

AUSTRIA

PHOTOVOLTAIC TECHNOLOGY STATUS AND PROSPECTS

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GENERAL FRAMEWORK AND NATIONAL PROGRAMME

Manufacturing of photovoltaic products has developed very well in Austria, however the market is still lacking continuity in public support schemes for a significant home market. This leads to typical export rates from individual companies of 90 % or even more.

Many of the innovative PV systems from Austrian production and design are installed in other European and outer European countries, due to the still insignificant and instable Austrian market support schemes.

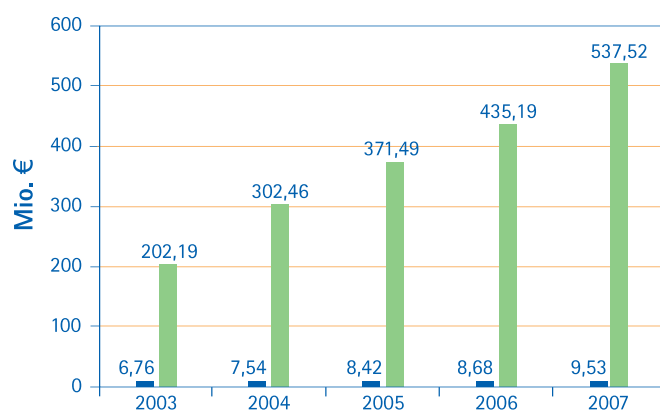
A wide public support for PV installations as well as for other "new renewables" (Austria has about 60 % electricity from large hydro) will also most probably not be achieved within the upcoming year; the revision of the green-electricity act (GEA) is not yet in operation, it can be expected that the huge potential of PV and the industrial opportunities for Austria will again not be addressed accordingly.

Even though the "new RES" are supported since the beginning of this act mainly via long-term guaranteed feed-in tariffs, the financial cap is too low to introduce significantly these "new RES" on the market. The feed in tariffs are stated by the Federal Ministry for Economics and financed by a supplementary charge on the net-price and a fixed price purchase obligation for electricity dealers.

The main pillars of the new regulation are:

- Annual additional funding volume reduced to 21 MEUR for all renewable energy sources
- Photovoltaics and other green plants will receive about 10 % of the support volume
- The duration of the program is 10 years constant + 2 years declining support

**Table 1: Subsidy Volume Development
for Green Electricity in Austria**



Source: E-Control, Austrian Energy-regulator, 2008

■ photovoltaic
■ sum of supported green electricity



Fig. 1 - Power Tower, Energie AG Linz (photo Ertex-Solar).



Fig. 2 - Chamber of Commerce, Vienna, 57 kWp PV-System (photo Austrian Chamber of Commerce).

It is often criticised that no definitions for supporting specific PV applications (as e.g. Building Integrated PV like proposed in the Federal "Austrian PV Technology roadmap") niche markets, where Austrian companies could maybe reach a leading position, had been made.

According to the former edition, by this feed-in-tariffs only systems > 5 kW will be supported; systems up to 5 kW have to undergo the procedure of application by the limited sources of the governmental Austrian Climate and Energy Fund.

This intermittently launched support initiative will support only small systems (private households) and was opened for the first time in August 2008 by one tender with a total budget of about 10 MEUR to support private PV Systems (< 5kW) which lead to another about 900 PV Systems with a total of about 4 MW. However, these singular initiatives are by many PV stakeholders not seen as appropriate basis to seriously and continuously develop a national PV market. Differently to the feed in tariff system this support scheme provided financial benefits to building integrated systems.

It can be expected that about 5-8 MW annually installed systems in Austria will be installed 2009 if the support systems will be operational.

National PV stakeholders question the effectiveness of the support system mainly because of the complexity of the support system, the modest financial limits and the uncertainty of the available budget, which might not be able to significantly bring up an Austrian PV home market. Although the new revision of the GEA is still in the phase of negotiation, a significant market stimulation aiming at establishing competitive Austrian PV industry will not be achievable.

RESEARCH AND DEVELOPMENT

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), a 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. Currently, about 1 500 employees are working in the PV industry in Austria. This initiative was again launched by the Department of Energy and Environment of the Ministry of Transport Innovation and Technology.

Currently the Austrian PV research activities are mostly focused on national and international projects: 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.

Two national 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 in 2008 and cover quite broad research items 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 can be financed within this well designed activity.

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

The electricity companies are investing more and more in renewable. Departments were founded to establish businesses, mainly through investments in new and existing renewable energy plants. However, due to the insufficient national support for renewables, they mainly invest in other European countries. For PV, most relevant activities were done by Verbund – Austrian Renewable Power: They have built up two systems with a total of 3 MW in Spain; mainly equipped with Austrian technology.

Research highlight of photovoltaics in Austria are:

- The Christian Doppler Laboratory "Applications of Sulfosalts in Energy Conversion" in Salzburg 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.
- Research on PV inverter specification (MPP, fault-ride-through,

efficiency aspects...) is done at arsenal research attracting world wide inverter manufacturers for collaboration.

- Smart electricity networks are the main focus of several national and EU financed 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.
- Cost reduction and optimization of new solutions for building integrated PV are addressed within several EU projects.
- Organic Solar Cells based on thin plastic films have been intensively investigated during the last 10 years, at the Kepler University of Linz. This led to the foundation of a local branch of an U.S. PV company in Linz.
- Socio-economic research concerning the integration of PV is internationally well positioned at the Technical University of Vienna.
- A large Austrian glass industry has intensified its activities in PV, mainly in addressing architectural building design.
- In the area of system technology, the activities for quality assurance, certification and testing of PV modules were extended. arsenal research, as an Austrian research & testing institution, is officially accredited to qualify crystalline silicon PV modules according to the EN/IEC 61215 standard, thin film modules according to the EN/IEC 61464 and module safety qualification according to the EN/IEC 61730, as well as PV inverters.
- 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; featuring a 45 kW highly innovative PV Facade

IMPLEMENTATION & MARKET DEVELOPMENT

Approximately 27 MW of PV power had been installed in Austria by the end of 2007. Figures are not yet available for 2008, but it is expected that currently not more than about 31 MW are totally installed in Austria.

The annual growth rate in 2007 was at a total of 2,2 MW; which is amongst the lowest.

Despite the weak home market, Austria has some internationally well positioned manufacturers nearly exclusively involved in foreign trade, mainly focusing on the neighbouring large German market as well as the well developed markets of Spain and Italy.

The main applications for PV in Austria are grid connected distributed systems, representing more than 90 % of the total capacity. Grid-connected centralised systems in form of PV-Power plants play a minor role with about 1,2 MW installed.

Building integration is an important issue and a few remarkable installations were realised, amongst them the so far largest PV Facade at the federal Chamber of Commerce in Vienna.

Beside on-grid applications off-grid systems are widely used to provide electricity to technical systems or for domestic use in Alpine shelters or households lying far away from the grid.

Some provincial governments have built PV-demonstration plants on municipal buildings in order to create public awareness for PV.

INDUSTRY STATUS

Despite the unclear and unsatisfactory situation with an insignificant national market for PV, the Austrian PV industry could still expand their activities during 2008 focussing on the export of their products predominately to the booming German and other International markets. In Austria, there are about 1 500 employees in the PV business which seems to be a success; but this relies very much on the development outside the country's borders.

Blue Chip Energy GmbH started production of silicon solar cells in the energy autarkic municipality of Güssing (Burgenland) in 2008. They are expected to finally employ 350 people.

Ertext-Solar (a subsidiary of Ertl Glas AG) realized couple of projects all over the world in recent years. A new and innovative laminated safety glass production line for BIPV modules started in June 2008 in order to follow the huge demand regarding BIPV projects. One of their main products is VSG; a laminated safety glass which can also be assembled easily to insulating glass.

Kioto-Photovoltaic, since 2004 produces PV modules. The company is closely linked to GREENoneTEC, European's market leader in solar thermal collectors.

PVT Austria, the first manufacturer of PV modules in Austria produces standard and tailored modules from imported crystalline silicon cells. The company successfully increased their output taking profit from the German PV boom.

SED manufactures modules specially designed for integration into PV-roof tiles. The custom laminates produced are directly stuck into standard format tiles made of recycled plastic and can easily replace conventional roofing materials.

SOLON-Hilber Technology: A subsidiary of the German SOLON manufacturer produces solar trackers and solar modules in Tyrol, close to Innsbruck. It began production in 2003 and currently more than 240 employees are working with this company.

Besides PV-Module and cell production, various other companies are manufacturing components for modules and BOS-components like batteries, inverters, cell-wiring or mounting systems:

FRONIUS INTERNATIONAL has been engaged in solar-electronics for many years and is one of Europe's leading manufacturer of inverters for grid connected PV systems.

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.

PLANSEE-WERKE in Tyrol is manufacturing metallic base materials for thin film solar cells.

Ulbrich of Austria is manufacturing string- and buswires for PV Cells and modules with a total capacity of more than 1,5 GW.

MARKET DEVELOPMENT

The Ministry of Environment, engaged in climate protection has started a large programme of initiatives to reduce CO₂ emissions ("klima:active") in 2004, by addressing and fostering various technology sectors like biomass-heating, solar thermal systems, heat-pumps, low energy buildings, environmental benign transport and others and is currently preparing a programme for photovoltaics, concentrating on awareness raising, education and information about the potential and possible future contribution of PV to the general energy supply.

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.

The Austrian Research and Testing Centre "arsenal research" (known as the internationally accredited PV module test institute according to IEC 61215 as well as testing PV inverters) has continued its "Certified PV Training" with another four trainings for installers and planners in 2008, in order to improve the quality of the installed systems. The promising feedback and the growing interest will lead to a minimum of six courses in 2009.

FUTURE OUTLOOK

The situation of the local PV market still remains unsatisfactory, mainly because of the complex, instable and primarily insignificant subsidies. If no significant and stable support mechanisms, (which can provide long and promising perspective for a national PV industry development) are introduced, the market will remain limited relying on regional incentives which will only partly support the market.

The situation of the steadily growing Austrian PV industry is expected to be further improved, mainly due to the international booming PV market, but still lacks support locally.

Some initiatives (PV Roadmap, Technology-platform, PV Lobbying by the Association, PV Conference, etc.) might draw the attention of decision makers, hopefully leading to a comprehensive long-term strategy for PV-development in Austria.

Potential PV niche markets, where Austria could take a lead position, have to be developed, in order not to fully lose the linkage to the booming international market. Some new initiatives and considerations at regional governments seem to be promising.

PV research and development will be more and more concentrated on international projects and networks, following the dynamic know-how and learning process of the world-wide PV development progress. Specifically the direct links to the new members of the European Union in Central and Eastern Europe in energy related items are to be mentioned, where PV plays more and more an important role.

The level of the public know-how about the potential and perspectives of PV is continuously growing. Several renewable energy education courses are already implemented, some new courses are currently under development. All of them include PV as an essential part of the future energy strategy. The importance of proper education for PV system installers and planners will increase, depending on the market situation. Training is already available and can be extended easily. Concerning higher level education, the University of Applied Science Vienna (Technikum-Wien) has started its Bachelor degree program in "Urban Renewable Energy Technologies" with PV-Systems as a core element of the education. A Masters degree program (MSc.) in the same field will commence in autumn 2009.

It can be expected that the National PV Association and other important PV stakeholders will further significantly promote the topic in Austria. The vital local PV industry, currently taking advantage of the strong German and other European markets is very much interested in creating a home market for PV, and is still waiting for an improvement of the economic frame conditions.