

Energy Resources

Physics

The sources, their conversion efficiency and their limits.

Typical generation efficiencies.

Source	Efficiency	Note
Coal	~35–40%	Carnot-limited
Gas (CCGT)	~55–60%	Combined cycle
Nuclear	~33%	Lower steam temperature
Hydro	~90%	No thermal step
Wind	~35–45%	Betz limit is 59%
Solar PV	~15–22%	No thermal step

Hydro and wind avoid the Carnot limit entirely because they convert mechanical energy directly, without a heat engine.