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FDI ATTRACTION AND CREATING LOCAL DEMAND

Review of Economic Growth Potential
Final Report

December 29, 2009

This publication was produced for review by the United States Agency for International Development. It was prepared by Josh Timberlake and Richard Longstaff, Deloitte Consulting LLP.

FDI ATTRACTION AND CREATING LOCAL DEMAND

REVIEW OF ECONOMIC GROWTH POTENTIAL

Final Report

USAID JORDAN ECONOMIC DEVELOPMENT PROGRAM

CONTRACT NUMBER: 278-C-00-06-00332-00

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USAID/JORDAN

USAID/ OFFICE OF ECONOMIC GROWTH (EG)

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EXECUTIVE SUMMARY

- Jordan faces energy and water scarcity challenges which are among the most acute in the world
- Addressing these energy and water challenges will help Jordan progress toward key strategic and economic objectives, including:
 - Decreasing dependence on foreign energy sources;
 - Generating jobs and investment.
- SABEQ has created a preliminary Year 4 work plan with a stated objective to:
 - Support creation of a Clean Tech and Water Entrepreneurship cluster in Jordan, through identification of executable opportunities, capacity building to meet local, regional, and global needs, and by inducing increased activity in these fields from local and international players
- The first task (included herein) is to review the sector's potential as a driver of economic growth. From this review, SABEQ will refine the preliminary work-plan activities into a focused, cohesive set of tasks to stimulate economic growth

The principal deliverable from this preliminary two-week assessment was a PowerPoint document presented to USAID. The “*USAID Presentation for December 17*” document has been included in handout format as the body of this report, and attached electronically.

PRESENTATION TO USAID (DECEMBER 17)



EWE / Clean Tech

Review of Economic Growth Potential

Contents

- Background and Approach
- Regulatory / Policy Considerations
- Foreign Direct Investment Attraction
- Recommendations and work plan Activities



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Background / Scope of Work

- Jordan faces energy and water scarcity challenges which are among the most acute in the world
- Addressing these energy and water challenges will help Jordan progress toward key strategic and economic objectives, including:
 - Decreasing dependence on foreign energy sources
 - Generating jobs and investment
- SABEQ has created a preliminary Year 4 work plan with a stated objective to:
 - Support creation of a **Clean Tech and Water Entrepreneurship** cluster in Jordan, through identification of executable opportunities, capacity building to meet local, regional, and global needs, and by inducing increased activity in these fields from local and international players
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Overview of current work-plan

- The current work plan consists of four primary categories
- Based on our review, we suggest a “Regulatory / Policy” category be added as a high priority to address during Year 4

Work plan Category	Comments
1. FDI Attraction	<ul style="list-style-type: none"> • Existing work plan does not include specific initiatives • This analysis suggests prioritized focal areas (within clean-tech sector) and activities to promote new jobs and investment
2. Capacity Building toward Green Collar Jobs	<ul style="list-style-type: none"> • Considered <i>enabling</i> activities to support FDI attraction • Several specific work plan tasks have already been developed and appear to be progressing • Additional suggestions to support these activities are included in the recommendations section
3. Create Local Demand for Clean Tech Implementation	
4. Create Awareness about Clean Tech / EWE	
5. Regulatory / Policy	<ul style="list-style-type: none"> • Not included in original work plan • Essential to supporting renewable energy generation, and important to aiding FDI Attraction and other work plan initiatives



Primary focus of this analysis
Secondary focus of this analysis

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Approach

- This initial assessment included reviewing several background reports, and conducting interviews with stakeholders from a wide range of public and private sector entities

Name ¹	Entity
Ross Hagen, Ramzi Sabella	USAID
Muawiyah Faydi	Ministry of Energy (Alternative Energy, Energy Efficiency Dept.)
Dr. Maen Nsour	Jordan Investment Board
Karim Kwar	EDAMA, Kwar Group
Rami Al Qusus	King Hussein Bin Talal Development Area
Muhammad Tarawneh, Mohammad Turk	Ma'an Development Area
Eng. Amer Al-Majali	Jordan Industrial Estates Corporation
Jose Ceron	Economic Development Zones Commission (advisor)
Dr. Ahmed Al-Ghandoor	Philadelphia Solar, Nur Energy, Hashemite University
Dr. Khaled Kahhaleh	Royal Scientific Society
Mr. Ennis Rimawi	Millennium Energy (investor), Catalyst Private Equity
Mr. Hisham Al-Rawashdeh	National Training & Employment Project
Mr. Anupam Govil	Global Equations
Various (initiative leads and other stakeholders)	SABEQ

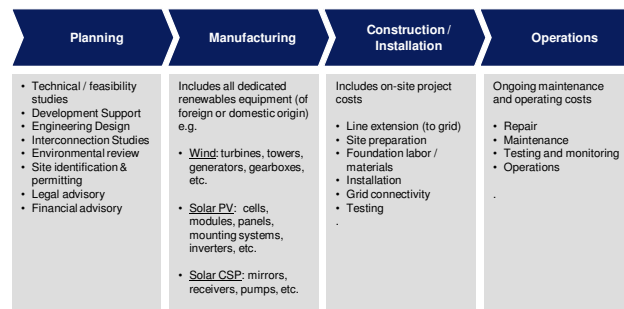


¹ Principal contact – most meetings included additional attendees

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Spectrum of Activities (large-scale generation project)

- Jordan stands to capture much of the economic benefit related to Planning, Implementation, and Operations of large-scale solar or wind generation projects occurring in the country
- However, **until** Jordan can develop a renewables manufacturing base, technology-specific capital equipment will be sourced from abroad

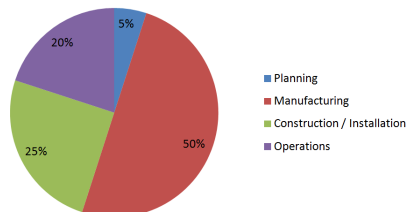


● → ● Illustrative Jordan capabilities within each activity (existing → potential)

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Value distribution across the Activity Spectrum

- Value share across the Activity Spectrum depends on technology used and scale. For utility-scale wind installations typical lifetime project spend is:



Over next 5 years:

- Capturing **some** of Planning segment value: **Probable**
- Capturing **some** of Manufacturing segment value; **Possible**
- Capturing **most** of Construction & Operations segments' value: **Probable**.
- Capturing **any** significant value requires supportive regulation and policy.



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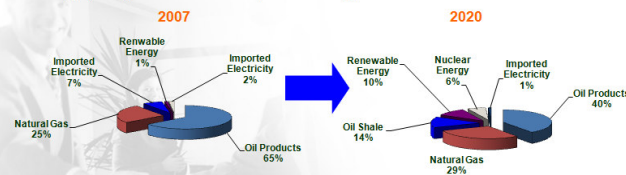


Regulatory / Policy Considerations

Jordan's Energy Challenge

Energy Sector

Jordan's currently has no indigenous sources of energy, in order to achieve security of supply the government developed the Energy Master Plan 2007- 2020.



The dependency on imported oil will be reduced by:

- Enhancing renewable energy projects.
- Implementing intensive energy efficiency programs.
- Utilizing oil shale to generate electricity and produce oil.
- Generating electricity from nuclear energy.
- Developing local sources of Natural Gas



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Policy stimulates demand

- 2007 Energy Strategy predicted doubling of energy demand by 2020
- 60% of new energy from domestic sources (Shale, Nuclear, Renewables)
- 20% of new energy from renewables



To date:

- Energy Law remains a work in progress
- Draft provisions for renewable energy are vague; fail to provide clear, long-term incentives for development
- Tender process adopted for large renewable sites; nothing has yet closed



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Common Renewables Policy Options

- Tendering
 - Large scale renewable sites packaged and offered to bidders
 - Bidder accepting lowest sales price /kWh wins development mandate
 - Advantages: Market based, simple Disadvantages: Episodic, higher risk
- Feed in Tariff (FIT)
 - Guaranteed offtake agreement, providing some form of price premium
 - Advantages: Simple, transparent, effective Disadvantages: Direct cost
- Green Credits
 - Domestic thermal operators buy 'Green Certificates' from renewables operators
 - Certificate requirements and quotas set by government
 - Advantages: Provides second funding stream Disadvantages: Complex, higher risk
- Tax Incentives
 - Reduced taxes on equipment, construction and operations
 - Generally used as an additional, rather than an enabling, incentive



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Feed-in Tariffs

- Feed-in tariffs are generally considered the most effective means to stimulate renewable energy generation
- A recent study by SEMI¹ cited several best practices in global feed-in tariffs:
 - Purchase and interconnection requirements – guaranteed offtake agreements to increase investor security
 - Fixed price payments – provide greater certainty than "premium payments" which fluctuate with market prices. Separate prices should be set for wholesale and retail production
 - Long-term payments – 10-20 year agreements are common
 - Predictable declines – time-based declines are more transparent/predictable than those based on capacity or sporadic regulatory reviews
- Currently no FIT policy in Jordan
 - Lack of FIT policy is significant impediment to GoJ's ability to meet its own renewables goals
 - Al-Qamsha wind farm negotiations have stalled over supply tariff issues
 - Makeup of incoming government may be unique opportunity to promote FIT-related issues



¹ Semiconductor Equipment and Materials International (SEMI)

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Feed-in Tariffs

- FITs not addressed in Energy Strategy or pending Energy Law
- Limited understanding of how FITs work or how they can help policy goals
 - Risk adjusted tariffs
 - Balance of payments
- However, GoJ continues to invest directly in conventional energy and does not seem to view this as a market distortion:
 - Phase III Samra Station gas-fired expansion: 200MW (effective 170MW), cost appx \$200m.
 - Ten year cost/MW produced = \$0.013;
 - Ongoing imported fossil fuel costs
- Providing similar levels of support to Renewables could have dramatic results:
 - Current pricing 'gap' at Al-Qamsha is \$0.04/kWh,
 - Use this as base for 10 year declining FIT model . Apply against 5 MoE wind portfolio sites
 - Ten year cost/MW produced = \$ 0.019
 - No import or fossil fuel costs



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Recent Feed-in Tariff Case Study – Ontario, Canada

- Ontario, Canada passed a new FIT in May, 2009
- Pays up to 10x the retail electric rate for certain installations
- In addition to substantial increases in planned small and large-scale generation, the FIT has attracted considerable **manufacturing** investment¹
 - Canadian Solar announced plans to establish a 200MW module manufacturing facility in Ontario, investing a planned C\$24M and creating an estimated ~500 jobs
 - Opsun Panels announced construction of a 50MW Solar Panel production line in Ontario
 - Sustainable Energy Technologies Ltd. announced that it will base the North American manufacturing of its "SUNERGY" line of inverters in Ontario
 - SMA Solar Technology AG announced a contract assembly / distribution agreement with Pure energies for it's Sunny Boy line of inverters



¹ Ontario's FIT contains "domestic content" requirements which encourage local production

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FDI Attraction



Clean Tech Overview?

- Definitions of “Clean Tech” vary, but the term is generally considered to encompass technologies which:
 - Harness renewable materials and energy
 - Reduce use of natural resources through enhanced efficiency
 - Reduce or eliminate pollution and waste



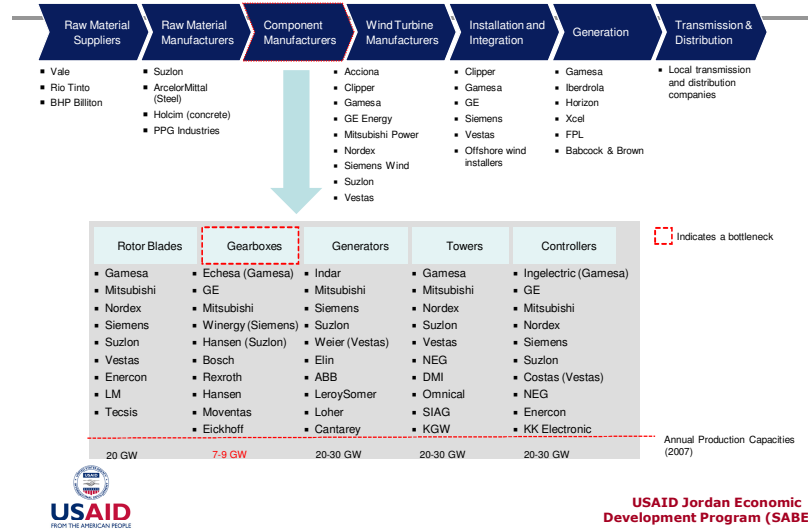
- Among these technologies **wind** and **solar** have been primary drivers of FDI and job creation -- with globally distributed value chains -- and are examined further herein as potential drivers for Jordan's economic growth
- Other clean technologies which may offer potential for Jordan to attract FDI (energy efficiency, water conservation) are addressed in the recommendations section



 Detailed value chain analysis included herein
 Detailed value chain analysis not included herein

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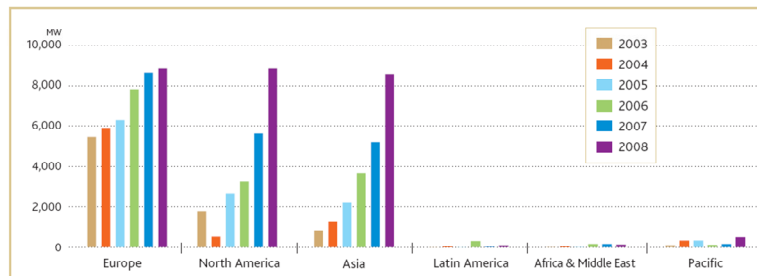
Wind Value Chain Overview



Wind Capacity Installations

- The vast majority of global installed wind capacity continues to occur in Europe, N. America, and Asia

ANNUAL INSTALLED CAPACITY BY REGION 2003-2008



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


Wind – Implications for Jordan

- Vertical integration is common among wind energy manufacturers; 5-6 companies dominate the value chain
- Manufacturers of wind turbines and other large components increasingly produce as close to installation sites as possible to minimize logistics costs / challenges of shipping oversized, overweight components
 - Majority of recent global investment in wind energy (manufacturing and installed capacity) has occurred in the “wind corridors” of the U.S. and China
- The Middle East in general, and Jordan in particular, has comparatively low wind resource potential relative to other global regions
- **As a result, Jordan is unlikely to attract significant foreign direct investment among wind component manufacturers**
 - Jordan should not neglect the wind industry as a possible source of foreign direct investment in manufacturing, but prioritizing investment attraction efforts toward select components of the solar value chain is a more viable strategy
 - Depending on regional / domestic success in attracting wind generation projects, Jordan may have a niche opportunity as regional service center for the wind industry



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Solar Overview

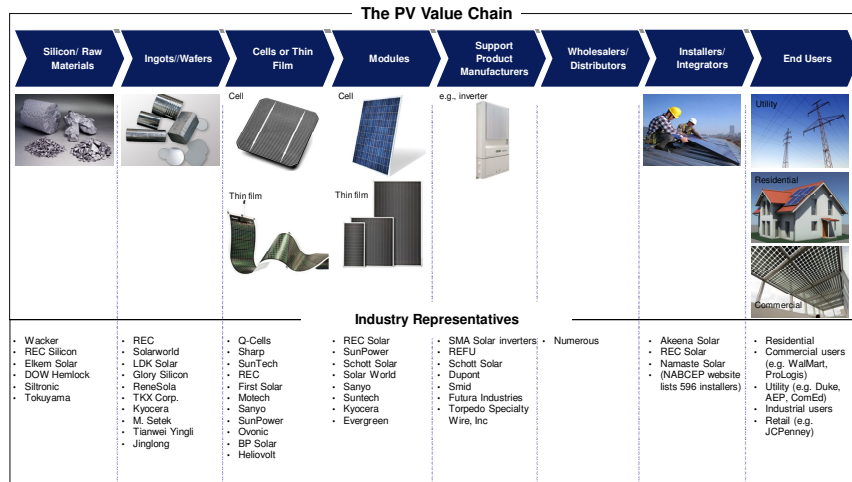
		Description	Energy Conversion	Conversion Type	Efficiency
Photovoltaic		PV systems use semiconductor materials that convert sunlight directly to electricity	Electricity	Direct	6 – 21%
Concentrated Solar Power		CSP systems use reflective materials that concentrate the sun's heat energy to drive a generator that produces electricity (solar thermal)	Electricity	Indirect (through heat)	20 – 40%
Solar Heating		Solar collectors absorb the sun's energy to provide low-temperature heat used directly for hot water or space heating for residential or commercial buildings	Heat	Direct	70 – 90%
Solar Lighting		Parabolic collectors focus sunlight into a fiber optic system to illuminate building interiors with sunlight	No conversion	None	Maximum efficiency



While other technologies are emerging, PV accounts for the vast majority of jobs and investment in solar, and is the focus of the following value chain assessment

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Solar (PV) Value Chain Overview



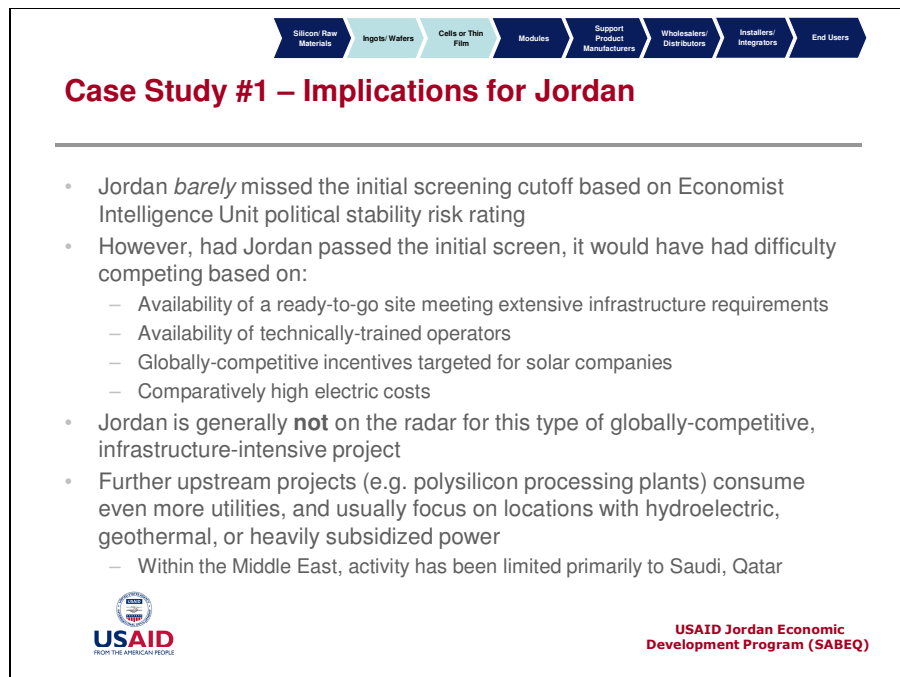
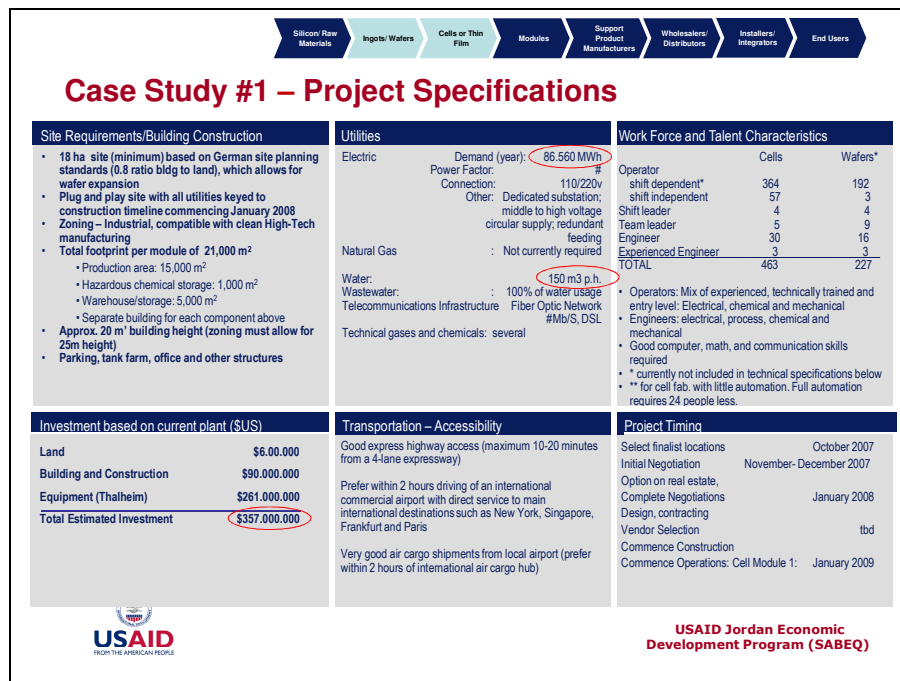
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Solar Manufacturing Case Study #1

- Leading German based producer of crystalline silicon solar cells
- Conducted global search for new production facility (wafers, cells)
- Middle East was key part of search area
 - Field investigations conducted in Dubai, Abu Dhabi, Oman
- Other finalists in N. America and Southeast Asia
- Project deployed in Southeast Asia



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Solar Manufacturing Case Study #2

- Leading global producer of solar inverters
- Conducted search for first production facility in North America
- Search focused on United States due to strong current (and projected future) market demand
- However, Ontario Canada's new Feed-in tariff was also a key consideration
 - Company deployed in Denver, CO, but determining how to best serve Canada (due to FIT) has become a high priority
- Company is already considering expansion into other global regions



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Case Study #2 – Project Specifications

Project Timing	HR Requirements*	Facility Requirements
<ul style="list-style-type: none"> • June 2009 – identify candidate locations (including Brief Field Investigations) • July 2009 – detailed field validation of short-list locations • July 2009 – preferred location/finalists known • August/September 2009 – finalize negotiations (depending on # of finalists) • January 2010 – commence operations • May / June 2010 – reach full operations 	<ul style="list-style-type: none"> • ~ 150 full-time employees at full operations in Year 1 (2011) <ul style="list-style-type: none"> • ~70% Operators (primarily temps) • ~20% Technicians / Team Leads • ~10% Management / Admin • Up to 700 employees may be required during peak production periods by Year 4-5 • Location should have the ability to support long-term headcount comparable to current Niestetal operations (1,200+ employees) • Significant seasonal fluctuations, requiring a flexible workforce and ability to utilize skilled or semi-skilled temporary employees <ul style="list-style-type: none"> • Must have potential to operate 24/7 • Favorable labor-management relations • Manufacturing orientation, electro-mechanical aptitude, and assembly skills required 	<ul style="list-style-type: none"> • 220,000 – 250,000 sf manufacturing and warehouse space • 20,000 – 30,000 sf office space • Existing building strongly preferred due to aggressive project timeframe <ul style="list-style-type: none"> • Shovel-ready sites will be considered in areas meeting all other requirements • Expansion potential for additional 80,000 – 200,000 sf (on-site, or preferably within ~5 miles) • Standard floor-loading capacity; e.g. 6" (15 cm) reinforced concrete, or greater • 5-meter (~16.5 feet) clear height required; 7-8 meters (23' – 26') preferred • 11 dock doors (min) – up to 16 preferred • Image and surrounding uses must be compatible with high-technology manufacturing
Access / Logistics Requirements	Utility Requirements	Capital Investment*
<ul style="list-style-type: none"> • Within maximum 4-5 days of primary customer base (closer proximity preferred) • Within maximum 3-4 days of primary suppliers (closer proximity preferred) • Within maximum 40 minutes (20 minutes preferred) a logistics hub and established 3rd party logistics providers • Reasonable proximity to an airport with commercial and cargo service • Highway access near the facility, with strong Interstate connectivity for shipping product nationally • No firm rail/port requirements (nice to have) 	<ul style="list-style-type: none"> • 2.5 MW peak electric demand <ul style="list-style-type: none"> • 6,000,000 kWh/year average usage • Standard line size (e.g. 13.5 kV) is sufficient • Dual-feed electric service preferred, but not required • Robust telecommunications infrastructure (ideally service from 2 providers) • Basic service requirements for water, wastewater, and gas (only required for heating / cooling purposes) 	<ul style="list-style-type: none"> • ~\$US 14M (~10M EUR) investment over initial 5 years, excluding real estate costs <ul style="list-style-type: none"> • ~\$US 12.5M (~9M EUR) machinery & equipment • ~\$US 1.5M (~1.2M EUR) software, telecom, and other infrastructure • SMA intends to lease the facility unless particularly favorable purchase conditions



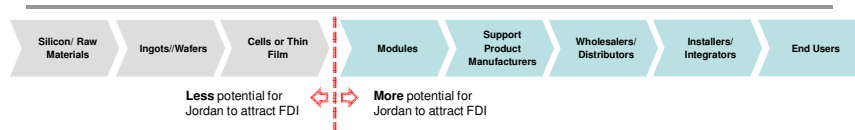
Case Study #2 – Implications for Jordan

- Many of Jordan's industrial parks can meet the basic infrastructure needs of this project
- Had the project been Middle-East focused, Jordan would have been challenged to meet key client preferences including:
 - Providing an existing manufacturing building
 - Demonstrating significant solar industry presence
 - Demonstrating customized government support for solar companies
 - Providing a favorable real estate opportunity in Amman
- Despite the above challenges, Jordan is more likely to be targeted for – and competitive in – this type of project for downstream components of the solar value chain.... but must develop a focused investment promotion effort to be successful



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Jordan's likely entry point into PV value chain



- Jordan is unlikely to attract much interest from the upstream, utility-intensive components of the solar value chain
- Greater potential to attract solar-related foreign direct investment in the PV sector lies primarily in downstream activities, including:
 - Production of modules, inverters, mounting systems, etc.
 - Engineering, testing, installation, maintenance, and other support services
- Additional applications of solar power (e.g. water heating) also offer economic growth / energy conservation opportunities, and are addressed in the recommendations section



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Recommendations

Regulatory Actions

- Provide Energy Policy advisory services to MoE, in particular developing tariff, risk-based planning and energy market analysis assistance
- Assist MoE to finalize Al-Qamsha wind farm tender
- Advise on redrafting of Energy LAw
- Use Al-Qamsha tariff agreement as basis to develop comprehensive FIT policy for Jordan
- Implement FIT policy through revised Energy Law
- Assist MoE to finalize remaining wind farm tender commitments
- Use FIT policy to promote open, non-tender process for additional wind and solar sites



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FDI Attraction Actions

- Identify / confirm focal areas within broader clean-tech sector, recommended to include:
 - Downstream elements of the solar PV value chain (modules, inverters, mounting systems, etc.)
 - Solar water heating systems (built on existing success / momentum in manufacturing and system integration)
 - Regional service / support centers for solar, wind or other clean technologies
 - Energy efficiency / water conservation technologies (specific technologies and value-chain components to be determined based on the incentives scheme adopted for green building codes)
- Develop and articulate Jordan's value proposition for clean-tech investment.
- Identify Jordan's competitive challenges (segment by controllable vs. non-controllable)
- Benchmark industry-specific incentives for clean-tech manufacturers or service providers in competing countries (regional, global)
- Establish external messaging (brochures, website, etc.) targeted to clean-tech companies
- Generate a Jordan presence at industry conferences and events (regional and global)
- Identify targets for outreach programs (by sector, technology, company)
- Investigate opportunities to develop a showcase manufacturing park in greater Amman which caters to clean-tech companies
- Nurture clean tech education, training, incubation, and collaborative research programs (many of which are planned or in progress already)
- Leverage learnings from ongoing outreach campaign developed by SABEQ BPO thread



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Sequencing of Actions (Illustrative)

Category	Short-Term (0-6 months)	Long-Term (6-24 months)
Policy	<ul style="list-style-type: none"> • Offtake Tariff Advisory, MoE • Assist MoE to finalize Al-Qamsha wind farm tender • Advise on redrafting of Energy Law 	<ul style="list-style-type: none"> • Use Al-Qamsha tariff agreement as basis to develop comprehensive FIT policy for Jordan • Implement FIT policy through revised Energy Law • Assist MoE to finalize remaining wind farm tender commitments • Use FIT policy to promote open, non-tender process for additional wind and solar sites
FDI Attraction	<ul style="list-style-type: none"> • Identify / confirm focal areas within broad clean-tech sector • Develop / articulate Jordan's value proposition for targeted investments <ul style="list-style-type: none"> □ Highlight competitive strengths □ Understand challenges, and develop mitigation strategies for "controllable" factors • Benchmark leading regional / global clean-tech investment attraction policies • Propose a suite of targeted incentives for clean-tech investment • Explore opportunities for a "showcase" clean-tech park within Greater Amman 	<ul style="list-style-type: none"> • Develop external messaging materials to promote clean tech investment <ul style="list-style-type: none"> □ Brochures □ Web site • Establish presence at industry conferences, trade shows, etc. • Identify targets for outreach (sector, origin country, specific company, etc.) • Initiate targeted outreach program: <ul style="list-style-type: none"> □ E-mail communications □ Visits to prospective regional / global investors □ Hosting of prospective investors within Jordan • Influence passage of recommended suite of clean-tech incentives • Customize training, research, and other efforts towards focal areas of clean-tech
Energy Efficiency¹	<ul style="list-style-type: none"> • Develop standardized building codes • Develop guidelines and incentive scheme for energy conservation • Develop online tools to educate private sector developers on economics of solar water heating and other conservation measures 	<ul style="list-style-type: none"> • Establish Smart Growth development code • Adopt standardized building codes (general and Smart Growth) • Develop building code enforcement mechanism • Encourage policy initiatives to require adoption of green-building measures by public sector



¹ Specific initiatives detailed in Green Building Codes report submitted to USAID in September, 2009

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Targeted Results

Measure	Current Goal (by 2010)	Comments
Jobs Created	2,750	<ul style="list-style-type: none"> Attracting large-scale generation projects (wind, CSP, PV) offer the best possibility to approach the job creation target – rule of thumb is 250 const. / 20 ops. jobs per 100 MW installed Other job creation mechanisms will supplement those produced from generation program
New FDI Generated	\$US 100M	<ul style="list-style-type: none"> Can be achieved through closing any of the proposed large-scale wind or solar (CSP or PV) generation projects – but will require government support Highly unlikely to meet this threshold through FDI attraction in the clean-tech manufacturing or service sector (proposed action items will take time to implement)
New clean tech firms established	6	<ul style="list-style-type: none"> Realistic objective through combination of FDI, local business incubation programs and entrepreneurship, and policy initiatives (adoption of green building codes, etc.)
Increase in Jordan's EWE productivity	5%	<ul style="list-style-type: none"> Will likely require adoption / implementation of several conservation measures, including: <ul style="list-style-type: none"> <input type="checkbox"/> New water tariff structure to encourage conservation (proposed to take effect starting late 2009 or early 2010) <input type="checkbox"/> Green building codes



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