Philippines – Prolonged Generation and Opportunity

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About the Speaker

- Director, International Geothermal Association (www.geothermal-energy.org)
- Trustee, National Geothermal Association of the Philippines (www.ngaphil.org)
- VP and Treasurer, Clean Rock Renewable Energy Resources Corp. [Natib and Daklan areas]
- Managing Partner, Puno and Penarroyo Law (www.punopenalaw.com)
- Professorial Lecturer, UP National Institute of Geological Sciences
- BS Geo, Bachelor of Laws (UP), Master of Laws (Univ. of Melbourne)
Discussion Outline

- RE Law
- Geothermal resource capacity
- Legal and regulatory framework
- Geothermal energy use, market development and stimulation
- Constraints, issues and risk factors

Data and illustrations courtesy of Philippine DOE
Important Features of RE Law

- Definition of geothermal as mineral resource paving the way for the entry of 100% foreign ownership
- Promotes the purchase, grid connection and transmission of electricity generated from RE sources to ensure its market
- Provides incentives such as exemption from various taxes and duties to RE developers to make investments more attractive
- Provision allowing ECCs to be issued from the appropriate DENR regional office
- Institutionalize local government’s share
Support Initiatives and Market Stimulations

- Renewable Portfolio Standard
- Renewable Energy Purchase Agreement/Wholesale Electricity Spot Market
- Certified Emission Reduction Market
- High volume backbone system of interconnected transmission lines, substations and related facilities
- Presidential Order directs local governments hosting power plants to develop ecozones that will draw power from geothermal
Contracts Awarded under the RE Law

- A total of 7 GRESCs under Open and Competitive Selection Process (OCSP), 5 GREOCs/GOCs and 21 GRESCs/GSCs under Direct Negotiation for frontier areas, 5 operating contracts for the operation of privatized power plants of NPC and 2 remaining Service Contracts under P.D. 1442 into GRESCs under R.A. 9513.

- To date, the country has 43 GRESCs/GSCs, seven (7) of which are producing fields, while the remaining are under pre-development/exploration.
Geothermal Service/Operating Contracts
(Development Stage)

Mount Makiling-Banahaw Geothermal Power Plant,
Laguna/Quezon
GREOC No. No. 2009-10-007
Total Installed Capacity - 458.53 MWe

Mount Makiling-Banahaw Geothermal Field
GSC No. 2013-04-045

Maibarara Geothermal Power Project,
Laguna/Batangas
GRESC No. No. 2010-02-012
Total Installed Capacity - 20 MW

Bacon-Manito Geothermal Power Plant,
Sorsogon/Albay
GOC No. 2012-04-027
Total Installed Capacity - 151.5 MWe

Bacon-Manito Geothermal Production Field
GRESC No. 2009-10-003

Northern Negros Geothermal Production Field, Negros
Occidental
GRESC No. 2009-10-005

Palipinon Geothermal Power Plants, Negros
Oriental
GOC No. 2012-04-026
Total Installed Capacity - 192.5 MWe

Southern Negros Geothermal Production Field,
Negros Oriental
GRESC No. 2009-10-002

Tiwi Geothermal Power Plant, Albay
GREOC No. 2009-10-006
Total Installed Capacity - 284 MWe

Tiwi Geothermal Field
GSC No. 2013-04-044

Tongonan I Geothermal Power Plant, Tongonan, Leyte
GOC No. 2012-04-026
Total Installed Capacity - 722.68 MWe

Leyte Geothermal Production Field
GRESC No. 2009-10-001

Mindanao Geothermal Production Field,
North Cotabato/Davao
GRESC No. 2009-10-004
Total Installed Capacity - 108.48 MWe

LEGEND
Producing Fields
GRESC - Geothermal RE Service Contract/
GSC - Geothermal Service Contract
GREOC - Geothermal RE Operating Contract/
GOC - Geothermal Operating Contract
(for Power Plant operation only)
Newly Commissioned Geothermal Power Plant

20 MW Maibarara Geothermal Power Project commissioned on February 08, 2014
Geothermal Service Contracts
(Pre-Development Stage)

LEGEND
- GRES-C - Geothermal RE Service Contract
- GSC - Geothermal Service Contract under RA 9513
- GSC under PD 1442

1. Sag-Lapadan-Bolinao-Bucloc-Tubo, Abra
   GSC No. 2011-12-029

2. Mainit-Sadanga, Mt. Province (80 MW)
   GRES-C No. 2010-03-023

3. Kalinga, Kalinga Province (60 MW)
   GRES-C No. 2010-03-024

4. Cagua-Baua, Cagayan (40 MW)
   GRES-C No. 2011-12-028

5. Buguigas-Tinoc, Benguet/Iligan (60 MW)
   GRES-C No. 2010-03-022

6. Cervantes, Ilocos Sur/Mt. Province/Benguet
   Potential Capacity to be determined
   GSC No. 2011-12-030

7. East Manyan, Ifugao/Benguet/Mt. Province
   Potential Capacity to be determined
   GRES-C No. 2013-11-041

8. Dacan, Benguet/Nueva Ecija (60 MW)
   GRES-C No. 2010-02-017

9. Negron-Cuadrado, Zambales/Pampanga
   Potential Capacity to be determined
   GRES-C No. 2013-02-040

10. Mariveles, Bataan
    Potential Capacity to be determined
    GRES-C No. 2013-02-042

11. Natib, Bataan (40 MW)
    GRES-C No. 2010-02-016

12. San Juan, Batangas (20 MW)
    GSC No. 2011-12-031

13. Matamis, Batangas (20 MW)
    GSC No. 06

14. Puting Lupa, Laguna (40 MW)
    Potential Capacity to be determined
    GSC No. 2014-01-349

15. Montelaga, Oriental Mindoro (40 MW)
    GRES-C No. 2013-02-013

16. Tayabas Luncan, Tayabas/Quezon
    Potential Capacity to be determined
    GSC No. 2011-12-032

17. Taon, Laguna/Tayabas/Quezon (20 MW)
    Potential Capacity to be determined
    GSC No. 2011-12-033

18. Camarines Sur, Camarines Sur (70 MW)
    GRES-C No. 2010-02-019

19. Labo, Quezon/Camarines Norte and Sur
    (65 MW)
    GRES-C No. 2010-02-020

20. Southern Bicol, Sorsogon (40 MW)
    GRES-C No. 2010-02-015

21. West Bulusan, Sorsogon
    Potential Capacity to be determined
    GSC No. 2013-11-048

22. Iriga, Albay and Sorsogon
    Potential Capacity to be determined
    GSC No. 2013-02-043

23. Cabanuan, Southern Leyte (40 MW)
    GSC No. 07

24. Mandalagan, Negros Occidental (20 MW)
    GSC No. 2012-01-038

25. Biliran, Biliran (50 MW)
    GRES-C No. 2019-02-010

26. Mainit, Surigao del Norte (30 MW)
    GRES-C No. 2019-02-021

27. Lakawon, Zamboanga del Sur/Zamboanga del Norte/Zamboanga Sibugay (40 MW)
    GSC No. 2012-01-038

28. Ampiro, Misamis Occ/Zamboanga del Norte/Zamboanga del Sur (30 MW)
    GSC No. 2012-01-035

29. Balingasag, Misamis Ori/Bukidnon (20 MW)
    GSC No. 2012-01-039

30. M. Zion, North Cotabato/Davao del Sur (20 MW)
    GSC No. 2012-01-037

31. Mt. Talomo-Tico, North Cotabato/Davao del Sur
    Potential Capacity to be determined
    GSC No. 2013-11-046

32. Mt. Sibulan-Kapatagan, Davao del Sur
    Potential Capacity to be determined
    GSC No. 2013-11-047
Cost of Doing Business

- Capital costs: US$4-5M per installed MW
- Operating and maintenance cost: US$0.03 to $0.05/kWh
- Tariff: no FIT rates & reflects costs incurred to obtain market-based financing prices ($\approx$US$0.19/kWh); mainly contracted on Php/kWh; base rate escalated by inflation and forex indices
- Volume: plants are baseload with 90% capacity factor but will depend on the contracted kilowatt hours
- Government share: 1.5% of gross income
Power Generation Mix

2011
- Natural Gas: 30%
- Coal: 37%
- Oil-Based: 4%
- Hydro: 14%
- Geothermal: 15%
- Solar/Wind: 0%

2012
- Natural Gas: 27%
- Coal: 39%
- Oil-Based: 5%
- Hydro: 15%
- Geothermal: 14%
- Solar/Wind: 0%
## Installed Capacity, 2010-2012

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<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td><strong>Installed Capacity</strong></td>
<td>1,972 MW</td>
<td>1,902.69 MW</td>
<td>1,848 MW</td>
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<tr>
<td><strong>Generation</strong></td>
<td>10,279 GWh</td>
<td>10,494 GWh</td>
<td>10,249.99 GWh</td>
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<tr>
<td><strong>Fuel Oil Displacement (MMBFOE)</strong></td>
<td>17.13</td>
<td>17.49</td>
<td>17.08</td>
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<tr>
<td><strong>Foreign Savings in MM US$</strong></td>
<td>1,349.31</td>
<td>1,377.51</td>
<td>1,861.74</td>
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NOTE: no official data yet for 2013
ROADMAP for the EXPLORATION, DEVELOPMENT and UTILIZATION of GEOTHERMAL RESOURCES IN THE PHILIPPINES (2013-2030)

Establishment of RPS and FIT

2013
Installation of additional 50 MW
New Areas - 20 MW
Expansion - 30 MW
Generation - 350.4 GWh
Employment - 85 (full time)
Investment - ~PhP11,250 MM

2015
Installation of additional 1,180 MW
New Areas - 1,050 MW
Expansion - 130 MW
Generation - 8,269.44 GWh
Employment - 2,006 (full time)
Investment - ~PhP265,500 MM

2020
Installation of additional 155 MW
New Areas - 90 MW
Expansion - 65 MW
Generation - 1,086.24 GWh
Employment - 263 (full time)
Investment - ~PhP34,875 MM

2025
Installation of additional 80 MW
New Areas - 20 MW
Expansion - 60 MW
Generation - 526.6 GWh
Employment - 136 (full time)
Investment - ~PhP18,000 MM

2030

VISION:
Increase of 75% in geothermal capacity by 2030

1. Installed Capacity 1,848 MW
   - Implementation of Detailed Assessment of Low-Enthalpy Geothermal Resources Project
   - Drafting of policy/guidelines for the direct use of small-scale geothermal energy
   - Feasibility of Small-Scale Geothermal Energy

2. Research/study on the steam/electricity pricing of geothermal resource to determine true cost of steam production
   - Research/Study on Enhanced Geothermal System (EGS) and Geothermal Heat Pump
   - Feasibility Study of Enhanced Geothermal System (EGS), Binary Technology, Utilization of Acidic Reservoir and Geothermal Heat Pump
   - Optimization and Improvement of Geothermal Power Plant Efficiency and Energy Conversion
   - Establishment of Geothermal Training Center

3. Study and promotion of nonpower application/cascaded use of geothermal energy for development
   - Encourage Service Contractors to undertake expansion and full utilization or optimization of the geothermal projects

4. IEC campaign to address the following issues: environmental permits and approval of SLUP, FLAG, TCP; protected areas; LGUs and NCIP/IPs social acceptability and harmonization with other government agencies' policies
   - Continued improvement of database and networking for better data access of both internal and external clients
   - Continued exploration in identified, underexplored, unexplored resource assessment of geothermal areas (high and low temperature/enthalpy)
# Targeted Geothermal Capacity Addition (in MW), by Grid

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<tr>
<td>LUZON</td>
<td>20</td>
<td>800</td>
<td>65</td>
<td>-</td>
</tr>
<tr>
<td>VISAYAS</td>
<td>30</td>
<td>150</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>MINDANAO</td>
<td>-</td>
<td>230</td>
<td>90</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>1,180</strong></td>
<td><strong>155</strong></td>
<td><strong>80</strong></td>
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DOE Plans and Programs for Geothermal

- Encourage service contractors to undertake expansion and full utilization /optimization of existing geothermal projects
- Develop non-power geothermal applications, as well as formulation of guidelines for non-power use
- Continue to promote the use of geothermal resources through Open and Competitive Selection Process (OCSP)
- Strengthen closer coordination efforts with other gov’t agencies and local governments to address environmental and socio-cultural issues
- Develop a framework/methodology for the pricing of geothermal resource to determine true cost of steam production, as well as to facilitate formulation of realistic price projections
- Intensify IEC campaign to increase level of awareness
Important Laws on Permitting

- Indigenous Peoples Rights Act ("IPRA")
- Environmental Impact Statement ("EIS") System
- National Integrated Protected Areas System
Investment Trends

- ODA loans from WB and JBIC for exploration to plant commissioning for state energy and power companies
- BOT for power generation, EPIRA, privatization of EDC
- Foreign equity under RE Law
- Traditional energy companies (EDC, Chevron, Aboitiz) and new greenfield developers
- Company equity and risk capital financing for new developers
- Role of Philippine local banks
Potential Issues with LGU

- Law is silent on whether LGU consent is needed for exploration
- Local government veto/moratorium on geothermal exploration and development
- National government should develop a transparent system of accounting for and allocation of sharing of revenues and taxes with LGUs.
- Expedite and streamline the release of LGU share on revenues and taxes through a simplified process with timeframe requirements to lessen local opposition to geothermal projects.
Potential Issues with IPRA

- Lack of clear cut rules on how to arrive at a decision making process of IPs
- Preferential rights of IPs; right of veto
- RE Law is silent on share of ICCs on geothermal revenue
Development Constraints

- Full foreign ownership
- Availability of geo-scientific information and professionals
- Area status and clearance, conflict with other land use, surface/land ownership
- Procedural efficiency and clarity between government agencies
- Environmental issues - Judicial intervention
- Tax issues
- Cheap shale gas in the US and its wide use for power generation - coal producers to export more to Asia at cheaper prices.
What Government Must Do

- Development of publicly available database protocols and tools for geothermal resource assessments
- Inclusion of Enhanced geothermal systems and Low enthalpy for Feed-in Tariff Rates
- Public-private partnership must be encouraged in the field of research, development and demonstration for new technologies in resource exploration.
Conclusion

- Philippine government will continue to ensure energy security by optimizing the use of geothermal energy by investment promotions and identification and implementation of sector reforms
- BUT: Regulatory framework should be long term, transparent, predictable and independently administered
- Need to address environmental and social acceptability issues by harmonizing the permitting process and intensifying efforts to increase the level of awareness for geothermal energy
Thank you!