

## PRODUCT CONTRACT

Product Description: Solar powered steam pump for well water.

Intended Customer: People of Lesotho as with the Bethel Business Community Development Center (BBCDC) acting as a liaison.

Market: Alternative energy promoters.

Customer Need	Product Attribute	Engineering Specification
maintainable by students/staff of BBCDC; long life expectancy	few built connections, moving parts; robust materials, simple construction	12 month life expectancy before 1 <sup>st</sup> necessary repair
efficient solar collector	adjustable trough position to maximize gathered energy of sun	achieve 2 % conversion of available solar energy to work
cheap construction, maintenance costs	made from common available materials, little construction required	cost for Bethel to build and maintain for 1 year less than \$1000
easy to assemble for necessary optical performance	large tolerances in manufacturing specifications, simple procedure	tolerances from 5 %
can operate once per day	storage tank	87.5 gallons of storage
conserve non-solar energy source	solar source is significant percentage of power input	at typical performance 100 % of power input is solar at worst case performance 50 % of power input is solar
safe operation	pressure safety valve  steam tight seals	will not exceed 65 PSI for injector pump, 40 PSI for push pump steam leak free outside of well
water retention	steam used to draw water added to that water	less than 5 % of input water is lost to atmosphere
easily repaired	components easy to exchange	each component replaceable by only removing two other components each component takes less than 1 hour to replace
water input per day, little maintenance required	input tank large enough to sustain full day's consumption	2 gallons for injector pump 2 gallons for push pump

transportability	easy to assemble	Parts can fit into a pickup truck
need water in winter	keeps water from freezing in pipes	water stays above 4° C
affordable and available product that fits into lifestyle and culture	out of the way collection tap for water access collects once a day for a daily supply	less than 8 square meters tap flow rate between 0.1 and 1.0 gallons per minute
civilian safety	fence around construction	5 ft wire fence discourages those who come to get water from playing with the areas affected by solar and steam heat
easy to switch from solar power source to alternative source if necessary	permanent alternate energy source platform	less than 5 minutes to change to alternate source
changeable to protect against hail and wind when not in use	can be turned over to expose flat back to elements	back rigid, protective can stand hail and winds for 2 months during bad season