

# KELLEHERS AUSTRALIA

## In-House Briefing Memorandum

### *The Legal Implications of Direct Geothermal Energy*

The increasing interest in direct geothermal energy systems in Victoria creates intriguing questions relating to property rights and regulation of the technology. A recent presentation by Professor Ian W Johnston, at the John Jaeger Award Seminar, triggered exploration of such potential legal issues.

#### What is Direct Geothermal Energy?

Direct geothermal energy utilises the latent temperature of the earth's surface, heated by solar radiation, as a continuous source of energy. Below a depth of 5 to 8 metres, the ground temperature remains consistently above the annual median air temperature. In Melbourne, the ground temperature at this depth is around 18°C. Depending on the season, this ground temperature within the first 10-100 metres of the surface can act as either a heat *source* or heat *sink* to heat and cool buildings.<sup>1</sup>

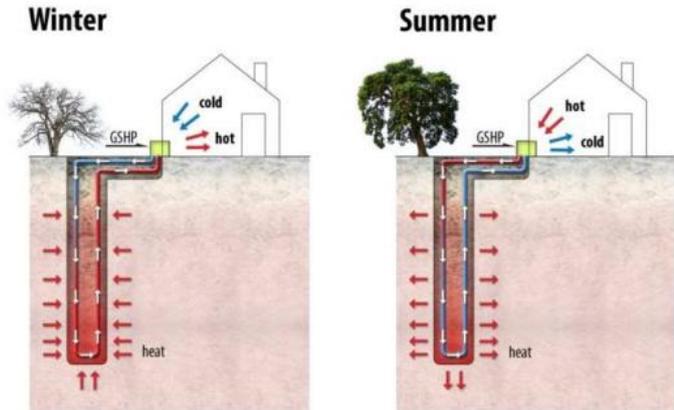


Figure 1: Principles of direct geothermal heating and cooling (borehole not to scale) (Ian W Johnston et al, 2012)

The energy is secured through the use of a Ground Source Heat Pump (GSHP) which cycles water through a heat exchanger and ground loops in a manner similar to a refrigerator. In winter, the GSHP extracts heat from water circulating in these ground loops and delivers it to a building. In summer, this is reversed and the GSHP extracts excess heat from the building and delivers it to the ground.<sup>2</sup>

The advantage of this technology is that it provides a renewable source of energy throughout the year – 24/7 – with potential to greatly reduce carbon emissions. For each kilowatt of electrical energy put into a direct geothermal system, about 4 kilowatts of energy is developed for heating or cooling use, reducing greenhouse gas emissions by 75%.<sup>3</sup> As energy use in buildings accounts for 26% of Australia's greenhouse gas emissions, with heating and cooling comprising 50% of this, direct geothermal energy technology provides scope for great energy savings. Direct geothermal energy systems can either directly access groundwater reserves ('open loop') or be a 'closed loop,' systems (where a sealed circulation system exchanges subsurface energy, for example through using building foundations). Systems can be installed horizontally – taking up greater surface area at a shallower depth – or 'vertically' where a system's surface area penetrates deeper into the earth.

Given their design and operation, it is conceivable that use of direct geothermal energy resources may affect neighbouring subsurface conditions, because the heat exchange process that creates cooling and heating of the earth can in some circumstances freeze earth around the piping loop. Thus, an owner who installs a direct geothermal energy system may gain a 'first mover' advantage and prevent a neighbour from utilising a similar geothermal energy system. Additionally, 'open loop' systems that directly access groundwater, can by virtue of their extraction, potentially affect groundwater levels and quality – impacting the useability of ground water for others.

<sup>1</sup> Ian W Johnston, Geothermal Energy Using Ground Source Heat Pumps, (2012) *New Zealand Geothermal Workshop 2012 Proceedings 19 - 21 November*, Auckland, New Zealand.

<sup>2</sup> Ian Johnson et al, Ian Johnston et al, Direct Geothermal Energy Demonstration Projects for Victoria (2012) *Australia New Zealand Geothermal Workshop 2012 Proceedings 19 - 21 November*, Auckland, New Zealand, 1.

<sup>3</sup> Ian Johnson (2012) above no 2, 2.

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### The Legal Issues: Ownership

The status of geothermal energy as part of the land owned by a registered proprietor is central to legal questions surrounding geothermal technology. In short the Crown owns all minerals<sup>4</sup> as well as 'all geothermal energy and geothermal energy resources that came to be on or below the surface of any land without human assistance'<sup>5</sup>. However the Crown can grant licenses for private geothermal energy mining. Exemptions apply to 'non-commercial 'small scale ground source heat pumps' near the source of geothermal energy which do not require a licence.<sup>6</sup> Once authorised or exempt, geothermal energy becomes the property of the person extracting it under Section 16 of the *Geothermal Energy Resources Act 2005 (Vic)*, (*GER Act*)

### Compensation

The *GER Act* provides regulatory measures for compensation and dispute resolution.<sup>7</sup> Compensation is payable by an authorised geothermal energy extractor where 'any loss or damage is sustained directly, naturally or reasonably as a consequence of the approval of or operation of any geothermal energy operation.'<sup>8</sup> However these compensation provisions do not apply to the small non-commercial geothermal energy systems excluded from the licensing provisions.<sup>9</sup>

### Other Legal Issues:

Broad common law principles of private nuisance may also allow recovery of losses arising from any detrimental effects of direct geothermal energy activity. Private nuisance seeks to protect the quiet enjoyment of land, with an action in nuisance available where substantial and unreasonable interference occurs to the enjoyment of land arising from the actions of another outside that land.<sup>10</sup> Such nuisance actions may be relevant in compensating for subsurface freezing or groundwater impacts affecting other landholders, including preventing the use of direct geothermal energy drawn from their own land.

Easement law may also have relevance where the land of one party gains a benefit created from a burden on another. It is also possible that direct geothermal energy systems could give rise to easements by long user, where a neighbour acquiesces to the burden of lost geothermal energy potential and thus grants a benefit to the adjoining land to use the areas available geothermal energy.

Pervasive direct geothermal energy use where every building has a direct geothermal energy system 'draining' the earth's geothermal capacity may challenge regulations in the future.

As with many forms of modern energy production, scientific evidence of its impact is limited and it is, therefore, important to remain aware of the environmental law 'precautionary principle' which provides that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."<sup>11</sup>

### Conclusions:

Direct geothermal technology is a burgeoning renewable energy resource. Over 3 million installations and large scale examples already exist across the northern hemisphere.<sup>12</sup> Avoiding legal impediments to direct geothermal energy technology is desirable whilst also protecting private property rights and public resources.

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<sup>4</sup> Section 9 of the *Mineral Resources (Sustainable Development) Act 1990 (Vic)*

<sup>5</sup> Section 12 of the *Geothermal Energy Resources Act 2005 (Vic)* (*GER Act*)

<sup>6</sup> Section 10 *Geothermal Energy Resources Act 2005 (Vic)*.

<sup>7</sup> Part 8 and Section 94 of the *GER Act*.

<sup>8</sup> Section 89 *Geothermal Energy Resources Act 2005 (Vic)*.

<sup>9</sup> Section 10 *Geothermal Energy Resources Act 2005 (Vic)*.

<sup>10</sup> *Bamford v Turnley* [1860] 3 B&S 62.

<sup>11</sup> The Encyclopaedic Australian Legal Dictionary citing Principle 15 of the United Nations Declaration on Environment and Development 1992 ('Rio Declaration')

<sup>12</sup> Ian Johnson et al, (2012) above no 1, 1.