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A Sensitivity Analysis of Economics of Remote MicroGrid System

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Economics of MicroGrid system

Sensitivity Analysis

Design of Remote MicroGrid system in island \bigcirc

- Only renewable energy? (Almost renewable system)
 - \rightarrow It is difficult to be a economic system. (High investment cost)
- Proportion of renewable energy must be proper for economics. \rightarrow Diesel Gen. + Renewable energy (Hybrid System)

Comparison between the only renewable and Hybrid system \bigcirc

- Economic evaluation for designing remote Microgrid for the same island grid in Korea.

	Before MG	Only Renew.	Hybrid
COE [KRW/kWh]	920	983 (△ 63)	850 (▽70)
B/C ratio	_	0.62	1.43
Investment [Million KRW]	_	5,038	1,660
Operation [Million KRW/yr]	930	679 (▽251)	740 (▽190)

***** MG : MicroGrid ***** COE : Cost of Energy \mathcal{K} KRW : Korean Won(\mathcal{W})

Which factor does make only renewable system be economic?

1. Market (Fuel price, Battery price)



- Very high fuel price or Very low battery price is needed - But hybrid system is always economic.

* Present fuel price : 900 KRW/L

2. Characteristic of island grid (Average load)



→ Only Renew. System : No economic system



X Data of objective island of analysis

Diesel	450kW (150kW x 3)	
Load	Average : 124kW Maximum : 305kW	
Average wind speed	5.5m/s	
Average solar radiation	3.68kWh/m2/day	

It can't make the difference of COE between the systems.

3. REC (Renewable Energy Certificate)



- Additional benefit→ Only renew. System can be economic

X Design results of remote MicroGrid

	Only Renew.	Hybrid
BESS	Battery 3,000kWh Inverter 500kVA	Battery 500kWh Inverter 250kVA
Wind Turbine	200kW	100kW
Photovoltaic	480kW	120kW

Conclusion

- \bigcirc It is essential to make high penetration of renewable energy with economics.
- REC weight will be very important factor for economics of remote MicroGrid in Korea.
 - It is needed to consider policy about renewable energy in island grid.