FACILITATING UTILITY-SCALE RENEWABLE ENERGY INVESTMENTS AND DEVELOPING SUSTAINABLE RET INDUSTRIES IN EMERGING MARKETS

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INTRODUCTION AND TOPICS FOR DISCUSSION

- Typical market entry barriers for utility-scale RE projects
- Generally accepted measures for reducing entry risks for RE projects
- Selected approaches and policies for eliminating barriers (United States, EU-27, China, India, Peru, and Kosovo)
- A tough sell – the case of Colombia wind power development
- What does a developer look for before investing in a RE project in an emerging market country?
- What does a typical 50 MW wind farm cost?
- Suggested financing approach and transaction structure for a typical 50 MW wind farm
- An integrated strategy for facilitating sustainable RE investments
- Developing a sustainable RET industry in an emerging market country – the case of Jordan

PART I

FACILITATING UTILITY-SCALE RENEWABLE ENERGY PROJECTS AND INVESTMENTS IN EMERGING MARKET COUNTRIES

"In emerging markets in particular, investment decisions in renewable energy projects are closely correlated with incentives."

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TYPICAL BARRIERS TO THE DEVELOPMENT OF UTILITY-SCALE RENEWABLE ENERGY PROJECTS

- Lack of a strong national strategy for promoting RE projects
- Low base load electricity tariffs from coal and gas-fired power plants
- Lack of cost-recovery tariffs and transparent tariff methodologies
- Regulatory frameworks that unintentionally discourage or penalize major utility-scale RE projects
- Lack of understanding by system operators on how to accommodate and manage variable energy outputs from RE projects
- Lack of coordination and planning support at both the national and local government levels
- Lengthy project and site approval processes
- Weak local commercial banking system that also lacks capacity for evaluating and reviewing loans for RE projects

GENERALLY ACCEPTED MEASURES FOR REDUCING ENTRY RISKS FOR RENEWABLE ENERGY PROJECTS

- Assurance of long-term government support and/or targeted subsidies
- Development of a formal approval process for planning consent at the national and local level
- Creation of a transparent regulatory regime supporting renewable energy project deployments
- Acceptance of long-term pricing contracts (on a must dispatch basis with the national utility or else on a take or pay basis with the designated off-taker)
- In other words, *strong assurances of a fair return on investment and also the mitigation of potential project risks and uncertainties*

SELETED APPROACHES AND POLICIES FOR MINIMIZING BARRIERS AND ENCOURAGING RE INVESTMENTS

- United States – accelerated depreciation, production tax credits, renewable energy portfolio standards, voluntary green programs, Federal RE grants for promising RET applications, recovery funds
- EU-27 – mandatory targets, fixed feed-in tariffs, targeted competitive tendering, tradable green certificates, capacity payments on basis of rated output, various fiscal incentives, subsidies, and tax exemptions
- China – $738 billion on new energy and CO_2 reduction over 10 years
- India – Accelerated depreciation, reduction of import duties, subsidized financing, favorable power purchase prices for some States,wind data
- Peru – supportive national legislation, targeted competitive tendering, guaranteed unleveraged IRR, open access to the national grid
- Kosovo – attractive feed-in tariff, open access to the grid but capped at 150 MW (of which only 60 MW can be wind)

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CHALLENGES CONFRONTING COLOMBIA IN ITS DESIRE TO PROMOTE UTILITY-SCALE WIND ENERGY

- Colombia has a rich endowment of energy resources including abundant coal, natural gas, and large-capacity hydro
- Energy sector already has a relatively low carbon footprint which is among the lowest in the region
- However, Colombia's interconnected power system is periodically impacted by large-scale droughts due to high reliance on hydropower
- While its wind regime is rated among the best in South America, it does not currently rank in the least cost expansion plan
- Moreover, wind power appears to be available when its contribution to the national grid is most needed
- But, not even CER credits traded at $50 per ton of CO_2 will allow wind to become a viable least cost option

KEY OBSTACLES AND POLICIES FOR ADDRESSING BARRIERS TO ENTRY FOR COMMERCIAL WIND

- Despite an abundant resource endowment and strategic advantages, wind-based generation faces two major obstacles:
  - Competition from conventional power sources with appreciably lower capital costs
  - Regulatory framework that does not acknowledge wind's potential firm capacity
- A recent World Bank study recommended the following policy options in an effort to facilitate utility-scale wind in Colombia:
  - Promoting access to multilateral financial instruments aimed at reducing GHG emissions (CDM, Clean Tech Fund, soft loans)
  - Implementing targeted fiscal measures to benefit investors
  - Reforming the regulatory system to support wind capacity

COMPARISON OF ACTIONS REQUIRED TO ACHIEVE A 14% IRR FOR A 300 MW WIND FARM IN COLOMBIA

Investment cost/kW (US$)	Reliability payment (%)	Required actions to reach a 14% Internal Rate of Return (IRR)
$2,400 per kW	None	Elimination of sector fees and system charges. as well as10% CTF financing and access to 60% soft loans
	20%	Requires considerable financial support: i.e., 40% CTF financing and access to 20% in soft loans
	30%	Requires considerable financial support: i.e., 30% CTF financing and access to 30% in soft loans
	36%	Requires special financing support: i.e., 20% CTF financing and access to 50% in soft loans
$1,800 per kW	None	Elimination of sector fees and system charges. No additional intervention is require
	20%	Requires special financing support: i.e., 40% access to soft loans
	30%	No additional interventions required
	36%	No additional interventions required

MAIN RESULTS OF THE ESMAP WORLD BANK POLICY INSTRUMENT IMPACT ASSESSMENT

- The single most effective policy instrument to promote wind power in Colombia is the granting of access to reliability payments for firm energy and complementary with hydro
- The implementation of this policy option is relatively easy to incorporate into the existing regulatory system.
- For new wind-power plants with costs in the range of $1,800/kW installed, the adoption of the reliability payments is enough to attract investors
- Higher capital costs require access to concessionary financial conditions, such as those provided under the Clean Technology Fund or fiscal incentives.

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WHAT DOES A PRIVATE DEVELOPER LOOK FOR WHEN CONSIDERING A RE INVESTMENT OVERSEAS?

- An internal rate of return of at least 14% and preferably greater
- Sufficient enough fiscal incentives and/or subsidies to achieve targeted IRR and required debt service cover ratio
- A transparent regulatory process with well understood tariff methodologies
- Assurance of long-term host government support for clean energy
- An off-taker willing to enter into a long-term power purchase agreement of sufficient duration to cover senior debt tenor
- A favorable investment code that guarantees repatriation of profits
- Convertibility of local currency to foreign exchange
- Executed bilateral investment treaties with the countries of origin for all equity participants

OVERVIEW OF TOTAL FINANCING REQUIREMENTS FOR A TYPICAL 50 MW WIND FARM (2010)

Component Description	Cost (US$)
20 x 2.5 MW GE Turbines, Towers, Spares, 2-Year Warranty, Erection, and Craneage	64,706,000
Optional Grid Compliance Systems	2,942,000
20 Step Up Transformers	1,271.000
150 kV ST/DT Breaker at Substation	1,007,000
150 kV Transmission Interconnection (6 km)	600,000
WindSCADA Plus System	233,000
VAT and Import Duties (Assumed at 20%)	14,152,000
Civil Works (Site & 20 Ring Foundations)	8,305,000
Engineered Gravel Access Roads (4.5 km)	350,000
Shipping from Port of Entry to Project Site	3,176,000
Insurance (Shipping, Construction, Erection)	1,129,000
Land Acquisition	1,000,000
Contingency (5%)	4,944,000
Total Cost to Construct	**$103,814,000**

Component Description	Cost (US$)
Project Management, Owner's Engineering, and Success Fee	4,153,000
Technical, Legal, and Professional Services	3,640,000
Loan Commitment and Disbursement Fees	975,000
Financial Advisory and Arrangement Fees	1,680,000
Interest During Construction	2,730,000
Working Capital	2,199,000
Contingency (5%)	809,000
Total Project Company Costs	**$16,186,000**
Total Financing Costs	**$120,000,000**
Total Estimated Cost per MW	**$2,400,000**
	12

SUGGESTED FINANCING APPROACH FOR A TYPICAL 50 MW WIND FARM IN AN EMERGING MARKET

- Inclusion of a MDB as a source of both senior debt and equity
- Limited recourse project financing security package
  - Off-take agreement
  - Licenses and permits
  - Escrow and reserve accounts
  - Risk insurance package
- Level of gearing at 65/35
- Debt service cover ratio greater than 1.5
- IRR of 14% or greater

Sources of Debt	Amount in Millions $	% of Total Debt	% of Total Costs
African Development Bank A loan	18.0	23.1	15.0
IFC Co-Financing	12.0	15.4	10.0
Ex-Im Bank Environmental Export Program	48.0	61.5	40.0
Total Debt	**78.0**	**100.0**	**65.0**

Sources of Equity	Amount in Millions $	% of Total Equity	% of Total Costs
Project Sponsor	6.0	14.3	5.0
Strategic Partner	24.0	57.1	20.0
IFC	12.0	28.6	10.0
Total Equity	**42.0**	**100.0**	**35.0**

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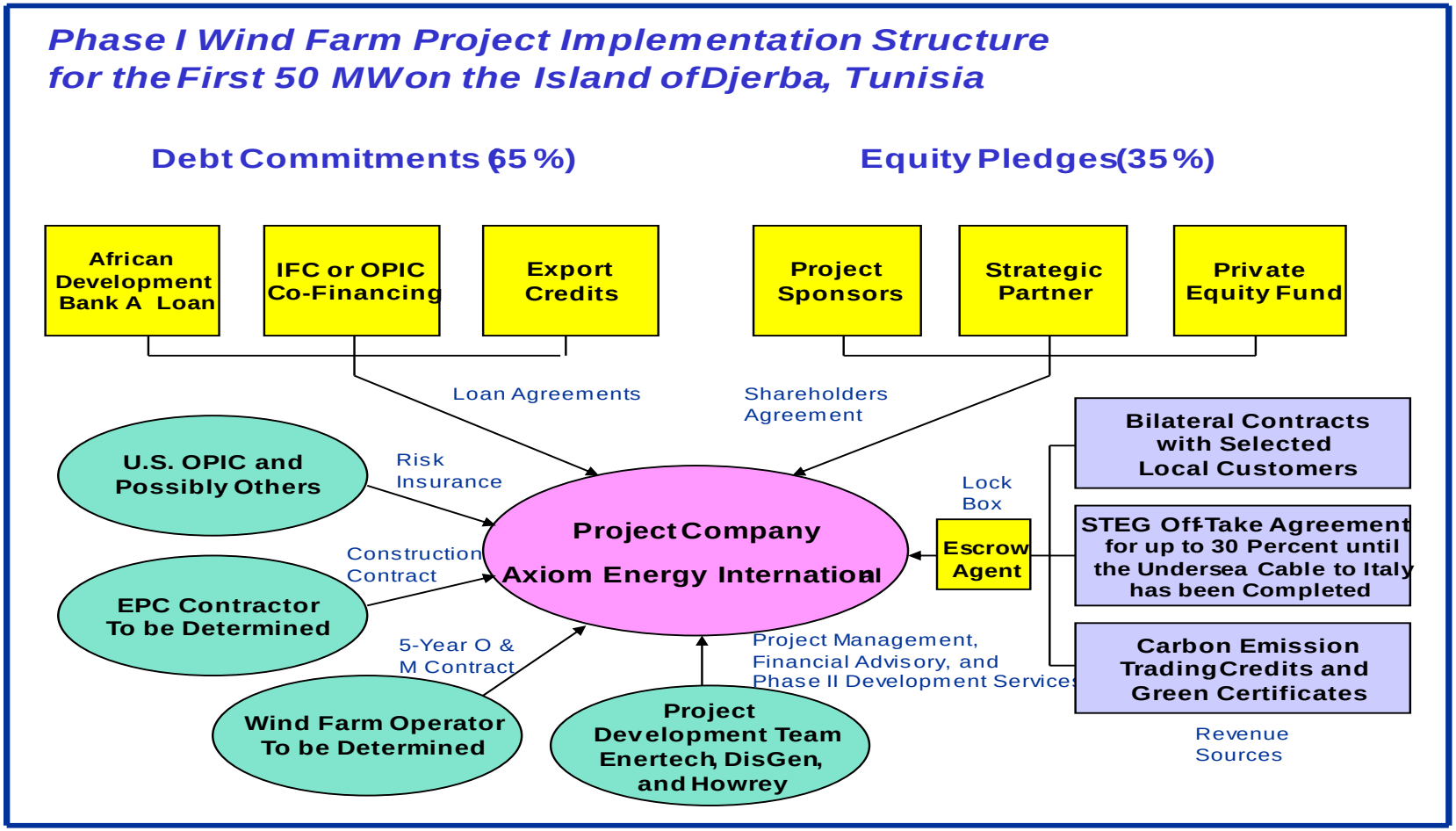
ASSOCIATED TRANSACTION STRUCTURE FOR A TYPICAL 50 MW WIND FARM



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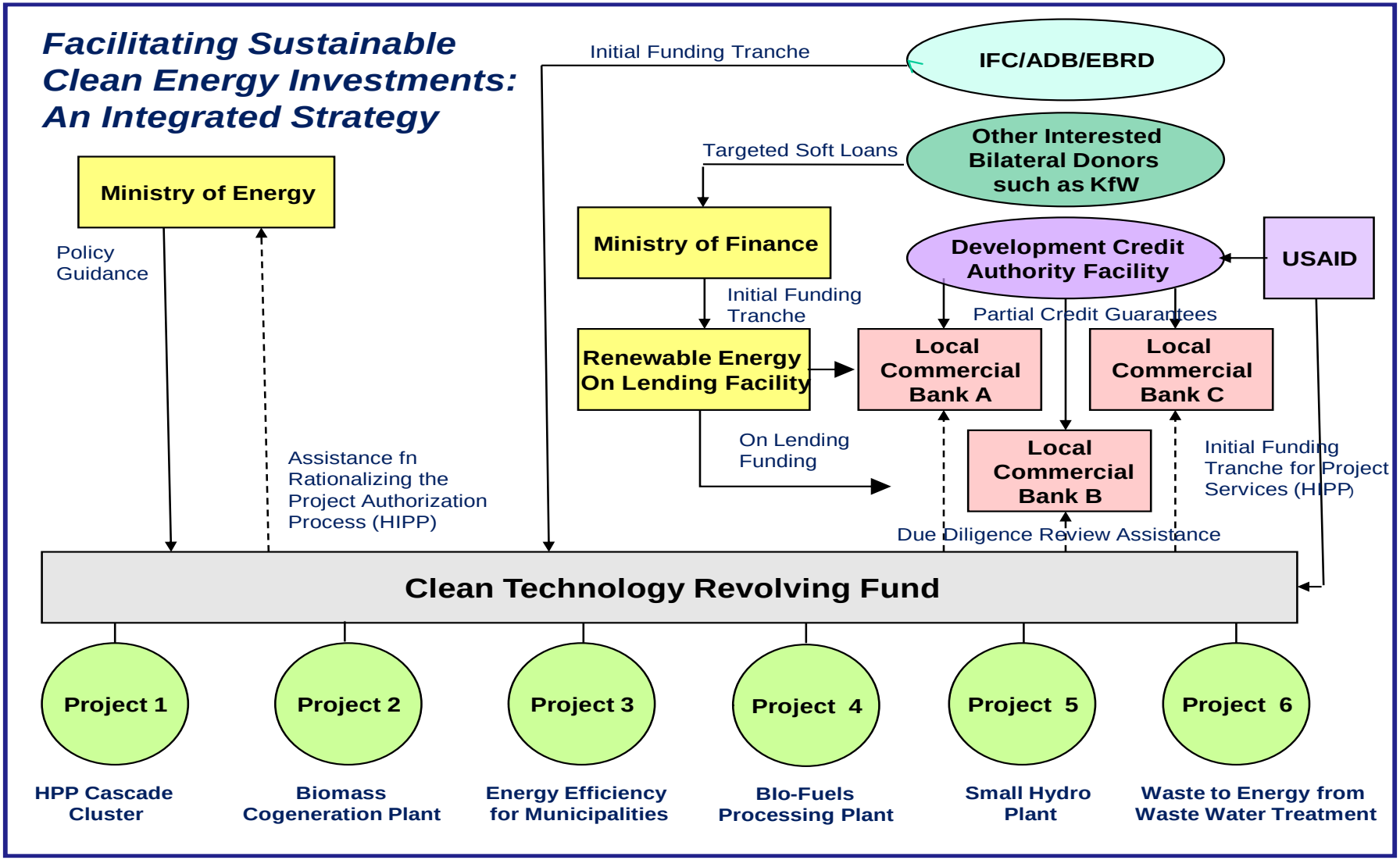
Facilitating Sustainable Clean Energy Investments: An Integrated Strategy



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PART II

INTRODUCTION TO THE DEVELOPMENT OF A SUSTAINABLE RENEWABLE ENERGY TECHNOLOGY INDUSTRY IN AN EMERGING MARKET COUNTRY: THE CASE OF JORDAN

DEVELOPING A RENEWABLE ENERGY TECHNOLOGY INDUSTRY – JORDAN CASE STUDY

- To promote energy independence and economic growth, Jordan aims to attract more foreign direct investment (FDI) in the clean tech sector
- Initial analysis conducted by Deloitte in 2010 under USAID's SABEQ program suggested Jordan most likely to compete successfully for investment in **solar** than in other "clean" technologies (wind, biofuels, etc.)
- Next Steps:
  - Benchmark Jordan against regional and global competitors for attracting solar FDI
  - Identify Jordan's competitive strengths, challenges, and value proposition to global solar companies
  - Recommend actions to increase competitiveness

CLEAN TECH INDUSTRY LOCATION BENCHMARKING

- Goal is to evaluate Jordan through the lens of a solar company (or consultant) conducting a global location analysis for a new manufacturing facility
- Benchmark locations were selected from among three categories:
  - Established global destinations
  - Emerging global competitors
  - Regional competitors
- The decision framework, criteria, and weightings are based on actual project experiences working with solar manufacturers
- Data sources mirror those used for Deloitte Consulting's commercial corporate location strategy projects

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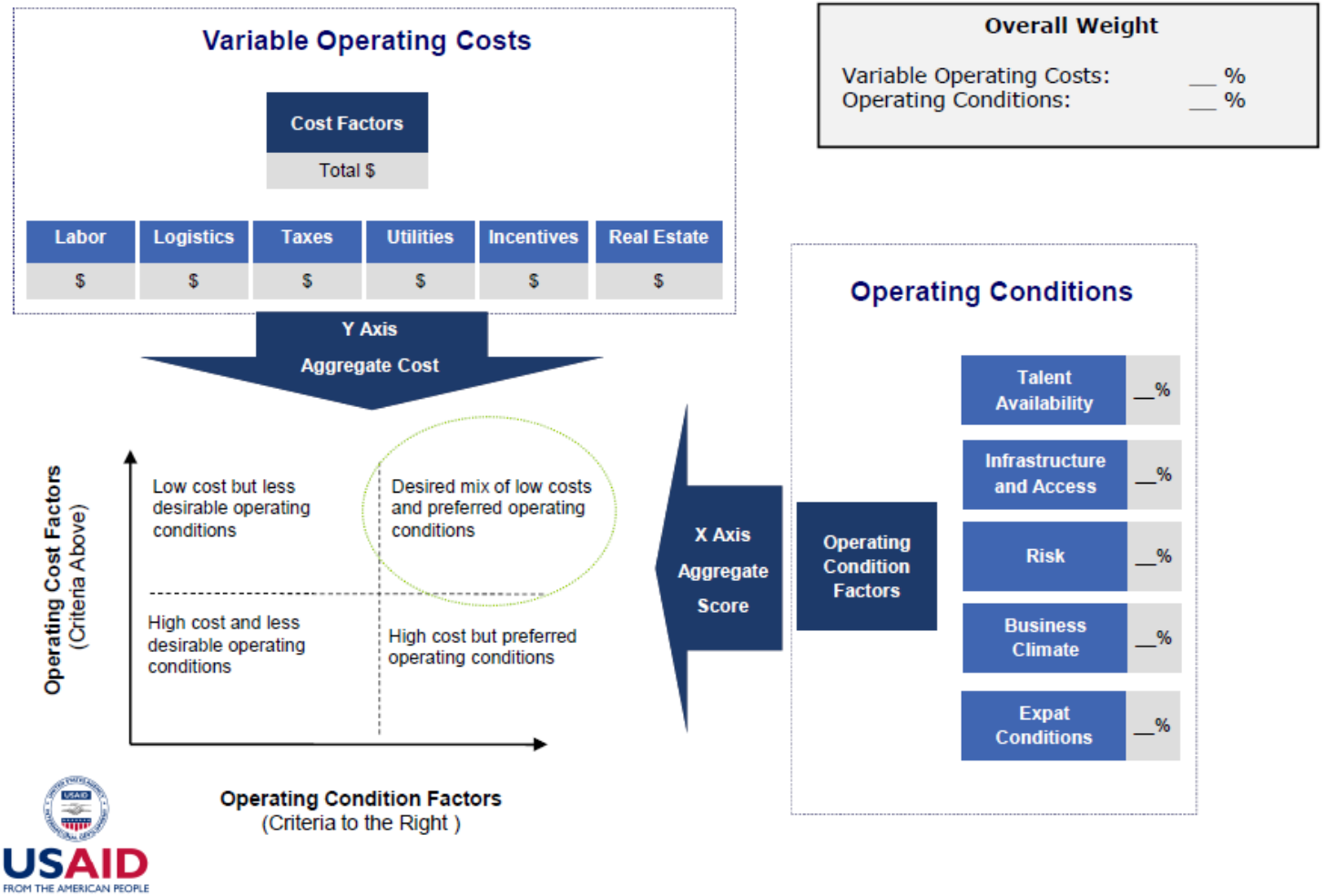
BENCHMARK LOCATIONS

	Country	Comments
Established Global	China	Key origin country of, and increasingly destination for, solar FDI
	Germany	Primary origin country for solar investments
	Malaysia	Has leveraged semiconductor platform to challenge Singapore
	Singapore	Established as a top-tier global destination for solar investment
	USA	Attracting substantial manufacturing investment to serve domestic market
Emerging Global	Mexico	Certain regions (e.g. Mexicali) shifting focus toward solar
	Philippines	Low-cost destination with successful history of FDI attraction in other sectors
	Poland	Emerging, lower-cost alternative to Germany
	South Africa	Successful history of FDI attraction; turning attention toward solar
	Thailand	Large electronics industry
Regional	Egypt	Considerable momentum in wind, nascent solar sector
	Israel	Established as a "clean-tech" hub within the region
	Oman	Minimal momentum to date – potential regional competitor
	Qatar	Minimal momentum to date – potential regional competitor
	Turkey	Key regional competitor for FDI attraction – targeting wind and solar
	UAE (Abu Dhabi)	MASDAR City has become a recognized global brand

LOCATION DECISION FRAMEWORK



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OPERATING CONDITIONS ASSESSMENT

Expat Conditions	10%
• Quality of life	70%
• Cost of Living	30%

Solar Enabling / General

Business Climate	25%
• Feed-in Tariff	10%
• Solar Irradiance	10%
• Solar Industry Presence	15%
• Government Focus on Solar	15%
• Ease of Doing Business	20%
• Construction Permitting	10%
• Employment Regulations	10%
• Tax / Regulatory Environment	5%
• Access to Credit	5%

Talent Availability	25%
• Labor Market Size	20%
• Direct Labor Availability	20%
• Qualified Engineers	20%
• University Education	20%
• English Language Skills	20%

Risk	20%
• Political Risk	25%
• Currency Risk	25%
• Intellectual Property Risk	25%
• Natural Disaster Risk	25%

Electric / Other

Infrastructure and Access	20%
• Robust Energy Infrastructure	15%
• Quality of Electric Supply	15%
• Ease of Acquiring Service	10%
• Overall Infrastructure	10%
• Real Estate	20%
• Airport Access	20%
• Port Access	10%

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Based on representative decision criteria and average weightings across multiple solar deployment projects. Criteria, and relative importance of each factor (weighting) can vary substantially by company/project.

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BUSINESS CLIMATE – SOLAR ENABLING ENVIRONMENT

	Country	National Feed-in Tariff (Solar)[1]	Solar Irradiance[2]	Solar Industry Presence/ Concentration[3]	Government Focus on Solar[3]
Established Global	China	No	Low - Moderate	High	Moderate
	Germany	Yes	Low	High	High
	Malaysia	Pending (2010-11)	Moderate	High	High
	Singapore	No	Moderate	High	High
	USA	No	Low - High	High	Moderate
Emerging Global	Mexico	No	Moderate	Moderate	Moderate
	Philippines	Pending (2010)	Moderate	Moderate	Moderate
	Poland	No	Low	Moderate	Moderate
	South Africa	Yes	Moderate - High	Low	Moderate
	Thailand	No	Moderate	Low	Moderate
	Jordan	**No**	**High**	**Low**	**Low**
Regional	Egypt	No	High	Low	Low (wind-focused)
	Israel	Yes	High	Moderate	Low - Moderate
	Oman	No	High	Low	Low
	Qatar	No	High	Low	Low
	Turkey	Yes	High	Low	Low (wind-focused)
	UAE	No	High	High	High

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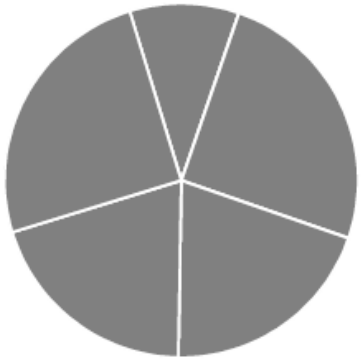
JORDAN'S COMPARATIVE OPERATING CONDITIONS

	Business Environment	25%
Solar Enabling	• Feed-in Tariff	10%
Solar Enabling	• Solar Irradiance	10%
Solar Enabling	• Solar Industry Presence	15%
Solar Enabling	• Government Focus on Solar	15%
General	• Ease of Doing Business	20%
General	• Construction Permitting	10%
General	• Employment Regulations	10%
General	• Tax / Regulatory Environment	5%
General	• Access to Credit	5%

Expat Conditions	10%
• Quality of life	70%
• Cost of Living	30%



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• University Education	20%
• English Language Skills	20%

Risk	20%
• Political Risk	25%
• Currency Risk	25%
• Intellectual Property Risk	25%
• Natural Disaster Risk	25%

	Infrastructure and Access	20%
Electric	• Robust Energy Infrastructure	15%
Electric	• Quality of Electric Supply	15%
Electric	• Ease of Acquiring Service	10%
Other	• Overall Infrastructure	10%
Other	• Real Estate	20%
Other	• Airport Access	20%
Other	• Port Access	10%

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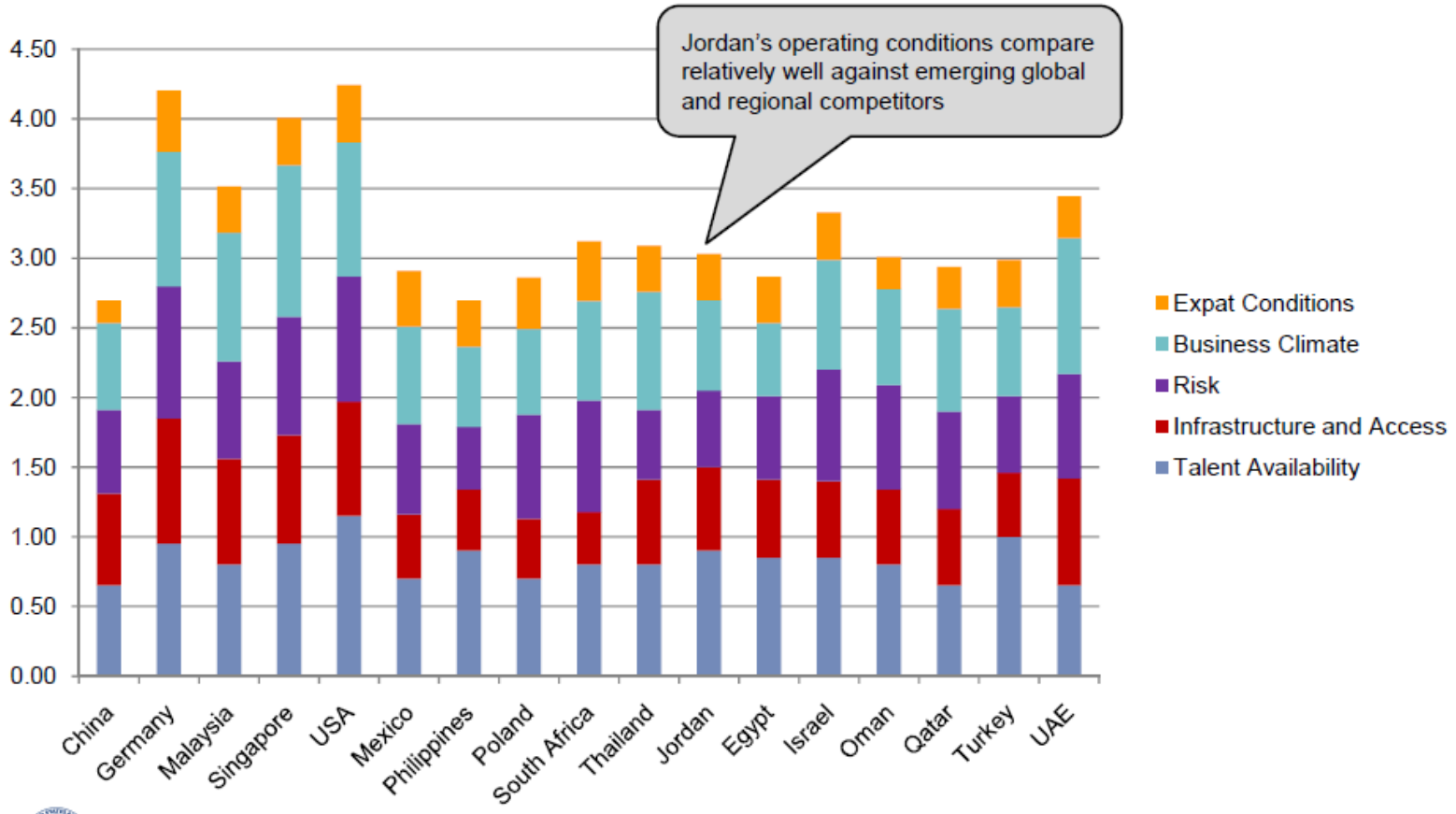
COMPARATIVE OPERATING CONDITIONS RANKING



Based on operating conditions weightings from previous slide. Each country was scored on a 1-5 scale (where 5 is most favorable) for each decision factor

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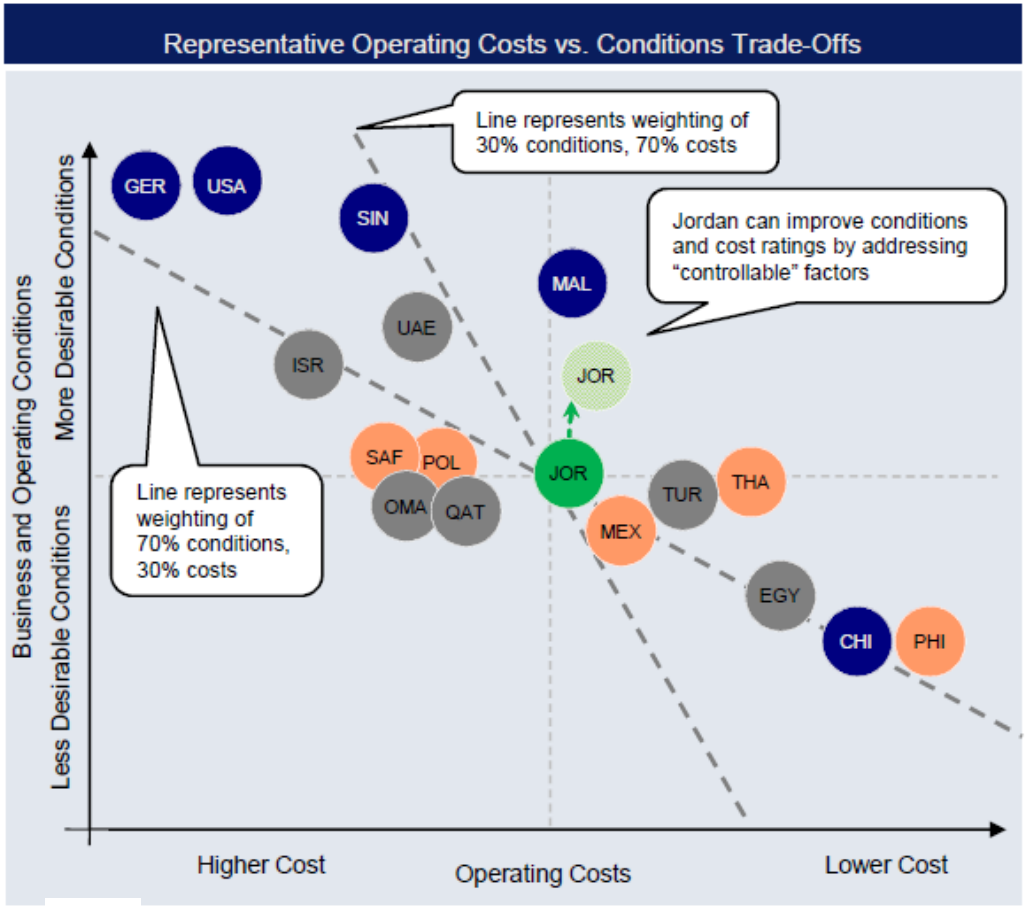
SUMMARY OF OVERALL RENEWABLE ENERGY TECHNOLOGY INDUSTRY COMPETITIVE POSITION



Global Established

- CHI China
- GER Germany
- MAL Malaysia
- SIN Singapore
- USA United States

Global Emerging

- MEX Mexico
- PHI Philippines
- POL Poland
- SAF S. Africa
- THA Thailand

Regional

- EGY Egypt
- ISR Israel
- OMA Oman
- JOR Jordan (current)
- QAT Qatar
- TUR Turkey
- UAE United Arab Emirates
- JOR Jordan (potential)

JORDAN'S CHALLENGES FALL INTO TWO CATEGORIES:

Non-Controllable Factors:

- Political risk
- Currency risk
- Labor market size
- Port access
- Ease of doing business[1]
- Solar industry presence

Controllable Factors:

- Feed-in Tariff (or other solar-enabling legislation)
- Government focus on solar
- Real estate
- Access to credit
- Industry-specific incentives and policies (beyond those which stimulate generation)

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RECOMMENDATIONS & NEXT STEPS:

- Conduct detailed study of generation policy alternatives
  - Utilize proposed MEMR policy and economic advisors to evaluate economics of Feed-in Tariff and other alternatives
- Begin outreach campaign to put Jordan "on the map" for solar
  - Gather relevant stakeholders (MEMR, DZC, EDAMA, others) to identify each entity's role in outreach activities *(as suggested in following Outreach Strategy section)*
- Identify solar-suitable real estate alternatives in greater Amman
  - Continue to investigate opportunities to bring additional zones under the DZC umbrella
  - Identify candidates for a solar or "clean-tech" specific industrial park
- Establish a fund to extend credit to solar companies
  - Investigate possible financing sources for small or large-scale loans
- Develop a solar-specific suite of incentives and policies
  - Evaluate "long list" of potential incentives for high-level fit with Jordan's economic and regulatory climate, and identify "short list" candidates for further analysis

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