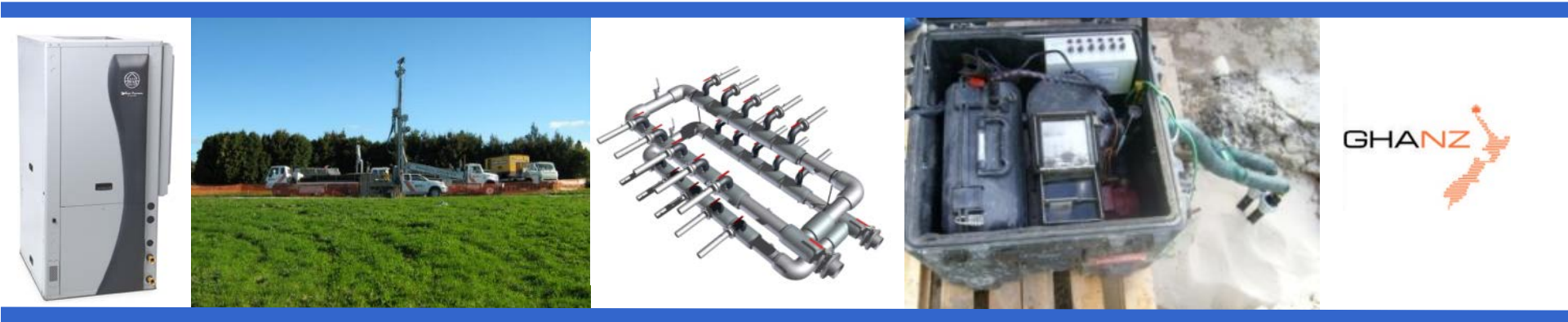


Addressing Sustainability and Optimisation in Ground Source Heat Pump Projects

Huw Williams ENGEO Ltd



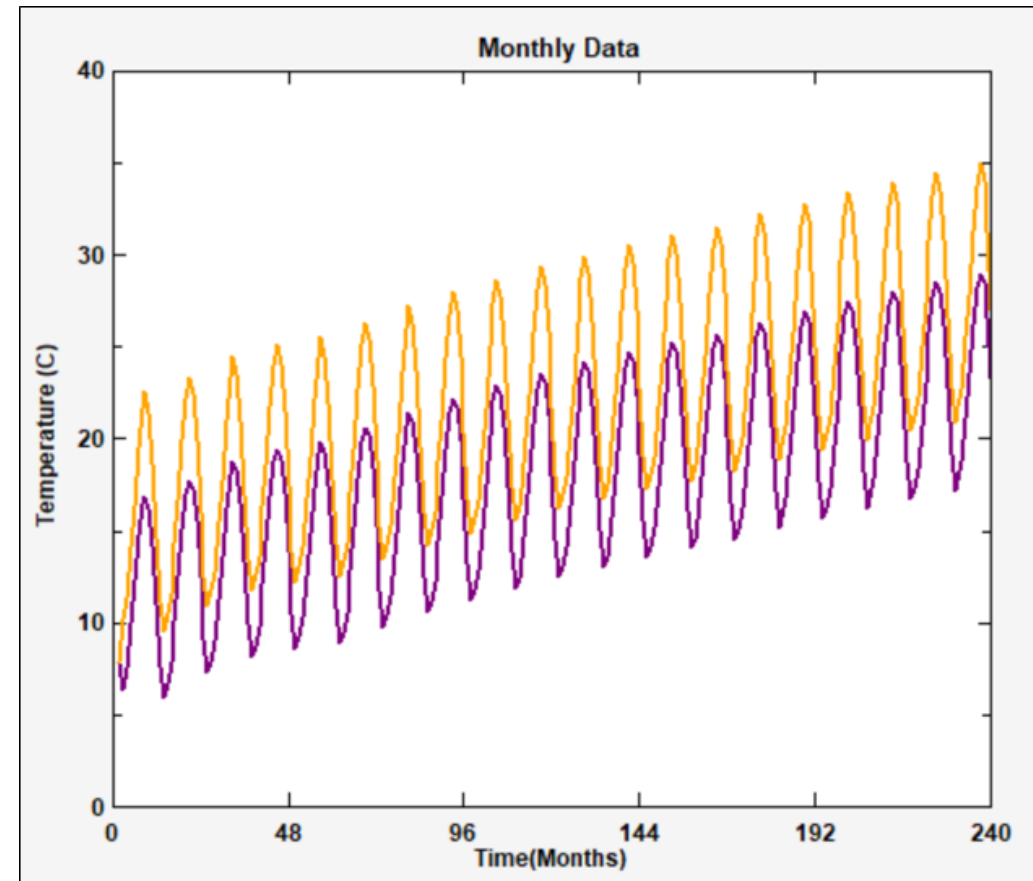
Question

Sustainability

– do we have a clear definition or criteria against which targets can be set in GSHP projects?

Sustainability – Criteria 1

Can the GSHP system supply the designed peak and annual loads for the design life of the system?



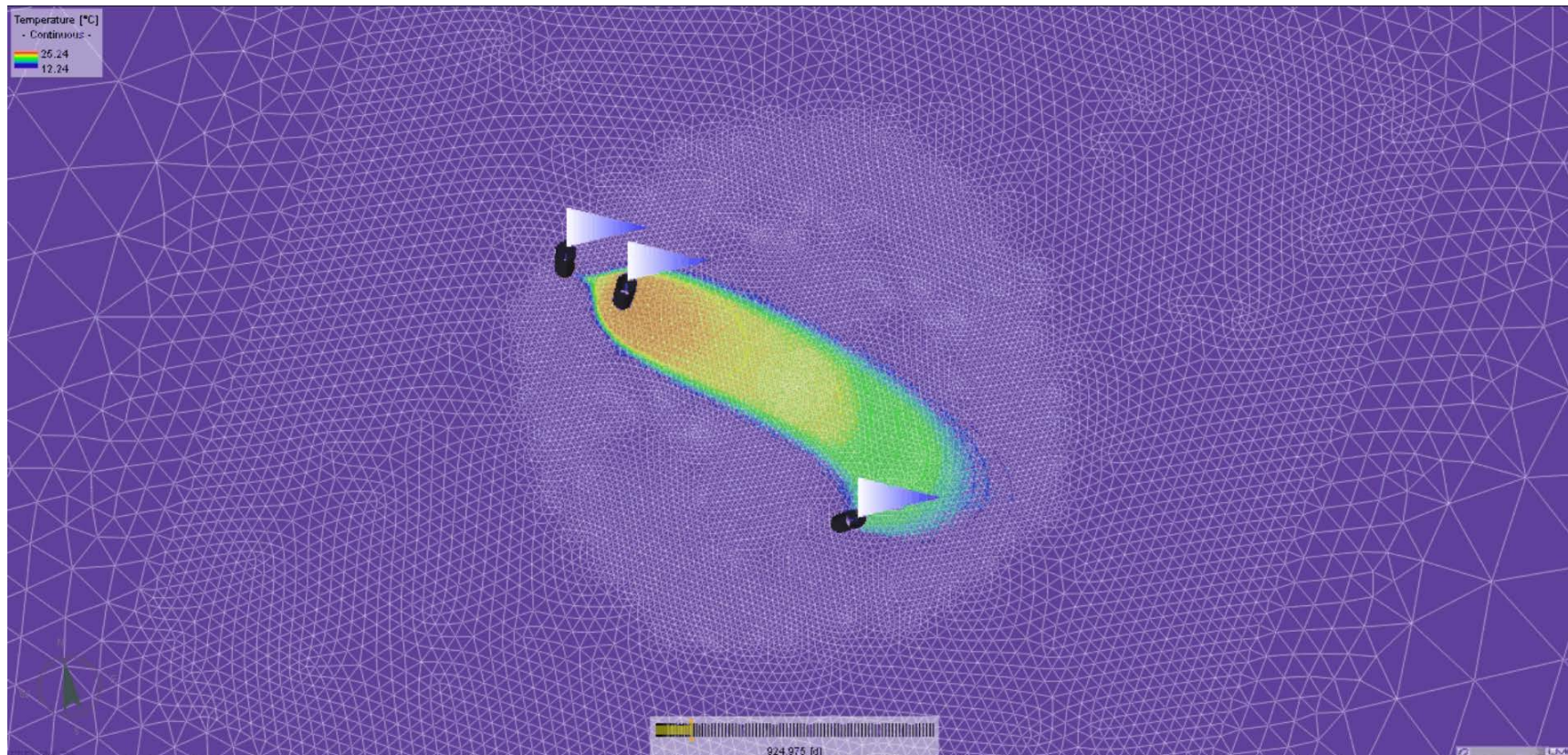
Sustainability – Criteria 3

Can the GSHP system provide OPEX and CO₂ savings for the full design life of the system?

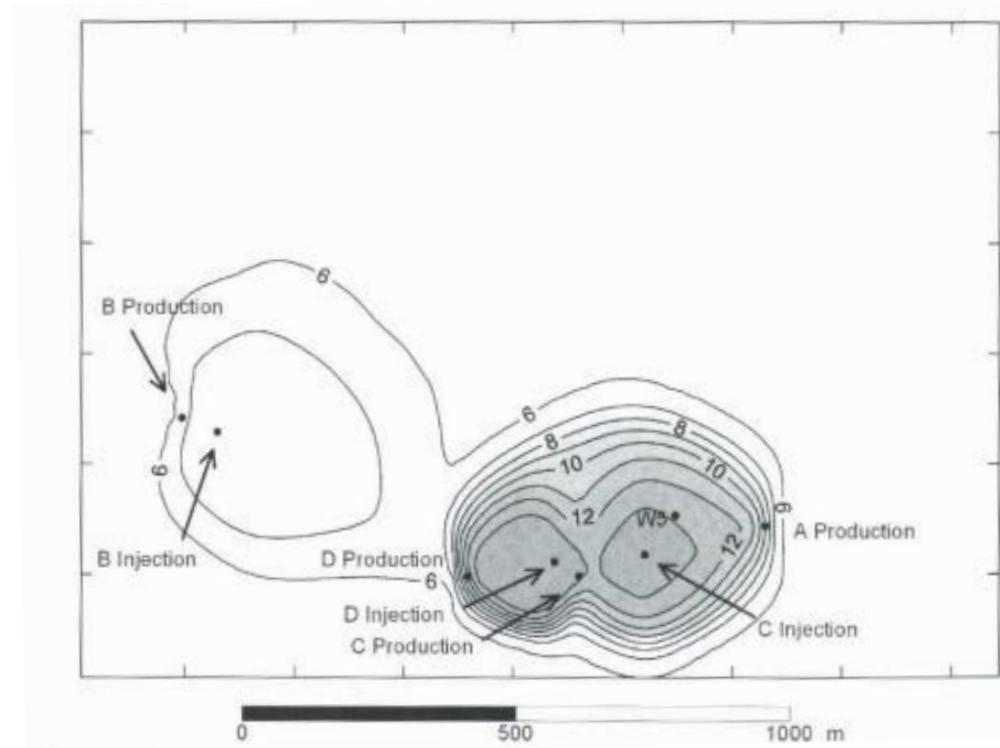
	Gas	Electric	GeoExchange™		
	Total Gas Cost	Total Electric Cost	Electricity Cost	Geo utility bill	Total Energy Cost
Single-Family	\$2,275	\$2,906	\$981	\$948	\$1,929
Multi-Family	\$719	\$860	\$342	\$264	\$611
Townhome	\$984	\$1,188	\$462	\$372	\$836

Sustainability – Criteria 2

Can the GSHP system operate without adversely impacting other temperature sensitive receptors?



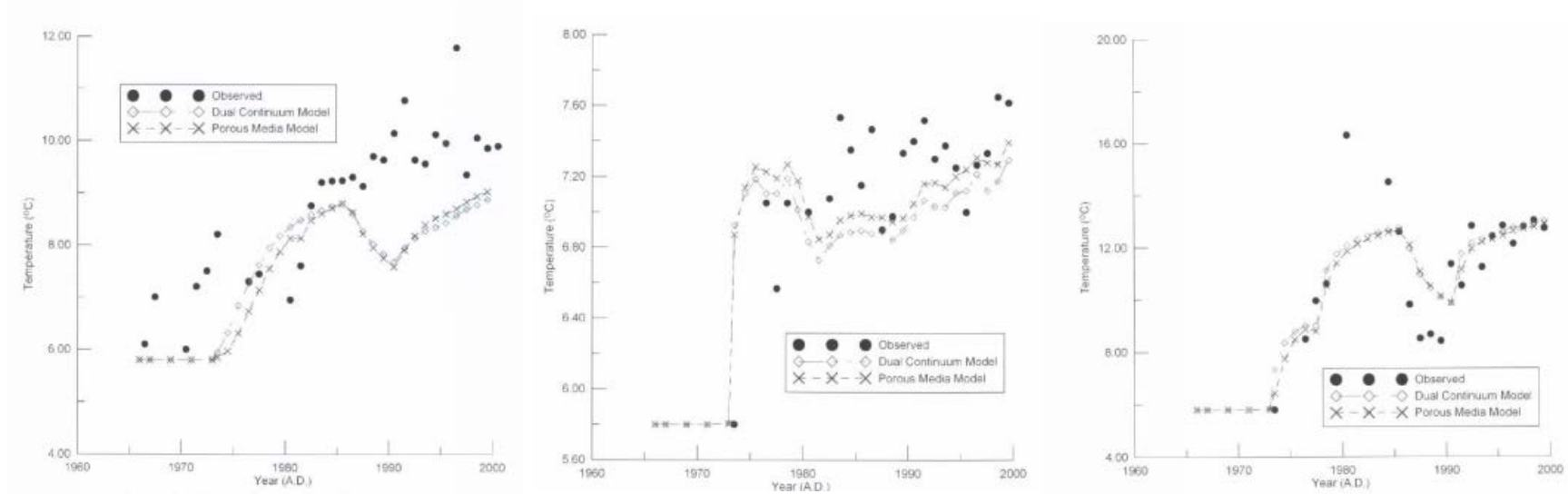
Sustainability – Cumulative Impact



Observed thermal pollution and post-development simulations of low-temperature geothermal systems in Winnipeg, Canada

Grant Ferguson • Allan D. Woodbury

Sustainability – cumulative effects



Observed thermal pollution and post-development simulations of low-temperature geothermal systems in Winnipeg, Canada

Grant Ferguson • Allan D. Woodbury

Hydrogeology Journal (2006) 14: 1206–1215

Question

Optimisation

– do we have a clear definition or criteria against which system efficiency for operational parameters can be set in GSHP projects?

Optimisation

With regard to optimisation, there are three types of GHSP system:

1. Those that don't work
2. Those that “work”
3. And those that work in an optimised and sustainable manner for the design life of the system

GSHP Optimisation Questions?

Building Design

1. Have the energy loads been balanced as much as practically possible and financially viably?

GSHP Optimisation Questions?

Ground Heat Exchanger Design

1. After optimising energy loads, how else can the size of the ground heat exchanger be minimised?
2. Has pumping energy been optimised as much as possibly
 1. Loop configuration – spacing and layout
 2. Minimising parasitic loads – pump size

GSHP Optimisation Questions?

Mechanical Design

1. Has the most efficient heat pump been specified and supplied to the project?
2. Has the most efficient distribution system for a GSHP been selected?
3. Have the controls been appropriately set up and monitored for future optimisation?

GSHP Optimisation Questions?

Operational Considerations

1. Has the system operator been sufficiently briefed on the operation of the GSHP system
2. Have the controls been appropriately set up and monitored for future optimisation?

Thanks for listening