

# ThinFilmSolar

*Driving the thin film movement forward*

Le Meridien, San Francisco, USA • 28-29 April 2009



## Learn from Industry Thought Leaders:



**Thomas Baruch**  
*Founder & Managing Director*  
**CMEA Ventures**



**Nolan Browne**  
*Managing Director*  
**MIT-Fraunhofer Center for Sustainable Energy Systems**



**Bernhard Dimmler**  
*Chief Executive Officer*  
**Würth Elektronik Research**  
*Managing Director, Research & Development*  
**Würth Solar**



**Rajeeva Lahri**  
*Chief Executive Officer*  
**Signet Solar**



**Tony Saxton**  
*Chief Executive Officer*  
**FTL Solar**



**Thomas Seitz**  
*Partner*  
**McKinsey & Company**

## Plus Insight and Analysis from:

- ▶ **Michael Allman**, *President*, **Sempra Generation**
- ▶ **Christopher Beitel**, *Managing Director*, **Applied Materials**
- ▶ **Benny Buller**, *Director of Device Improvement*, **First Solar**
- ▶ **Steven Chan**, *Chief Strategy Officer*, **Suntech America**
- ▶ **Matt Cheney**, *Chief Executive Officer*, **MMA Renewable Ventures**
- ▶ **Tom Djokovich**, *Chief Executive Officer*, **XsunX**
- ▶ **Michael Gering**, *Chief Executive Officer*, **Global Solar Energy**
- ▶ **Paula Mints**, *Associate Director*, **Navigant Consulting**
- ▶ **Dr. Mohan Misra**, *Chief Executive Officer*, **ITN Energy Systems**
- ▶ **Dr. Brian Murphy**, *Chief Executive Officer*, **PrimeStar Solar**
- ▶ **Dr. Henning Wicht**, *Senior Director and Principal Analyst, Photovoltaics*, **iSuppli**
- ▶ **Abe Yokell**, *Principal*, **RockPort Capital Partners**
- ▶ **Dr. Hein van der Zeeuw**, *Chief Executive Officer*, **Oderson**

## Gain an in depth understanding of the Thin Film market:

- ✓ Understand the current status and potential of the Thin Film market
- ✓ Network with industry leaders
- ✓ Learn from case studies on improving the efficiency and reliability of Thin Film
- ✓ Hear about the latest innovations in the applications of Thin Film
- ✓ Benefit from a series of interactive panel discussions where you have the opportunity to quiz those in the know
- ✓ Gain insight into Thin Film development outside of the United States

### PLUS

*Pre-Conference Training Course:*  
**An Introduction to Solar Technology and Markets for Non Engineers**

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**SolarGlobalSeries**

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# ThinFilmSolar



As part of the highly successful Green Power Conferences **Solar Global Series**, we are now pleased to announce our **Thin Film Solar** conference, bringing together industry thought leaders and key stakeholders to drive forward the development of the industry.

The **Thin Film** industry has witnessed rapid expansion and manufacturers are now looking to identify ways to sustain that growth and meet expansion targets in a difficult economic climate. There has been impressive investment into thin film technologies but as the global downturn engulfs the financial markets, the industry will face some of its toughest challenges yet.

Through a series of interactive panel discussions and case studies, experts will share their strategies for ensuring the continued development of **Thin Film** solar projects. This is a must attend for those involved in module and cell manufacturing, technology innovation, equipment supply, financing, utilities, energy policy and installation.

## Hear what past delegates have had to say about our Solar Global Series events:

“ I learnt a lot from the conference in terms of the market drivers, new technologies and financing. ” ABENGOA

“ Informative, good overview. ” VATTENFALL

## Companies who have attended the Solar Global Series include:

Abengoa • AdvanceSis • ARKchem • BP • BSW-Solar • Cagayan Electric Power & Light Co • CEN (European Standards) • CREST • Dresdner Kleinwort • ECOSTREAM • Edwards Vacuum • Ellinas Wind Project Holding • Elnett International • Environmental Technologies International Corporation • European Investment Bank • Evolvec • GE Energy • GNA Communications • Group IPS • Heren Energy • IDC • IDTechEx • iEnergies AS • IMPERIAL • Industrial Fuels & Power • Invest In Germany • Investec • ITW • JTC Corporation • Macquarie • Magenta Partners • Mahindra & Mahindra • McKinsey • Nanosolar • NaREC • Neo Energia SL • NetCrystal • New Energy Finance • NextEnergy Capital • Norconsult AS • Nuon Helianthos • Optic Technium • Optimus Patents • Polysolar • Portuguese Trade & Investment Office • PSE AG • Qatar Petroleum • Q-Cells • Ruston Whebe • Sertec Energy • SgurrEnergy • Sharp, Solaire Direct • SOLAR • Solar Century • Solar Ventures • Solimpeks • SUNTECH-POWER • Total SA • Trina Solar • UK Trade & Investment • WISE India • XinAo • Yingli Green Energy Europe

## Sponsorship & Exhibition Opportunities

Sponsor **Thin Film Solar** and benefit from:

- ▶ **1st class lead generation:** meet companies actively working in the Thin Film Solar industry
- ▶ **Enhanced brand profile:** pre-event promotional campaign plus extensive on site branding
- ▶ **Excellent publicity:** gain an incredible amount of presence from on site promotion
- ▶ **A cost effective marketing solution:** our development team will be happy to customise a package and develop a cost effective marketing channel to generate new sales leads

Sponsorship options for **Thin Film Solar** offering varying levels of branding and exposure are available to suit budgets and marketing aims. Contact **Ben Leighton** for further details:

Tel: +971 4 8135211

Fax: +44 207 900 1853

Email: [ben.leighton@greenpowerconferences.com](mailto:ben.leighton@greenpowerconferences.com)

## Endorsed By:

**AltaTerra**  
RESEARCH NETWORK



**EuPD Research**

| International Solar

## Who Will You Meet?

- ▶ Thin Film cell and module manufacturers
- ▶ Thin Film installers & plant owners
- ▶ Technology innovators
- ▶ Equipment suppliers
- ▶ Utilities
- ▶ Semiconductor companies
- ▶ Investors
- ▶ Industry analysts & press
- ▶ Government representatives

## Enhanced Delegate Networking

One of the fantastic new features of **Thin Film Solar** is the online networking system – all pre-registered delegates, speakers and guests can contact each other, organise meetings and network before, during and after the event using this easy to use, private networking system. For more information, please visit the website.

[www.greenpowerconferences.com](http://www.greenpowerconferences.com)

## SolarGlobalSeries

This event is the 7th edition in the **Solar Global Series**. This series is an annual calendar of events covering the range of solar technologies and focusing on different sector developments such as solar power generation, solar architecture and solar investment.

The series provides an excellent platform to do business with solar industry leaders around the world and develop your business. These events have an excellent track record of attracting senior representative from the whole solar value chain.

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08.15 Registration & welcome coffee

09.00 Chair's opening remarks

## Keynote Session – The Current Market and its Development

The state of the current market will be assessed through a series of brief presentations and in-depth discussion. Get a clearer understanding on where the industry is headed and how it is evolving.

09.10 **The Evolution of Thin Film – Market Status**

- ▶ Thin Film's impact on the PV industry
- ▶ How is the thin film landscape changing?
- ▶ Global supply and demand
- ▶ Potential vs. projected production
- ▶ Assessing the expansion plans of the thin film industry
- ▶ Competing with crystalline
- ▶ Expanding existing markets

### Expanding into Thin Film

**Steven Chan**, Chief Strategy Officer, **Suntech America**

### Perspectives on Thin Film & Solar Market Development

**Thomas Seitz**, Partner, **McKinsey & Company**

### Thin Film's Competitiveness with Crystalline Silicon

**Nolan Browne**, Managing Director, **MIT-Fraunhofer Center for Sustainable Energy Systems**

10.30 Networking refreshment break

11.00 **Panel Discussion with Brief Case Studies Investment into Thin Film as the Credit Crunch Bites**

- ▶ The current state of investment
- ▶ Venture capital investments
- ▶ Encouraging investors
- ▶ New funding avenues, where is capital still available?
- ▶ How is project finance changing?
- ▶ Overcoming the obstacles to investment
- ▶ What is the overall outlook?

Moderated by: **Nathaniel Bullard**, Senior Associate, **New Energy Finance**

### Commercial Solar Projects and the Prospects for Thin Film

**Matt Cheney**, Chief Executive Officer, **MMA Renewable Ventures**

### Transformative Approaches in Thin Film at Solyndra

**Thomas Baruch**, Founder & Managing Director, **CMEA Ventures**

### Key Drivers for Investment

**Abe Yokell**, Principal, **RockPort Capital Partners**

## Addressing the Key Challenges Facing the Development of the Thin Film Market

This session will examine the challenges that the industry is confronting. It will look at what steps can be taken to remove any potential barriers to the advancement of the thin film movement.

12.00 **Panel Discussion – Answering the Critical Questions**

- ▶ How can you improve the efficiency of thin film?
- ▶ How can you drive down the BOS costs?
- ▶ What about reliability issues for flexible substrates?

**Dr. Jeffrey J Urban**, Associate, **Lawrence Berkeley National Laboratory**

**Danielle Merfeld**, Leader, **Solar Technologies Platform, GE Global Research**

**Benny Buller**, Director of Device Improvement, **First Solar**

**Dr. Henning Wicht**, Senior Director and Principal Analyst, **Photovoltaics, iSuppli**

12.45 Networking lunch break

## Market Applications & Customer Perspectives

14.15 **Panel Discussion with Brief Case Studies The Applications of Today's Thin Film**

- ▶ In which markets is thin film more competitive than crystalline modules?
- ▶ Early thin film markets and niche applications
- ▶ Different technologies for different markets?
- ▶ The role that thin film can play in green building

Moderated by: **Paula Mints**, Associate Director, **Navigant Consulting**

### Thin Film in the Military

**Dr. Mohan Misra**, Chief Executive Officer, **ITN Energy Systems**

**Tony Saxton**, Chief Executive Officer, **FTL Solar**

### Thin Film in Space-Bound Applications

**Kevin Reed**, Chief Marketing Officer, **Welsom Space Power Consortium**

### Thin Film in the Utility Sector

**Michael Allman**, President, **Sempra Generation**

### Thin Film in BIPV Projects

**Michael Gering**, Chief Executive Officer, **Global Solar Energy**

15.20 Networking refreshment break

## Key Drivers for Emerging Players

15.45 **Panel Discussion Feed-in Tariffs and Government Support**

- ▶ What is still needed?
- ▶ The impact of the DoE's Solar Initiative
- ▶ US Investment Tax Credit
- ▶ Emerging policies and initiatives
- ▶ The Californian perspective
- ▶ New revenue streams

**John Lushetsky**, Manager, **Solar Energy Technology Program, U.S Department of Energy**

**Jon Guice**, Managing Director, **AltaTerra Research**

**James W. McTarnaghan**, Partner, **Duane Morris**

16.30 **Panel Discussion with Brief Case Studies Thin Film Rising Stars**

- ▶ Experts and promising thin film manufacturers lay out their plans, hopes and fears for the coming 12 months

**Dr. Lloyd Tran**, Director, **Clean Tech Institute** and President, **International Association of Nanotechnology**

**Dr. Brian Murphy**, Chief Executive Officer, **PrimeStar Solar**

**Tom Djokovich**, Chief Executive Officer, **XsunX**

17.30 Close of day one & networking drinks

08.30 Welcome coffee

09.00 Chair's opening remarks

## Assessing the Technology and Materials

### 09.10 Panel Discussion What Does the End of the Silicon Shortage Mean for Thin Film?

- ▶ Assessing price and price advantage
- ▶ Which applications will be most affected?
- ▶ What new challenges will thin film face?
- ▶ Developing a business strategy to prepare for market changes
- ▶ Avoiding and preparing for a bottleneck in the supply of raw materials for thin film

**Jon Guice**, *Managing Director, AltaTerra Research*

**Bernhard Dimmler**, *Chief Executive Officer, Würth Elektronik Research, Managing Director, Research & Development, Würth Solar*

**Dr. Lloyd Tran**, *Director, Clean Tech Institute and President, International Association of Nanotechnology*

### 10.00 Multiple Case Studies and Discussion Semiconductors and Disposition Techniques

**Amorphous Silicon**  
**Christopher Beitel**, *Managing Director, Applied Materials*

**CdTe**  
**Dr. Brian Murphy**, *Chief Executive Officer, PrimeStar Solar*

**CIGS**  
**Michael Gering**, *Chief Executive Officer, Global Solar Energy*

Discussion with audience questions:  
**Which material will lead the way in thin film development?**

**11.00 Cost Reduction RoadMap at First Solar**  
**Benny Buller**, *Director of Device Improvement, First Solar*

11.15 Networking refreshment break

**11.45 Panel Discussion  
An Examination of Per Watt Pricing**  
▶ How does thin film stack up against polycrystalline per watt pricing?  
▶ What does this mean for the future of thin film?  
▶ Energy yield vs. power rating

**Nathaniel Bullard**, *Senior Associate, New Energy Finance*  
**Thomas Maslin**, *Solar Analyst, Emerging Energy Research*  
**Daniela Schreiber**, *Head Of Research, EuPD Research*

## Regional Focus – Beyond the United States

This session will offer an excellent insight into what is going on in thin film manufacturing outside of the United States. Case studies will be presented from manufacturers in both Asia and Europe.

**12.30 Asia as the Emerging Thin Film Power House**  
**Cyril Saidah**, *North America & Europe Sales Manager, QS Solar, China*

12.50 **Europe Stands Firm**

**Bernhard Dimmler**, *Chief Executive Officer, Würth Elektronik Research, Managing Director, Research & Development, Würth Solar*

13.15 Networking lunch break

## Scalability

### 14.30 Panel Discussion with Brief Case Studies Debating Turnkey Developments and Increasing Scalability

- ▶ Fully automated and semi-automated Technology
- ▶ Increasing the size of modules
- ▶ Realizing potential through scalability
- ▶ Shifting to large scale gigawatt manufacturing
- ▶ Economies of scale

**Christopher Beitel**, *Managing Director, Applied Materials*

**Dr. J. Manjunathaiah**, *Vice President Business Development – Solar, MAG Industrial Automation Systems*

**Dr. Hein van der Zeeuw**, *Chief Executive Officer, Odersun*

15.30 Networking refreshment break

### 16.00 Panel Discussion Grid Parity and Future Outlook

- ▶ Defining 'grid parity'
- ▶ Are we there yet?
- ▶ What are the key factors and conditions to consider?
- ▶ What actions are needed to achieve grid parity?

**Daniela Schreiber**, *Head of Research, EuPD Research*

**Rajeeva Lahri**, *Chief Executive Officer, Signet Solar*

**Danielle Merfeld**, *Leader, Solar Technologies Platform, GE Global Research*

16.45 Chair's closing remarks

17.00 Close of conference

Agenda correct at time of going to press. Please see the website agenda for the latest details.

## FORTHCOMING EVENTS

GulfSolar

*Harnessing the potential of solar power  
in the Middle East*  
Dubai, United Arab Emirates • 6-7 May 2009

Grid Parity  
Solar Economics Forum

*An in-depth investigation on solar finance,  
investments, markets, costs and technology*  
London, UK • 16-18 June 2009



## COURSE OBJECTIVES

Whether you are brand new to the industry or simply want to refresh and update your knowledge, this one-day training course is designed to help you understand the fundamental aspects of the Solar PV energy industry. A focus will be provided onto thin-film technologies and markets, but the course will first outline the fundamental principles behind *any* PV system, in order to understand thin-film within its market and wider competitive context.

You can use the course as a self-contained session or as an opportunity to gain a basic level of understanding and confidence to help you gain most benefit from the **Thin-Film Solar Conference** taking place on the two days following.

### Style & Level

The course will be run in an informal manner which allows and encourages time for discussion and questions, ensuring that participants get the most out of the day.

Although important scientific principles are included (and some simple calculations may be used to illustrate the topics), no prior scientific background is assumed. The course is therefore ideal for those in commercial, marketing, senior management and other non-technical functions – those who wish to understand the basic principles and the impact of technologies on market opportunities, without being swamped by technical detail.

### Course Timetable:

08.00 Registration & Coffee

09.00 Start of Course

17.30 Close of Course

*(includes lunch plus morning and afternoon refreshment breaks)*

## ABOUT YOUR TRAINER

**Dr John Massey** is Green Power Academy's Training Director and combines a strong academic science background with over fifteen years experience researching and analysing technology industries and trends in the commercial sector. He has delivered training all around the world, in particular explaining the workings, commercial context and implications of rapidly evolving technologies to senior, non-technical executives. He has also developed educational material for both live and distance learning courses.

Following a 1st Class Honours degree in Natural Sciences from the University of Cambridge, John gained a PhD in Earth Sciences and has since undertaken further study in topics ranging from Economics to Innovation & Sustainability.



## AGENDA DETAILS

### Key concepts in understanding Solar Technology & its Potential

- ▶ An introduction to some key energy concepts and measures:
  - ▶ Energy, work and power
  - ▶ Energy conversion and efficiencies
- ▶ The Solar resource & its Applications
  - ▶ The fundamentals of Solar Radiation and the size and variability of the resource
  - ▶ Applications in on- and off-grid solar PV, with a focus on thin-film
  - ▶ Basics of the The Grid and the potential of thin-film and other PV to supply it

### Photovoltaic (PV) Principles

- ▶ How solar cells work:
  - ▶ the photovoltaic effect
  - ▶ PV materials
  - ▶ PV cell designs and their commercial evolution
  - ▶ Measuring and improving cell efficiencies and performance
- ▶ Focus on thin-Film technologies:
  - ▶ Silicon thin-films (both crystalline and amorphous)
  - ▶ CIGS
  - ▶ Cd-Te
  - ▶ GaAs
  - ▶ ... plus variations and other, emerging technologies
  - ▶ Technology choice vs. applications and economics

### From Cells to Systems

- ▶ PV systems: from cells to modules to systems
- ▶ The balance between performance/efficiency and ease/cost of manufacture
- ▶ Understanding full system costs, including non-solar elements (BOS)
- ▶ PV concentrators for on-grid solar power
- ▶ Case studies and examples

### A Solar PV Market Outlook & Review

- ▶ A review of today's thin-film PV Market: market size, key players and trends
- ▶ Solar market drivers, economics and hurdles:
  - ▶ supply-side issues
  - ▶ competition
  - ▶ regulation
  - ▶ consumer / social factors
- ▶ Major market trends and indicators

## ABOUT GREEN POWER ACADEMY

**The Green Power Academy** has been established to provide the quality, impartial, informative and enjoyable training needed to increase and distribute knowledge and skills to green energy industry professionals.

Whether you are new to the industry, have recently changed jobs or simply wish to refresh your knowledge, our training should become a key part of your personal or company professional development programme.

If you are interested in learning more about what we offer and wish to keep up-to-date as new course dates and topics are added to our programme, please bookmark and register your interest at:

[www.greenpoweracademy.com](http://www.greenpoweracademy.com)

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## Media Partners:



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If you would like to partner with us, please contact [ryan.winchester@greenpowerconferences.com](mailto:ryan.winchester@greenpowerconferences.com)

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**Green Power Conferences** was established in 2003 by a team of professional, environmentally aware event experts and were the first to offer professionally organized events focusing on the sustainability sector. Over the last five years, we have welcomed over 8000 delegates from 82 countries and built a global database of 250,000+ contacts. Our expertise lies in producing high quality, interactive conferences that provide ample networking opportunities for delegates and

partners alike. Green Power Conferences offsets the impacts of its commercial activities towards renewable energy projects.

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## Please register me for

### Standard Rates

Two Day Conference + Workshop  
(27-29 April)  US\$2799

Two Day Conference only  
(28-29 April)  US\$1999

Workshop only  
(27 April)  US\$1099

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Register 3 delegates, only pay for 2

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(27-29 April)  US\$2239

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Workshop  
(27 April)  US\$879

Note: Non Profit Rates are available for registered NGO's, government representatives and non profit organisations only. Discounts are at the discretion of Green Power Conferences and proof of status may be requested.

## Delegate Details

	Name	Job Title	Telephone	Business email
1				
2				
3				

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**Bank Address: Herrengasse 12, FL-9490 Vaduz, Liechtenstein**  
**Account Name: GP Conferences Ltd**  
**Account Number: 0192568AC**  
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**Confirmation:** You will receive confirmation of your booking by email. If you do not receive anything within 48 hours, please contact info@greenpowerconferences.com to ensure we have received your booking.

**Cancellations:** If you cancel before April 14 2009, you will receive a refund less US\$300 administration charge. We regret that no cancellations can be accepted after this date. Substitutions are welcome at any time.

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## Venue

**Le Meridien**  
333 Battery Street, San Francisco, USA CA 94111  
Tel: +1 415 296 2900

Registered delegates will be sent suggested accommodation details.