Design Project 2

Group 4:

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Mission Statement

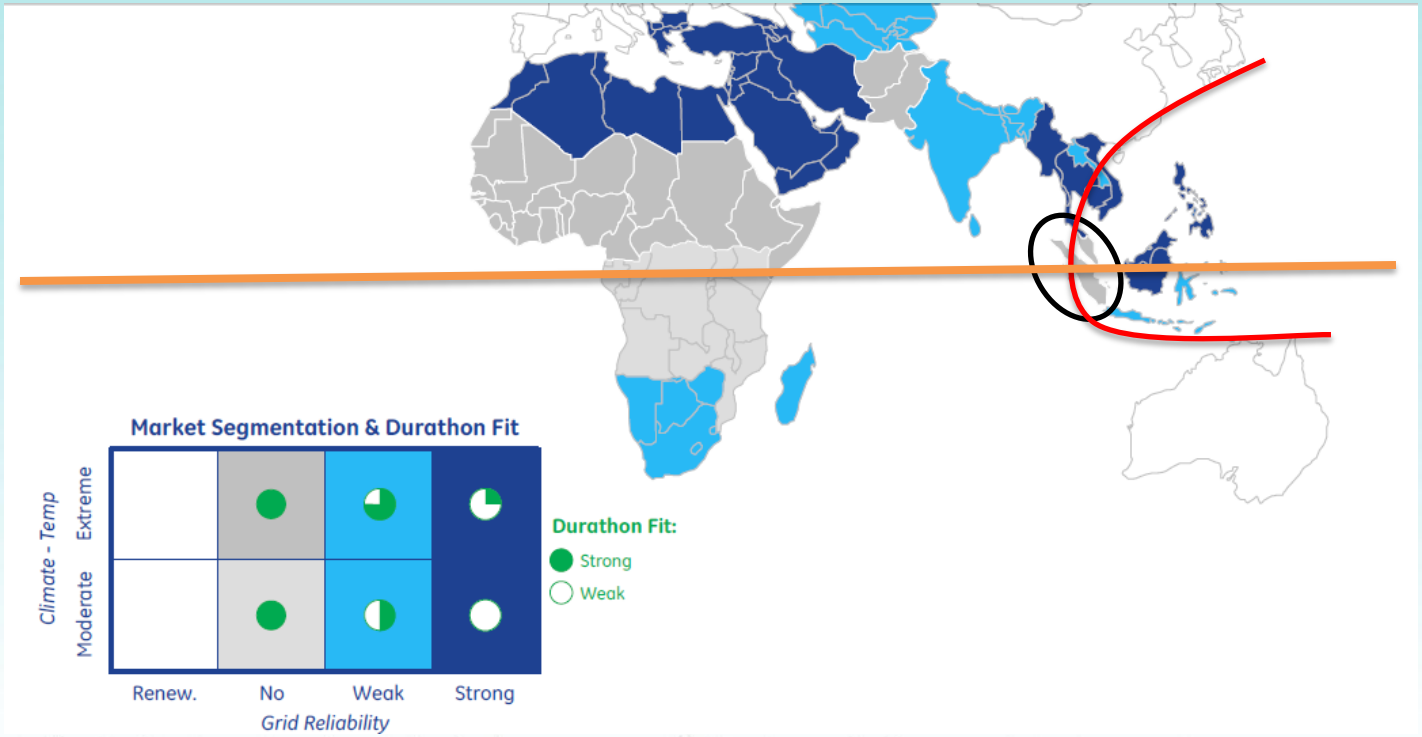
"To provide an efficient and reliable telecom cell phone grid system in an underdeveloped country through the implementation of a sustainable, green energy resource."

Kelantan, Malaysia

- Geography
  - 5,761.4 sq. mi
- Population
  - 1,635,000
- Density
  - 283.8/sq. mi
- Terrain
  - Mountainous
    - Volcanoes
  - Coastal Plains
- Economy
  - Rice
  - Rubber
  - Tobacco

Why Malaysia?

- No Grid Reliability
- Strong Durathon Fit
- Equator
- Located in Ring of Fire



Benchmarking

For: Malaysia

	Geothermal Energy	Wind Energy	Solar Energy (Reference)	Hydro Energy
Price	-	0	0	-
Maintenance	0	0	0	-
Efficiency	+	-	0	+
Eco-Friendly	0	0	0	-
Lifetime	+	+	0	+
Availability	+	-	0	-
Geography	+	-	0	-
Sum +'s	4	1	0	2
Sum 0's	2	3	7	0
Sum -'s	1	3	0	6
Net Score	3	-2	0	-4
Rank	1	3	2	4
Continue?	Yes	No	Yes	No

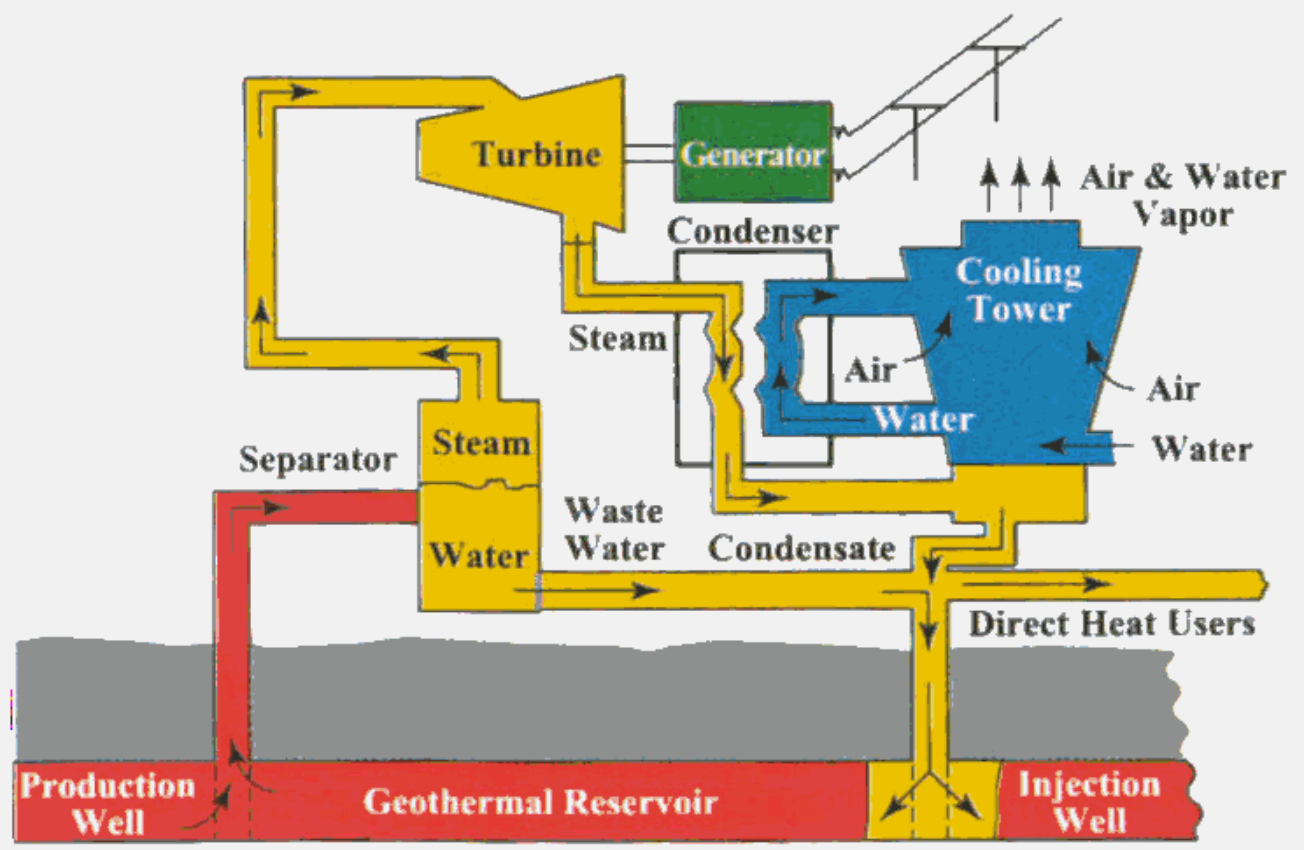
Design Matrix

For: Malaysia

		Geothermal Dry Steam System (Reference)		Geothermal Flash Steam System	
	Weight (%)	Rating	Weighed Score	Rating	Weighed Score
Price	30	3	0.90	4	.90
Maintenance	15	3	0.46	3	0.46
Efficiency	10	3	0.30	4	0.4
Eco-Friendly	10	3	0.30	4	0.4
Lifetime	20	3	0.60	3	0.6
Availability	10	3	0.30	3	0.3
Geography	05	3	0.15	3	0.15
Total Score		3.01		3.21	
Rank		2		1	
Continue?		No		Yes	

Geothermal Energy

- Energy derived from the heat of the interior of the Earth.



The Design

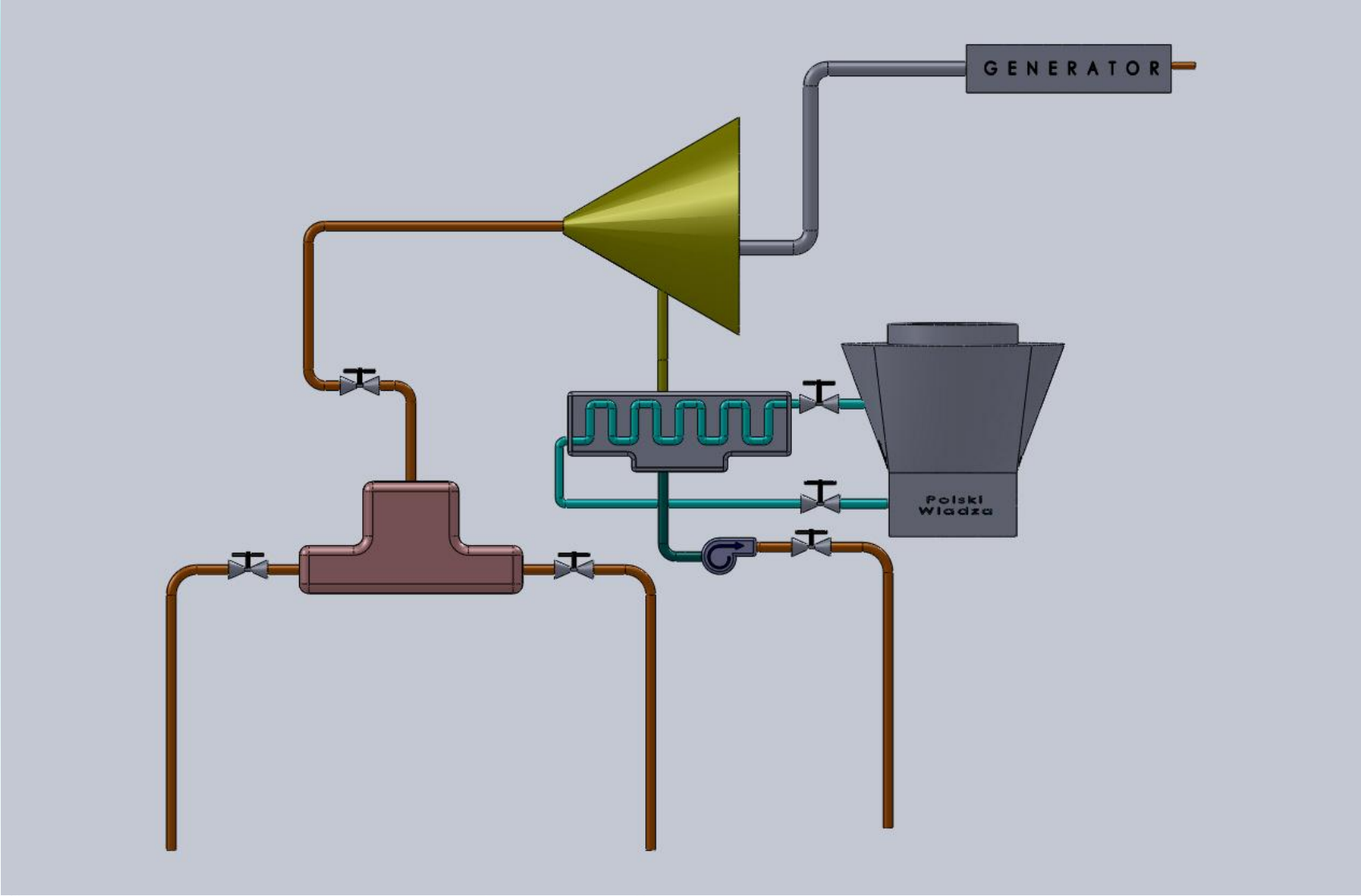
Needs:

- Green Energy Source
- Reliable Electrical Grid
- Environmental Stability
- Economic Adequacy
- Cell Phone Availability

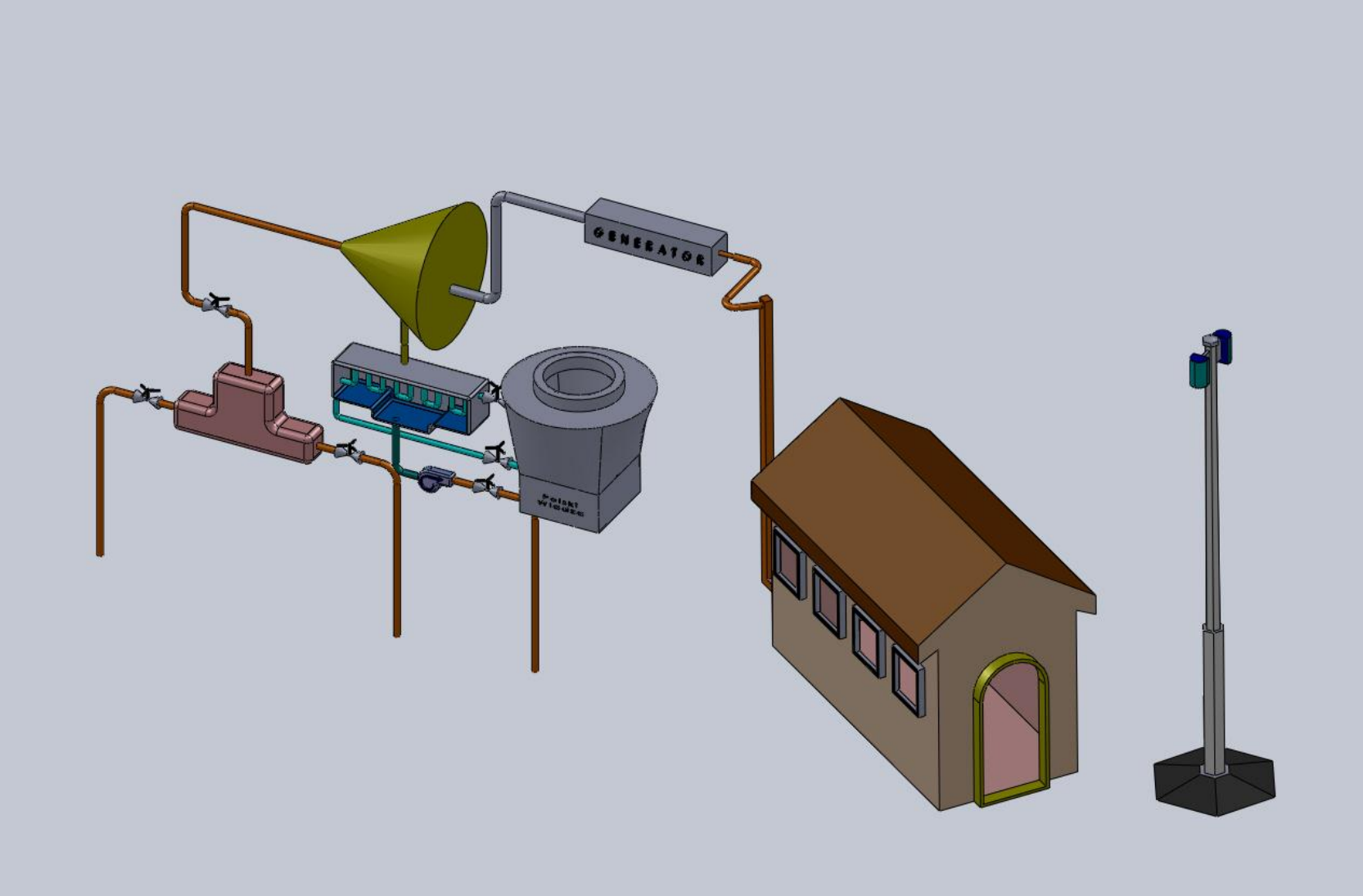
Application:

- Flash Geothermal System
  - 32kW Output
  - 97% Availability
  - Self-Sustaining
- Type A2 Durathon Battery
  - 24.9kWh
- Providing Power to Local Region
- Base Cell Phone Telecom System

Our System



Integrated Design



Economic Outlook

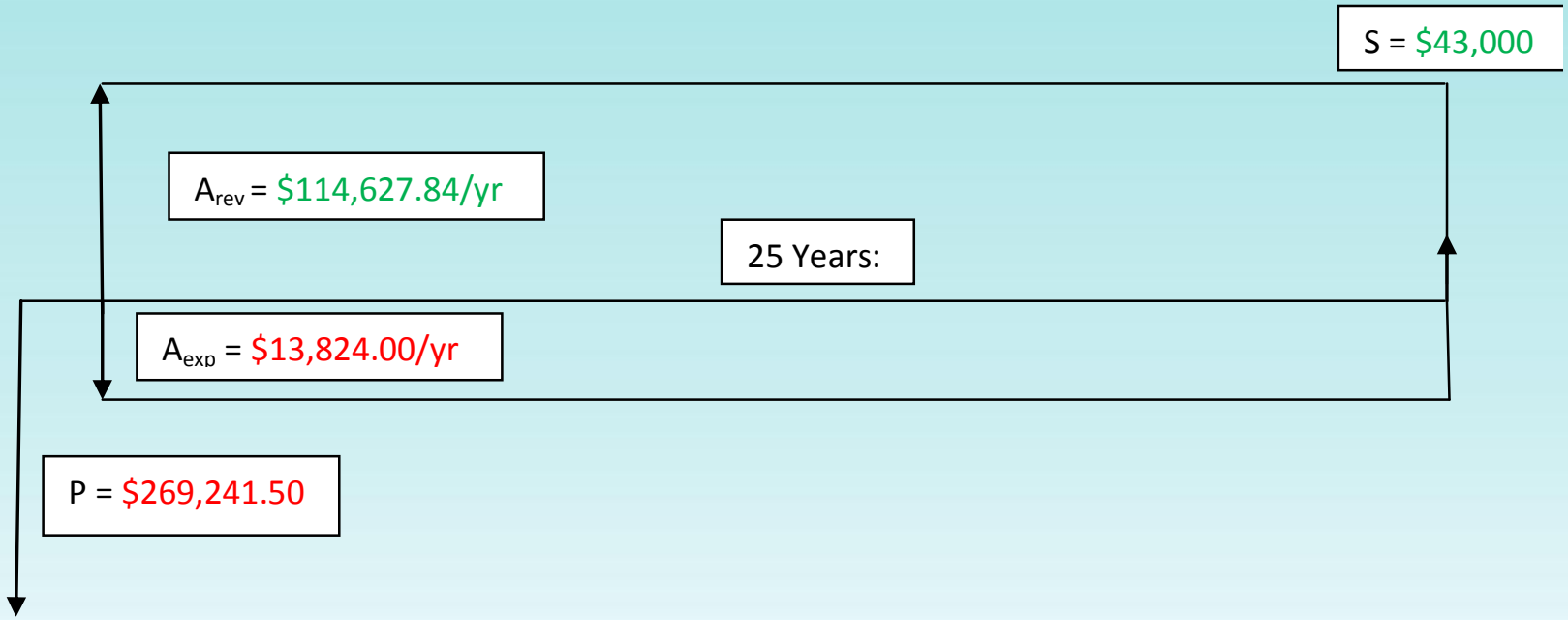
Costs:
Initial:
-Drilling - $1,500/100 ft.
2 holes @ 1279 ft
= $38,370
-Geothermal System - $2,500/kW installed
@ a 32 kW system
= $80,000
-Cell Tower/Hut/Utilities
= $150,000
-Durathon Batteries - $3,000/each
@ 1 battery
= $3,000
-Bio-Diesel Generator - $2,000
@ $1.85/gal Fuel with 30 gal tank
= $55.50 + $2,000 = $2,055.50
Total Initial Costs - $269,241.50
Maintenance Costs:
-Geothermal System - $0.05/kW/h
@ 1 year
= $13824.00/yr
Total Maintenance Costs - $13,824.00/yr

Revenue:
-Lease Cell Tower - $2,000/month
@ 12 months
= $96,000/yr
-Selling Power - $0.07/kw/h
@ 1 month = $1552.32
@ 1 year = $18627.84
Total Revenue - $114,627.84/yr

Salvage Value:
- Geothermal System - $1,000/kW
@ a 32 kW system
= $32,000
-Cell Tower/Hut/Utilities - $10,000
@ 1 system
= $10,000
-Durathon Battery - $1,000
@ 1 battery
= $1,000
Total Salvage Value - $43,000

Total Expected Life - 25 years
Proposed Total Revenue after 25 Years: $2,293,854.50

Cash Flow Diagram



NPV = $514,666.10

Conclusion

- Provides a Reliable Electrical Grid
  - Underdeveloped Country
- Expands Cell Phone Usage
- Integrated Hybrid Energy
- Stimulates Economy

Questions?