Detailed Analysis of Energy Cost by Source

Data from Published Sources including US Dept of Energy, International Energy Administration and Similar

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
Capital per Kw *using published data noted*	2,343	1,647	2,500	4,400	2,626	920	10,000
Average Capacity Factor (Acf) % time of full power	16%	30%	70%	70%	65%	50%	90%
Mid-Life Output (mlo) *assumes preventive O&M*	90%	95%	86%	100%	89%	93%	100%
Useful Life (years) *economic life*	25	20	40	100	40	50	75
O&M per Kw per year (at installations over 10 MW)	25	28.895	103.81	62.86	92	39.57	133.33
Fuel per KwHr *current prices but volatile*	0	0	0	0	0.025	0.03842	0.0049

These 6 data points above on each type of energy source provide all inputs required for analysis.

The sources for this data are noted in the document on this website titled "Sources for Energy Data".

Step A **Calculate Total Energy Produced by a 1 Kw power system over its useful life**

Energy = 1Kw * Useful Life (hours) * Acf * mlo

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
Lifetime output per Kw	31,733	49,932	210,941	613,200	202,706	203,670	591,300

Step B **Calculate the Quantity of 1Kw Units required to produce 876,0000 KwHr**

Quantity = 876000 ÷ Total Kw Lifetime Output

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
No. of 1-Kw systems for 876,000 KwHr	27.61	17.54	4.15	1.43	4.32	4.30	1.48

Calculations that equalize all power generation sources and normalize units.

1. Determine the Total Capital $ required to produce that energy
2. Determine to total $ for Operations & Maintenance to produce that energy
3. Determine the total $ for Fuel to produce that energy
4. Add the 3 values (Capital, O&M, and Fuel) to produce the total cost
5. Divide by 876000 (hours in 100 years) to determine the average cost per KwHr

1 Capital Required

Capital = capital per Kw * Quantity of Units

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
Capital for 876000 KwHr	64,679	28,895	10,382	6,286	11,348	3,957	14,815
Capital Amortization for 1.0000 KwHr	0.0738	0.0330	0.0119	0.0072	0.0130	0.0045	0.0169

2 O&M Required

(DOE data specifies O&M per Kw power per year)

O&M = O&M per Kw per year x Quantity of Systems x 100 years

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
O&M for 876,000 KwHr	69,013	50,693	43,110	8,980	39,758	17,019	19,753
O&M for 1.0000 KwHr	0.0788	0.0579	0.0492	0.0103	0.0454	0.0194	0.0225

3 Fuel Required

(DOE data specifies Fuel per KwHr)

Fuel = Fuel/KwHr * 876,000

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
Fuel for 876,000 KwHr	-	-	-	-	21,900	33,656	4,292
Fuel for 1.0000 KwHr	-	-	-	-	0.0250	0.0384	0.0049

4 Total Cost for 876,000 KwHr

Total Cost = Capital + O&M + Fuel

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
	133,692	79,588	53,493	15,266	73,006	54,632	38,860

5 Average Cost per Kilowatt Hour

Average Cost to Produce Each KwHr = Total Cost for 876,000 hours ÷ 876000

System	Solar	Wind	Geothermal	Hydro	Coal	Nat Gas	Nuclear
	0.1526	0.0909	0.0611	0.0174	0.0833	0.0624	0.0444

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