CoreNet Global Summit

#17 Around the Globe in 90 Minutes: Alternative Energy Manufacturing – What, Where, Why, How?

Moderator:

Andy Shapiro, Biggins Lacy Shapiro & Co

Speakers:

Dennis Donovan, Wadley, Donovan, Gutshaw Consulting
Dennis Meseroll, Tractus Asia
René Buck, Buck Consultants International
Dr. Gerald Fine, Schott North America, Inc.

CONVENING 윤**CHANGE**





Welcome and Introduction to Workshop

Welcome to Workshop

- Alternative Energy Equipment Manufacturing
 - o What
 - \circ Where
 - \circ Why
 - \circ How

Purpose

- Define a fast growing industry
- Understand industry locational needs
- More effectively service companies
 - o Internal CRE's
 - o Service Providers
 - Economic Development Organizations (EDOs)



Workshop Content



A: Industry definition, operating requirements & Illustrative companies

- (Dennis Donovan)
 - Solar
 - Wind
 - Biomass

B: Location criteria & Incentives role

- North America (Dennis Donovan & Andy Shapiro)
- Asia (Dennis Meseroll)
- Europe (Rene Buck)

C: Case Study (Dr. Gerald Fine)

- Schott Solar
- Albuquerque Plant



Our Moderator and Speakers

Moderator & Speaker:

Andy Shapiro from Biggins Lacy Shapiro & Company LLC, Partner/20+ yrs experience

- Incentives
- Public policy
- Land use
- North America Focus

Speakers:

Dennis Donovan from Wadley-Donovan-Gutshaw Consulting, Partner/35 yrs experience

- Site Selection
- Logistics
- HR Mobility
- Americas Focus

Dennis Meseroll from Tractus, Partner/20 yrs experience

- Site Selection
- Market Analysis
- Market Entry
- Logistics
- Asia Focus



Additional Speakers



Rene Buck from Buck Consultants International, President/25 yrs experience

- Site Selection
- Logistics
- Incentives
- EMEA focus

Dr. Gerald J. Fine from Schott North America, Inc. President, 25 yrs/Industry/academia

- Bachelor's, Amherst College
- Phd., CA Institute of Technology
- EVP, Corning
- Boston University, Professor, Department Manufacturing engineering
- Nine patents

About The Global Location Partners

- Formal Alliance
- Worldwide Reach
- Industry Spectrum
- Including Renewable Energy



Q&A and Post Event Recap



Additional Factors:

These are additional factors that we will not be able to address due to the time.

- Energy savings/storage devices, such as
 - •Batteries
 - •Capacitors
 - •Flywheels
- Fuel Cells
- Geothermal

Questions/Answers after Speaker Presentations Post- Event.

You can find this presentation on CoreNet Website after the conference. For more information, visit our websites. www.BLSstrategies.com www.tractus-asia.com www.wdgconsulting.com www.bciglobal.com



Industry Definitions

- 1. Solar
 - Casting/Wafer
 - Cell Manufacturing
 - Photovoltaic
 - Thin Film
 - Module Assembly
 - Systems Assembly (at customer site)
- 2. Wind
 - Base (assembled at wind farm site)
 - Tower
 - Blade
 - Nacelle
 - Other Components
 - Small Scale Wind Turbines
 - Smaller blades
 - Smaller facilities
 - Turbine assembly (at wind farm site)







Industry Definitions

3. Biomass

Renewable Energy From

- Living Cells
- Recently Living Cells
- Sample Raw Materials such as:
 - •Corn
 - •Sugar Cane
 - •Barley
 - •Switchgrass
 - •Sorghum
 - •Trees
 - •Wood Chips
 - •Algae
 - •Municipal Waste
 - •Landfill gas

- •Animal Waste
- •Cellulosic
 - •Utilizes non-edible
 - •Leaves Edible
 - •Emerging
- •Typical Output
 - •Methane Gas
 - •Ethanol
 - •Biodiesel
 - •Co-generation









Critical Operating Requirements: Solar



Requirement	Casting	Cell	Module Assembly	System Assembly
Capital Investment	\$1 billion	\$100-\$200 million	\$25-\$45 million	\$0.5-\$1.5 million
Site (Acres)	300+	75-150	15-30	3-6
Building				
Size (sf)	750,000	500,000	250,000	15,000-30,000
Ceiling Height	25'	25'	25'	25'
Transportation				
Four lane highway	Yes	Yes	Yes	Yes
Rail Service	Yes	Desirable	Yes	No
Motor Courier Service	Yes	Yes	Yes	Yes
State width/length				
Restrictions	N/A	N/A	N/A	N/A
Electric Power (KW)	13,000	2,000	1,500	500
Electric Power (kWh)/Month	8.5 million	1.2 million	750,000	50,000



Cont'd Critical Operating Requirements: Solar



Requirement	Casting	Cell	Module Assembly	System Assembly
Natural Gas Consumption (MCF)	175,000	20,000	12,000	2,500
Water Consumption	5 mgd	0.5 mgd	0.3 mgd	0.1 mgd
Labor				
Engineer	50	25	25	5
Technician	150	125	75	15
Production	250	150	125	10
Other	50	50	25	5
Subtotal	500	350	250	35
Raw Materials	Polycrystalline Silicon	Silicon wafers or photovoltaic materials	PV cells, glass	Cell modules



Critical Operating Requirements: Wind



Requirement	Towers	Blades	Nacelles
Capital Investment	\$150-\$250 million	\$100-\$200 million	\$50-\$100 million
Site (Acres)	100-200	100-200	35-65 acres
Building			
Size (sf)	200,000-400,000	250,000-500,000	100,000-300,000
Ceiling Height	30'-40'	50'-60'	25'
Transportation			
Four-lane highway	Yes	Yes	Yes
Rail Service	Yes	Yes	No
Motor Carrier Service	Yes	Yes	Desirable
State width/length			
Restrictions	Yes	Yes	N/A
Electric Power (KW)	3,000	2,500	2,000
Electric Power (kWh)/Month	1.5 million	1.2 million	1.0 million



Cont'd: Critical Operating Requirements: Wind



Requirement	Towers	Blades	Nacelles
Natural Gas Consumption (MCF)	26,000	18,000	10,000
Water Consumption	0.3 mgd	0.4 mgd	0.2 mgd
Labor			
Engineer	25	20	25
Technician	100	100	75
Production	200	250	125
Other	25	30	15
Subtotal	350	400	240
Raw Materials	Steel	Composite materials (e.g., fiberglass and sometimes aluminum or wood)	Generator, electronic controls, steel, copper cables



Critical Operating Requirements: Biomass



Requirement	
Capital Investment	\$25-\$75 million
Site (Acres)	75-150
Building	
Size (sf)	100,000-200,000
Ceiling Height	25'
Transportation	
Four-lane highway	Yes
Rail Service	Yes
Motor Carrier Service	Yes
State width/length	N/A
Restrictions	
Electric Power (KW)	2,500
Electric Power (kWh)/Month	1.6 million



Cont'd: Critical Operating Requirements: Biomass



Requirement	
Natural Gas Consumption (MCF)	75,000
Water Consumption	0.7 mgd
Sewer Treatment	0.5 mgd
Labor	
Engineer	5
Technician	30
Production	150
Other	15
Subtotal	200
Raw Materials	Plants/crops, animal waste, municipal waste, wood chips



Key Locational Criteria: Solar (High, Med., Low)



Criteria	Casting/W	PV afer Thi	cell n Fi	ls/ M ilm As	lodı sem	ile Sy ibly Ass	sten seml	ns bly
Proximity								
Market	М		Н		Н		Η	
Raw Material	Μ		L		М		L	
Transportation								
Four-lane highway	Н		Н		Н		Н	
Motor carrier	Н		Н		Н		Н	
Rail	Н		М		М		L	
State Restrictions	L		L		L		L	
Public Opposition	L		L		L		L	
Utilities								
Electric Power	Н		М		М		L	
Natural Gas	М		L		L		L	
Water	Н		L		L		L	
Sewer	М		L		L		L	

Important



Cont'd: Key Locational Criteria: Solar (High, Med., Low)



Criteria	Casting/Wa	afer PV cel Thin F	ls/ Modul ilm Assemb	e System oly Assemb	s ly
Real Estate					
Ready to go sites	Н	Н	Н	М	
Available buildings	М	М	М	Н	
Fast track					
Construction	Н	Н	Н	Н	
Environmental	М	М	М	L	
Labor Market					
Availability	М	М	М	М	
Unionization	Н	Н	Н	Н	
Area training resources	М	М	М	L	
Business Costs	М	М	М	L	
Labor	М	М	М	М	
Electric Power	Н	М	М	L	
Natural Gas	М	L	L	L	
Water	М	L	Н	L	
Transportation	М	Н	Н	Н	

Important



Key Locational Criteria: Wind (High, Med., Low)



Criteria	Tower	Blade	Nacelle
Proximity			
Market	Н	Н	Н
Raw Material	М	М	М
Transportation			
Four lane highway	Н	Н	Н
Motor carrier	Н	Н	Н
Rail	Н	М	L
State Restrictions	Н	Н	L
Public Opposition	Н	Н	L
Utilities			
Electric Power	М	М	L
Natural Gas	L	L	L
Water	L	L	L
Sewer	L	L	L

Important



Cont'd: Key Locational Criteria: Wind (High, Med., Low)



Criteria	Towe	r Blade	Nacelle
Real Estate			
Ready to go sites	Н	Н	Н
Available buildings	L	L	М
Fast track			
Construction	Н	Н	Н
Environmental	М	М	М
Labor Market			
Availability	М	М	М
Unionization	Н	Н	Н
Area training resources	М	М	М
Business Costs	М	М	М
Labor	М	М	М
Electric Power	М	М	L
Natural Gas	L	L	L
Water	L	L	L

Important



Key Locational Criteria: Biomass (High, Med., Low)



Criteria

Proximity	
Market	М
Raw Material	Н
Transportation	
Four lane highway	Н
Motor carrier	Н
Rail	Н
State Restrictions	L
Public Opposition	L
Utilities	
Electric Power	Н
Natural Gas	Н
Water	М
Sewer	М



Cont'd: Key Locational Criteria: Biomass (High, Med., Low)



Criteria

Real Estate	
Ready to go sites	Н
Available buildings	М
Fast track	
Construction	Н
Environmental	М
Labor Market	
Availability	М
Unionization	Н
Area training resources	М
Business Costs	М
Labor	М
Electric Power	Н
Natural Gas	М
Water	М
Transportation	М

Important



North America



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North America Location Tendencies

1. Rapidly Growing Industry

- Next decade, clean energy
- \$150 billion
- 2.5 million jobs
- Equipment a major component



2. Plants tend to locate near customers

Wind

Towers

•Blades

Nacelles

Solar

- •Cells
- Modules
- Assembly

•Casting

- Somewhat important
- •More driven by
 - Utilities
 - •Sites

Biomass

Somewhat importantMost critical, raw material proximity



3. Capital Intensive Operations

4. Infrastructure Critical

- Large scale sites
- Available buildings a plus
- Transportation
- Utilities

5. Labor Also Important

- Small cadre engineers
- Technical workers
- Production workers
- Skills transferrable, e.g.,
 - Electronics
 - Metalworking
 - Other advanced manufacturing
- Training a key (specific to industry)
- Nonunion imperative





6. Moderate Cost Locations Sought

- Electric Power (casting/wafers)
- Transportation
- Land/Building
- Labor
- Taxation
 - Property
 - Sales/Use



- 7. Prefer states
 - Programs dedicated to industry
 - Including
 - University research
 - University/community college curricula
 - Financial assistance
 - Mfg
 - Consumption
 - Infrastructure investment (e.g., transmission)
 - Clean energy strategy
 - A bonus if community has dedicated program



- 8. Incentives Important
 - Capital Intensiveness
 - Cost Minimization
 - Among most desirable
 - Grants/forgivable loans
 - Property tax abatement
 - Sales tax exemption
 - Site development assistance
 - New job tax rebates
 - Customized training



Location Hotspots: North America

- 1. Solar
 - Western U.S.
 - Southeast
- 2. Wind
 - Mid-continent
 - Great Lakes (offshore)
 - Coastal (offshore)
- 3. Biomass
 - Dispersed
 - Current Leading Areas
 - Midwest
 - Southeast
 - Northeast

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Location Hotspots: North America

4. States that have emerged as leaders

Solar	Wind	Biomass
Oregon	North Dakota	Georgia
Arizona	lowa	Louisiana
New Mexico	Kansas	lowa
Colorado	Colorado	Texas
Michigan	Ohio	Florida
Pennsylvania	Michigan	Illinois
California	Montana	North Carolina
Nevada	Arkansas	New York
Idaho	Texas	Indiana

- 5. However, nearly all states
 - Will be players
 - Some more extensively than others
 - In part due to market size (within next day delivery)



Illustrative New Facilities: Solar

1. Solar

- Hemlock (castings/wafers) ۰
 - Saginaw, MI
 - Clarksville, TN •
- Sanyo, Salem (OR) •
- Walker (castings), Cleveland (TN) •
- Schott (cells), Albuquerque (NM) •
- Solar World (cells), Hillsboro (OR) •
- Konarka (cells), New Bedford (MA) •
- Abound Solar, Ft. Collins (CO) ۰
- Ascent Solar (modules), Adams County (CO) ۲
- Solon (modules), Tucson (AZ) •
- Advanced Solar Photonics (modules), Lake Mary (FL) •
- FLABEG (modules), Central PA •
- Kyocera (modules), Tijuana (MX) •



Illustrative New Facilities: Wind



2. Wind

Blades

- Nordex, Jonesboro (AR)
- Siemens, Ft. Dodge (IA)
- Molded Fiberglass, Aberdeen (SD)
- LM Glasfiber
 - Little Rock (AR)
 - Grand Forks (ND)
- Vestas
 - Brighton (CO)
 - Windsor (CO)
- Global Wind Systems, Novi (MI)
- Fuhrlander, Butte (MT)

Towers

- Trinity Structures, Newton (IA)
- Vestas, Pueblo (CO)
- DMI Industries, Fargo (ND)

•Nacelles

- Nordex, Jonesboro (AR)
- Vestas, Brighton (CO)
- Siemens
 - Elgin (IL)
 - Hutchison (KS)

•Small Scale Turbines

- Bergey Wind, Norman (OK)
- Wind Turbine Industries, Prior Lake (MN)
- Southwest Wind Power, Flagstaff (AZ)



Illustrative New Facilities: Biomass

3. Biomass

- Range Fuels, Soferton (GA)
- U.S. Biodiesel, Seabrook (TX)
- Cargill, Iowa Falls (IA)
- Prairie Pride Biodiesel, Vernon County (MO)
- Broin Cellulosic, Emmetsburg (IA)



Business Attraction Keys





- 1. Understanding of Markets (Solar/Wind)
 - Within 500 miles
 - Current
 - Potential
- 2. Understanding raw material base (Biomass)
- 3. Certified Sites
- 4. Power/water (especially for castings)



Business Attraction Keys

5. Workforce documentation: Solar, e.g.,

- Chemical engineers
- Electrical engineers
- Mechanical engineers
- Quality control

6. Workforce documentation: Wind, e.g.,

- Sheet metal
- Machine maintenance
- Electricians
- Welders

- Chemical techs
- Process techs
- Electronic techs
- Engineering techs
- Solderers
- Machine operators
- Engineers (electrical & mechanical)
- 7. Workforce documentation: Biomass, e.g.,
 - Machine Ops
 - Process Control
 - Mixing
 - Blending
 - Packaging
 - Biochemist





Business Attraction Keys

8. State Programs Supporting

- Clean Energy
- Equipment Manufacturing

9. Dedicated Incentives Packages

- Oriented to the industry
- List on DSIRE database
- Clearly feature on EDO website

10. Renewable Energy

- Education
- Training

11. Business Start-Up/Entrepreneurship

- University Programs
- Incubators
- Marketing Networks
- Venture Capital

12. Trade Industry Associations

- American Wind Energy Association (awea.org)
- Solar Energy Industries Association (seia.org)
- Biomass Energy Research Association (beraonline.org)
- Biomass Thermal Energy Council (biomassthermal.org)



Sampling of Effective State Renewable Energy Strategies

- 1. New Mexico: Solar
 - State consumption mandate
 - Solar technology educations
 - University of NM
 - NMSU
 - Santa Fe Community College
 - NM Solar Energy Industry Association
 - Dedicated Incentives
 - Production, 6% tax credit (multiple taxes)
 - Operation, tax credit (cents/kWh)
 - Equipment manufacturing, 3% tax credit
 - Consumption tax incentives
 - Residential
 - Commercial
 - Permit expedition



Sampling of Effective State **Renewable Energy Strategies**



Oregon: Solar 2.

- State consumption mandate
- Solar technology education
 - University of OR
 - **OR State University**
 - Lane County Community College
 - OR Support Network for Research, Photovoltaics Lab
 - Center for Sustainable Solar Manufacturing
- **OR Solar Energy Coalition**
- **Dedicated** incentives
 - Consumption/production, 35% 50% investment tax credit (includes equipment manufacturing)
 - 100% property tax exemption
 - Consumption
 - Equipment value
- Permit expedition + certified sites


- 3. Texas: Wind
 - State mandate
 - Wind energy technology education
 - Texas Tech
 - Amarillo College
 - TX Renewable Energy Industries Association
 - T. Boone Pickens
 - Dedicated incentives
 - 10% investment tax credit, consumption
 - Franchise tax exemption
 - Producers
 - Equipment manufacturing
 - New transmission lines (Montana as well)
 - Permit expedition
 - Abilene
 - City example
 - Windstar Industrial Center
 - Education/training
 - Incentives (local)



- 4. Colorado: Wind/Solar
 - State mandate
 - Technology education
 - Colorado State University (Abound Solar)
 - Pueblo Community College
 - CO Solar Energy Industries Association
 - Dedicated incentives
 - Grants (Governor's Energy Office)
 - Property Tax Financing (Clean Energy Districts)
 - Sales/use tax exemptions
 - Permit expedition



5. Iowa: Biomass

- State mandate
- Biofuels Technology Education
 - IA State University
 - IA Lakes Community College
- IA Renewable Energy Association
- Dedicated incentives
 - Production/operation tax credit
 - Property tax reduction
 - Sales tax exemptions
 - Loans





- 6. Michigan: Wind
 - Like other states also solar/biofuels
 - State mandate
 - Renewable energy technology education
 - Wayne State University
 - Grand Valley State University
 - University of Michigan
 - Michigan State University
 - Kalamazoo Valley Community College
 - Macomb Valley Community
 College
 - Muskegon Community
 College

- Great Lakes Renewable Energy Association
- Dedicated incentives
 - 10% investment tax credit
 - Next Energy Zone (tax holiday, Detroit)
 - Renewable Energy Renaissance
 Zones
 - 100% abatement, most taxes
 - 15 years
 - Biomass tax credits
- 7. OH: Third Frontier
- 8. GA: Biomass Energy Corridor



Illustrative HR Requirements – Solar

- 1. Casting
 - Chemical engineer
 - Chemical technician
 - Process technician
 - Machine operator (e.g., process control, drilling cutting, chemical)
- 2. Cell Manufacturing
 - Engineer
 - o Electrical
 - o Mechanical
 - o Process
 - o Materials
 - Technician (e.g., electronics)
 - Assembler
 - Quality control
 - Maintenance

- 3. Module Assembly
 - Engineering
 - o Electrical
 - o Mechanical
 - o Materials
 - Production
 - o Solderers
 - o Assemblers
 - o Machine Operators (e.g., process control)
 - o Electronic techs
 - o Maintenance
- 4. Systems Assembly
 - Engineers
 - Technician
 - Quality control
 - Sales (solar experience)



Illustrative HR Requirements – Wind



- 1. Towers/Blades
 - Engineers
 - o Electrical
 - o Mechanical
 - o Materials
 - Production
 - o Sheetmetal
 - o Electrician
 - o Welder
 - o Machine operators, e.g.,
 - Milling
 - Boring
 - Cutting
 - Coating
 - o Machinist
 - o Millwright
 - o Maintenance
 - o Technician
 - Electronics
 - Engineering

- 2. Nacelles
 - Engineer
 - o Electrical
 - o Mechanical
 - Production
 - o Assembler
 - o Machine operator (e.g., turning, boring, cutting, stamping)
 - o Quality assurance
 - Technician
 - o Electronics
 - o Engineer



Illustrative HR Requirements – Biomass

- 1. Scientists (handful)
 - Chemist
 - Biologist
 - Chemical engineer
 - Environmental engineer
- 2. Production
 - Machine operator (e.g., mixing, blending, packaging)
 - Machine tender/helper
 - Technician (process control, biology, chemistry)
 - Maintenance



North America Incentives Overview



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Around the Globe in 90 Minutes: Alternative Energy Manufacturing



North America Incentives Overview: Federal level



Type of Incentives available at Federal level

Advanced Energy Manufacturing Tax Credit

- Authorized by American Reinvestment & Recovery Act of 2009 & administered by US Dept of Energy/IRS
- Provides investment tax credit of 30% for new, expanded or re-equipped advanced energy manufacturing projects
- Capped at \$2.3 billion, expires in two years or until cap is reached. This is part of Stimulus funding.
- Deadline for first round of funding is October 16
- Project must be completed within 4 years
- Eligibility based on the following:
 - Viability of project
 - Expected job creation
 - Reduction of air pollutants & greenhouse gas admissions
- Technological innovation
- Speed-to market
- Geographic diversity in relation to other project submissions

Other incentives emphasize renewable energy generation and production not manufacturing



North America Incentives Overview: State Level



- New job creation. Some states require project average wages to be above state or county average
- **Capital Investment.** All state require minimum level of capital investment to receive incentives)
- **Targeting by industry.** Most incentive programs accommodate several forms of alternative energy projects/uses including manufacturing, R&D, and corporate headquarters
- Examples to follow:
 - Spotlight on select states and their respective alternative energy incentives
 - Focus on incremental jobs and investment: win/win
 - Funding sources vary, from direct legislative appropriations, to dedicated funds from utility payments.



North America Incentives: Arizona





woman or minority-owned or small (less than 100 employees).



North America Incentives: New Mexico



Incentives offered for renewable or alternative energy

• Incentives specifically dedicated to alternative energy manufacturers



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Alternative Energy Product Manufacturers Tax Credit

- 5% of taxpayer's qualified equipment expenses to be deducted from corporate tax liability; 5 year carry forward provision; Max claim \$500,000
- Employer must add at least 1 job in year following credit

Additional incentives that may apply

- High Wage Jobs Tax Credit max of \$12,999 of wages/ benefits paid for each high-wage job
- Companies must qualify for Job Training Incentive Program (JTIP)



North America Incentives: Oregon



97 Incentives offered for renewable or Alternative Energy Incentives specifically dedicated to Renewable Energy Resource Equipment manufacturers **Business Energy Tax Credit** • 50% of renewable energy mfg facility's eligible costs, distributed over 5 years at 10% per year and capped at \$20M Biomass Credit can also be applied to the renovation of an existing facility. Credits Solar can be carried forward up to 8 years; Pass through option available • Can be combined with 15 year property tax exemption on all investment over • Wind \$100M in urban areas and \$25 million in rural communities; company pays

communities.

Additional Incentives that may apply

- Enterprise Zone Incentives- not subject to local property taxes during construction and once running, 7-15 years of property tax relief
- Strategic Investment Program available statewide for projects developed by "traded-sector" businesses (most often manufacturing). Can offer exceptional benefits in terms of net present value

annual community service fee up to \$2M in urban areas and \$500,000 in rural



North America Incentives: Michigan



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• Incentives offered for renewable or Alternative Energy

• Incentives specifically dedicated to Alternative Energy Manufacturers



Non Refundable Business Activity Tax

- The credit is equal to the lesser of (1) the amount of company's "tax liability attributable to qualified business activity" for the tax year exceeds the "baseline tax liability attributable to qualified business activity," or (2) 10% of the company's "adjusted qualified business activity" performed in Michigan, outside of a "Renaissance Zone," for a tax year exceeds such activity for the 2001 tax year. No restriction on duration.
- Credits are not refundable, transferable. There is no maximum
- Under either formula, a business may not claim the credit for any tax year in which its "tax liability attributable to qualified business activity" did not exceed the "baseline tax liability attributable to qualified business activity" in 2001



North America Incentives: Michigan





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Incentives offered for renewable or alternative energy

Incentives specifically dedicated to alternative energy manufacturers



Renewable Energy Renaissance Zones

- 100% abatement of MI business tax, state education tax, personal and property tax, and local income tax
- Up to 15 years with phase out in 25% increments in last 3 years.
- Statutory limit of **15 zones** within state; county and community must agree to forgo taxes in order to establish zone which must be approved by state.

Additional incentives that may apply

- •Job Creation Tax Credits (MEGA) tax credits for projects that create high wage, high quality jobs. MEGA tax credits are negotiated pursuant to specific site location & cost differential between location and similar location outside of MI. Credits offered selectively, benefits negotiated based on multiple factors. MEGA is based on a percentage of the state personal income tax generated by new employees.
- Industrial & Commercial Personal Property Tax relief: exempts manufacturers from paying the 6 Mills State Education Tax and the 18 Mills local school property tax on industrial personal property



North America Incentives: Pennsylvania





Loans for Renewable Energy Program and Solar Energy Grants Program are also available.



North America Incentives: Pennsylvania







North America Incentives: Pennsylvania







North America Incentives: Utah





- Project must be located within a registered renewable energy development zone; local government must approve creation of zone and agree to forgo property taxes for up to 30 years.
- Local government may provide property tax abatement of up to 30 years
- Cannot be combined with EDTIF tax credit and Industrial Assistance Fund



North America Incentives Case Study: Michigan



Global Wind Systems

- State hopes to rebuild manufacturing base by cultivating renewable energy startups
- \$32 Million manufacturing facility in Detroit suburb of Novi
- Startup received \$40 million from angel investors
- Michigan's first manufacturer of utility wind turbines
- Each wind generator sells for \$2.5 to \$3 million
- First crop of turbines to be delivered by 2010
- Committed to hire 356 workers
- Company will need 2 million SF of space to accommodate production over 5 years
- Received \$7.3 million in tax credits over 9 years
- State assisting with locating qualified workers



North America Incentives Case Studies: Oregon



Sanyo

- \$80 million, 130,000 SF solar ingot and wafer manufacturing facility in Salem
- 200 new jobs with average salary of \$50,000
- Company will tap into state's concentration of present and former semiconductor manufacturing workers
- First tenant in planned 79 acre renewable energy and development park
- Construction of phase to be completed in October with plant in full capacity by April 2010
- State provided \$20 million in Business Energy Tax credits



Issues to be Managed



END USERS:

- Targeted incentives may not always create the greatest value for projects. Look more broadly across all applicable inducements, particularly those that may be mutually exclusive.
- Pay attention to confidentiality/public affairs impacts.

ECONOMIC DEVELOPERS:

- Review programs/incentives to ensure that end users are able to fully realize/optimize incentives offered.
- Remedies should be proportional to shortfall.

Solar energy in Europe: the good, the bad and the not so ugly

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The future of solar energy is very promising....





Around the Globe in 90 Minutes: Alternative Energy Manufacturing



... but now the industry is in a transition



- Polysilicon down from \$180/kilo to \$50 k (in one year)
- Crystalline modules from Germany down from \$4.60/Wp to \$3.40/Wp in one year (China figures: \$4.30-\$2.70/Wp)
- The Photovoltaic Global 30 Index down in a year from 140 to 80 (2005 = 100)
- Job losses + cancelled projects

Sources: Global Solar Technology Magazine, 2009 PG 30 Index, 2009 PV XChange, 2009



Europe is today the most important market...



Accumulated installed PV-Worldwide annual market in Electricity in MW 2008 2008: 5,559 MW Rest of the world; 4%-Japan; 4%-Europe South Korea; 5%-USA; 6% Rest of the world Europe; 81%

 In the PG30 Index are 11 European companies with 43% of the market capitalisation of the 30 companies





Until 2020, Europe will be the largest market in the world, with a value of \in 27 billion (\in 9.5 billion in 2007)



Source: EPIA, 2008



Location requirements

A Depending on technologies

• Crystalline Silicon Technology Value Chain



• Thin Film Technology Value Chain



B Depending on business model

- Vertical integration
- Geographical split of the value chain



C Depending on which phase in the value chain

	Silicon to wafer	Wafer to cell	Cell to module	Thin Film		
Most important requirements	Qualified labor	Qualified labor	Labor costs	Qualified labor		
	Energy costs	Energy costs	Market proximity	R&D Network and collaboration within the network		
	Closed PV Value chain	R&D Network and collaboration within the network	Transport infrastructure	Universities and R&D Institutes with focus on PV Industry		
	Incentives	Universities and R&D Institutes with focus on PV Industry		Availability and nearness of base material		
	Availability and nearness of base material	Incentives		Incentives		
↓ Less important requirements		Environmental regulations				
	Source: Weiser 2008, Buck Consultants International, 2000					

Source: Weiser, 2008, Buck Consultants International, 2009



The good in Europe: Eastern Germany

Success factors

- Feed-in-tariffs
- Cash incentives
- Availability of land



The bad in Europe: Spain

Fail factors

- Too generous
- Cap on installation in 2009: 500 MW







The not so ugly in Europe: the European Commission in Brussels



EU 27 policy target for total final energy consumptions vs. likely RES Scenario



* These projections include 75 TWh or "Solar and other RES" hich make up a portion of the overall PV share Sources: EREC "Renewable Energy Technology Roadmap" – EU DG TREN "European and Transport: trends to 2030 – update 2007"



Strategic Research Agenda of Photovoltaic Platform (2009)



Rounded, indicative figures ¹⁾	1980	1995	2009	2020	2030	Long term potential
Typical turn-key system price	>30	10	3 - 4.5 ²⁾	1.5 - 2.3	<1	0.5
Typical electricity generation costs @ 1300 kWh/kW _p -year ³⁾	>2	0.7	0.20 - 0.30	0.10 - 0.15	<0.07	0.03
Commercial flat-plate module efficiencies	Up to 8%	Up to 12%	Up to 20%	Up to 23%	Up to 25%	Up to 40%
Commercial concentrator module efficiencies	(-10%)	Up to 20%	Up to 30%	Up to 35%	Up to 40%	Up to 60%
System energy pay-back time @ 1300 kWh/kW _p -year (years)	>10	>5	<2	<1	0.5	0.25

- 1) Monetary quantities are expressed in EUR at 2009 values
- 2) The range covers power plants (at the lower end of the price range), large systems on buildings (middle of the range) and small systems on buildings (upper end of the range)
- Calculated using the PV TP's 'NPV/FiT' model (NPVTP) with the parameters of amortisation over 25 years, 6% cost of capital, 1% O&M & insurance costs



Four R&D themes



- Enhancing Performance research that leads to higher device outputs and improved system performance
- Improving Manufacturability research that addresses the ease and cost of component manufacturing and of system operation
- Promoting Sustainability research that aims to bolster PV's green credentials
- Addressing Applicability research that develops products and technology to meet specific market needs
- Budget 2009-2013: \$10 Billion
 - 55% private sector
 - 45% public funds



Recommendations for American States



- Take a long term perspective prepare for the upturn
- Copy the feed-in-tariff system make a balanced package
- Attracting European companies?
 - Cells + modules manufacturing
 - R&D centers
 - Equipment manufacturing
 - Storage devices
- Think out of the box
 - Solar cells on the roof of your (electrical) car?
 - Integrated wind-solar sites?



Alternative Energy Trends in Asia



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Alternative Energy Trends in Asia



- China and India as manufacturing hubs
- Export focused for most Alternative Energy equipment
 But this is changing rapidly
- Emergence of vertically-integrated Green Tigers
 - India
 - China
- S.E. Asia is the alternative energy Wimbledon of Asia
 - Few, if any, local alternative energy equipment champions
 - Incomplete supply chains
 - But, favorable investment environment for foreign manufacturers



Investors' Outlook - China



Jilin

Constructing wind power industrial park with investment of US\$1.5 billion and targets to be largest wind power equipment manufacturing base in northern China by 2013.

Henan

In 2004 made ethanol fuel compulsory for automobiles. Market share of ethanol fuel now >95%. Expected to produce 1 million tons of biofuel by 2010

Jiangxi

Set target to increase sales value of solar power industry to be US\$50 billion





China Solar Manufacturing







China Wind Manufacturing





Around the Globe in 90 Minutes: Alternative Energy Manufacturing

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Investors' Outlook - India





India Manufacturing



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LOB

Investors' Outlook – S.E Asia





S.E. Asia Manufacturing







Incentives



	Energy Generation			Manufacturing		
	Wind	Solar	Biomass	Wind	Solar	Biomass
China	100 GW installed capacity by 2020	US\$ 2.9/W rooftop subsidy Gov't will pay 50% of investment up to 20 MW per province 20 GW installed capacity by 2020	US\$173.8/ton ethanol subsidy	US\$ 88/kW subsidy for first 50 sets, must be reinvested in R&D	Negotiable general manufacturing incentives	Negotiable general manufacturing incentives
	20% of the country's power through A.E by 2020			10% reduction in corporate income tax (CIT)		
India	10.5 GW installed capacity by 2012	50 MW installed capacity by 2012	1.3 GW installed capacity by 2012	No specific wind incentives	Import duty exemption on mfg equipment	No specific biomass incentives
	10 % of the country's power through A.E by 2020			Venture Capital Fund (VCF) Incentives vary widely from SEZ to SEZ		
Thailand	No targets	5 GW installed capacity by 2020	3.7 GW installed capacity by 2020	8 year CIT exemption + Standard BOI incentives		
Vietnam	No specific incentives	No specific incentives	Tax incentives + loan schemes TBA	4 year CIT exemption + 50% reduction ensuing 9 yr*		
Singapore	NEA focused on energy efficiency - MELS + FELS			No specific wind incentives	Subsidy programs	No specific wind incentives

Obstacles







Opportunities







SCHOTT Solar in New Mexico



Dr. Gerald J. Fine President and CEO SCHOTT NA October 14, 2009



The questions for today...



1. Who is SCHOTT Solar?

- 2. How do we site manufacturing?
- 3. Why New Mexico?
- 4. Unsolicited advice to those across the table









SCHOTT Solar is part of a globally diversified international high-tech manufacturing group



Over 17,000 employees worldwide

SCHOTT solar



Our product portfolio covers a wide range of solar power generation

SCHOTT

solar







Our products are deployed in diverse environments, including a photovotaic field in Brockton, MA









SCHOTT solar





And in concentrated solar power plants such as Nevada Solar One



⇒64 MW

- ⇒On grid since June 2007
- 20 year Power Purchase Agreement with Nevada Power Company and Sierra Pacific Power Company





(Courtesy of Acciona Solar Power Inc)





We are manufacturing these products in our state-of-the-art facility in Albuquerque, NM



Initial investment: \$125 million

- Ground breaking: March 2008
- Start of production: April 2009
- Building size: 175,000 ft²

SCHOTT

solar

• Employees: 300 (phase 1)

- Future Plans
 - Investment: \$500MM
 - Building size: 800,000 ft²
 - Employees: Up to 1500



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Our process was straight-forward and typical of industry











Some of SCHOTT Solar's musts and wants



<u>Musts</u>

- 100 acres of flat land
- Access to suitable power and water
- Workforce availability
- Collaborative education system
- A track record of fast permitting
- Ability to close a deal quickly
- Clear and risk-free financial incentives

<u>Wants</u>

- Favorable state renewable energy policy
- 1 day trucking to key markets
- Access to a major airport
- Other larger manufacturing facilities in the region
- Single point-of-contact
- Right-to-work statutes





The process continued.....











What goes into the P&L?

- NOT just tax incentives
- Cash
- Revenue (speed to market, opportunity to do business in the state)
- Wage rates
- Capital costs
- Land prices
- **Regional construction costs**
- Transportation and warehousing costs
- Tax rates





The questions for today...



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Albuquerque offered us many advantages





- Commitment of public and private partnership(s)
- Support of state and city economic development groups
- A culture of supporting solar
- Optimal location for building a factory
- Close to major solar markets.

AND the best P&L





The questions for today... The questions for today...



1. Who is SCHOTT Solar?

- 2. How do we site manufacturing?
- 3. Why New Mexico?
- 4. Unsolicited advice to those across the table







Finally, some advice for those on the other side of the table...



- I spend my career with my BS detector on high and it pegs easily.
- If I ask for 100 acres of flat land near a major airport, don't take me to a tree-lined canyon 125 miles away.
- Cooperation between public agencies is essential I don't want to watch the local ED agency negotiate with its own state.
- Tax incentives are nice. Low taxes are better. Except for school taxes, which we will always gladly pay.
- The public utilities play a key role in the selection process. If they send an engineer two years out of school, it is probably a deal killer.
- The local educational institutions have an important role to play.
- Speed matters. Work fast and in collaboration.





Wrap Up Summary & Q&A

Wrap up Summary:

Questions/Answers after Speaker Presentations

Post- Event. You can find this presentation on CoreNet Website after the conference.

For more information, visit our websites www.BLSstrategies.com www.tractus-asia.com www.wdgconsulting.com www.bciglobal.com