

GeoExchange in Remote Communities

December 11, 2007 CGC Conference, Calgary, AB

Daniel Booy, EIT, Dipl.T.

Geo-Xergy Systems Inc.

Introduction



- **Fuel options for remote communities**
- **Pros & Cons of geo-exchange in remote communities**
- **Design**
- **Construction**
- **Commissioning**
- **Operational**
- **Case Studies**

Fuel Options for Remote Communities



- Diesel is most common source of fuel
- Electrical generation onsite using diesel
- Fuel oil systems require fuel handling: spills are more difficult to control, detect and remediate due to location = not good choice
- Electric resistance is baseline case
- Propane often considered for back-up
- GeoExchange scores high for distributed generation cases

Onsite Diesel Generation Common



Diesel generators are very common source of energy for remote communities

GeoExchange in Remote Communities



- **GeoExchange Pros:**
 - **Reduces peak electrical demand**
 - **Most feasible option for diesel-based generation**
 - **Lots of space in rural areas typical**
 - **Hands willing to help (close community)**
 - **No onsite combustion of fossil fuels, pristine settings preserved**
 - **Heating and cooling with one system = less building area and lower capital cost**
 - **Capital investment stimulates local economy (job creation)**

GeoExchange in Remote Communities



- **Cons:**
 - **Capital cost high for small tax base**
 - **Unique technology**
 - **Refrigeration/service contractors often far away**
 - **Design is very site specific**
 - **Lack of trained designers often leads to mistakes**
 - **Transportation fuel use for servicing large in comparison to energy savings**
 - **Currently no operator training specific to geothermal, no power engineers in many areas**
 - **Post-occupancy evaluations costly and not typically done**
 - **Commissioning procedures variable based on CX agent**

Design



- **KISS (Keep it Simple & Solid)**
- **Detailed loads: peak loads and annual loads considered in detail**
- **Looking at all options to save \$ (small community tax bases)**
- **Documents clear, drawings that show modes of operation clearly**
- **As-built documentation gathered, particularly for the GHX**
- **Beat old Murphy – try to think of the fact that if it can happen, it will happen.**
- **Design intent documentation provided for others who may need to inspect the system**

Looking at All GHX Options Reduces Cost



GHX design is very site specific...looking at ALL available options, including hybrid loops can reduce capital cost and help involve local contractor resources



Construction



- **Consideration of local equipment / contractor resources**
- **Regional considerations for transportation & climatic factors: costs can rise considerably**
- **Fashion contracts to include costing for local volunteers to enable volunteer labour:**
 - **Contractor covers WCB, supervision, volunteer time is credited to client**
 - **Local people take ownership and help document system attributes**

Commissioning



- Procedures for CX and re-CX outlined in detail in tender docs and in maintenance manual.
- Peer review from experienced professionals should be considered from outset of design
- Involve operators in post-occupancy monitoring / reporting plans
- Training manual for the operators since continuity of staffing can be an issue and original training session is not the only time to train staff
- Ensure noisy or faulty components are dealt with or they get disabled
- Ensure budget for inspections and QA/QC program is adequate
- Develop as-built drawings so data is available to troubleshooters prior to their travel to site

Operational



- **Ensure arrangements for nearest qualified service company are made before handing over system**
- **Ensure refrigerant, water testing, parts, etc. are provided for service people (flying in items can be difficult, time consuming and costly)**
- **Clearly outline all operating procedures**
- **Set up control system for remote monitoring and remote assistance to help operators from afar**
- **Ensure operator can communicate using photos and written correspondence**
- **Investigate the core competencies of the operational staff and make arrangements to supplement local skill sets**

Case Studies



- **Hot Springs Cove**
- **Port Simpson**
- **Edgerton**
- **Haida Gwaii**
- **Houston**

