Development of Small Hydro Projects in the Philippines: 

ROMELECO’s Catingas Mini-Hydro and RE-Diesel Hybrid Projects 

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Kuala Lumpur, Malaysia 

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Consultant, Asian Development Bank
OUTLINE OF PRESENTATION

1. Background: Challenges to Philippine Off grid Electrification
2. Introduction to Romblon Electric Cooperative, Inc. (ROMELCO)
3. Case presentation: Catingas Mini-hydro Project
4. Case presentation: Cobrador RE-diesel Hybrid Project
5. Concluding Remarks
ENERGY ACCESS SITUATION IN ASIA-PACIFIC

- 4.2 Billion Population in Asia
- 1.8 Billion People without access to clean cooking
- 615 Million People without access to electricity
THE PHILIPPINES: CHALLENGES TO OFF GRID ELECTRIFICATION

- Archipelago of 7,107 islands
- 2,000 islands are populated:
  - Main islands – Luzon, Visayas & Mindanao are grid connected
  - Hundreds of smaller islands – limited or no access.
- Power in small islands:
  - Diesel mini grids by the National Power Corporation-Small Power Utilities Group (NPC-SPUG)
  - Distributed by rural electric cooperatives
  - Power generation receives subsidies from government
- Only 22 of 233 NPC-SPUG areas have 24/7 electricity service; 70% have only 8 hours or less of electricity
- Level of electrification (2014) = 80%; over 4 Million households are without access to electricity
ROMBLON ELECTRIC COOPERATIVE, INC. (ROMELEC)

- ROMELCO – an electric cooperative (owned by members it serves) with franchise to distribute electricity in the Province of Romblon

- Franchise area coverage:
  - Main islands of Sibuyan and Romblon
  - Several smaller islands

- Connection level:
  - 20,447 consumers or 79% of potential

- ROMELCO spearheads the Association of Island Electric Cooperatives (AIEC) in renewable energy generation.
CATINGAS MINI-HYDRO POWER PROJECT

• 900 kW run of river hydro facility, developed by ROMELCO in Sibuyan Island in 2006

• **Compelling reason:** to provide 24-hour reliable, cost-effective and environmentally-friendly power supply in the island of Sibuyan

• **Prior to hydro operation:**
  
  o Power supply from diesel gensets was limited (only 12 hours/day) and unstable
  
  o Sibuyan residents (Pop: 56,541) were often plagued with blackouts due to mechanical failures and unreliable delivery of fuel supply
CATINGAS MINI-HYDRO POWER PROJECT

PLANT INFORMATION

- Hydro Resource: Catingas River
- Plant location: Barangay Taclobo, San Fernando, Sibuyan Island, Romblon
- Design Capacity: 1,350 kW
- Commercial Capacity: 900 kW (2X 450 kW Turbines)
- Total Project Cost: Php 140,928,420 (US $3.13 Million)
- Construction period: 3 ½ years
- Date of Commissioning: December 20, 2009
# CATINGAS MINI-HYDRO POWER PROJECT

## Challenges

<table>
<thead>
<tr>
<th>• Technical</th>
<th>• Financial</th>
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<tbody>
<tr>
<td>Lack of reliable river data</td>
<td>ROMELCO had no financial capacity to invest</td>
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<tr>
<td>ROMELCO had no technical expertise</td>
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<table>
<thead>
<tr>
<th>• Construction</th>
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<tbody>
<tr>
<td>Land acquisition &amp; access road issues</td>
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<tr>
<td>Scarcity of local contractors with hydropower construction track record</td>
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<tr>
<td>weather condition</td>
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## Solutions

| • Hired expert consultants to undertake feasibility study and detailed engineering design | |
| --- | |
| Created a subsidiary corporation – Catingas Mini-hydro Power Corporation | |
| Entered into joint venture agreement with Vergel3 Consults | |
| Availed of project loan from the Development Bank of the Philippines | |
| Filed Eminent Domain Case for acquisition of land for the power plant | |
| Trained personnel | |
CATINGAS MINI-HYDRO POWER PROJECT

INNOVATIVE FINANCING FROM LOCAL BANK

Loan from Development Bank of the Philippines (DBP):

1. Project Preparation Loan

1. Project Loan
   • Loan Amount: Project cost of Php 145 Million; additional loan sought to expand project to 1.35 MW
   • Loan Terms and Conditions
     o 90/10 debt-equity ratio
     o 15 years, 3 years grace period on principal; partially secured with project assets
     o Interest during construction made part of the loan

3. Factors considered by DBP in loan approval
   • Project is highly developmental
   • ROMELCO was a Category “A+” Cooperative
   • Project was determine to be technically and financially viable; DSCR>1
Typical Load Curve
Sibuyan Island
August 11 2014
CATINGAS MINI-HYDRO POWER PROJECT

2014 KWH PURCHASED OF ROMELCO
(Sibuyan Island)

<table>
<thead>
<tr>
<th></th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
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<tbody>
<tr>
<td>HYDRO</td>
<td>451,430</td>
<td>446,250</td>
<td>380,730</td>
<td>453,950</td>
<td>276,010</td>
<td>349,440</td>
<td>463,960</td>
<td>501,970</td>
<td>482,930</td>
<td>276,010</td>
<td>349,440</td>
<td>463,960</td>
</tr>
<tr>
<td>DIESEL</td>
<td>29,652</td>
<td>32,410</td>
<td>89,950</td>
<td>114,604</td>
<td>305,844</td>
<td>58,730</td>
<td>43,232</td>
<td>37,422</td>
<td>47,376</td>
<td>36,848</td>
<td>47,376</td>
<td>39,872</td>
</tr>
<tr>
<td>TOTAL</td>
<td>481,082</td>
<td>478,660</td>
<td>470,680</td>
<td>568,554</td>
<td>645,974</td>
<td>655,284</td>
<td>522,690</td>
<td>545,202</td>
<td>520,352</td>
<td>532,658</td>
<td>563,276</td>
<td>500,402</td>
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TOTAL PERCENTAGE CONTRIBUTION

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<tbody>
<tr>
<td>HYDRO</td>
<td>81%</td>
</tr>
<tr>
<td>DIESEL</td>
<td>19%</td>
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CATINGAS MINI-HYDRO POWER PROJECT

HISTORICAL PERFORMANCE

KWH Purchased
Sibuyan Island, CY 2010-2014

<table>
<thead>
<tr>
<th>SOURCE OF POWER</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>HYDRO</td>
<td>56.7%</td>
<td>87.6%</td>
<td>89.6%</td>
<td>84.8%</td>
<td>81.4%</td>
</tr>
<tr>
<td>NPC-DIESEL P/P</td>
<td>43.3%</td>
<td>12.4%</td>
<td>10.4%</td>
<td>15.2%</td>
<td>18.6%</td>
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**CATINGAS MINI-HYDRO POWER PROJECT**

**PROJECT BENEFITS**

<table>
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<tr>
<th>Community</th>
<th>ROMELCO</th>
<th>Country</th>
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<tr>
<td>• 24/7 reliable electricity service resulting in huge economic benefits</td>
<td>Improved operations and higher connection level (79% increase in connections since 2009)</td>
<td>Savings of Php 416,723,671 ($US 9.26M) in avoided government subsidies from 2010-2014</td>
</tr>
<tr>
<td>• 4,617 more households are now receiving electricity services</td>
<td>Availed of fiscal and non-fiscal incentives provided under the RE Act of 2008 (including tax and cash incentives)</td>
<td>Foreign exchange savings (Over 7.3 Million liters of diesel fuel was saved from 2010-2014).</td>
</tr>
<tr>
<td>• Lower generation cost charged to consumers by Php 1.38/kWh (US$0.03/kWh)</td>
<td>Proven business model replicable in other islands within its coverage/other areas in the Philippines</td>
<td>Climate change mitigation (Avoided carbon dioxide emission estimated at about 19,597 tons)</td>
</tr>
</tbody>
</table>
• Expansion of Catingas Mini-hydro Power Plant to increase its capacity to 1.35 MW

• Goal: generate 90% of power in Sibuyan Island from renewable energy

• Pilot RE-diesel Hybrid Project in one of its smaller islands in partnership with ADB
The Partnership was created in 2009 to address energy poverty at the regional scale.

**TARGET:** Provide energy access to 100 million people in Asia Pacific by 2015.

99% of target achieved!
FEASIBILITY STUDY: Hybridizing Existing Diesel Power Plants

- Collaboration with NEA and KEMCO
- 5 sites in remote islands in the Philippines
- Designing of least cost renewable energy option
- Hybridization of existing diesel mini-grids with renewables to
  - increase efficiency
  - improve reliability
  - reduce fuel costs
- Proof of financial viability
- Business model for replication through electric cooperatives/ other private investors and potential scale up through ADB

SABTANG, BATANES
COBRADOR, ROMBLON
LOGBON, ROMBLON
STO. NINO, WESTERN SAMAR
BANTAYAN ISLAND, CEBU
PILOT PROJECT: Cobrador, Romblon

- Collaboration between ADB, NEA, KEMCO and Romblon Electric Cooperative
- Setting up of 30kW solar PV plant and hybridization with existing diesel genset of ROMELCO
- Incorporation of Lithium-ion batteries
- Extension of power supply from 8h to 24h per day
- Reduced electricity tariff to consumers by about US$ 0.50/kWh (from Php 30 to Php 6.59)
- Connection of additional households
- More power for productive uses & income generation (e.g. boat making, marble industry, water purification, tourism)
PILOT PROJECT: Cobrador, Romblon

- A sustainable strategy for enhancing delivery of electricity to small island communities and promoting inclusive growth
- **Mixed financing**: ADB-KEMCO grant with equity contribution from ROMELCO
- **Full Cost Recovery** by ROMELCO: Access government subsidy through Universal Charge for Missionary Electrification (UCME); subsidy may decrease in the long run as economic status of the island improves.
- Business model is **replicable** in many areas throughout the Philippines by electric cooperatives and/or private sector
CONCLUDING REMARKS

• Line extension alone will not achieve universal access to electricity especially for island nations like the Philippines

• According to the International Energy Agency (World Energy Outlook 2011), over 40% of unconnected rural areas will be most economically served by mini-grids or off grid solutions

• Governments should recognize the strategic importance of renewable energy mini-grids and put this squarely into their policy agenda

• Governments may introduce smart subsidies to leverage investments in renewable energy mini-grids by private sector

• Renewable energy mini-grid and hybrid business models, as presented, are replicable and may be scaled-up

• There is financing available: Commercial banks, such the DBP, are open to financing more of these projects; proper structuring of projects is essential.
SALAMAT PO (THANK YOU) AND MABUHAY!

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