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Clean Efficient Biomass, Coal, Gas Cogeneration

Philippine Cogeneration Outlook: Immediate Opportunities

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Philippine Energy Situation

- Highly diversified energy mix
- Power sector restructuring towards competition and market-based mechanisms
- Favorable *statements* on renewable energy
- Power supply constraints beginning to show
- Available biomass resources *(rice husk, coconut shells and husks, bagasse, others)*

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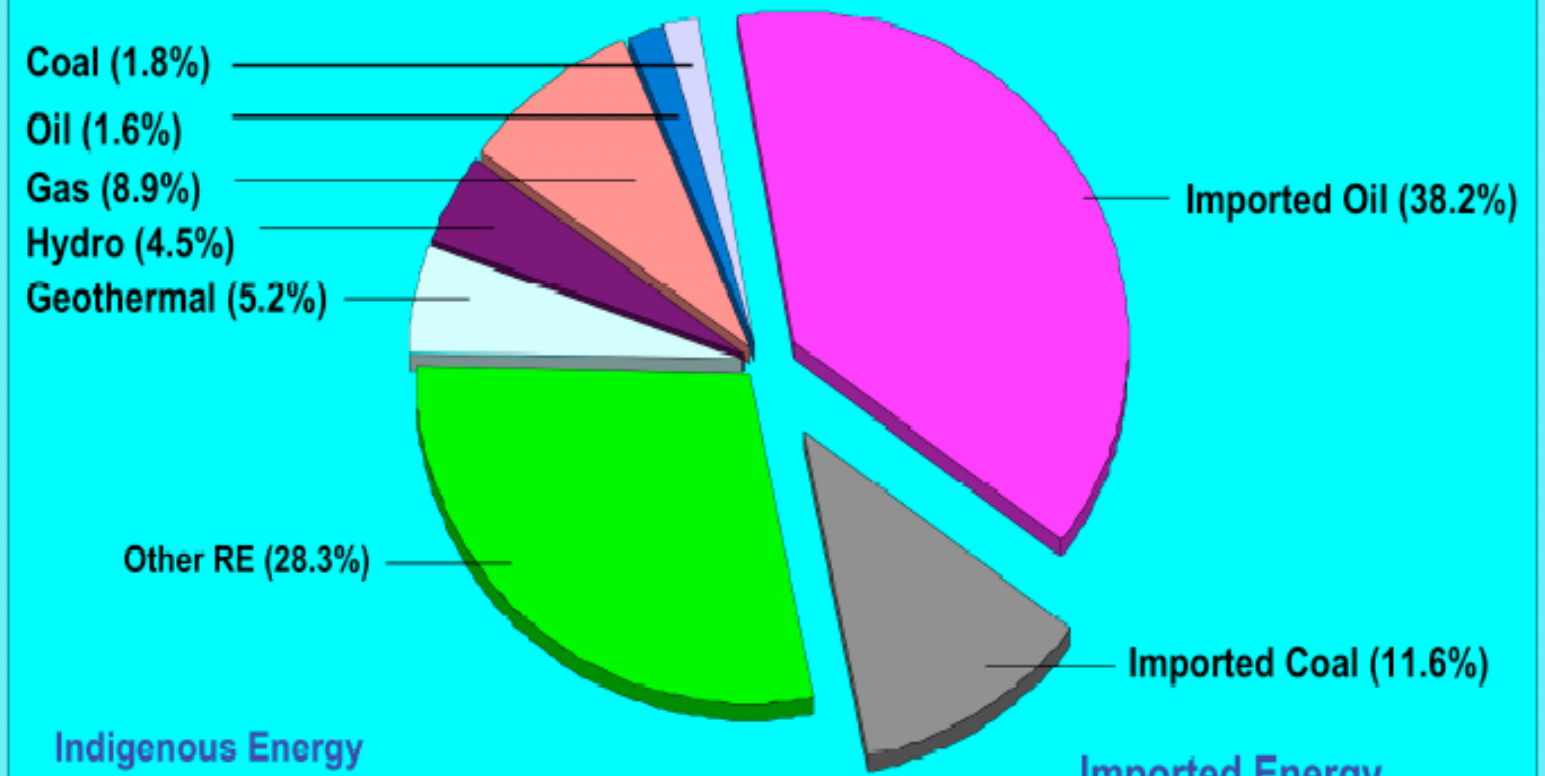
PRIMARY ENERGY MIX 2004



Indigenous Energy
149.1 MMBFOE
Self-sufficiency – 50.2%

Imported Energy
147.8 MMBFOE

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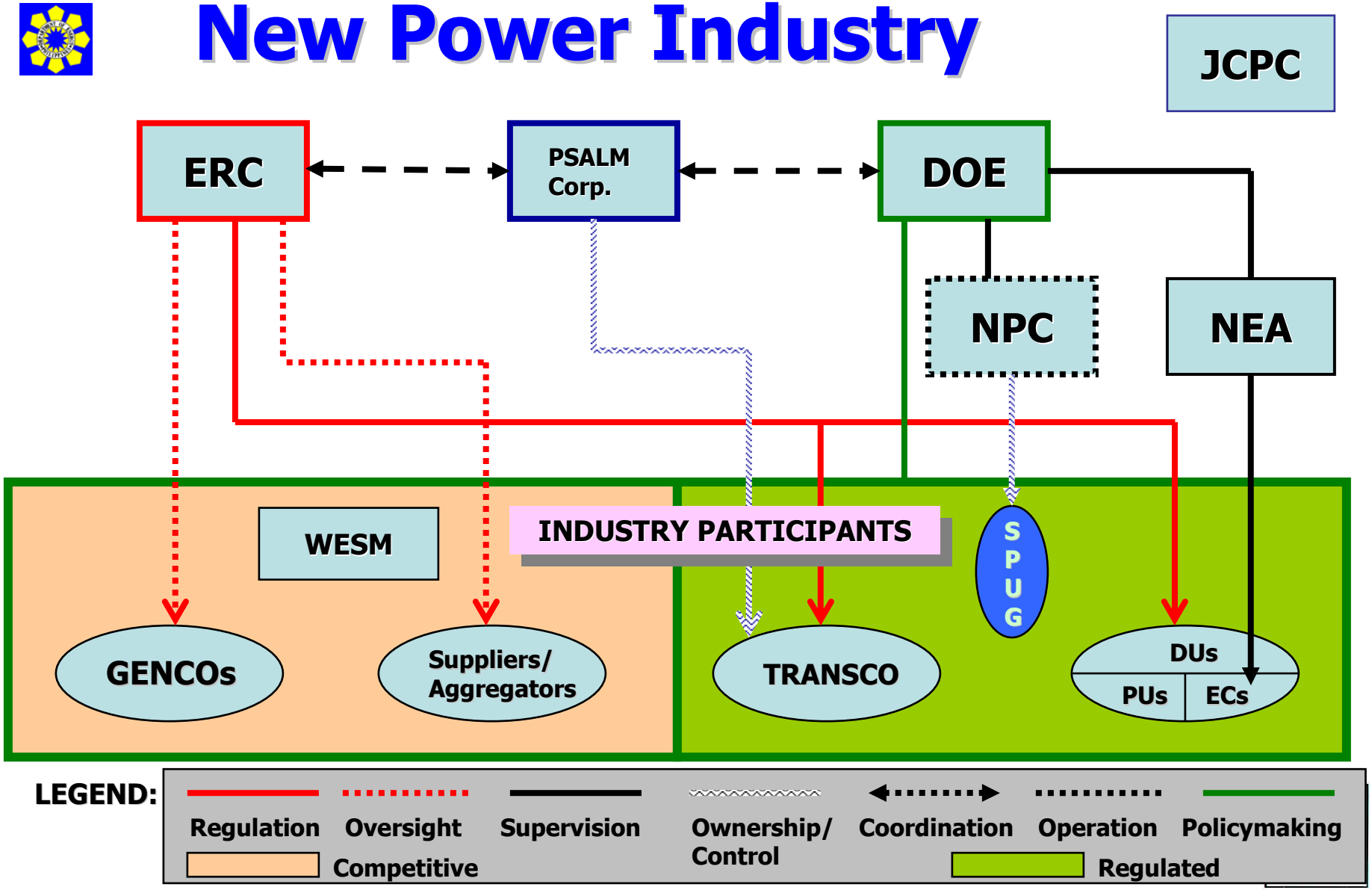
New Power Industry



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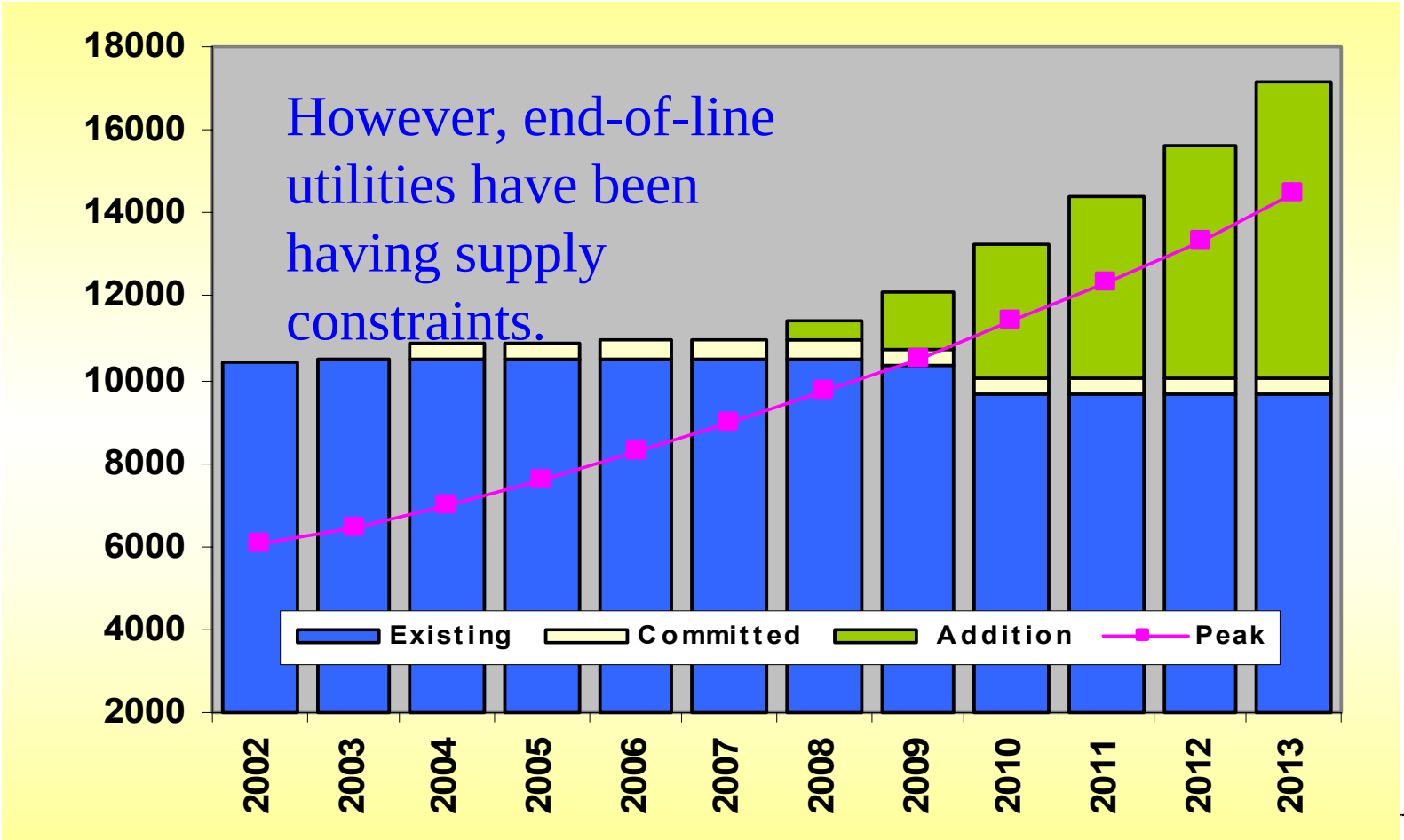
Luzon Power Supply Outlook



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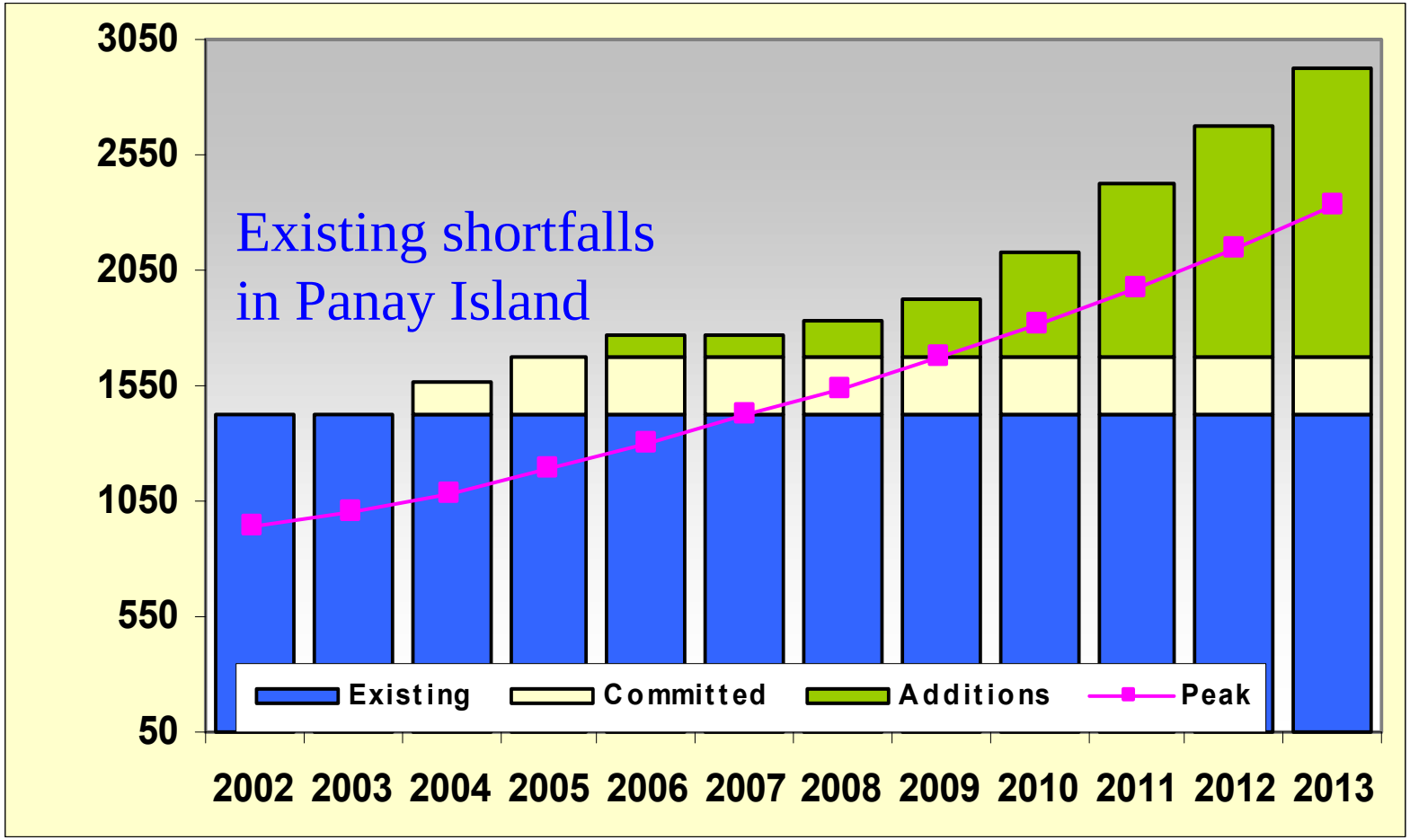
Visayas Power Supply Outlook



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POLICY ON RENEWABLE ENERGY

RE Policy Framework

- DOE issued RE Policy Framework
- Policy bias towards the development and utilization of RE
  - Promote more private sector participation in RE development
  - Encourage to use in rural development & off-grid electrification
  - RE projects "priority" for special incentives by the Board of Investments
- PNOC to establish a Renewable Subsidiary
- Philippine Senate ratified the Kyoto Protocol in October 2003
- DOE led two RE trade missions to Europe

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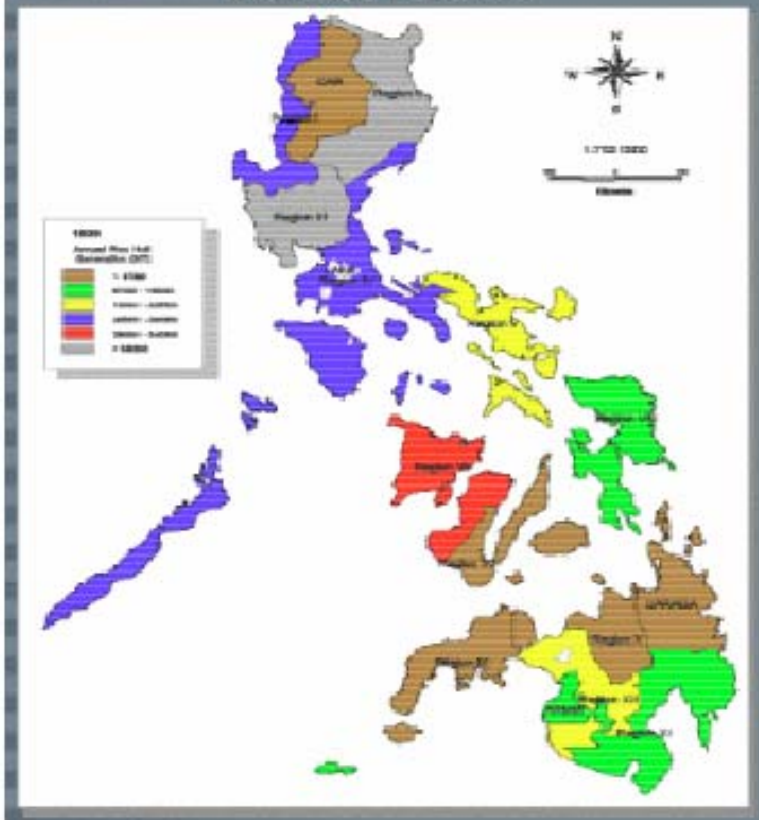
Biomass Resource Base

Biomass Potential

Biomass Potential



- Sugar Cogeneration
  - 39 mills spread over 16 provinces w/ an average of 4,600 tons of canes per day
  - US NREL Study: 540 MW potential
- Ricehull Power
  - Annual production of 45.17M tons equivalent to over 4 million barrels of oil
  - US NREL Study: 360 MW potential
- Coconut Residues
  - Few opportunities for heat and power
  - UNDP/ESMAP: 20 MW grid potential
- 50 MW Victorias Milling Bagasse-fuelled cogen plant
- 30 MW Talisay Bagasse-fuelled cogen plant

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Policy & Programme Shorfalls

- Lack of concrete incentives for investors
  - Mandatory off-take from electric utilities
  - Clear power pricing mechanism
  - Access to targeted subsidies
- Lack of cogeneration track record
  - Affects bank assessment of potential projects
  - Increases perceived risks by local government officials and environmental agencies

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Project Development Hurdles

- Access to financing and capital markets
- Access to power market
- Limited availability of technology
  - Equipment suppliers hesitant to develop market
  - Few experienced local technology providers

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La Suerte Rice Mill

- 40 years in local rice milling business
- Produces premium quality milled rice
- Modern rice milling equipment
- Main rice market is Metro Manila
- Well established relationships *(including provision of financing)* with local farmers

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La Suerte Cogeneration

- First Philippine Full-Demonstration Project
- Solves owner's problems
  - Rice Husk disposal
  - Electric Power supply
  - Diesel Gensets operations and maintenance
- Provides new revenue streams
  - Rice Hull Ash & Electric Power sales
  - Grain Drying services
  - Certified Emission Reductions (CERs)

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Modern Milling Equipment with Computerized Control

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Key Milling Parameters

- 6 MT rice/hr average, 9 MT/hr during peaks (*Recent operations confirm rising demand, new milling line being planned)*
- 300 days operation per year
- 3.3 MT rice husk output per hour
- 24% rice husk content by weight of paddy
- 60 kWh consumption per MT rice output

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Key Project Components

- 1 MW Power Plant using rice husk as fuel
  - Vyncke (Belgium) boiler
  - KKK (Germany) turbine
- Cimbria Grain Dryer
  - 5 MT / hour capacity
    when drying corn estimated at 80 days per year
  - 7 MT / hour capacity
    when drying paddy estimated at 120 days per year

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Project Significance

- Initiate similar projects in 3 neighboring *(within 5 kilometers)* rice mills with related owners
- Be a reference for large rice mills in Nueva Ecija, Pangasinan, Iloilo, South Cotabato
- Showcase for the Development of the Philippines and other local banks
- Potential CDM project

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Potential Rapid Replication

- 3 rice mills *(Cauayan Grains, Golden Season, Valiant)* in Isabela are all larger than La Suerte
- Cauayan Grains is the largest corn trader in the Philippines
- Bulacan rice hull-fired power project *(Intercity Industrial Estate)*
- Specific rice mills already identified by EDUFI and its partners in provinces mentioned

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Policy Significance

- Provide the Philippine Department of Energy with a *model project* to formulate more pro-active programmes towards biomass cogeneration
- Remove barriers that are based on perception of environmental performance, power generation reliability, and project sustainability

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EDUFI Role

- Continue to support project developers under the COGEN3 programme
- Present lessons learned in project development to government officials to assist in formulating policies & programmes
- Prepare a potential project database

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Potential Follow-On Activities

- Help financial institutions formulate more responsive lending guidelines
- Help DOE channel existing subsidies towards private sector projects in biomass cogeneration using lessons from Thailand and Malaysia
- Disseminate project information to encourage others