended for analysis, and the reader should do their own research if they require more detailed data.

Electricity in Austria 2007 (Source: VEÖ Association of the Austrian Electricity companies)

General data about Austria :

- Territory: 83 850 km2
- Inhabitants (2007): 8,300 000
- Domestic electricity consumption (excl. PS): 67 918,6 GWh
- Electricity consumption per inhabitant: 8,23 MWh/year
- Domestic electricity generation: 64 283,4 GWh

Number and capacity of power plants installed (including estimations):

- 627 (5 194,5 MW) run-of-river plants
- 101 (6 602,1 MW) pumped-storage plants
- 1 777 (12 008,9 MW) (estimated) other hydro-power plants
- 615 (6 441,0 MW) (estimated) thermal power plants
- 2 537 (1 010,5 MW) (estimated) other power plants (wind, PV…)

Number of network levels: 7

- Levels 1-3: high and ultra-high voltage
- Levels 4-5: medium voltage
- Levels 6-7: low voltage

1) retail electricity prices (2008)

	Net-price	Energy tax	VAT	Total taxes	Final price
	EUR/kWh	EUR/kWh	EUR/kWh	EUR/kWh	EUR/kWh
Electricity price (Industry)	0,08	0,02	0,00	0,02	0,10
Electricity price (household)	0,13	0,02	0,03	0,05	0,18
Source: E-Control					

2) Typical household electricity consumption:

   4200 kWh (Source Statistik Austria www.statistik.at)

3) Typical metering arrangements and tariff structures for electricity customers (for example, interval metering? time-of-use tariff?)

   For normal households: Typically fixed tariff (no time-of-use) or day/night time dependent tariff.

4) Typical household income:

   27 971 EUR per year (2007 data) – according to EU SILC 2007 (Source Statistik Austria www.statistik.at)

5) typical mortgage interest rate:

   N/A

6) voltage (household, typical electricity distribution network)

   Single phase 230 V, 3 phase 400 V; 50 Hz;
   Electricity networks structured in Transmission (220 kV – 400 kV), sub-transmission (110 kV), medium voltage distribution (10 kV – 30 kV), and low voltage distribution (400 V)

7) price of diesel fuel (2007):

	Net-price	Energy tax	VAT	Total taxes	Final price
	EUR/l	EUR/l	EUR/l	EUR/l	EUR/l
Diesel fuel (private use)	0,50	0,36	0,17	0,53	1,03
Source: Statistik Austria www.statistik.at					

8) Typical values of kWh / kW for PV systems in parts of your country
   850 kWh/kWp to 950 kWh/kWp
   Source: Authors estimation.