



Master thesis:

Multi-Criteria Decision Analysis of geothermal energy in Puyuhuapi, Chile

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Abstract

The current methods to appraise geothermal energy projects are not applicable for small-scale projects that aim responding to local needs. Small-scale geothermal cogeneration projects may help improve the energy system of Southern Chile localities that struggle with the environmental impact from firewood heating and with the low-quality electricity service. This study aided the decision-making process of an academic project that evaluates the feasibility of developing of geothermal energy in Puyuhuapi, a small locality of Southern Chile. The first scientific goal underscores the integration of stakeholders' views into the decision making without requiring an exhaustive participation, which is crucial for projects on an early stage. Such integration was done by combining a thematic analysis of stakeholders' interviews with a Multi-Criteria Decision Analysis. The second goal focused on the formulation and evaluation of geothermal projects that respond to the diverse stakeholders' views. Four projects were designed and appraised according to multi-dimensional criteria and stakeholders' preferences. The results showed that the involved stakeholders would prefer a project that supplies heating and electricity to the locality over a project with an exclusive focus on electricity generation. The consideration of uncertainty in criteria, in methods to calculate option's overall performance, and in stakeholders' preferences deepened the understanding of options' performance. However, further analysis and the reduction of uncertainty are necessary to do a fine-grained comparison of options. The proposed method may be applied to similar small-scale geothermal projects that aim attending local issues.