



*Project development:
Co-operation between MENA and the EU”*

*Dii annual Conference
November 2/3 2011, Cairo, Egypt*

**Karim Asali
Technical Development Manager**



First Solar Offerings

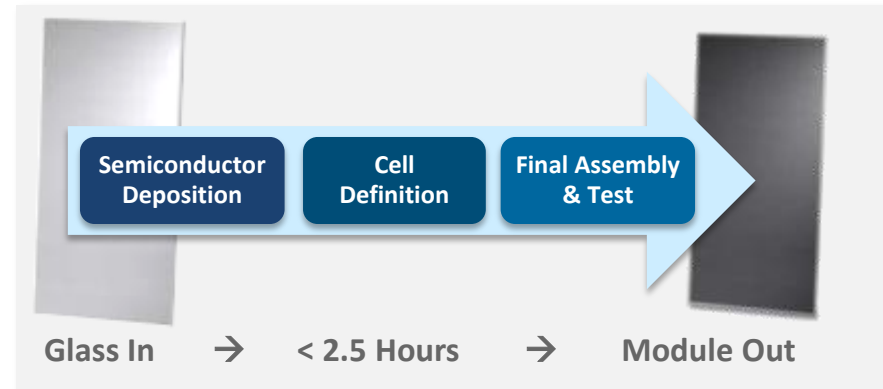


Module Manufacturing

- Breakthrough thin-film process technology
- Fully integrated, continuous process
- Continuous cost reduction driven by productivity and technology improvements

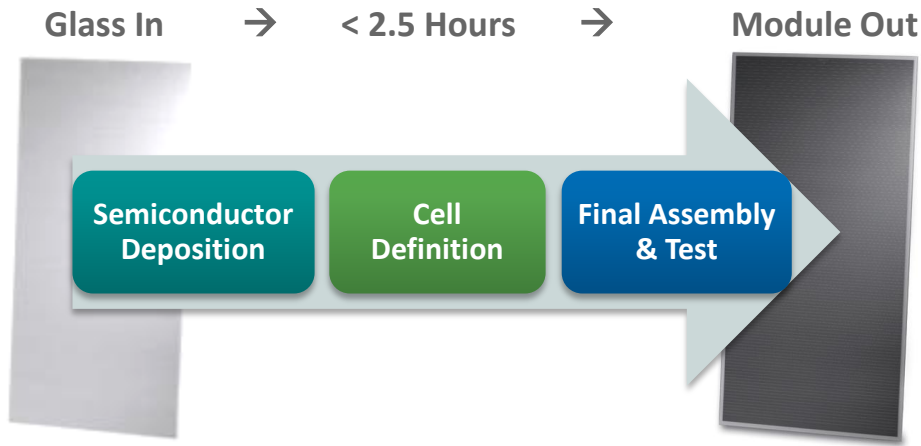
Systems Solutions

- Utility-scale PV systems
- Project and site development capabilities
- Rooftop and commercial and industrial solutions
- Engineering, procurement, and construction capabilities (turnkey solution)
- Monitoring and maintenance program—predictable lifetime expenses



PV Module technology & manufacturing

First Solar Fully Integrated, Automated and Continuous Thin Film Process



- 98-99% reduction in semiconductor material
- Fully integrated, continuous process vs. batch processing
- Large 60 x 120cm (2' x 4') substrate vs. 6" wafers

Conventional Crystalline Silicon Batch Technology



Track Record and Bankability



Modules Shipped

~4.5 GW¹

EPC Installed

450 MW¹

EPC Under Construction

2.3 GW¹

¹ As of September 2011; all data in DC.

© Copyright 2009, First Solar, Inc.

Banks that Back First Solar's Technology



J.P.Morgan

Bank of America

Morgan Stanley

CIMB BANK

LB \equiv BW



SOCIETE GENERALE



COMMERZBANK



Piper Jaffray

HSBC



COWEN GROUP

HypoVereinsbank
UniCredit Group



CREDIT SUISSE

CRÉDIT AGRICOLE

Deutsche Bank



Helaba
Landesbank
Hessen-Thüringen



UniCredit

DKB
Deutsche
Kreditbank AG

citibank



HSH NORDBANK

NORD/LB



Bayern LB

NATIXIS



Maybank

lcm LAZARD CAPITAL MARKETS

ThinkEquity LLC
A Panmure Gordon Company

GLEACHER & COMPANY

Example of First Solar Utility Systems

First Solar-Developed Projects



Site	Sarnia, Ontario, Canada
Distinction	World's largest PV Project
System Size	80MW AC
Project Developer	First Solar, Inc.
EPC Contract	First Solar, Inc.
Owner	Enbridge Inc.

Partner-Developed/ First Solar EPC Projects



Site	El Dorado/Copper Mountain, Nevada, USA
Distinction	Largest PV project in U.S.
System Size	58MW AC
Project Developer	Sempra Energy
EPC Contract	First Solar, Inc.
Owner	Sempra Energy

Solar sector addresses real and growing challenges



Power/ energy challenges

- **MENA has large and growing power needs** with capacity gaps for domestic electricity, desalination and industry

Economic challenges

- **True cost of oil/gas-generated electricity hidden by subsidies;** solar price is close to being competitive or even has reached it in certain areas and applications
- Energy Exporters needs to address the opportunity costs
- Energy importers need to reduce their energy bills portion of GDP
- **Oil/gas-generated electricity depletes strategic resources** which is critical for other industries and exports.

Political challenges

- **MENA needs to create jobs for a growing population**
- Renewable energy preserves oil reserves & energy independence - critical for national security in a volatile region
- Subsidies for oil and gas-generated electricity are difficult to remove directly

Environmental challenges

- MENA and GCC in particular have massive CO2 emissions (avg. 4.6 tons/capita vs. 2.6 in Germany)
- Scarcity of water and air pollution is worsening

Migration of Solar Markets

Mission: *Enable a world powered by clean, affordable solar electricity.*

- Target: LCOE at peak electricity price parity of \$.10-.12/kWh
- Acceptable ROE for Asset Owner

Existing Markets

- Subsidy dependent
- Finite markets
- FiT digressions

Transition Markets

- FiT digression towards parity
- Gov. policy incentives
- Price elasticity
- Minimize LCOE and max energy yield
- Add solutions/technology/capacity
- Technology adoption
- Grid infrastructure and institutional development

Sustainable Markets

- Fossil fuel peak price parity
- Minimal subsidy
- Grid integration/stability
- Environmental sustainability
- Price to access peak electricity mkt
- Leverage technology/solution cost declines and sustainability
- Add capacity to satisfy demand

**FSLR
Leadership
Strategy**

- Scale volumes to reduce cost
- Price to enable throughput
- Long-term contracts
- Grow penetration

Advantages and their implications on Project Development



Development and Installation	Performance and Sustainability	Financing
<ul style="list-style-type: none">• Short project development cycle• Most topographies possible – does not require flat land• No gas pipelines nor water infrastructure required• Simple, rapid installation (0.5-1 MW / day) – no moving parts• Highly modular and flexible construction• Parallel development of several sub-plants possible• Flexibility for gradual expansion of system and transmission lines• Proximity to consumers• Time of day production	<ul style="list-style-type: none">• No use of water, gas or oil during operations• No emissions or waste• Low carbon footprint• Highly reliable, simple system with few components• Low maintenance (no moving parts)• Low sensitivity to dust, humidity and strong winds• No geographical restriction due to quality of radiation: works with global radiation / diffuse light• Recycling and reuse of 90% module weight and 95% of semiconductor	<ul style="list-style-type: none">• Modularity allows incremental financing• High fixed, low variable cost investment• No commodity price risk post construction• Low operating and maintenance cost• Largely pre-funded end-of-life treatment (module recycling prefunded by FS)• Highly predictable and stable cash flow

Challenges and their implications on Project Development



Regulatory framework	Business Environment	Technical Environment
<ul style="list-style-type: none">• Address the real costs of fossil generated power while considering both elements of subsidies and addition of value of solar generated power to enable apples with apples comparison• Adapt local laws to allow new generator entrants to contribute and play a role in the energy mix• RE to obtain priority in feeding into the grid• Allow RE grid integration	<ul style="list-style-type: none">• Communicate existing track record of utility scale experience in similar geographies• Change mind set of utilities to open up to new types of power generation• Project Finance:<ul style="list-style-type: none">- Share experience of European and US banks financing RE with MENA banks (DSCR requirements...etc.)- Share experience of investors on low risk profiles of RE• Capacity building to enable job creation on lowering costs	<ul style="list-style-type: none">• Address and educate the utilities that RE can actively contribute to grid stability (reactive power, voltage control, power control...)



Source: Gehrlicher Solar, Solarpark Salmdorf

شكرا لإصغائكم

