


Energy Technologies Comparison Table (2010)

 RENEWABLE & SUSTAINABLE ENERGY STUDIES	Non renewable			Renewable					
	Coal Pulverized coal without/with flue gas desulfurization	Nuclear	Gas Turbines Open cycle (OC)/ Combined cycle (CC)	Wind Grid connected with no storage	PV (c-Si) Grid connected with no storage	Parabolic Trough With various storage time	Central Receiver With various storage time	Biomass Forestry residue (FR)/ Municipal Solid Waste (MSW)	Hydro Typically used for energy storage, included for completeness only
Installation cost Rand per MW	R17m - R20m	R26m - R33m/MW	R4m (OC) R6m (CC)	R14m - R17m	R10m – R24m	R27.5m (0hr) R51m (9hr)	R27m (3hr) R40m (14hr)	R33m (FR) R67m (MSW)	R 1 m/MW excluding the dam
Power Reliability (Availability/Capacity factor)	92% (85%)	92 – 95% (High)	89% (10 - 50%) (Used for peak loads only)	94 - 97% (29-41%)	98% (11%-14%) (Depending on location)	95% (25 - 44%) (Depending on storage size)	92% (29 - 47%) (Depending on storage size)	90% (85%)	High (10 - 50%) (Used for peak loads only)
CO₂ emissions	930kg/MWh	Low	622kg/MWh (OC) 376kg/MWh (CC)	Low	Low	Low	Low	1287kg/MWh (FR) 1607kg/MWh (MSW)	Medium (dams release methane)
Water usage	33 - 230L/MWh	For cooling: 6000L/MWh Sea water	19.8L/MWh (OC) 12.8L/MWh (CC)	None	For washing mirrors & PV panels: 45000L/MW per year	245 - 270L/MWh	280 - 316L/MWh	200 - 210L/MWh	For storage, same water is pumped back to be reused during peak times.
Operating and maintenance costs Fixed (Variable)	R350 – R500/kW-yr (R36 – R44/MWh)	N/A (R95 - R125/MWh)	R70/kW-yr (OC) R148/kW-yr (CC) (Zero for both)	R266 - R312/kW-yr (N/A)	R402/kW-yr (N/A)	R424 - R635/kW-yr (N/A)	R490 – R700/kW-yr (N/A)	R972/kW-yr (R31/MWh)(FR) R2579/kW-yr (R38/MWh)(MSW)	N/A (R40 – R150/MWh)
Fuel cost estimates	R15/GJ	R6.25/GJ	R42/GJ (Depending on fuel prices!)					R19.5/GJ (FR) Zero (MSW)	Note that water needs to be pumped back up, therefore has some electricity costs.
Economic life	30 years	60 years	30 years	20 years	25 years	30 years	30 years	30 years	50 years
Period for installation in years	5 - 9 years	1 Unit – 6 years 6 Units – 16 years	2 - 3 years	2 - 6 years	1 - 2 years	4 years	4 years	4 years	Site dependent 3 - 6 years
Base load / Peak power	Base	Base	Peak	Intermittent	Intermittent	Intermittent	Intermittent	Base	Peak in SA

*All data (except Hydro) from EPRI Member Specific Final Report, July 2010 - Power Generation Technology Data for Integrated Resource Plan of South Africa

NOTE: These values are for comparative purposes only. Certain technologies might currently pose much more economical figures compared to these figures. Contact crses@sun.ac.za for further information.