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Renewable Energy Projects – Wind and Solar

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Wind and Solar Power - some interesting facts

- Despite the recession, total global investment in renewable energy broke a new record in 2010, reaching $211 billion – up from $160 billion the previous year
- Wind power capacity increased by 20% in 2011 to approximately 238GW seeing the greatest capacity addition of any renewable energy technology
- In 2011 solar PV saw another year of extraordinary market growth with almost 30 GW of operating capacity added increasing total global capacity by 74% to almost 70 GW
- Renewable energy in 2010 supplied an estimated 16.7% of global final energy consumption

Source: REN 21 2011 Renewables Global Status Report

TOP FIVE COUNTRIES – Annual additions in 2010

	New capacity investment	Wind power	Solar PV	Solar hot water/heat[2]
1	China	China	Germany	China
2	Germany	United States	Italy	Germany
3	United States	India	Czech Republic	Turkey
4	Italy	Spain	Japan	India
5	Brazil	Germany	United States	Australia

Source: REN 21 2011 Renewables Global Status Report

TOP FIVE COUNTRIES – Existing capacity as of end-2010

	Renewables power capacity (not including hydro)	Renewables power capacity (including hydro)	Wind power	Biomass power	Geothermal power	Solar PV	Solar hot water/heat[2]
1	United States	China	China	United States	United States	Germany	China
2	China	United States	United States	Brazil	Philippines	Spain	Turkey
3	Germany	Canada	Germany	Germany	Indonesia	Japan	Germany
4	Spain	Brazil	Spain	China	Mexico	Italy	Japan
5	India	Germany/ India	India	Sweden	Italy	United States	Greece

Source: REN 21 2011 Renewables Global Status Report

Solar and Wind Renewable Energy

Solar Energy - 3 types

1. **Solar Thermal** – this is energy converted to heat and generally aimed at household populations and it can take the form of solar space and water heating
2. **Concentrated Solar Power** – type of solar thermal energy used to generate electricity. This is mostly aimed at large-scale energy production. Concentrated solar power technologies use lenses or mirrors to reflect and concentrate sunlight onto receivers. The concentrated heat is then converted to thermal energy which in turn produces electricity via a steam turbine or heat engine driving a generator.
3. **Photovoltaic (PV)** solar power is electricity generated from the use of photovoltaic cells. PV modules can offer electricity in areas where it is not cost effective to use the conventional grid (extend grid lines or access transmission lines), or where electricity grids are rudimentary.

Wind Energy

- Energy generated from wind turbines.
- The turbines must be positioned in strategic locations so as to maximize wind potential
- Large wind farms may be connected to the electricity power transmission network and smaller turbines are connected through the distribution grid

Turkmenistan – Wind & Solar Energy Potential

- No renewable energy policy/legal framework
- Turkmenistan did ratify the UN conventions relating to environmental protection including the UN Framework on Climate Change and the Kyoto Protocol
- 2012 – the government adopted the National Sustainable Energy Strategy and Action Plan
- According to the Renewable Energy and Energy Efficiency Partnership (REEEP) approximately 40% of Turkmenistan holds wind energy potential suitable for power generation.
- REEP estimate that 10GW could be developed in the medium term and potentially 500GW in the long term
- Such quantities may even rival the country's natural reserves
- REEP also estimates a very high solar potential in Turkmenistan

The main barriers for wind and solar RE development in emerging markets

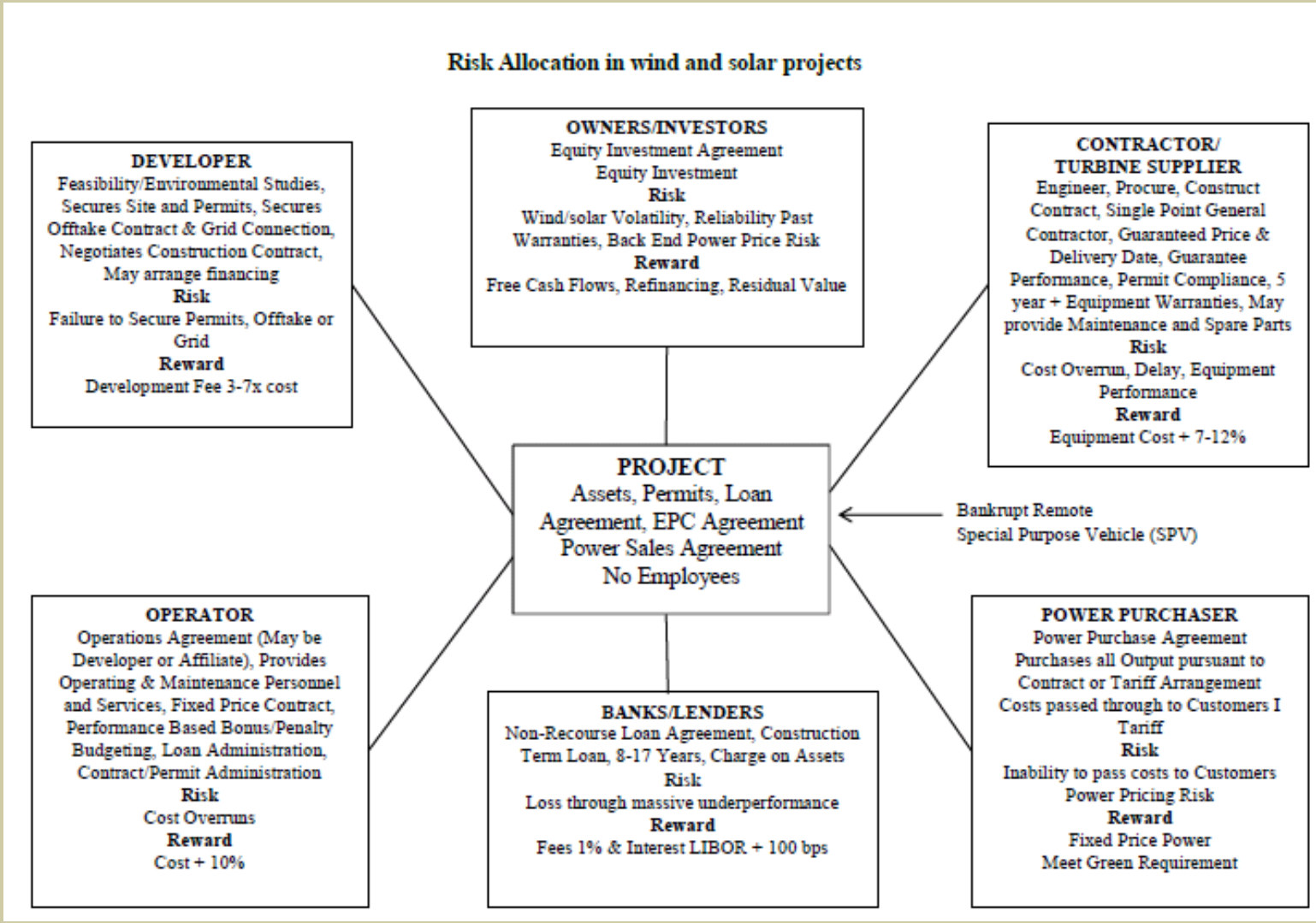
- Lack of development or seed capital is often seen as the prime reason preventing renewable energy transactions
- Lack of knowledge or capacity in the public sector (general political risk)
- Issues relating to government support
- Lack of legislative or regulatory framework
- Issues relating to property law
- Issues with convertibility of foreign exchange

Key risk issues renewable power development

- Development times and up front costs
- Inaccurate resource assessment
- Fuel supply variability
- Demand risk
- Public objections – appearance based
- Potentially difficult access to grid/infrastructure – lead times to obtain existing grid connection can be very long and/or access lines to grid expensive / no clarity on grid access tariffs
- Lack of expertise for methods of site selection and the technical aspects of wind power
- Critical stakeholders are not sufficiently engaged
- Lack of access to information
- Unfavourable pricing rules

Potential solutions for renewable energy development

- Gather good resource data – for example the Sun Scientific Production Association affiliated with the Supreme Council for Science and Technology could act as the relevant entity for this
- Create a Climate Change Fund (as contemplated) through which renewable energy pilot project could be financed and developed
- Engage critical stakeholders early – list includes local communities, ministries and local authorities
- Link renewable energy development with support for climate and clean energy agenda and inform opinion-informers including the media and leaders at both the national and local level
- Build capacity for the development of renewable energy projects
- Prepare the legal and regulatory framework and relevant policy and regulatory incentives for developers


Risk Allocation in wind and solar projects
DEVELOPER
Feasibility/Environmental Studies, Secures Site and Permits, Secures Offtake Contract & Grid Connection, Negotiates Construction Contract, May arrange financing
Risk
Failure to Secure Permits, Offtake or Grid
Reward
Development Fee 3-7x cost
OWNERS/INVESTORS
Equity Investment Agreement
Equity Investment
Risk
Wind/solar Volatility, Reliability Past Warranties, Back End Power Price Risk
Reward
Free Cash Flows, Refinancing, Residual Value
CONTRACTOR/ TURBINE SUPPLIER
Engineer, Procure, Construct Contract, Single Point General Contractor, Guaranteed Price & Delivery Date, Guarantee Performance, Permit Compliance, 5 year + Equipment Warranties, May provide Maintenance and Spare Parts
Risk
Cost Overrun, Delay, Equipment Performance
Reward
Equipment Cost + 7-12%
PROJECT
Assets, Permits, Loan Agreement, EPC Agreement
Power Sales Agreement
No Employees
Bankrupt Remote
Special Purpose Vehicle (SPV)
OPERATOR
Operations Agreement (May be Developer or Affiliate), Provides Operating & Maintenance Personnel and Services, Fixed Price Contract, Performance Based Bonus/Penalty Budgeting, Loan Administration, Contract/Permit Administration
Risk
Cost Overruns
Reward
Cost + 10%
BANKS/LENDERS
Non-Recourse Loan Agreement, Construction Term Loan, 8-17 Years, Charge on Assets
Risk
Loss through massive underperformance
Reward
Fees 1% & Interest LIBOR + 100 bps
POWER PURCHASER
Power Purchase Agreement
Purchases all Output pursuant to Contract or Tariff Arrangement
Costs passed through to Customers I Tariff
Risk
Inability to pass costs to Customers
Power Pricing Risk
Reward
Fixed Price Power
Meet Green Requirement

Case Study Cabeolica Wind Farm

First commercial-scale, privately financed PPP wind farm in SSA

- **General Business Framework** – including the government and the state-owned utility as shareholder in the project company gave government an additional incentive to see the project succeed
- **Lack of Developers** – the developer was InfraCo, part of the PIDG. InfraCo was set up to tackle the risks of early stage development – risks that the private sector typically would not accept. Without the availability of this early stage risk capital the project is unlikely to have succeeded
- **Issues with Offtaker** – Offtaker was not sufficiently creditworthy to support a 20 year PPA but additional government support structures were put in place through which the government provided an unconditional guarantee of some of the offtaker's payment obligations under the PPA
- **Political Risk -** Cape Verde has one of the most stable political systems in Africa

Case Study – continuation

- **Availability of Long-Term Debt** – DFIs were happy to provide financing
- **Availability of Equity** – provided by InfraCo
- **Availability of Equipment** – the project benefited from an equipment supplier/contractor that was keen to expand its operations in the region, that had the capability and experience to build this challenging project and that could offer a full EPC package. This was one of the most important factors that allowed this project to obtain suitable financing.
- **Other Innovations** – the Government of Cape Verde entered into Establishment Convention giving the project company certain tax and foreign currency benefits. In addition, the key legal framework for PPPs was already in place.

About Trinity

Trinity is a fully regulated, niche corporate, commercial and finance law practice offering high quality legal services to financiers, developers and governments undertaking energy, resources and infrastructure transactions in Africa and other emerging economies. The team comprises senior lawyers from large international UK and US law firms.

Trinity is ranked by Chambers & Partners' Chambers Global 2013 the guide to the world's leading lawyers (including project finance lawyers) and by Legal 500 2012 for its emerging markets, infrastructure and power work. The 2013 edition of Chambers Global ranks Trinity International for "Projects & Energy: Africa" alongside some of the largest and best firms in the market. 25 firms rated, Trinity is equal first in terms of number of named individuals. Trinity is ranked in the same category as Allen & Overy LLP, Chadbourne & Parke LLP, Dewey & LeBoeuf, Milbank Tweed and Mayer Brown.

Focus Newsletter

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Market position/recognition for Trinity

- **Project Finance Magazine 2013** onshore wind IPP of the year for the Chirongeni Wind IPP (Romania);
- **Chambers & Partners 2012:** Trinity International LLP rated as a firm and all Trinity partners named “leaders in their field”;
- **the Africa Energy Awards Best Renewable Project (2011)** for the Cabeolica wind farm in Cape Verde, where we advised Finance Corporation;
- **InterContinental Finance Magazine Global Award 2010:** “Niche Law Firm of the Year - UK” and “Project Finance Law Firm of the Year – UK”;
- **African Renewables Deal of the Year 2009,** Project Finance Magazine/Euromoney and **Best EMEA Sustainability Deal 2008**, EMEA Finance**:** Olkaria III Geothermal IPP, Kenya
- **the Project Finance International (PFI) and Project Finance Magazine (2008/2009)** power deal of the year , Project Rabai in Kenya, where we acted for the sponsors;
- **Lawyer Awards 2008**: Runner up “Niche Law Firm of the Year”
- **Infrastructure Deal of the Year 2008,** for both Project Finance International and Project Finance Magazine**:** Lekki/Epe Expressway, Nigeria
- **Power Deal of the Year 2008**, for both Project Finance International and Project Finance Magazine: Rabai Power Station, Kenya
- **Project Finance Magazine Africa Deal of the Year 2006,** acting on for the management team in its MBO of Copperbelt Energy Corporation (Zambia).

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