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Keynote Speech The Situation of PV in Europe
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Europe and namely the European Union is together with Japan and the United States a leading player for the development and promotion of PV - a traditionally very open and global market. With 106 MW overall capacity installed in 2002, the EU comes not far behind Japan, the world market leader.

Germany sets the tone of the European market as it alone represents currently almost 80% of it. Italy and Spain, number 3 and 4 after the Netherlands on Europe's PV hitlist, made together just a little contribution of 6 MW, a quite surprising discovery considering that the Mediterranean countries are popular for their abundance of sunshine.

The situation is different for European module production which is more evenly spread. Here, France and Spain contributed as much as 45% to the total of 136 MW in 2002. PV industry in Germany came first with 57 MW. But also in production Germany's dominance in Europe will become more obvious in the current year 2003 as it is expected to almost double.

It is interesting to note that the discrepancies between national production and market in Europe is an image of the global development of PV: while for instance Japan produced last year 250 MW which is almost half of world-wide production, its domestic market was much smaller and a large fraction was exported. PV is indeed a world market with a lot of intercontinental exchanges and co-operation. Since development of markets and production capacities are in full swing it is inevitable that unsold production can occur - last year probably up to 100 MW - and stronger competition may lead to industrial rearrangements and hopefully lower prices. It is interesting to note that artificial barriers to world trade in PV could by and large be avoided. Certification which is often employed as an instrument for obstruction is fortunately being taken care of at IEC, the International Electrotechnical Committee in Geneva, but more specifically even at the "Global Approval Program" PV GAP in Geneva, in which the PV Associations (or the competent equivalent) of Japan, Europe and the US cooperate.

Europe has a strong technological basis; it is almost exclusively associated with crystalline silicon. Germany alone has currently 22 module producers, 9 cell manufacturers and 3 for wafers; there are also 14 producers of inverters. The leaders are "RWE-Schott Solar" and "Solar World AG". Both are active on wafers, cells, and modules as well. They are planning investments

of several hundred mio Dollars, partly with public support. It includes 60 MW a year cell production respectively, and for instance for Solar World the planning of "220 MW-wafer" capacity. The latter plans furthermore a factory in Belgium together with "Degussa" for "solar-grade" silicon employing "Bayer technology". Germany's industry is, however, by no means alone pressing ahead with ambitious plans to increase production capacity for crystalline silicon cells. We could indeed learn that Isofoton and BPSolar in Spain for instance have currently on the drawing board manufacturing plants for 100 MW and 80 MW respectively for operation in 2004. It should also be mentioned that as far as solar-grade silicon is concerned the Renewable Energy Corp. in Norway shares with Komatsu from Japan a new production line in Washington State, USA.

It is important to note that PV is in Europe definitely part of a much wider interest for a sustainable energy policy. This was illustrated for example at the World Climate Conference in Kyoto where the European countries under the lead of the EU Commission were hard pushing for ambitious GHG reduction goals. Not all, but many EU member countries not only have or had "green" parties in the Government, but the need for a sustainable policy goes through much of the political spectrum and society at large. Many EU countries have a moratorium for nuclear energy; in a recent poll, the Eurobarometer, 66% of people declared support for Renewable Energy uses. The consequences can be seen in practice: following a statistical survey published by the International Energy Agency in April this year concerning energy consumption patterns during the decade of the 1990s, the EU had a yearly 1.6 increase of the share of REs in total energy consumption whilst Japan and the USA had a decrease of appr. -1%. Germany had even an increase of +4.9%. For energy conservation and efficiency, expressed as energy per unit of GDP, the trends were similar: the EU had a yearly 1% reduction in energy intensity - Germany even -2.1% - whereas in Japan it did not decrease. (In the US, however the trend went with a decrease of 1.4% also in the right direction).

It is well known that the increasing share of the REs is mostly due to the "explosive" wind market development in Europe, i.e mostly in Germany, Spain, and Denmark. Germany has today a wind power capacity of over 12 000 MW and derives 5% of its electricity consumption from the wind. The turnover of the world-wind market can be estimated at 7 billion Dollars annually compared to a world PV market of 4 billion. For the time being the turnover of PV may be comparable in size but the corresponding electric energy production of the capacities installed in 2002 was at least 40 times smaller.

Wind power and PV are supported together in Germany's "EEG" law which sets mandatory tariffs at which the utilities must buy RE electricity. For PV the tariff stands currently at 45 cents per kWh with a 5% annual reduction built into the law. The EEG is going to be rearranged this year to compensate among other things, for the fact that the additional support via the federal "100 000 roof programme" is going to be fully implemented at the end of this

year. It is expected that the political support for the EEG law will survive the current legislative period which ends in September 2006 because the main opposition party has signaled in a new move their support for the law. After all, REs have created in the last few years more than 130 000 new jobs in Germany, more than the nuclear and coal sectors employ together.

Green tariffs play no real role in Germany. Why should they? If green tariffs are dearer than ordinary tariffs, the polluter selling electricity produced from non-sustainable conventional resources sells for less. This is against the "polluter pay principle". With the EEG law the RE electricity is cheaper than the conventional and all electricity consumers of the whole country pay an extra in their bill. This extra amounts to .2 cents or .4 cents, depending on asking the RE supporters or the utilities which have to pay. Some energy-intensive industries are exempted from paying the extra.

In Germany we have today for PV a situation in which investors are subsidized for the full cost, a model which had been developed in the City of Aachen many years ago. Most of the PV systems go for grid-connected homes and buildings. A new trend is emerging since last year where investor groups set up financing models similar to what is done in wind energy, to promote multi-MW PV plants in the field. A 4 MW plant was just inaugurated in Northern Bavaria, the State with the best Sun in Germany, at a turn-key price of 5 Euro/Watt peak. It is installed on a concrete platform of a former ammunition depot. Hopefully there will be more of those in the whole world.

Even though the financial conditions for PV for the individual home owners are favourable, it is generally accepted that the German public could be mobilized even more for PV because the hurdles to overcome are not only financial. I personally think that the Japanese public is a shining example in its commitment to PV and its readiness to invest in it.

Germany has more than a hundred "Initiatives for Solar Energy" as grass-root movement. There is a special federal program for PV promotion in schools (900 applications were received). Information for potential PV users become increasingly available on internet. They concern profitability, technical information and financial instruments.

How about the future? The world-wide support for PV will, no doubt, lead to considerable cost decreases in the foreseeable future. The "chicken and egg" vicious circle - high cost/no market and no market/no cost decrease - is on the verge of being broken. The EU has like Japan a market goal for PV implementation by 2010. It stands at 3 GW. Even optimists can expect this to happen only if the other EU member countries follow the example of Germany. The European Commission is pushing hard for it with supports and regulations. But time may turn out to be not yet ripe.

The pace of market expansion may not be so certain, but the fact that in the long run PV will become with the other REs a dominating factor in the World's energy supply is out of the question.

We must continue in our common effort to make this happen.