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GEOTHERMAL ENERGY: A CLEAN ENERGY ALTERNATIVE FOR SOUTHERN CHILE

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ABSTRACT

We propose a project for developing geothermal heat in southern Chile which would directly benefit a small community, reducing the energy costs, helping to preserve the native forest (since wood is presently the main source for heating in southern Chile), and reducing in consequence the carbon footprint. The small community would be located near volcanic sources within the Región de los Ríos, close to the city of Valdivia, in order to exploit geothermal sources at shallow depths (a few hundred meters). A borehole would be drilled and hot water and vapour would be extracted which would in turn feed heat radiators installed in buildings and houses and drive as well electric generators.

INTRODUCTION

Nowadays the main methods for obtaining energy rely on burning fossil fuels (oil, coal and natural gas). These energy resources are non-renewable and are highly contaminant, contributing to the greenhouse effect and therefore to the warming of the planet. Thus the need for clean and renewable energy is urgent. The main examples are eolian (wind) energy, solar energy, hydroelectric energy, and geothermal energy.

A very good alternative is geothermal energy, which has been traditionally underused, and has the advantage of not depending on the weather, climate condition or time of the day, as is the case for solar energy and eolian energy.

Chile has a large geothermal potential because of its location over the "Pacific Ring of Fire".

The geological survey of Chile (Servicio Nacional de Geología y Minería) has investigated more than 120 sites along the country where there is an especially relevant geothermal potential. None of these sites has been used yet for generating electricity or for heating purposes.

Figure 1. Satellite view of southern South America. Source: Google Earth.

THE PROPOSAL

The proposal aims at supplying both electricity and heat from geothermal sources to a small community in Southern Chile, both for heating and electricity.

METHODOLOGY

The first step is to perform shallow drillings (ideally not more than a couple of hundred meters) to reach hot water and hot vapour sources in a previously prospected area where shallow geothermal sources are predicted to exist. Once the thermal source is reached the water/vapour would be fed to the surface through thermally isolated conduits.

For heating purposes the water would be collected in a tank which would act as a central reservoir, ideally located underground for isolation purposes. This would save the need for multiple drillings which are very expensive. From this central unit isolated hoses would run to the different buildings and houses which would have a series of radiators installed within their rooms. If the thermal water is acceptable for washing/drinking, it would also save energy expended normally from fossil fuels used for water heaters. The idea would be to implement this system in all the buildings and homes within a pre-selected town.

In order to produce electricity, hot water and/or hot vapour will be used to feed generators, ideally of at least several tens of kW in order to provide a major part of the electric consumption of the small community.

Figure 5. Typical double-chamber (slow combustion) wood-burning stove used in southern Chile.
Source:http://www.arroyoesquel.com.ar/assets/images/estufa03.jpg

Figure 3. Satellite view of the IVth Region of Chile (Región de los Ríos). Source: Google Earth.

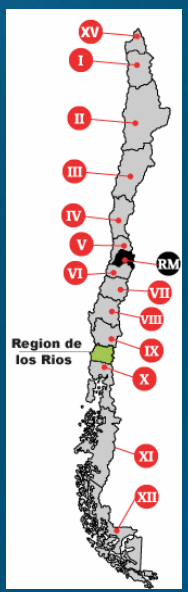

Figure 2. Chile: political division. Source: http://www.wikilosrios.cl/index.php/Imagen:Mapa_chile_regiones.png

Figure 4. Native "Valdivian" rainforest in southern Chile. Source: http://farm3.static.flickr.com/2095/2400925255_803225bd7b.jpg?v=0

Figure 6. Gas emissions from a wood-burning stove in southern Chile. Source:http://news.bbc.co.uk/media/images/41052000/jpg/_41052875_pap1.jpg

Figure 7. Nesjavellir, Iceland, an example of a geothermal plant. Source:http://en.wikipedia.org/wiki/Image:NesjavellirPowerPlant_edit2.jpg

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