Geothermal Project Timelines

6th African Rift Geothermal Conference | ARGeo-C6
Short Course 1 | Project Management for Geothermal Development

Yngvi Guðmundsson
Geothermal project phases

• Resource identification
  • Potential areas, Defining concession and Allocating concessions

• Exploration
  • Surface exploration and Exploration drilling

• Plant construction
  • Production drilling
  • Steam gathering, turbine generation system, power lines
Geothermal project milestones

• Each phase ends or starts with a major milestones

• Can be very difficult to reach these milestone

• Usually problem with funding/financing
Geothermal project duration guidelines (Example, ESMAP Geothermal handbook)

<table>
<thead>
<tr>
<th>Activity/Phase</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project review and planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start-up and commissioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Most guidelines or literature assume 5-7 Years for project
Geothermal project duration/timeline

• Has significant influence on project feasibility

• Often pressure from government to show progress

• Are Seven years reasonable?
Examples of projects for comparison

- From Iceland: Krafla, Svartsengi, Nesjavellir, Reykjanes, Hellisheidi and Þeistareykir.
  - Key dates generally accessible on company websites, news articles or through literature

- From Kenya: Olkaria and Menengai.
  - Key dates generally accessible through UNU-GTP articles or news articles
Krafla
Installed capacity: 60 MWe
Surface exploration: 1973
Exploration drilling: 1974
Construction start: 1975
Completion of first unit: 1978
Nesjavellir
Installed capacity: 60 MWe, 200 MWth
Resource identification and surface exploration: 1946
Exploration drilling: 1986
Construction start: 1989
Completion of first unit: 1990 (only heating)
Svartsengi
Installed capacity: 75 MWe, 150 MWth
Resource identification and surface exploration: Unclear
Exploration drilling: 1971
Construction start: 1975
Completion of first unit: 1976 (only heating)
Reykjanes
Installed capacity: 100 MWe
Resource identification and surface exploration: 1953
Exploration drilling: 1997
Construction start: 2004
Completion of first unit: 2006 (50 MWe)
Hellisheiði
Installed capacity: 303 MWe, 133 MWth
Resource identification and surface exploration: Unclear
Exploration drilling: 2001
Construction start: 2005
Completion of first unit: 2007
Þeistareykir
Installed capacity: 45 MWe (in 2017)
Resource identification and surface exploration: Unclear
Exploration drilling: 2002
Construction start: 2015
Completion of first unit: - in Construction
Olkaria

Resource identification and surface exploration: Unclear
Exploration drilling: 1973
Construction start: 1979
Completion of first unit: 1981
Olkaria
Estimated total installed capacity:
Olkaria I: 45 MWe
Olkaria II: 105 MWe
Olkaria III: 139 MWe
Olkaria IV: 140 MWe
Olkaria IAU: 140 MWe
Cumulated capacity from multiple well head generators: ~60 MWe
Menengai
Installed capacity: 105 MWe (Planned)
Start of exploration: 2004
First exploration drilling: 2011
Construction start: 2013
Completion of first unit: in Construction
Results

• First phase (Resource indentification and surface exploration) does not have a clear start or duration

• New projects take more than seven year if everything is considered

• Shorter by developing small units, simple or direct use units as a first unit
New Projects (greenfield) timeline

- 10 years is more realistic if everything is considered
- 5-7 years is reasonable from start of **exploration drilling**
Conclusions

• If additional time is realized in the early phases of the project it can be considered to reduce risk in the project going forward

• If a project fast tracks through the first phases of the project, it should be considered to have higher risk of delay in the later stages.

• Additional time in the first phases allows more time for better project planning