



Solar City Gleisdorf

The Solar city of Gleisdorf lies in the sunny hills of the Austrian province of Styria approximately 25 km east of the capital of this province, Graz. The city has 5500 inhabitants and extends for an area of 4.78 km². The city's geographic situation makes it an important traffic and commercial centre with attractive business possibilities. A modern meeting centre offers a large number of cultural and athletic events to the region.

Within Austria Gleisdorf is known for its numerous renewable energy initiatives, projects and measures. Many visible projects like the solar tree, the solar energy road and the multi-functional photovoltaic noise protection wall along the motorway support the "solar city" image of Gleisdorf. Approximately 350 kW_p of PV systems have been installed within over one hundred projects.

In order to prepare this case study the following stakeholders, who have been involved over the years in several projects in Gleisdorf, have been interviewed:

- Representative of AEE (Working group for renewable energies- an autonomous Society for Renewables)
- Representative of Energy Utility "Feistritzwerke- Steweag GmbH" which partly belongs to municipality of city Gleisdorf.
- Representative of the Styrian government.
- Architect

Discussions focused on information in terms of general issues of public acceptance and interest and as well problems that had arisen and how had they been overcome.

The major PV programme/project in Gleisdorf

The first solar thermal initiatives were started in Gleisdorf at the beginning of the 1980's. A group of interested customers built the first solar thermal collectors for single family houses. At the beginning of the 1990's the first PV systems were installed in order to generate electricity. Starting from this time the trend towards renewable energies has been continuous.

Since 1991 many new PV and solar thermal systems have been installed with over 150 different projects in different locations. The largest projects can be specified as follows.

The major PV applications:

- 10.4 kWp PV Power plant on the roof of the utility "Feistritzwerke-Steweag GmbH".
- 8.2 kWp PV system at the city hall of Gleisdorf
- 7 kWp PV system on the solar tree which located in the middle of the city.
- 100 kWp multifunctional noise-protection PV system wall along the motorway A2.
- 9.9 kWp on the roof of Gleisdorf Waves Bath.
- 10.2 kWp at the medical centre "Äskulap"

In addition about 600m² of solar thermal collectors were installed. In over 100 households the water is heated by solar energy. The major projects are;

- 230 m² at the solar low energy house "Sundays".
- 100 m² on the roof of Gleisdorf Waves Bath.



Description of PV Projects

Communal PV power plant

This project was the first PV power plant in Austria realised through a shareholder programme. In 1995 a PV system with a capacity of 10.4 kW_p was installed on the roof of utility “Feistritzwerke-Steweag”. The system was financed by 68 shareholders and the company Feistritzwerke GmbH, which also coordinated the shareholder programme. This project made it possible for environmentally engaged people to own a share of a PV power plant. The project objectives can be classified as follows.

- To replace fossil energy sources by renewable energies.
- To reduce greenhouse gasses. With this project yearly 1.5 tons CO₂ can be avoided.
- To demonstrate a PV power plant
- To encourage the general implementation of PV systems

The costs were kept as small as possible through carefully selection of components, appropriate size of PV systems and the use of existing infrastructure and know-how. Hence the prices was kept to 7000 €/ kW_p, whereas standard system costs at that time were 9500 to 13000 €/ kW_p. This project showed that big systems could be installed at a favourable price if suitable conditions are available.

At the beginning sales of share certificates were slow. The project manager put a lot of effort into this area and a high advertising effort was made. This led to a lot of interest in participation by the local population. About 2500 persons obtained information about photovoltaics. In the end 68 people bought shares which financed 80% of the whole costs with the remaining 20% financed by the utility “Feistritzwerke “





Solar street and solar tree

The solar tree - the new symbol of Gleisdorf – was built in 1998 with a capacity of 7 kW_p and was connected to the public electricity grid. It stands in the "solar street" which is a 3.5 km long street section, where about 80 objects are powered by photovoltaics, such as a public solar clock, advertising boards and street lights. Solar cells have also been used for art and the solar tree is one of these examples. It is 17.3 meters high and consists of a 12700 kilogram solid steel sculpture in the form of a tree with five branches holding 140 solar panels.

The tree generates approximately 6650 kWh of electricity annually which can supply about 70 city streetlights in the centre of Gleisdorf. But the solar-tree is not only an artistic and technological object which produces electricity. It also underlines the future ideologies in terms of energy of Gleisdorf. Furthermore it promotes energy awareness to the people. In this respect the solar-tree connects the elements of art, solar technology, city organisation and planning together in one project.



Most of the PV systems in the solar street have been financed by the utility "Feistritzwerke", which partly belongs to the city municipality. Hence the projects of the solar street can also be called a city initiative.

The PV Power plant and the solar tree were the first steps towards PV-application and renewable energies in Gleisdorf. In the following years more PV-plants and solar thermal applications were realised. Most of the PV systems are grid-connected systems. Only a few PV systems like road signs, billboards and other demonstration objects are operated off-grid.

The largest photovoltaic system in the solar street is a facade-integrated system with a capacity of 10 kW_p. The electricity demands of this building can be covered by its PV system.



The headquarters of AEE (Working group for renewable energies) is also another interesting example of a passive solar house with a solar thermal system and a photovoltaic system placed on the roof.

Positive issues regarding PV power, solar thermal applications and other renewable energies in Gleisdorf.

- The city was always very interested in renewable energies and their development. Therefore Gleisdorf has received different national and international energy-awards and environmental protection awards.
- There is a renewable energy exhibition which takes place once a year. There many domestic companies which based are in the region Gleisdorf/Weiz are specially promoted.
- Every two years an international solar symposium takes place in Gleisdorf. In this meeting about 400 people participate from 20 different countries. This is a general economic incentive for the region, and brings a positive aspect to PV and other renewable energies.
- Within the campaign “SOLAR ELECTRICITY for schools” each school gets a trackable PV power system, if they are customers of the utility. This system looks like a solar wheel and is a triple tracked on-grid PV system. It allows teachers and pupils to operate their own solar power plant and lets the pupils investigate solar power and learn some practical physics.



- The city government of Gleisdorf is also interested in renewable energies in public buildings. In the future PV-plants, solar thermal plants and biomass must be installed in all public buildings constructed. Retrofits at older public buildings have also been made within the renewable energies programme.
- The shareholders of the PV power plant on the roof of utility “The Feistritzwerke-STEWEAG GmbH” were surveyed, half of them indicated that they had changed positively their energy use attitude and nearly 80% of them had taken energy saving measures in order to use energy efficiently.

How is information about renewable energy in buildings provided?

In Gleisdorf there is a free consulting interview with a representative of the utility company for everyone who wants to plan a new building. In these interviews the application of renewable



energies are presented. Furthermore the advantages and possibilities of renewable energies are imagined and the size of the requested/ needed facility is discussed.

This consulting interview is obligatory for all new building owners. Without this discussion it is not possible to get a subsidy. This service is used yearly by 30 - 50 house owners.

An energy database: a possibility for energy efficiency measures

Currently there are efforts by the AEE (working group for renewable energies) to create an energy database in which the level of energy consumption of individual buildings would be noted. This will offer different possibilities to the building owners in order to achieve lower energy consumption and the use of renewable energies.

How can a subsidy for a PV or thermal system be obtained?

- PV electricity is publicly supported by the co-financing of 50% of the Feed-in-tariff by the government of Styria. However only 200 kWp is subsidized per year, which is very low so only a few people obtain this subsidy. The funds for one year are exhausted within ten minutes of the appropriation.
- There is also an investment subsidy from the government of the province Styria which provides a maximum of 2000€ per PV system. But this amount is too low to make PV systems attractive. Although PV has no acceptance problem, the high costs and lack of subsidies are still decisive barriers for PV.
- Some people apply for the subsidy which is approved in the framework of a yearly cap of 200 kWp but the problem is that some of them don't then install a PV system. In this way they take the allocation from others, who are really interested to install a PV system but cannot obtain a subsidy because the capacity cap of 200 kWp has been reached.
- Gleisdorf is one of the leading cities in Austria for using solar thermal. Solar thermal systems get the highest level of support within Austria, perhaps even in Europe, in Gleisdorf. The Styrian government also subsidises the solar thermal systems but the biggest amount comes from the city of Gleisdorf. This means that solar thermal plants are more attractive for a house owner than a PV system.

How to ensure that that systems work correctly? Who is responsible for maintenance?

PV systems are known to need no or minimal maintenance. But it is still necessary to ensure that the system works correctly in order to get maximal yield from a PV systems.

- The communal system (PV Power plant) on the roof of the Utility Company has been working very reliably and there have been very few problems with this PV system. Service activities are carried out by the employees of the utility company. Function control is checked monthly and once a year the modules are cleaned. In the winter the surface of the PV modules are kept free of snow. The expected annual yield of 9000 kWh has been exceeded to 9500 kWh.
- Private owners and operators are responsible for their own PV systems. For them the most interesting point is if the system works correctly and effectively. Often private persons can't tell if there is a problem and they don't check the system regularly. So problems or errors arising are only recognized later and can lead to impaired function for a period of time. If they have questions or problems the private operators can call the energy companies but an annual system check or maintenance service is not offered by the utility.
- Tenants are mostly not interested in where the electricity and the warm water come from, especially if they were not involved in the planning process or they are not intending to stay in the dwelling for a long time. In this case it is only important for them that electricity and warm water is available.



- The latest solar thermal plants have a big advantage in comparison with PV systems because these systems are equipped with a malfunction message system. If an error should arise an error message is sent to the operator.

Sources of further information

Energy region Gleisdorf/Weiz : <http://www.energieregion.at>

Institute for sustainable technologies: <http://www.aee-intec.at/>

AEE - working group for renewable energies (publications):

<http://www.aee.at/index.htm?publikationen/zeitung/verzeichnis.php>

Feistritzwerke (Utility): <http://www.feistritzwerke.at/>

City of Gleisdorf: <http://www.gleisdorf.at/>

Sundays (Solare Niedrigenergiehaus): <http://www.ibo.at/solareniedrigenergie2.pdf>

Common PV power plant (PV-Interessentan-Anlage):

<http://www.nachhaltigkeit.at/bibliothek/tatenbank/de/f0001057.pdf>

<http://www.pvresources.com/en/art.php>

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Case Study prepared by:

Demet Suna & Christoph Schiener of EEG

e-mail: suna@eeg.tuwien.ac.at

