IRENA Workshop – Mobilizing the Private Sector

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Agenda

1. The private sector – How does this usually get involved in geothermal exploration?
2. How to reduce exploration risk in order to attract private developers to your geothermal portfolio
3. Recommended steps

The Private Sector

- Risk averse - experienced geothermal developers take every step to minimise their investment risk
- Highest risk is during the exploration drilling phase (proving the resource exists), and during the appraisal drilling phase (proving enough steam to justify building a power plant)
- Drilling funds are always the most difficult to obtain - expenditure during exploration/appraisal phases can require US$ 30-70Million
- Prudent and efficient developers (e.g., EDC, Mighty River Power, Contact Energy, Polaris) favour developing low risk resources:
  - Low country risk (political, access/communities)
  - Low market risk or solid business case (bankable PPA [or feed-in-tariff], transmission lines not far away)
  - Low resource risk (Initial US$0.5 - US$ 1m to assess risk)

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The Private Sector

- Prudent and efficient geothermal developers usually have a portfolio of projects (5, 10, 15 prospects)
- Cover a number of countries to further minimise risk
- However -
  - They have limited human resources which can slow progress in certain countries as their portfolios grow
  - Governments may want to consider a healthy balance between local junior geothermal exploration companies and well established prudent and efficient international developers
- How do you attract these companies to the ANDES to speed up geothermal development?

Reduce the exploration risk

- From the technical point of view, most Andean countries have a good number of low risk geothermal systems (5 to 10)
- These present features at the surface that make them attractive exploration targets as these minimise the exploration risk e.g. -
  - Fumaroles
  - Boiling springs depositing silica sinter
  - Bicarbonate waters in-between SO_4 rich and chloride features
- Further reduce key risks for these areas by indirectly indicating the presence of high temperature and permeability

Reduce the exploration and appraisal drilling cost & risk for private developers

- Provide partial grants for exploration geoscience and slimhole drilling (ie don't give 100%, unless there is some government participation in the project)
- Provide contingent grants for first 2-3 fullsize wells (grants that would be written-off if unsuccessful, or converted to debt if successful)
- Consider insurance products (perhaps combining well loss insurance with insurance covering last 1-2 wells required to meet mezzanine debt requirements for FID for power plant)

However, before investing in Exploration

- Proceed as private developer:
  - Consider the business case –
    - Is there an attractive PPA or power price [eg Feed-In-Tariff]?
    - Do we need to build expensive roads/bridges?
    - What is the cost of the transmission interconnection?
  - These areas should have good access and ideally supportive communities, who could be empowered to have a real stake in the development
  - From the initial portfolio, only a limited number of areas will comply with these requirements (e.g., El Tatio, Apacheta, Laguna Colorada, Quellaapacheta, Nevados del Ruiz, Chachimbiro, etc.)

Private Industry View

- If possible, reduce the risk proving temperature and permeability through:
  - A high standard G&G&G exploration programme, and
  - A deep drilling programme (at least, 1000-1500m depth)
- This could represent an investment of ~US$7m per area - (US$0.5m-1m G&G&G, 3 x US$ 2m/slimhole), excluding infrastructure (wellpads, road, water supply)
- Make these areas available to prudent and efficient developers looking to increase their portfolio of projects (e.g., EDC, ENEL, MRP)

Private Industry View

- For countries with no geothermal development and where concessions have not been granted such as Ecuador, Colombia, Bolivia, Argentina:
  - Take advantage of available knowledge from experienced geothermal countries such as Iceland, Italy, Mexico, New Zealand, Costa Rica to lead a de-risking exploration effort
  - Link local geological surveys with experience geothermal scientists from the countries listed above and implement an efficient, low cost exploration programme aimed at de-risking a number of geothermal areas

Recommended/Conclusions

- Carry out a G&G&G programme to short list main areas of low exploration risk (local scientists, lead by experienced geothermal scientists)
- Always filter these areas considering the business case
- If possible, drill the most attractive areas to demonstrate temperature, permeability and benign fluids so as to attract prudent and efficient developers to develop the first geothermal projects
- Government to look for ways to catalyse development (e.g. attractive feed-in-tariffs or exploration grants)

Remember

- Top geothermal developer countries have started their development through initial government support:
  1) USA
  2) Philipines
  3) Indonesia
  4) Mexico
  5) New Zealand
  6) Italy
  7) Iceland
  8) Kenya
  9) Japan
  10) Turkey
  11) Costa Rica
  12) Nicaragua
  13) El Salvador

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