

Germany: A Green SMART Trendsetter on Sustainability

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Germany is just amazing in its great commitment to a sustainable future. In June 2010 this year, a milestone was achieved when a Solar- and Greentech delegation to Germany was organized by MGCC which was an astonishing experience for many Malaysian corporate players in the field of Green Technology. In partnership with the Malaysian Photovoltaic Association and the Federation of Malaysian Manufacturers (FMM) and with the support of MATRADE, over 20 Malaysian participants enjoyed the 8nights/9days programme.

In light of Malaysia's vision in developing a Greentech agenda and its own Greentech industry, this time the programme was catered to participants to include a match-making session with German companies, a visit to the largest solar exhibition Intersolar, and three specific tailor-made training modules on PV-installations, on Green Townships and Green Buildings, each for a duration of 1 ½ days, besides several other highlights.



The Malaysian delegates having fruitful discussion and learning about a 54 MW solar park in Strasskirchen close by Munich. A representative from Q-Cells explains about the products and the model of a private farmer becoming energy producer, converting parts of his agricultural land into a solar park with a size equaling 272 soccer fields next to each other!

Large scale photovoltaic power plants with a capacity of 1 MW and above make up less than 20% of installed capacity in Germany. These "power plants" are ground mounted and place on factory roofs. While factory roofs still have much future potential ground-mounted installations on agricultural land are discouraged and do not receive Fit any further.



Delegates watching a Thermal Solar installation at Solarlog where solar light is being focussed and water is being heated up to produce steam over a generator to produce electricity. The technology needs a clear blue sky with plenty of sunshine throughout the year as it will not be effective when cloudy. Solar thermal applications and solar thermal power plants will in the future, become a relevant competitor for PV-installations, especially as solar thermal applications allow a storage of the generated heat and can therefore feed the electricity into the grid when mostly needed, for instance during the evening or at night.

Green Products and Policies

By 2020 Germany aims to have 1 Million electric vehicles on the road. The target was given by the German Chancellor Angela Merkel. Germany is a world leader in automotives as well as a leader in green technology products. Likewise, its FIT-system plays a great importance in shaping and leading the Government's policies in promoting sustainability and green technologies. Both of these initiatives are the push-forward for the country to become a leader in producing sustainable cars and sustainable mobility.

As cars are usually parked 90% of the time, in the future cars could be powered by solar units installed at the roofs of the vehicles. During parking and charging times, the vehicles can be connected and supply electricity to the grid, f.i. during peak consumption periods.



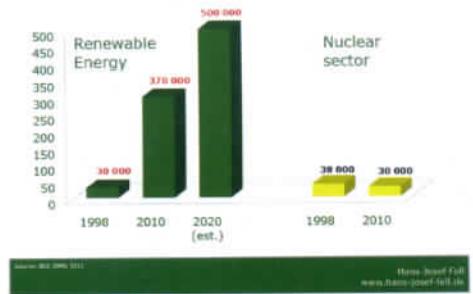
Sherina Wong from MGCC, who successfully organized June 2011's Solar and Greentech delegation to Germany is seen here with an electric car, which is driven by an employee of one of the companies visited. In Germany, the individual employees of the Greentech companies likewise live the sustainable principles in their private life, giving a good example for their next generations.

Export Price for Germany's FiT Law

Since decades, German products are highly sought after - be it automobiles, machines or tools, due to its reputation for producing high quality products. But in addition to that, Germany has lately risen as a technology leader in green technologies like solar, wind, biomass or other technologies. Hence it is comes as a pleasant surprise that perhaps Germany's most successful "export item" is not an industrial product, but a German policy! Over the last decade, the German Feed-in-Tariff, FiT (EEG), has become the "best-selling" export and was exported to over 55 countries where it was chosen, implemented and adapted to the respective local conditions. The law contributed greatly to the diversity in Germany's energy resources, and it is believed that even Europe's largest economy will exit nuclear technology and fully depend on renewable energies within the next few years. This sets a benchmark example. Thus, Sustainability is the watchword.

Figure 1 - Next to a still growing health care industry, there is no industry sector with such an amazing growth story than the GreenTech sector! Next to the energy supply, the sector creates highly-qualified and highly-paid employment opportunities.

Renewable Energy as a Job Engine in Germany



Amazing figures do speak for themselves: by 2012 Germany will have 1 Million Independent Power Producers (IPP) and these individual residences, farmers, industrial/office buildings (as for this purpose project companies are formed) earn money by "feeding into the grid" and "power" the leading European economy.

The picture shows an office building with solar units built into the windows. German energy efficiency efforts have made windows with two glass layers a standard. The latest hype is windows with three glass layers serving as dual purpose. One is to save energy and the last (outside) layer comes with incorporated solar cells, hence allowing the window to generate energy.

Residence as office concepts have changed tremendously over the recent years: A few years ago it was the non-plus ultra to become a so-called "passive house", which means that a house or building produces the energy it needs on its own from renewable energy. But as the industry is quickly progressing meanwhile the "active house" has become the watchword. It means the building produces more clean energy that it needs and sells the oversupply to the grid, materializing on the FiT and the house or factory roof serves the owner in becoming an energy producer.

Germany: 1 Million Independent Power Producers by 2012

Share of the Renewables in the gross electricity consumption in Germany

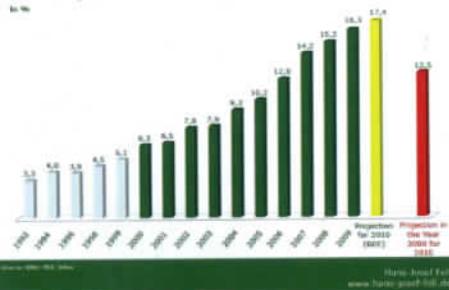


Figure 2 - Germany over the recent years did overreach the government-set target of renewable energy share due to its successful policy providing a solid market for private engagements.

In 1983, the first German grid-connected photovoltaic installation went into operation at Mibertshofen, Munich. From this moment on, renewable energies took an amazing path. By 1990, the German electricity demand was 550 TWh and only about 3.1% was generated from renewable energies, mainly from hydro power plants. It was in 1991 when the German Electricity Feed-in-Tariff law was introduced along with a 1,000 roofs photovoltaic program. By 1999 Germany started the 100,000 roof program and by the year 2000, electricity demand had a share of 6.5% of renewable energy. April 2000 was the year when the Renewable Energy Sources Act (EEG) came into effect

Germany: Energy Shift from the Fossil-Nuclear Age to the Renewable Age

with its first amendment made in January 2004 followed by the second amendment 2009. This provided further legislations for the introduction of renewable energy. By 2010 Germany electricity demand stood at 621 TWh out of which 16.4% came from renewable energy sources. Out of these, 16.4% are provided by 36% or 36.500 GWh of Wind Energy, 33% or 33.460 GWh from Bioenergy/Biomass, 19% from Hydro Power and 12% was generated by Photovoltaic. In the first half of 2011, Solar power contributed about 3% to the electricity generation becoming a major pillar of Germany's 20% renewable energy share.

By 2020 Germany estimates its electricity production to be around 600 TWh and expects 52% of it to be generated by renewable energy (43% by fossil fuels, 40% by renewable energy sources, 12 % Photovoltaic and 5 % others). Recalling the experience of recent years, in which Germany year by year over-reached its targets on renewable energy, one could believe that again these ambitious targets will be reached or even overreached.

By 2050 the complete switch of the power supply to renewable energy is scheduled at latest with wind, the sun, biomass, hydropower and geothermal being the major power resources and Photovoltaic having a projected share of around 30%.

Optimizing the Right Energy Mix with Integration

Germany's future in renewable energy resources need to be used in a complementary way, i.e. often there is a stronger wind if the sun is not shining and biomass could complement wind or sun resources during day and night time. And regional aspects of the available renewable energy resources do vary and will be used due to the local occurrence, i.e. wind energy in the north on an on- and offshore basis and more sun energy in the Southern part

of the country.

The same would apply for Malaysia. With the sun energy being available during the peak energy usage hours of the day can be complemented by hydro power and the largely available resources of biomass from the palm oil industry and other sectors.

Energy Partnerships, Smart Grids and "Electricity Highways"

...across borders

Like one province will support another with electricity supply over a grid connection, "Electricity Highways" will become the topic between countries. Over a European high-voltage DE (HVDC) transmission, grid fluctuations in power generation in one country will be offset by another country having at that time an oversupply of renewable energy. The "electricity highways" transport energy across large distances with low losses and allow materializing on its regions with higher potential to generate renewable energy at lower costs. First long distance transmission grids are in place, for instance between Germany and Norway, providing renewable energy from Germany's sun energy during day time to Norway and receiving Norway's hydro powered renewable energy during night time.



... in the region

Likewise the exchange of renewable power between the regions will be enhanced with the establishment of more sophisticated grid systems. Compared to now, when power plants generate energy without detailed knowledge on the real-time demand of the consumers, future "smart grids" will communicate between producers, traders and consumers to optimize the power production, distribution, storage and consumption and by that save energy and money.

... and at home

So called "smart meters" will access the real-time electricity prices and pass this information on to intelligent devices, which will then tailor the power consumption of the household according to the price levels. During inexpensive price periods, the programmed washing machine will start to wash the clothes when the owner is at work or sleeping. Likewise and at inexpensive periods of the day electric vehicles will be charged, while at expensive periods the oversupply of energy of the building will sell its energy to the grid at best price levels.

A Major Challenge: The Set Up of a "Smart Infrastructure"



All these changes require a major expansion and reconstruction of the power supply system as electricity is generated by numerous sources and fluctuations have to be likewise encountered. These make up tremendous challenges for the utility providers, who would have to increase their smart grid network if politicians have set the targets to increase the share of renewable energy.

Germany's tremendous rise in renewable energy had and has to be supported by a likewise rapid development of the grid which has currently a total length of 1.78 Million km with 53,708 km of ultra-high-voltage, 76,279 km of high-voltage, 507,210 km of medium-voltage and 1.16 Mill km of low voltage lines. By 2020, an expansion of high-voltage of 350-3.600 km, medium-voltage of 55,000-140,000 km and low voltage grid of 140.000 - 240.000 km is planned in order to "feed in" the increasing share of renewable energy.

The "smart grid" must absorb the many independent energy suppliers and, in the right voltage balance secure the stability of the grid. Power grids need to be extended in three different levels, the medium and low-voltage grids i.e. to accommodate the feed-ins from many PV-suppliers, the high-voltage grid must be able to bring in larger amounts of energy (wind, solar or biomass) power plants and the high-voltage electricity highway must be able to exchange energy supply and demand throughout the country or even the borders of the continent and accommodate to different seasons such as summer and winter.

Global Fossil and Renewable Subsidies 2009

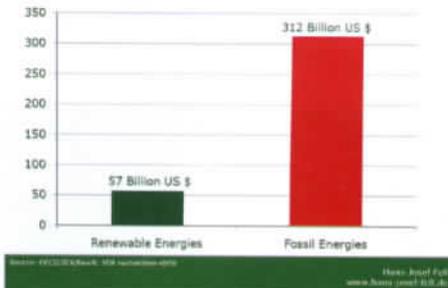


Figure 3 – Minor energy price increase to finance renewable energies (FiT) are often a political “hot topic”. It is often forgotten that fossil and nuclear energies receive much higher subsidies and often life-cycle assessments are not encountered.



“Smart (European) Cities” with energy self-sufficiency and 100% renewable energy reach are increasing and attracting residents to live in.

Malaysia

Malaysia has embarked on the right path to introduce the Feed-in-Tariff system- a system which was successfully chosen in over 55 countries worldwide. However, further commitment is needed. The initial step taken to introduce the FiT system at the end of December 2011, spearheaded by the Ministry of Green Technology, Energy, and Water (KeTTHA) is in the right direction. Thus, the responsibility needs to be likewise taken and the opportunities and chances seen by the other responsible stakeholders in the government, as with other relevant Ministries to set in the future with right frameworks for the private sector.

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Malaysia is on its best way with the implementation of the FiT scheme towards a sustainable path, and to secure a higher share of renewable energy. But besides the FiT, commitment by the other Ministries involved and the quantity of the FiT has to be increased along with a broader incentive scheme to provide the right economies of scale to allow a considerable industry to emerge.

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Refurbishing old buildings

The town's oldest and most outdated looking building was refurbished and reshaped to become a modern and useful building which has become the pride of the town.

It is just amazing what opportunity the latest technology with the right policy can produce. It is however crucial that the incentives given for 21 years are guaranteed FiT, such as tax incentives and others, for the building owners to encourage investing into making an amazing new facade and by doing so becoming an an independent Clean Power producer (ICPP).



Intersolar exhibition, 2300 Exhibitors just on Solar technology