



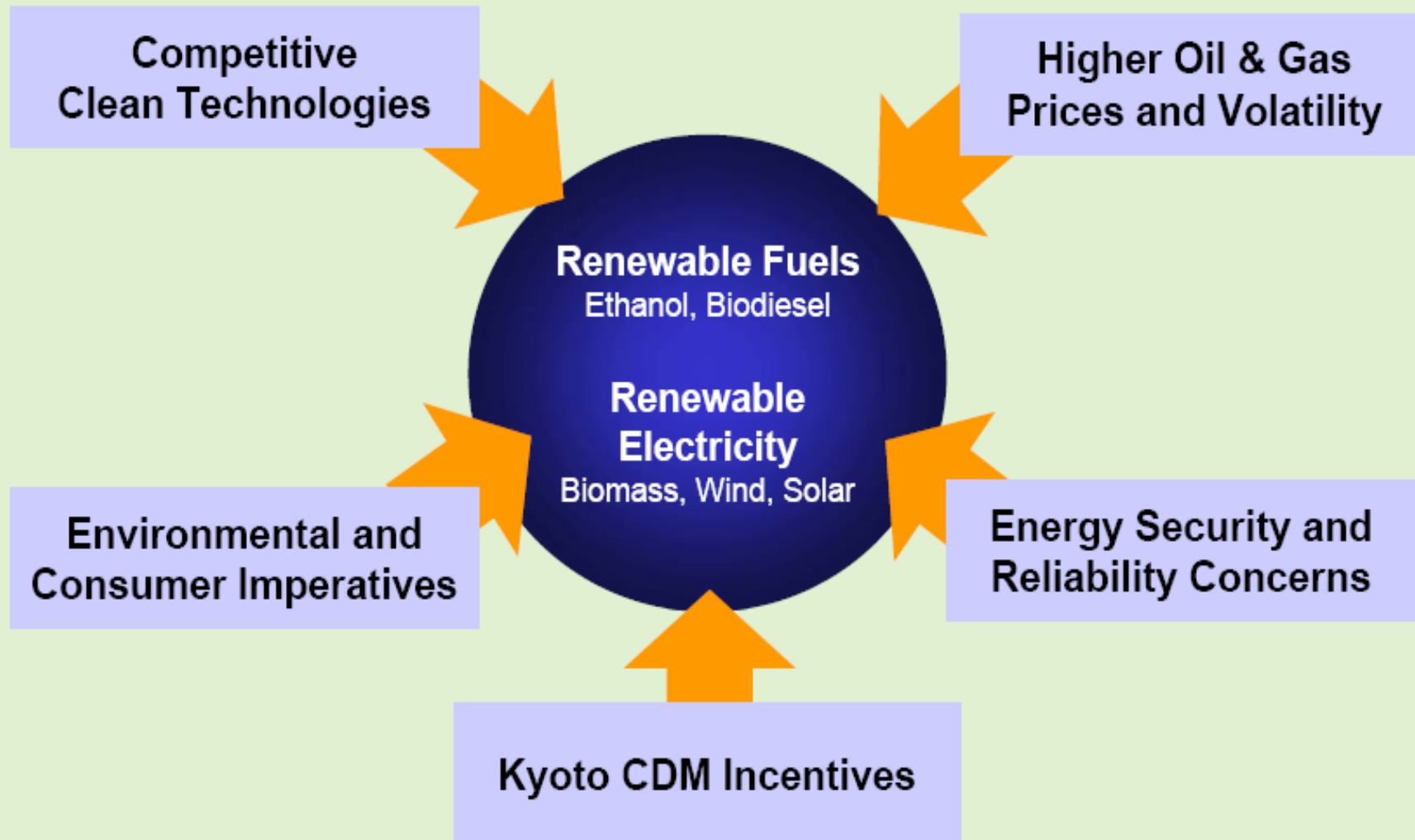
IFC and Renewable Energy Finance

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Infrastructure Department

Financing for Climate Conference:
Innovative Solutions and New Markets

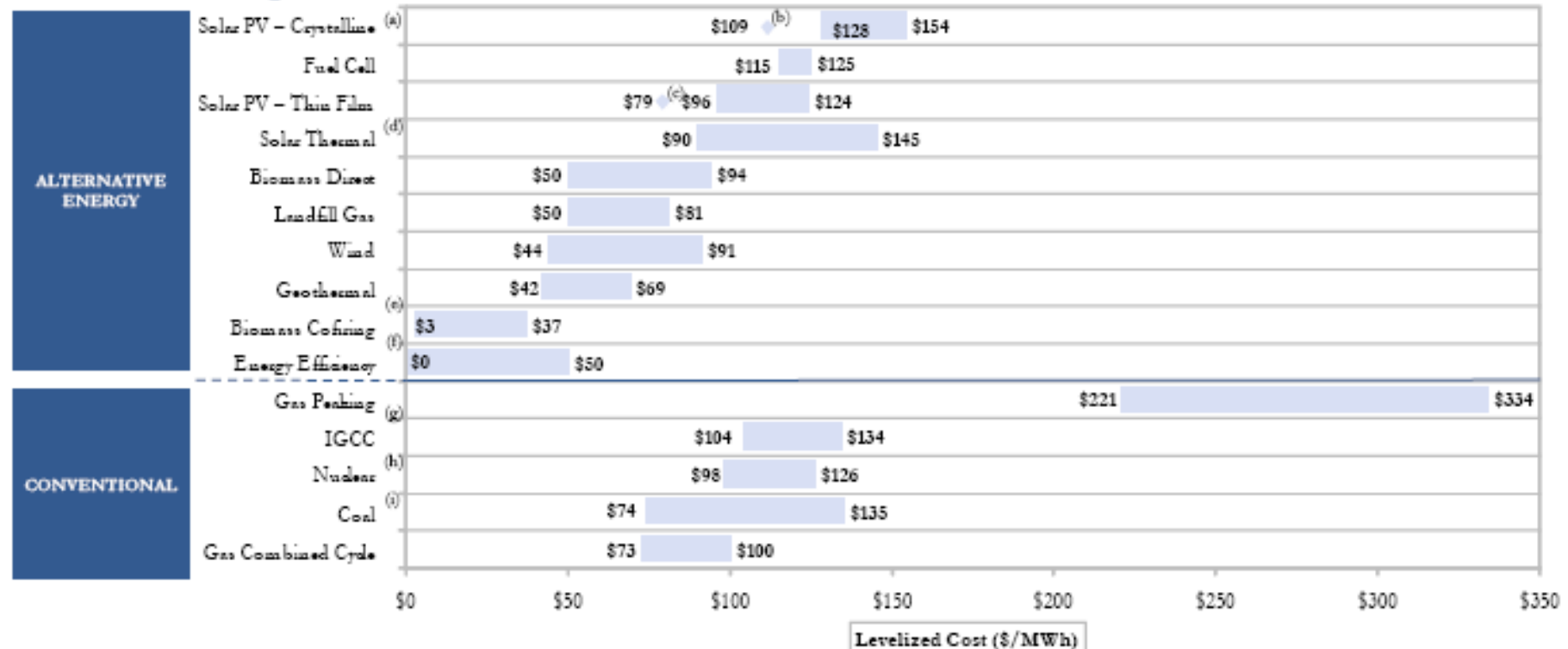
September 11, 2008

Five Forces Creating Attractive Opportunities



Levelized Cost of Energy Comparison

Certain Alternative Energy generation technologies are already cost-competitive with conventional generation technologies under some scenarios, even before factoring in environmental and other externalities (e.g., RECs, potential carbon emission costs, transmission costs) as well as the fast-increasing construction and fuel costs affecting conventional generation technologies



Source: Lazard estimates.

Note: Reflects production tax credit, investment tax credit, and accelerated asset depreciation as applicable. Assumes 2008 dollars, 60% debt at 7% interest rate, 40% equity at 12% cost, 20-year economic life, 40% tax rate, and 5-20 year tax life. Assumes coal price of \$2.50 per MMBtu and natural gas price of \$8.00 per MMBtu.

(a) Low end represents single-axis tracking crystalline. High end represents fixed installation.

(b) Represents a leading solar crystalline company's targeted implied levelized cost of energy in 2010, assuming a total system cost of \$5.00 per watt. Company guidance for 2012 total system cost of \$4.00 per watt would imply a levelized cost of energy of \$90 per MWh.

(c) Represents the leading thin-film company's targeted implied levelized cost of energy in 2010, assuming a total system cost of \$2.75 per watt. Company guidance for 2012 total system cost of \$2.00 per watt would imply a levelized cost of energy of \$62 per MWh.

(d) Low end represents solar tower. High end represents solar trough.

(e) Represents retrofit cost of coal plant.

(f) Estimates per National Action Plan for Energy Efficiency; actual cost for various initiatives varies widely.

(g) High end incorporates 90% carbon capture and compression.

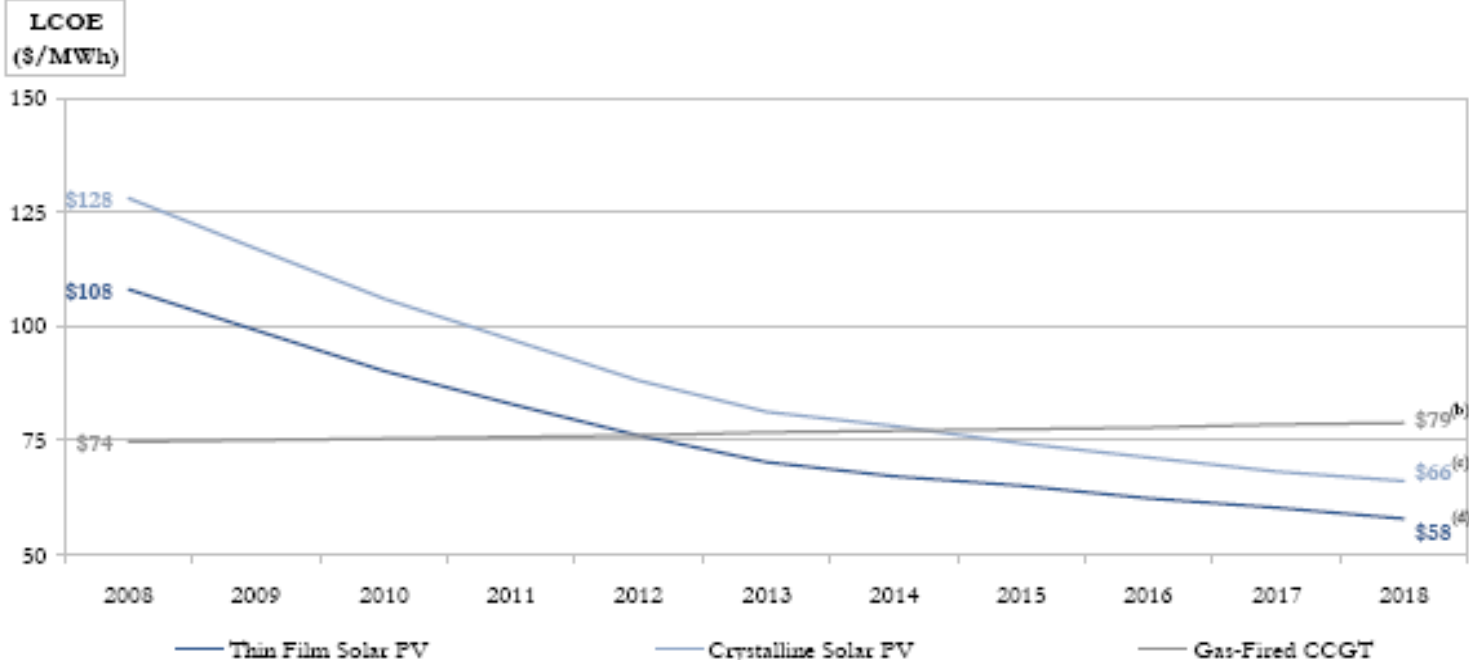
(h) Does not reflect potential economic impact of federal loan guarantees or other subsidies.

(i) Based on advanced supercritical pulverized coal. High end incorporates 90% carbon capture and compression.

Levelized Cost of Energy – Sensitivity to Capital Costs^(a)

An important finding in respect of Solar PV technologies is the potential for significant cost reductions over time as manufacturing scale along the entire production value chain increases; by contrast, conventional generation technologies are experiencing capital cost inflation (as well as fuel cost inflation), driven by high levels of global demand for conventional generation equipment, where potentially cost-reducing manufacturing improvements for these mature technologies are largely incremental in nature

- This assessment, however, does not take into account the intermittent nature of Solar PV as compared with the dispatchable nature of conventional generation; the key finding in this regard is that Solar PV technologies will play an increasingly *complementary* role in generation portfolios



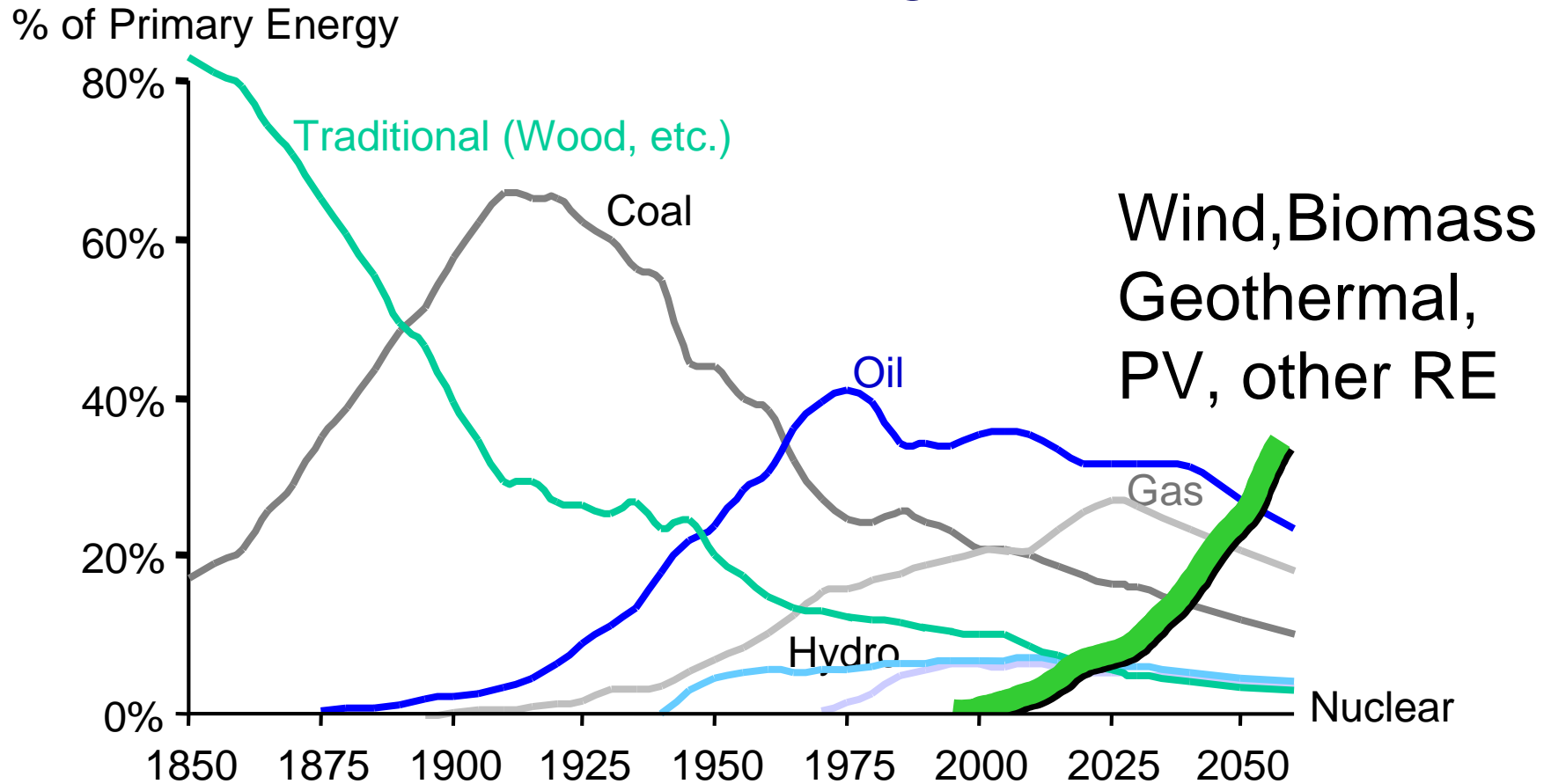
Source: *Lazard estimates*

Note: Reflects production tax credit, investment tax credit, and accelerated asset depreciation as applicable. Assumes 2008 dollars, 60% debt at 7% interest rate, 40% equity at 12% cost, 20-year economic life, 40% tax rate, and 5-20 year tax life. Assumes coal price of \$2.50 per MMBtu and natural gas price of \$8.00 per MMBtu.

- (a) Assumes capital costs for thin film and crystalline Solar PV decline by 10% annually through 2012 and 5% annually thereafter; assumes capital costs for gas-fired CCGT increase by 2.5% annually and gas prices constant at \$8.00 per MMBtu.
- (b) Assumes 85% capacity factor.
- (c) Assumes 26% capacity factor based on single-axis tracking.
- (d) Assumes 25% capacity factor.



Renewables Becoming a Significant Contributor ... and Growing



Source: Shell Global Scenarios



LDC Renewable Energy Key Drivers

Economic

- Rising oil prices makes RE more attractive
- Utilizes domestic resources that can displace imports
- Generates employment and new enterprises
- By-product sales improve enterprise viability (i.e. biomass)

Environmental

- Represents reduced air emissions and LDC cities often have severe air pollution
- Helps combat climate change/global warming
- Supports sustainability/eco-efficiency at enterprise level

Social

- Can help rural areas combat large scale migration to urban areas
- Governments, industry, and local populations recognize value
- Individuals want to support “green energy”

Increasingly, demand for access to clean modern energy from renewable sources is rising in the developing world.



LDC Challenges of Renewable Energy

- Hydro, biomass and geothermal are commercial - sector activity still limited by weak deal flow & few strong sponsors
- Wind is intermittent resource (not base load) and generally not competitive without regulatory & tariff support
- Solar PV and solar thermal electric (CSP) not cost competitive for grid-connected applications
- Market barriers: weak regulatory frameworks, absence of subsidies/poorly designed subsidies
- Mobilization of concessional finance (eg GEF, CIF/CTF), carbon finance and other project support where needed



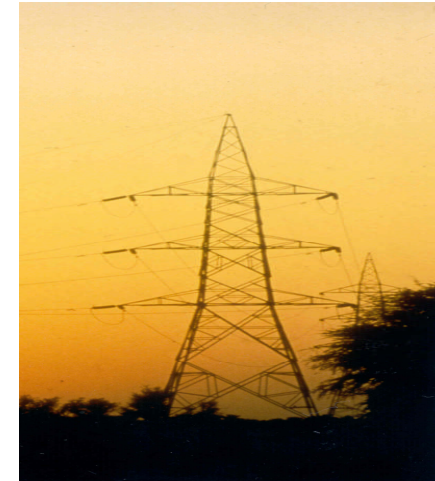
Basic Challenges in Developing World Power

- **>1.6 billion without access to electricity**
- **>1500 GW in new generation needed in LDCs through 2020**
- **LDC governments/IFIs lack sufficient capital to finance expected supply shortfall**
- **Reliable/affordable power is key to poverty alleviation and sustainable development**



IFC's Track Record in Power

- Began in 1990
- Total portfolio of US\$2.3 billion
 - IFC: US\$1.3 billion
 - B-loans: US\$1.0 billion
- Invested in over 15,000 MW of generation capacity and US\$15.0 billion in aggregate project costs
- IFC has invested in power generation, distribution, transmission, and energy efficiency projects in 32 countries worldwide





What Is IFC Doing Differently in the Power Sector?

- Local and regional sponsors
- Merchant generation plants (without PPAs) which are cost-competitive
- Transmission and distribution (India, Philippines)
- Developing projects from scratch jointly with World Bank
- Captive power for large industrials
- Holding companies with pool of assets (e.g. China)
- Local currency financing (e.g. India, Thailand)
- Acquisition financing

- Public-private partnerships
- Renewable energy and carbon credits



No Single Model for IFC Involvement in Renewables

- Type of Projects:
 - Greenfield project/expansion of existing facilities
 - Privatization/expansion
 - Concession-based/BOT/Sponsor-owned
 - Local sponsors/foreign sponsors/joint ventures
 - Public-Private partnerships
- Types of Financing Models:
 - Project Finance
 - Corporate Finance/Development Company Investments
 - Private Equity Funds/Venture Capital Funds



IFC Renewable Energy Investments

Since 1990 IFC has financed >\$1.7 Billion in >40 renewable energy projects (21 Hydro, 5 biomass, 4 wind, 4 geothermal, 3 SPV; 1 corporate loan; & 2 FIs)

- Hydro projects in Belize, Brazil, Chile, Costa Rica, Guatemala, India, Nepal, the Philippines, Tajikistan, Turkey, India, Uganda & China
- Wind projects in Czech Republic, Brazil, Dominican Republic & India; others under review in Bulgaria, Chile, China, Estonia, India, Pakistan & Turkey
- Biomass cogeneration projects in Brazil, Peru, Nicaragua, Guatemala and India
- Geothermal projects in Djibouti, Guatemala, Indonesia and the Philippines
- Solar PV manufacturing in China, India & Russia; off-grid SPV
- CSR work with Investee Companies, e.g. micro-hydro in Bolivia, grid-tied solar PV in the Philippines



Selected Wind Power Projects

- **8.25 MW wind project in Dominican Republic using \$13 million loan guarantee for Basic Energy private utility**
- **37 MW wind project in India with “A” loan of \$33 million for MSPL, a mining firm which is largest wind IPP**
- **156 MW wind project in Bulgaria with EUR40 million “A” loan & EUR40 million “B” loan for AES**




Solar PV Manufacturing Projects

- **INDIA**: \$22.5 million in loans for 80 MW p.a. c-Si solar PV cell/module manufacturing plant with Moser Baer PV Ltd
- **RUSSIA**: \$25 million in loans & \$50 million in equity for new polysilicon manufacturing plant
- **CHINA**: up to \$45 million in equity and up to \$95 million in “B” loans for ENN Energy Co./XinAo Solar for 60 MW p.a. a-Si tandem junction thin-film solar PV module manufacturing plant

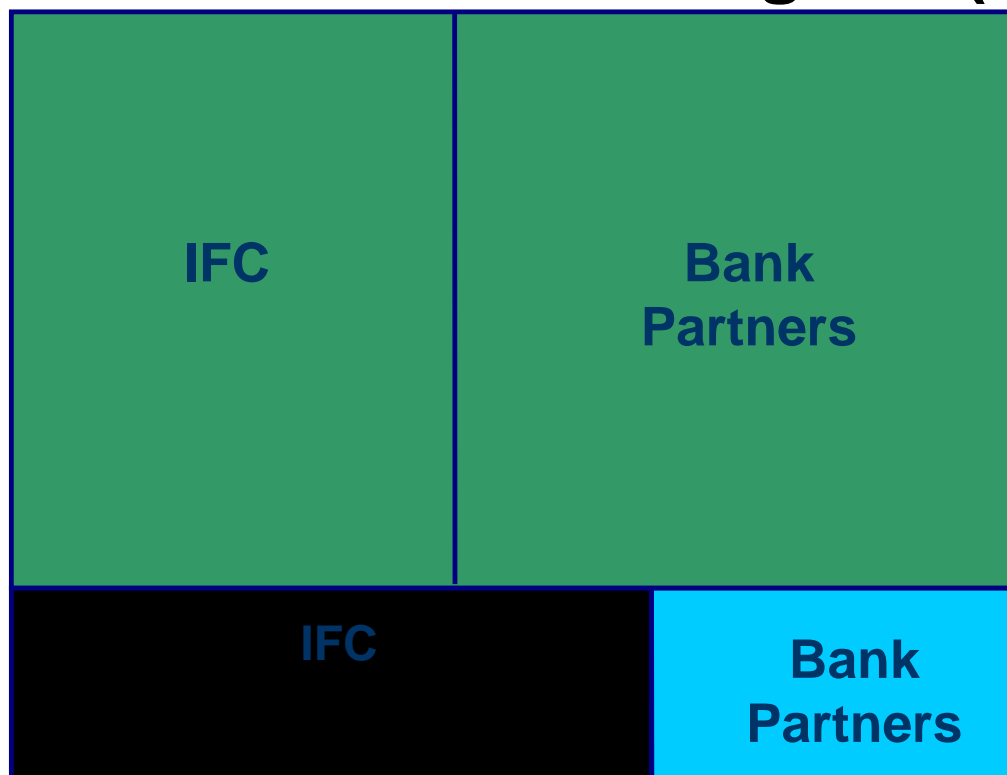


Climate-Related Private Equity Funds

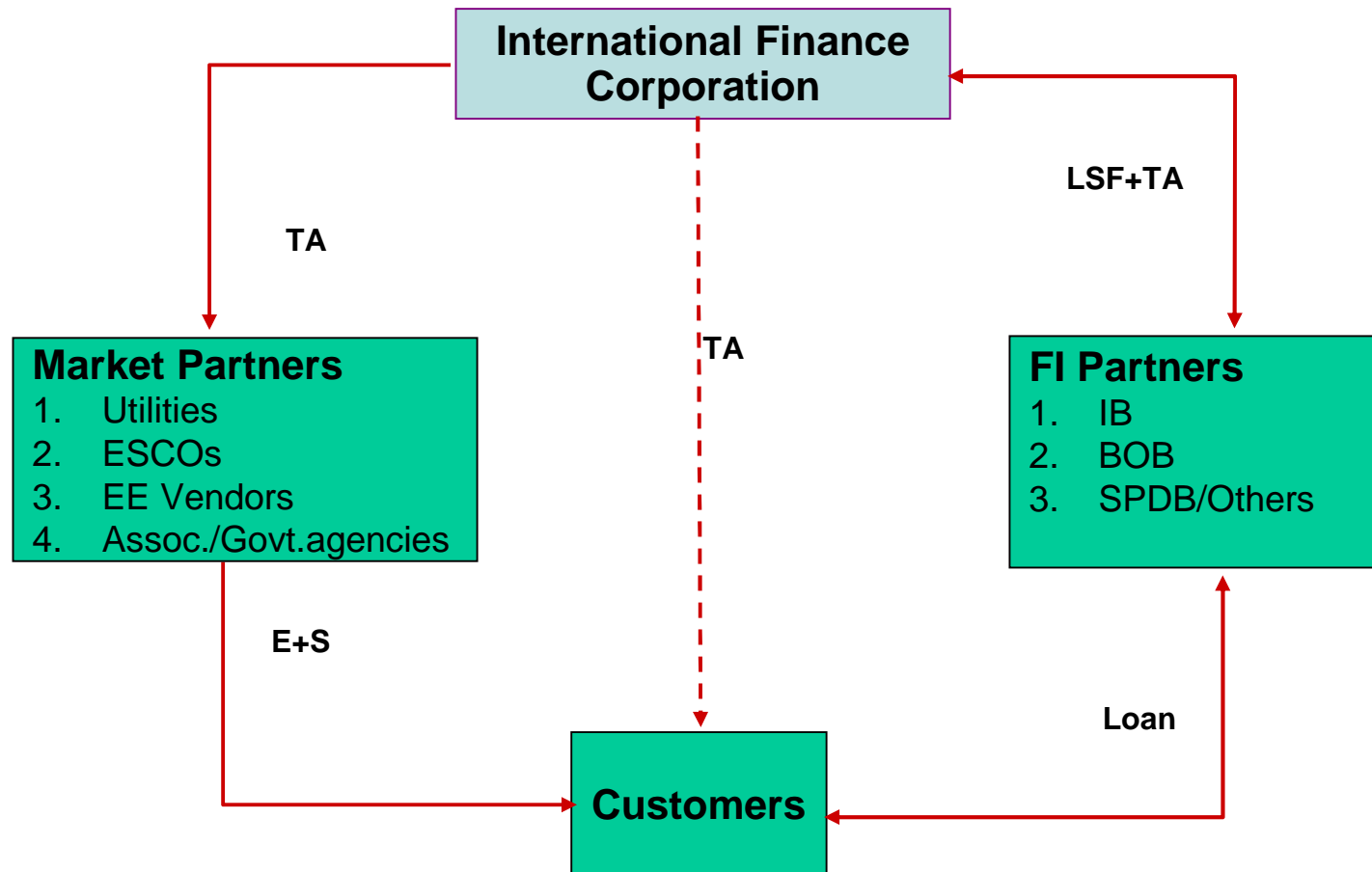
- Aloe Environment Fund 2- \$22.5 million IFC commitment to ~\$150 million fund managed by *Aloe Private Equity* for India and other Asian countries (incl. China) - - clean energy, renewables, energy efficiency, waste management & recycling
- Evolution One LP - \$20 million IFC commitment to ~\$225 million fund with *Consensus Business Group* as partner with focus on cleantech/clean energy opportunities in Southern Africa (SADCC) -- renewables, waste management, natural products, & green buildings
- China Environment Fund III LP- \$15 million IFC commitment to ~\$150 million fund with *Tsing Capital Co. Ltd.* as fund manager with focus on renewables, reuse/recycle, water resource management, waste treatment, & sustainable agriculture
- Plans to invest in 10-15 additional Funds for a total of \$300-\$500 million in IFC commitments by 2011



China Utility-based Energy Efficiency Finance Program (CHUEE)



- Line of credit supported by approved facility (CHUEE I): \$115 million
- Line of credit supported by additional facility (CHUEE II): \$350 million
- Loans could be provided to end users or equipment/service providers



TA: Technical Assistance
CA: Cooperation Agreement

LSF: Loss Sharing Facilities
E+S: Equipment, Engineering Service





Project Map of CHUEE Program

As of November 2007



- As of March 31, 2008
- **55** loans provided by partner banks to energy efficiency and renewable energy projects
- Total loan amount: **US\$180** million
- Annual GHG emission reduction: **4.3** million
- A pipeline of about **280** projects, with total investment of more than **US\$672** million



Mobilization of Funds for Clean Energy Technology Innovation

- Clean Technology Demonstrations
 - e.g. Grid Connected PV (Honduras & DR), Externally-fired Combined Cycle using bagasse feedstock (Brazil), Biomass harvesting (Peru)
- Capacity Building Activities - e.g. Legal and Regulatory Framework for Wind (Russia/Mongolia)
- Programs to Support Technologies & Business Models
 - e.g. off-grid solar PV, LEDs in Africa, EE financing for SME ESCOs, & Fuel Cells for Stationary Applications;
- Early stage equity investments in clean technology firms
 - e.g. micro-turbine manufacturer, technology for black liquor processing



CEPALCO Project, Philippines: Grid Connected PV Installation (1 MW)



Stage 1: Initial site work



Stage 2: Panels being installed



Stage 3: Completed plant; Commercial Operations – Sept. 2004



Key Contacts for IFC

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