



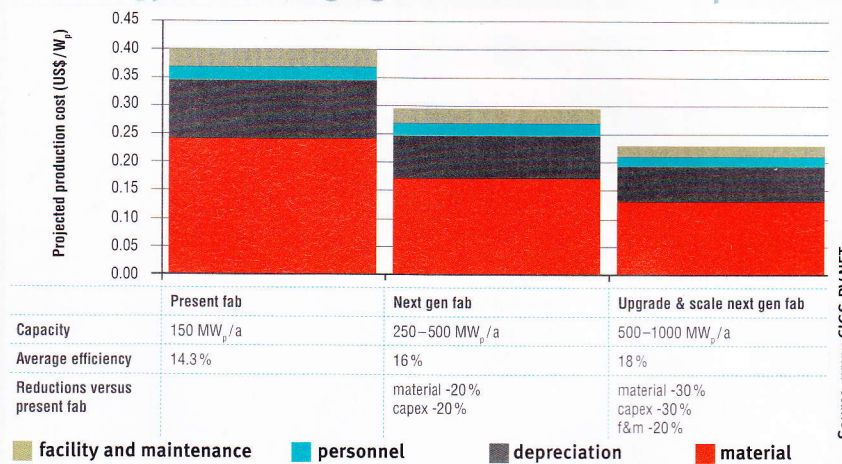
Analysts and market researchers produce a vast number of studies on how the different sectors of renewable energies have developed both globally or in selected countries. They send out their own projections on how markets for all kinds of renewable energies are set to develop. Facts and figures come into our mailbox, in an endless stream, difficult to overview. SUN & WIND ENERGY has selected several interesting ones and presents you our new Facts & Figures section.

CIGS: low cost high efficiency photovoltaics technology

The PV modules with CIGS (Cu(In,Ga)(Se,S)₂) absorbers are well positioned in the field of PV technologies with present record efficiencies for production size modules of 16,5 %. Recent progress at the cell level paves the way for progress towards total area module efficiencies of 18 %. Low cost CIGS PV modules can provide electricity below 5 €-ct/kWh (LCOE). In the longer term in combination with suitable wide bandgap absorbers CIGS can be used as bottom cell in tandem devices that enable efficiency values well beyond 30 %. These are the main findings of a study conducted by a group of international researchers and companies lead by two German research institutes, the Zentrum für Sonnenenergie- und Wasserstoff-Forschung (ZSW) and the Helmholtz-Zentrum Berlin (HZB).

Currently the biggest production units, ranging in capacity from 100 to 1,000 MW/a, are located in Germany and in Japan. These are operated at high yields well beyond 90 % over the whole value chain. At present, the total world-wide CIGS production capacity is about 2 GW/a. Even when using non-abundant elements like indium, a supply limitation is not expected below a production volume of 100 GW/a. Large area deposition and acceler-

Projected CIGS production cost using presently available technology and leveraging further cost reduction potential



ated processing combined with new CIGS facilities have the potential to yield total cost of ownership of 40 US\$-ct/W even at productions capacities as low as 150 MW/a. Costs will be continuously reduced by improving module efficiency from 14 % to 18 % and by scaling effects reducing the bill of materials (purchasing large volumes, reducing layer thicknesses and using less pure materials) and

capex. Improved productivity by next generation equipment (improved throughput, yield and availability), minimized energy consumption and optimized infrastructure will also contribute to the cost decrease. Summarizing all reduction potentials, and scaling to the multi GW/a level, CIGS technology will be able to reduce costs by another 25 % to 40 % within the near term.

Global PV market reached new record in 2015

After 40 GW of grid connected PV installations in 2014, 2015 saw a significant growth with a market reaching at least 51 GW, according to data compiled by the PV Market Alliance (PVMA). Strong growth was observed in all major markets while more emerging market started to contribute to the global growth.

China installed at least 15 GW, a 37 % increase against 2014 installations. The utility-scale segment continued to dominate the market with a share of more than 70 %. With this new record China overtook the pole position from Germany with 43 GW installed capacity.

The US market grew by 56 % in 2015 over 2014 to 9.8 GW. However, installations were to a large extent driven by ITC uncertainty and accelerated growth in the market for residential solar leases.

Europe installed about 8.5 GW,

driven primarily by a booming UK market at more than 4 GW, followed by a reduced German market at 1.4 GW.

India confirmed its growth with 2 GW installed in 2015 and positive prospects for the coming years.

A number of emerging markets on all continents started to contribute significantly to the global growth. Installations reached around 1.5 GW in other American countries and around 2.5 GW in other Asian countries, including Australia. Africa and the Middle East together contributed about 1 GW.

Analysts from Bloomberg New Energy Finance are even more optimistic about 2015 installations summarizing to 57 GW. Together with 64 GW of new wind power installations they calculate a global investment of US\$ 392 billion – an all-time global record.

Growing demand for renewable electricity with GO

The demand for renewable electricity documented with Guarantees of Origin (GO) surpassed 340 TWh in Europe in 2015. This is up more than 8 % from 2014. GO are issued electronically for the electricity generated (1 GO per MWh), traded and used by suppliers as evidence to their customers of the quality of the delivered electricity. The five countries that consume the most renewable energy are Germany, Sweden, Switzerland, the Netherlands and Italy. Together they demand three-fourths of the renewable energy used in Europe. The Netherlands is the fastest growing market. From 2014 to 2015 it has grown by 12 % and consumed more than 42.5 TWh in 2015. Germany is still the largest market with a total volume of 87 TWh in 2015. For the first time since 2011, there was a real balance between supply and demand.

Data: www.ecohz.com