



Sustainability assessments of GSHP systems

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Introduction

- *This presentation will briefly present work Golder Associates has recently completed in Canada reviewing best practice on the assessment and subsequent regulation of environmental impacts from GSHP systems*



Synopsis

- Background
- Scope and approach
- Identified environmental concerns
- Conclusions



Background

- Golder Associates acted for the Ministry of the Environment in a Canadian province, to support the development of environmental standards for GSHPs
- Provides an insight into approaches in other countries
- Covered closed loop and open loop (including standing column wells)
- Differing terminology
 - Low temperature geothermal
 - GeoExchange
 - EES (Earth energy systems)
 - GCHCS (Ground-coupled heating–cooling systems)



Scope and approach

- Review of legislation, policy and guidance in other countries
- Review of scientific and technical literature in relation to environmental issues and GSHP
- Stakeholder consultations
- Develop recommendations for technical, licensing and policy approaches



Environmental concerns

Environmental concerns associated with GSHP were categorised as:

- Three groups of thermal impacts
- Thermal sustainability
 - of a single system
 - in relation to neighbouring systems
- Thermal ecological impacts
- Thermal geotechnical impacts



Environmental concerns

Environmental concerns associated with GSHP were categorised as:

- Borehole drilling
- Groundwater mining (abstraction)
- Groundwater mounding (re-injection)
- Ground settlement/subsidence
- Air quality concerns (refrigerant leakage)

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Conclusion

The preferred approach involved implementing the following actions:

- Promote energy-balanced GSHPs in particular for:
 - large commercial systems;
 - areas with a current/potential high density of systems;
 - an environmental context particularly sensitive to thermal impacts (i.e., proximity to surface water, etc.)
- Introduce a two-tiered policy approach based on size and capacity of GSHPs to facilitate access to systems to private owners;
- Make use of available tools such as guidelines, training and inspection to promote the design and construction of GSHPs so that they have low potential for environmental impact;
- Given the predicted trends for an increased use of GSHPs in the future, adapt policy requirements as the use of GSHPs becomes more widespread in the province



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