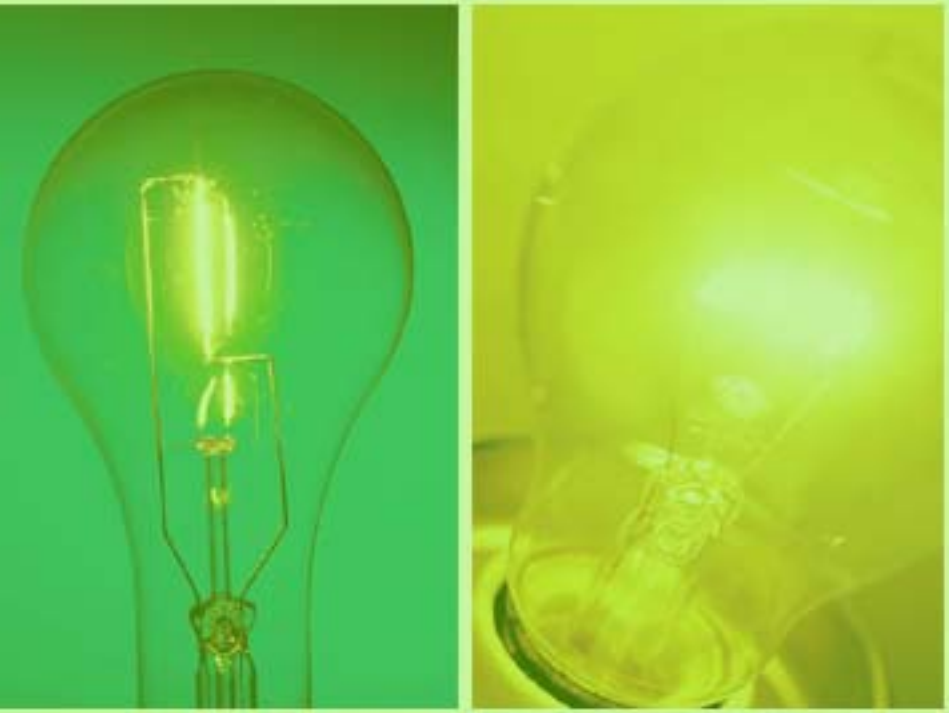
Challenges and Opportunities in Financing the Renewable Energy Sector



Seminar on Innovations in Financing Sustainable Energy Projects in Southeast Asia

Vincent S. Pérez
December 5, 2006

Merritt Partners

- **Boutique energy advisory firm offering advice to companies with existing or potential energy business in Asia**
- **Value Proposition**
  - Energy Expertise
  - Asian Experience
  - Unrivaled Network
- **Energy Focus**
  - Upstream and Downstream Oil and Gas
  - Power Generation, Transmission and Distribution
  - Renewable Energy
  - Biofuels
- **Opportunities for Energy Companies**
  - Strategic cross border opportunities
  - Acquisitions and divestments
  - Identification of international partners
  - Privatization of government-owned energy assets

Global Growth in Renewable Energy

1. RE supplies >17% of world's primary energy
   (REN21 Renewables 2006 Status Report)

2. RE supplies 182 GW worldwide (excluding large hydro) with 80 GW or 44% in Emerging Countries

3. Global RE market projected to grow 400% in next 10 years reaching $157B by 2015
   (Clean Edge "Clean Energy Trends 2006)

Main Drivers for RE growth

1. Security of energy supply
2. Energy self-sufficiency
3. Reduce vulnerability on oil price volatility
4. Mitigation of Global Warming
5. Least cost of rural electrification in remote areas

Renewable Energy Potential of ASEAN

Country	Biomass	Geothermal	Hydro	Wind	Solar
Cambodia	**700 MW**		**300 MW** (mini) **10,000 MW** (large)	**1.3 GW**	**5 kWh/m^2/day** (6-9 hrs)
Indonesia	**49,810 MW**	**27,000 MW**	**75,000 MW** (large) **459 MW** (mini)	**Significant** **(3-6 m/s)**	**4.8 kWh/m^2/day**
Lao PDR			**26,500 MW** (theoretical) **18,000 MW** (total)	**24 GW** (7-8 m/s) **2,7 GW** (8-9 m/s)	
Malaysia	**2,700 MW**		**29,000 MW** (large)		**4.5 kWh/m^2/day** (4-8 hrs)

Source: Renewable Energy Policies in ASEAN, Romeo Pacudan, 2005

Renewable Energy Potential of ASEAN

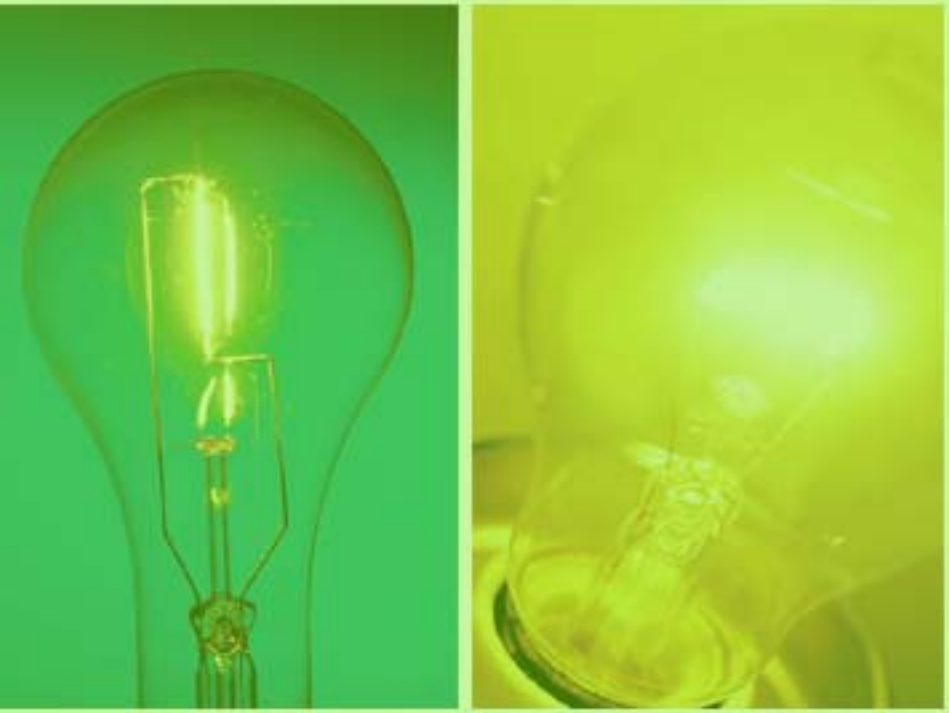
Country	Biomass	Geothermal	Hydro	Wind	Solar
Philippines	**120 MW**	**2,600 MW**	**11,223 MW** (large & small) **1,847 MW** (mini) **27 MW** (micro)	**7,404 MW** (Technical)	**5.1 kWh/m^2/day**
Thailand	**7,000 MW**		**700 MW** (small)	**1,600 MW** (Technical)	**>5,000 units** (solar PV)
Vietnam	**400 MW**	**200 - 340 MW**	**800 - 1,400 MW** (small) **90 -150 MW** (pico) **300 - 600 MW** (isolated mini grids) **400 - 600 MW** (grid - based mini hydro)	**103 GW** (7-8 m/s) **8.7 GW** (8-9 m/s) **452 MW** (>9 m/s)	**5 kWh/m^2/day** (4-5.9 hrs)

Source: Renewable Energy Policies in ASEAN, Romeo Pacudan, 2005

Challenges / Issues in RE Financing

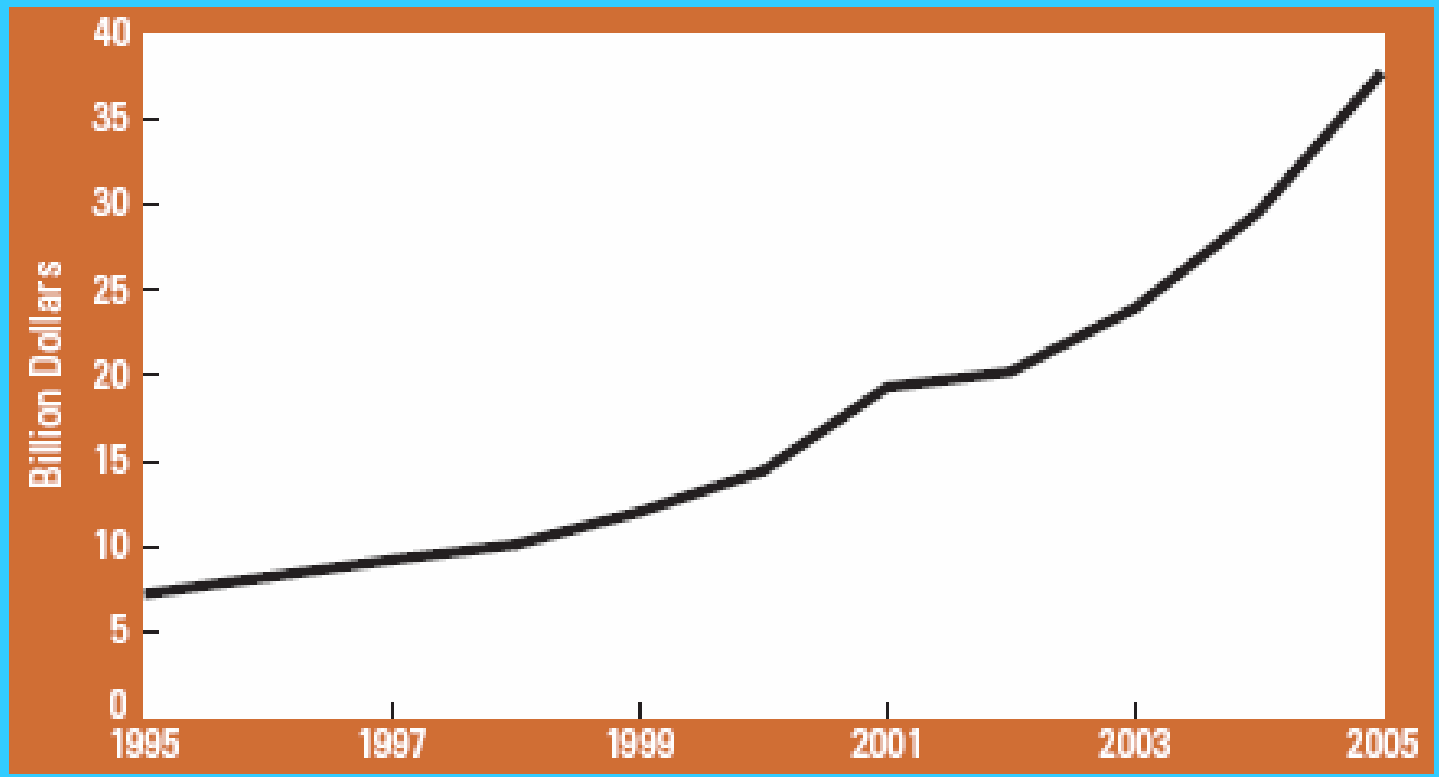
- **RE characteristics**
  - Site specific (geothermal and hydro)
  - Intermittent (particularly wind or solar)
  - Generally not competitive with fossil fuel
- **Limited Experience of Developers**
  - Local developers may have limited track record and lack operating experience
- **Small Project Size**
  - Often small but take the same amount of work as a large project
- **High Upfront Costs**
  - Renewable equipment more costly than conventional fuel plants
- **Regulatory**
  - Weak regulatory frameworks
  - inadequate tariffs / incentives / subsidies

Overview of Debt Financing for Renewable Projects



Growth in RE Investments

Annual Investment in Renewable Energy, 1995-2005



From: Status Report on Renewable Energy Worldwide, 2005, by E. Martinot

Mature Renewable Sectors

1. Large Hydroelectric Power
2. Geothermal Power
3. Large Biomass Power

Low risk and competitive investments.
Capital intensive.

Renewable Technologies that have taken off

1. Wind Power
2. Small Hydro Power
3. Solar PV – silicon-based

Significant investments by major energy companies, renewable companies, with available funding sources.

Raising Project Finance for Renewables:

- **Domestic project finance banks**
  - Typically lack experience in the market due to deal shortage
  - In many markets tenor is shorter
- **International project finance banks**
  - US banks have not entered sector due to deal size & regulatory risk
  - European banks provide almost all liquidity in sector
- **Export credit agencies**
  - Useful where countries have weaker credit
  - Limits sourcing options for technology especially in sellers market
- **Multi-lateral agencies**
  - World Bank, IFC, ADB
- **Bilateral agencies**
  - DANIDA, DEG, JBIC
- **Carbon funds**
  - Provide supplemental finance based on forecast carbon value

Debt Financing for Renewables

A. Multilateral institutions (World Bank, Asian Development Bank)
B. Global Environment Facility (GEF)
C. Bilateral Institutions (JBIC, KfW)
D. International Commercial Banks
E. Local Development Banks
F. What Lenders Look for in Renewable Lending

Debt Financing : Multilaterals

1. World Bank

- US$ 338 M lent to new renewables (2002-2004)
- For example, WB lent $202 M to Turkish Industrial Devt Bank to on-lend to private renewable developers up to 12 years with 4 years grace period
- Committed to grow renewables lending by 20% p.a. next 5 yrs

2. Asian Development Bank

- US$ 717 million lent for renewable and energy efficiency projects through the Clean Energy Program (2000 – 2005)
- Allotted US$1.9 billion for Clean Energy Loans (2006 – 2008)
- Introduced new initiatives for Clean Energy Financing: Energy Efficiency Initiative (which includes RE) and Carbon Market Initiative

Debt Financing : Multilaterals

3. Global Environment Facility (GEF)

- US$ 100 M committed each year (2002-2004)
- Co-finance renewable power for rural electrification through World Bank, UNDP, UNEP, etc.
- By far, largest funder of off-grid solar power in 20 emerging countries in Africa, Asia, Latin America ($210 M in 10 years)

4. KfW IPEX-Bank

4. lent € 151 M for renewables in 2004

5. International Finance Corporation

4. US$ 2.3 billion portfolio in power loans

Debt Financing : Multilaterals

6. European Investment Bank

- Renewable loan portfolio worth € 920 M
- Wind (45%), Hydro (21%), Geothermal (20%)
- Target 50% share of total power loans in renewables by 2010

7. Japan Bank for Intl Cooperation (JBIC)

- $ 141 M Japan GHG Reduction Fund, first carbon fund in Asia
- Major lender in geothermal in Indonesia and the Philippines
- Small 50 MW projects get up to 12 years, discounted fees

Debt Financing: Commercial Banks

1. **HypoVereins Bank**
   - Germany, Spain, US, India, Phils, Thailand
   - Up to 10 yrs at 70:30 @ 8.5% rate (with 2 year wind data and offtake with strong local utility)
2. **Banco Santander, Banesto, BBVA, Caixa Madrid**
   - Up to 13-15 yrs at 80:20
   - even 90:10 for large utilities Endesa, Union Fenosa
3. **Fortis Bank (Benelux)**
   - Primarily wind, landfill gas, waste-to-energy ($2 billion)
   - Looking at Central America, Central Europe (esp Poland) and Asia (particularly China and India)

Debt Financing : “Green” Bank

1. Triodos Bank

- First Bank dedicated solely to sustainable banking
- Founded in 1980 in the Netherlands by a study group
- Triodos Ventures created in 1980 to finance then risky wind power projects
- Launched Netherlands’ first green investment fund in 1990
- Launched Solar Investment Fund in 1998
- Triodos Research provides pension funds with research on environmental and social performance of listed companies
- Mission:

  to enable individuals, institutions and businesses to use money more consciously in ways that benefit people and the environment, and promote sustainable development

SUSTAINABLE BANKING

What Banks Look For in Renewable Lending

1. **Wind Resource** – site data, reference data
2. **Technology** – Turbine choice, warranty, independent engineer review
3. **Offtake** – Power Purchase Agreements
4. **Sponsor** – Credit Quality
5. **Host Country** – Supportive regulatory framework
6. **Clear Tariff Mechanisms** – "lacking in uncertainty"

Source: Nick Gardiner, Director, Energy Finance Group, Fortis Bank, London (Renewable Energy Finance Forum, June 2004)

Raising Project Finance for Renewables:

- As renewable energy markets grow, project finance will play an increasingly important role:
  - High capex requires long term financing to ensure expected equity returns
  - Assets lend themselves to project financing as cash flows are typically stable and risks quantifiable
- Average leverage is 70%-80%.
  - This creates a 12% – 17% IRR for equity

Source: Shane Bush, Head Renewables, Standard Chartered Bank, June 2006

Raising Project Finance for Renewables:

- In new markets full of change, contracts should consider:
  - A power purchase agreement of at least 10 years
  - Proven technology
  - 2 - 5 year equipment warranty can make significant difference
- The natural resource risk is critical and often requires debt service cover ratios to be higher than for conventional power projects
  - Wind, solar, run-of-the-river hydro contain inherent cash flow uncertainty due to natural resource risk, but are considered perpetual resources
  - Each project is different and therefore project financing will be different
  - Leverage impacted by as much as 20% by natural resource risk

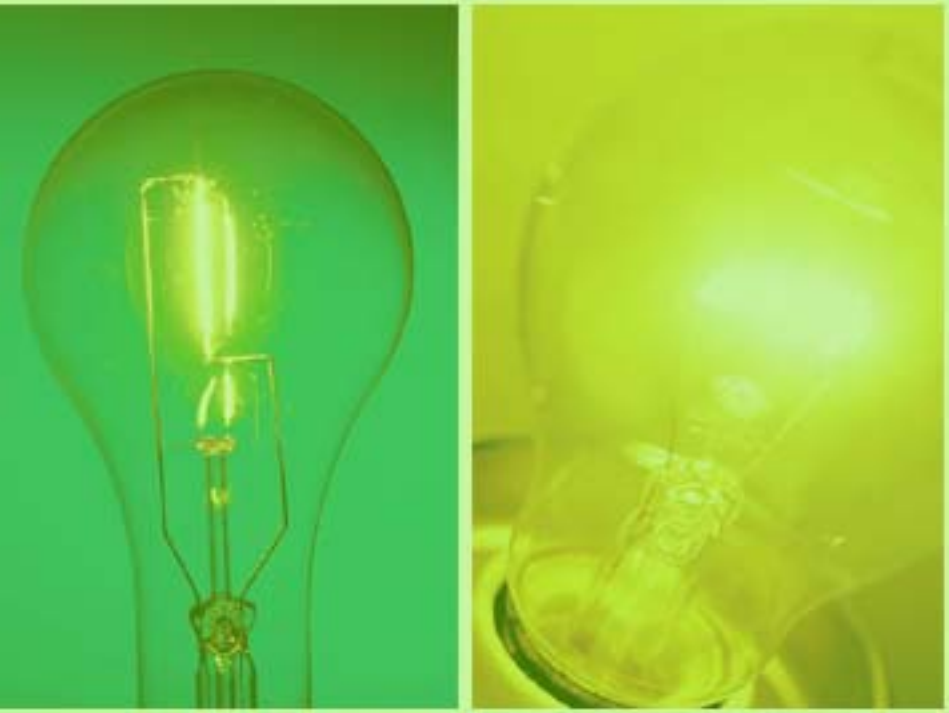
Source: Shane Bush, Head Renewables, Standard Chartered Bank, June 2006

Raising Project Finance for Renewables:

- Access local and international liquidity
  - Often key factor is term (length) of loan repayment
  - Achieving >70% leverage typically requires a term of ten years +
- Consider raising subordinated debt for 10% – 15%
  - Keep senior debt risk profile reasonable
  - Factor in carbon financing
- Consider two stage financing
  - Raise additional debt after project is fully operational
  - Bond market has not been particularly active in the sector
  - Rating agencies are still inexperienced due to low volumes

Source: Shane Bush, Head Renewables, Standard Chartered Bank, June 2006

Case Example



Deutsche Investitions und Entwicklungsgesellschaft mbH

- Long-term loans:
  - up to € 25 million (or USD)
  - 4 – 12 years
  - fixed or variable interest rates
- Mezzanine finance:
  - usually between € 5 – 15 million (or USD)
  - combining elements of equity participation and senior loan
- Equity capital:
  - usually between € 5 – 20 million
  - minority shareholder, with voting rights, board seat
  - clearly defined exit strategies

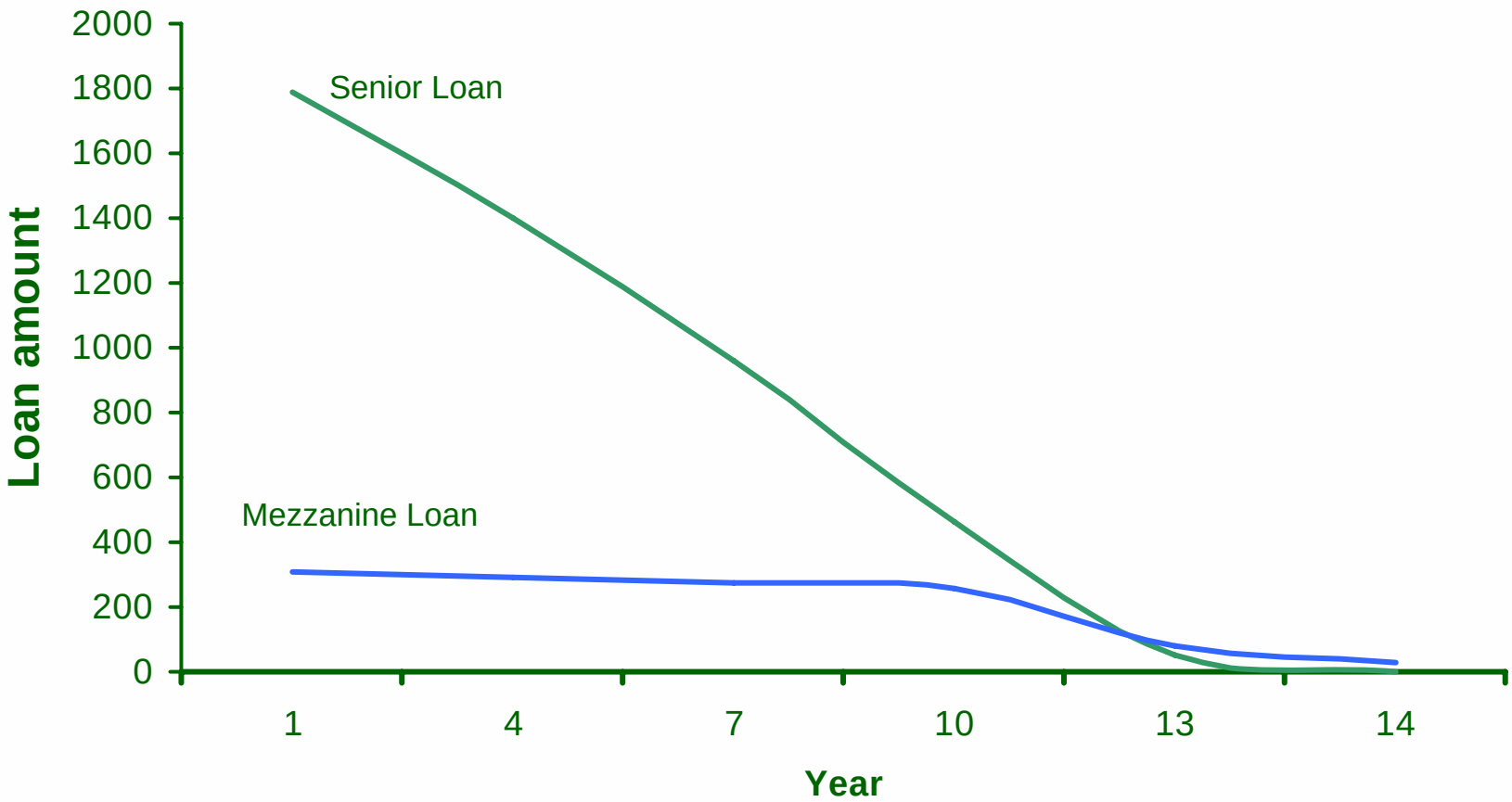
Source: DEG Thailand, June 2006

Case Example: Miaoli in Taipei

- Facts:
  - 25 Enercon wind turbines, 50 MW capacity, € 67 Mn
  - Sponsors Infravest and WPD, Germany
- Financial challenges:
  - Senior lenders provided maximum 70% of project cost
  - Sponsors could inject up to 18% of project by equity
- Solution:
  - DEG provided mezzanine loan covering 12% of project
  - Completely subordinated to senior lenders
  - Tenor 15 years, 2 years of grace
  - Fixed interest rate plus Payment in Kind (PIK)

Source: DEG Thailand, June 2006

Case Example Chart: Outstanding Loan Amount



Source: DEG Thailand, June 2006

Local Currency Financing from IFC:

- Botswana
- Brazil
- Chile
- China
- Colombia
- Czech Republic
- Egypt
- Ghana
- Hungary
- India
- Indonesia
- Kenya
- Mexico
- Nigeria
- Pakistan
- Peru
- Philippines
- Poland
- South Africa
- Thailand
- Turkey
- Vietnam

Source: Infrastructure Department, IFC, October 2006

Eligible Countries for DANIDA Financing:

- Bangladesh
- Benin
- Bhutan
- Bolivia
- Burkina Faso
- Egypt
- Ghana
- Kenya
- Mali
- Mozambique
- Nepal
- Nicaragua
- Tanzania
- Uganda
- Vietnam
- Zambia

Source: DANIDA, June 2006

Financing for Renewables: ASEAN

1. **Cambodia Rural Electrification Fund**
   - WB and ADB funded: 50% loans, 25% grant, 25% private equity
2. **Malaysia Electricity Supply Industry Trust Account**
   - IPPs and Tenaga contribute 1% of revenues
3. **Innovation for Envt Sustainability Fund (Singapore)-$20M**
4. **Energy Conservation Promotion Fund of Thailand**
   - Funded by levy on Bht 0.04/liter on petroleum products
   - Bht 0.36/kWh Subsidy for 5 years for Small Power Projects
5. **Remote Area Renewable Energy Fund of Vietnam**

Financing for Renewables: ASEAN

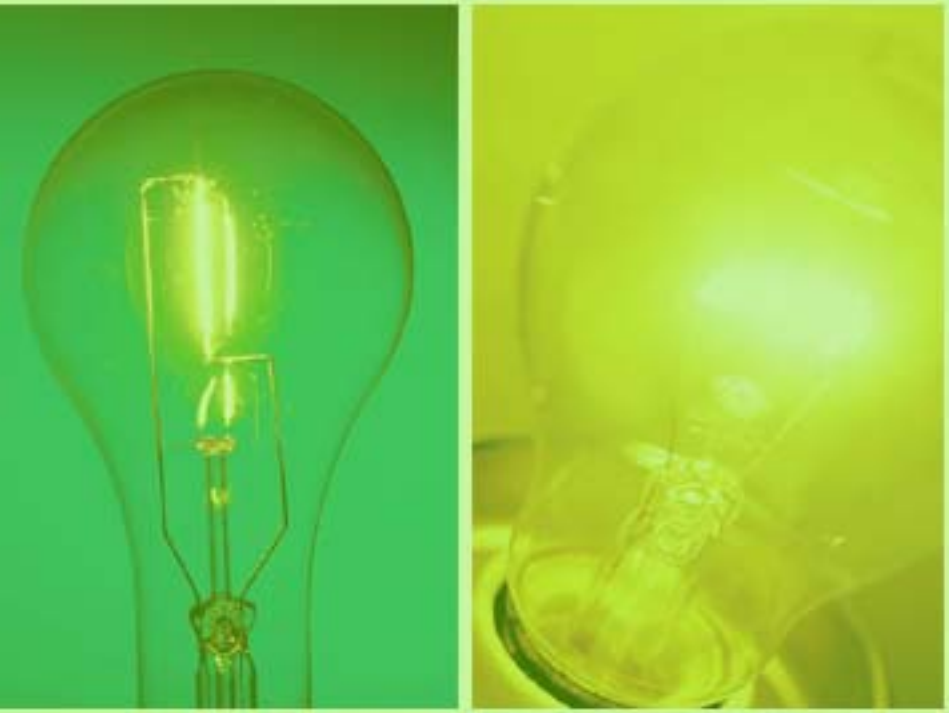
1. **Energy Regulation 1-94 (Philippines)**
   - IPPs contribute Php 0.01/kWh of electricity sales to host communities for rural electrification
2. **Universal Charge for Missionary Electrification (Phils)**
   - All consumers pay a universal charge of Php 0.10/kWh for missionary electrification in off-grid areas
3. **Capacity Building to Remove Barriers to Renewable Energy Development (Phils)**
   - GEF funded grants for project preparation and loan guarantees

Investment Funds in Renewables

- **FE Clean Energy Group** - 3 funds totaling $175 Mn in Latin America, Asia and E. Europe
- **Carlyle Group-Riverstone Renewable Energy Infrastructure Fund** - $685 Mn in April 2006 to invest in wind, solar, geothermal, biomass and biofuels
- **Environmental Enterprises Assistance Fund** - $85 Mn
- **Renewable Energy and Energy Efficiency Fund** -$65 Mn
- **Nth Power LLC** – at least $200 Mn

"The overwhelming message that is coming across – driven by governments, corporates and certain financial institutions – is that renewables is here to stay."

-- Nick Gardiner, Fortis Bank



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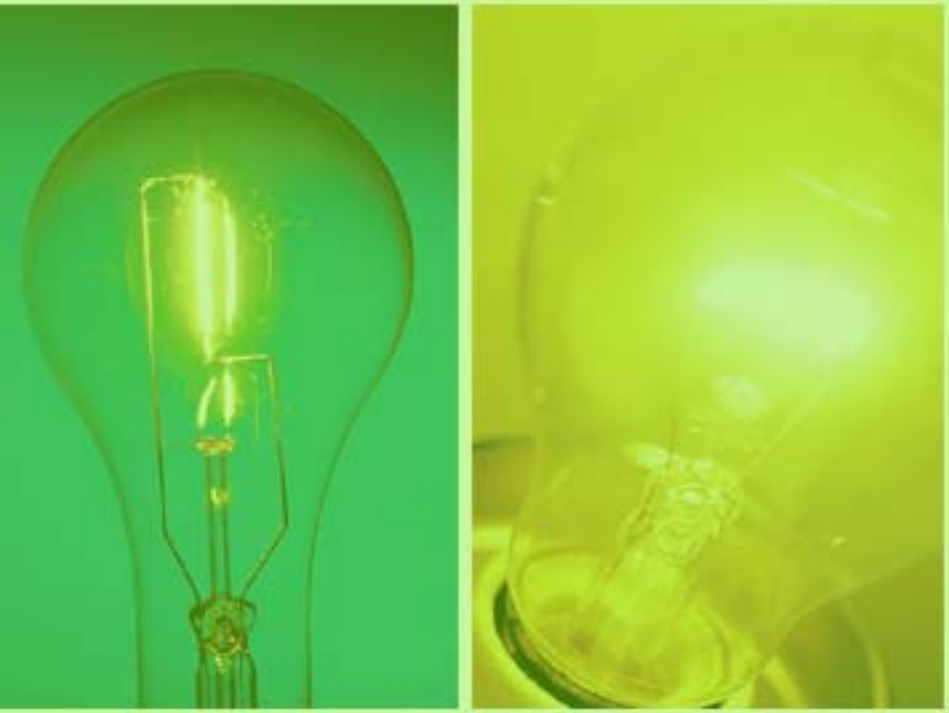

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