

ZZ SMRT Ltd.

Consulting, the language of the practical.

Est. 2017

Here's a brief cost-saving analysis comparing diesel and hydrogen fuel for power generation at work sites over one year. This includes estimates for fuel costs, oil, oil filters, and other consumables.

Assumptions

- **Diesel Generator:** 100 kW
- **Hydrogen Fuel Cell:** 100 kW
- **Operating Hours:** 8 hours/day, 5 days/week
- **Fuel Prices:** Diesel: \$3.50/gallon, Hydrogen: \$10/kg
- **Diesel Fuel Consumption:** 0.4 gallons/kWh
- **Hydrogen Fuel Consumption:** 0.1 kg/kWh

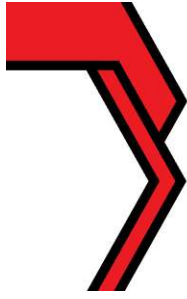
Diesel Generator Costs

1. Fuel Consumption:

- Daily: $100 \text{ kW} * 8 \text{ hours} = 800 \text{ kWh}$
- Weekly: $800 \text{ kWh} * 5 \text{ days} = 4000 \text{ kWh}$
- Annual: $4000 \text{ kWh} * 52 \text{ weeks} = 208,000 \text{ kWh}$
- Diesel Required: $208,000 \text{ kWh} * 0.4 \text{ gallons/kWh} = 83,200 \text{ gallons}$
- Annual Fuel Cost: $83,200 \text{ gallons} * \$3.50/\text{gallon} = \$291,200$

2. Oil and Filters:

- Oil Changes: Every 250 hours (assumed 1 oil change per month)
- Oil per Change: 5 gallons
- Annual Oil Consumption: $5 \text{ gallons} * 12 = 60 \text{ gallons}$
- Oil Cost: \$20/gallon
- Annual Oil Cost: $60 \text{ gallons} * \$20/\text{gallon} = \$1,200$



zz SMRT Ltd.

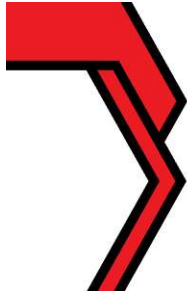
Consulting, the language of the practical.

Est. 2017

- Oil Filters: 1 filter/change
 - Annual Filters: 12 filters
 - Filter Cost: \$15/filter
 - Annual Filter Cost: 12 filters * \$15/filter = \$180
- 3. Other Consumables:**
- Estimated Annual Cost: \$500
- 4. Total Annual Cost (Diesel):** \$291,200 (fuel) + \$1,200 (oil) + \$180 (filters) + \$500 (other) = \$293,080
- 5. Weight of Consumables:**
- Diesel: 83,200 gallons * 7.1 lbs/gallon = 590,720 lbs
 - Oil: 60 gallons * 7.5 lbs/gallon = 450 lbs
 - Filters: 12 filters * 1 lb/filter = 12 lbs
 - Total Weight: 590,720 lbs + 450 lbs + 12 lbs = 591,182 lbs

Hydrogen Fuel Cell Costs

- 1. Fuel Consumption:**
- Daily: 100 kW * 8 hours = 800 kWh
 - Weekly: 800 kWh * 5 days = 4000 kWh
 - Annual: 4000 kWh * 52 weeks = 208,000 kWh
 - Hydrogen Required: 208,000 kWh * 0.1 kg/kWh = 20,800 kg
 - Annual Fuel Cost: 20,800 kg * \$10/kg = \$208,000
- 2. Other Consumables:**
- Estimated Annual Cost: \$500



zz SMRT Ltd.

Consulting, the language of the practical.

Est. 2017

3. **Total Annual Cost (Hydrogen):** \$208,000 (fuel) + \$500 (other) = \$208,500

4. **Weight of Consumables:**

- Hydrogen: 20,800 kg * 2.2 lbs/kg = 45,760 lbs
- Total Weight: 45,760 lbs

Summary

- **Total Annual Cost:**
 - **Diesel Generator:** \$293,080
 - **Hydrogen Fuel Cell:** \$208,500
 - **Annual Savings with Hydrogen:** \$293,080 - \$208,500 = \$84,580
- **Total Weight of Consumables:**
 - **Diesel Generator:** 591,182 lbs
 - **Hydrogen Fuel Cell:** 45,760 lbs
 - **Weight Reduction with Hydrogen:** 591,182 lbs - 45,760 lbs = 545,422 lbs

Conclusion

Using hydrogen fuel cells for power generation at work sites can result in significant cost savings of approximately \$84,580 annually and a reduction in the weight of consumables by about 545,422 lbs.