

Technology and Economics of Photovoltaics in Switzerland, BFH TI Burgdorf, 30th of June 2011



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Direktor Berner Fachhochschule, Technik und Informatik, *1961, ist promovierter Physiker (Universität Basel) mit betriebswirtschaftlicher Zusatzausbildung (ETH). Er ist verheiratet und lebt mit seiner Familie in Thun. 1993 hat Dr. Rohr den Aufbau der Empa in Thun übernommen und führte die Werkstoff-technologie zu einem der erfolgreichsten Bereiche. Er ist Visiting Assistant Professor an der Universität Zagreb und seit 2004 Schweizer Delegierter im Technical Committee of COST. An der EMPA in Thun konnte Dr. Rohr in den vergangenen fünf Jahren zusammen mit rund 50 Mitarbeitenden 10 EU-Projekte, 15 KTI-unterstützte Industrietransferprojekte, jährlich etwa eine Million direkte Industrienaufträge und etwa zehn Patente realisieren.

Dr. Lukas Rohr

Welcome at BFH TI



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Urs Muntwyler got his degree as an electrical engineer at the Institute of Technology Bern - HTA Biel. He has been the co-founder and manager of the *Tour de Sol*, the first solarmobile race in the world (1985 - 1992). Muntwyler was CEO of a leading solar company in Switzerland from 1988 - 2010. Since August 2010 he works as professor for photovoltaics.

**Prof.
Urs W. Muntwyler**

Photovoltaic becoming a dominant source of electricity

In future, we have to replace the electricity from nuclear power plants by new electric energy sources. The main source in Switzerland will be photovoltaic. Some industrial leaders believe even 40% of the power production would be possible. In practice even 15-20% will be enough. The installation on houses, infrastructure and the grid integration will be discussed.



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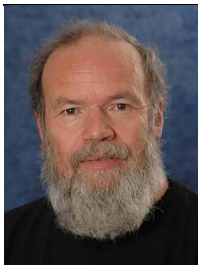
Born 1947, he graduated in Electricals Engineering at ETH (Diploma in 1971, PhD in 1978). After 2 years in the industry he was elected as a professor at the former Ingenieurschule Burgdorf, now part of BUAS. In 1987 he started with first student projects in Photovoltaics (PV). In 1988 he founded the PV laboratory at BUAS and could hire an additional assistant for PV projects. At present there are 7 persons working at this laboratory. In 24 years he has directed more than 10 major research projects and participated at 3 EU projects. The focus of his work is PV systems technology. Besides sophisticated inverter tests, EMC, lightning protection and safety an important part of his research deals with long-term energy yield and reliability of photovoltaic systems.

**Prof. Dr.
Heinrich Häberlin**

He is author of about 150 scientific papers and 3 extended books about PV systems technology. The latest one published in 2010 is being translated into English and will be published by Wiley in fall 2011.

Long-term Behaviour of Grid-Connected PV Systems over more than 15 Years

Since 1992 the PV laboratory of BFH-TI in Burgdorf has carried out several analytical monitoring projects without any interruptions with a continuously increasing number of plants and inverters. Most of the plants are in Burgdorf, but since 1993 also two high alpine plants at 3454m and 2670m are included in the project. In 2001, the PV laboratory started monitoring of the (at that time) largest PV plant in Switzerland (Mt. Soleil). Since December 2001 also a PV pilot plant with 3 different thin-film technologies (CIS, a-Si tandem cells, a-Si triple cells) has been monitored. The purpose of these long-term monitoring projects is to register all relevant influences on energy yield, degradation, reliability, and life expectancy of grid-connected PV plants, which can not be detected during relatively short initial monitoring campaigns of 1 or 2 years, that are often performed after the erection of new PV plants, but stopped later in order to save costs. For some of the plants, very long monitoring periods (without interruptions or data losses) of 15 to 19 years are available. Monitoring data of all these plants are accessible on www.pvtest.ch.



Urs Wolfer

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Urs Wolfer, Bundesamt für Energie (BFE), El.Ing. HTL in Telekommunikation und Regel-technik (1976). Verheiratet, wohnhaft in Lüterkofen SO. Aufbau des BFE-Programmes Elektrofahrzeuge (1991), Leiter des Technologiebereichs Solarenergie und der Wärmespeicherung (bis 2008), heute Marktbereichsleiter Solarenergie und KEV- PV-Technologieverantwortlicher.

Swiss feed-in tariff policy

Entwicklung vom Pioniermarkt über erste Anläufe mit FIT zur neuen Strategie des Bundesrates.



Dr. Christoph Harder

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Dr. Christoph Harder received the Electrical Engineering Diploma from the ETH in 1979 and the Master and PhD in Electrical Engineering in 1980 and 1983 from Caltech, Pasadena, USA. He is co-founder of the IBM Zurich Laser Diode Enterprise which pioneered the first 980nm high power pump laser for telecom optical amplifiers.

He has been managing during the last few years the high power laser diode R&D effort in Zurich expanding, working closely with a multitude of customers, the product range into 14xx pumps as well as 808 and 9xx multimode pumps for industrial applications. He has published more than 100 papers and 20 patents and has held a variety of staff and management positions at ETH, Caltech, IBM, Uniphase, JDS Uniphase, Nortel and Bookham.

Global data on breakeven times

Tariffs for electricity consumption and feed-in vary greatly from location to location, as they are determined by local authorities. The global PV manufacturing markets work with these differences and make use of it. The economic breakeven analysis is relatively simple (because it is local) while the energy breakeven time turns out to be very complex and challenging (because it is global). In this talk we attempt to address this challenging breakeven analysis.



Dr. Stefan Oberholzer

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Born 1974 in Basel, Stefan Oberholzer received a PhD degree in Physics from the University of Basel in the area of Nanoelectronics. After several years working in academic research abroad and in Switzerland he is since 2008 responsible for the photovoltaics and concentrated solar power research programs at the Swiss Federal Office of Energy.

The Swiss PV Research Programme



Christian Renken

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Nach dem Studium Energie- und Automatisierungstechnik mit Schwerpunkten im Bereich Photovoltaik an der Fachhochschule Konstanz (D) war Herr Renken 7 Jahre als projektverantwortlicher Assistent an der Berner Fachhochschule in Burgdorf tätig. Dort führte er im Labor für Photovoltaik bei Prof. Dr. Häberlin Langzeituntersuchungen an netzgekoppelten Photovoltaikanlagen durch. Im April 2004 trat Herr Renken seine Stelle bei 3S Swiss Solar Systems AG als Leiter Verkauf Solar Systeme an. Aktuell ist er in der Funktion als Head of 3S Photovoltaics tätig.

Photovoltaic - Common Energy Supply for the Future

3S Swiss Solar Systems ist seit Jahren der technologische Weltmarktführer für Produktionsanlagen zur Herstellung von Solarmodulen. Das Equipment für Solarmodulproduzenten wird unter der Marke 3S Modultec vermarktet.

Das Unternehmen entwickelt und produziert in Lyss unter der Marke 3S Photovoltaics darüber hinaus zukunftsweisende gebäudeintegrierte Solarsysteme 3S Swiss Solar Systems mit den Marken 3S Modultec - Module Solutions und 3S Photovoltaics - Solar Building Technologies ist ein Unternehmen der Meyer Burger Technology AG.

**Oerlikon Solar, Trübbach SG**

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Dr. Andreas Bächli, Product Manager at Oerlikon Solar, physics diploma: ETH Zürich; PhD: IAP at the University of Berne ; research fellowship: Caltech in Pasadena, Ca. Work focus on thin film coatings for photovoltaic, optics, semiconductor and tribology as well as laser micro processing. Professional career since 1995 at Balzers/Unaxis/Oerlikon: various positions in the divisions Optical Coating and Solar.

Thin film PV

Oerlikon Solar is the leading equipment turn-key supplier to the thin film silicon photovoltaic industry. In this talk we present the company and today's TF Si technology. As input to the workshop we touch the development of the efficiency, review the cost-down achievements and round up with a discussion of other contributing factors to the competitive analysis.

**Dr.
Andreas Bächli**

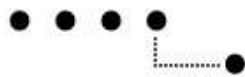
**Sputnik Engineering AG, Biel/Bienne BE**

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Seit März 2009 leitet Michael Ernst als neuer Teamcoach Sputniks zwölfköpfigen Entwicklungsbereich Zentralwechselrichter in Biel. „Bei Sputnik habe ich die Gelegenheit, ein hochmotiviertes Team zu führen“, sagt der 36-jährige Elektroingenieur und ergänzt: „Mit den SolarMax-Produkten kann ich mich sehr gut identifizieren. Außerdem gefällt mir die Firmenkultur dieses unabhängigen, dynamischen Unternehmens.“ Nach Anstellungen an der Ingenieurschule in Biel und bei ABB in Mexiko arbeitete Ernst zehn Jahre lang bei einem Schweizer Hersteller von Hörgeräten.

Electronic interface from PV module to wall-plug

Michael Ernst



Berner Fachhochschule

Technik und Informatik

 energie-cluster.ch

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