Abstract: IEA Energy Report 2011 state that increased cost of accessing energy and the effects on economic growth (GDP) across regions is one of grave concern. The Cost implication of energy supply often shape regional energy policies across the Globe, this paper presents an empirical investigation into the relationship between energy generation and economic growth, while also investigating probable threats to sustainable energy supply across regions. Energy generation was found to have some implication for economic growth across regions. It was found that hydro electric, renewable energy and nuclear generation sources were significantly driving growth across regions while coal and gas sources were not. This was particularly true since the cost of fossils was having strong cost implications, for overall energy generation cost in countries in regions due to overdependence on fossils. Generating sources were also found to have strong implications for sustained energy supply (energy security), renewable energy and gas generating sources had the strongest effects on sustainable energy supply across regions, this was probably true since regions were focusing on new technologies in energy generation process, which are cheaper cleaner and more sustaining, while still depending on gas plants due to the relative cost implications of maintaining gas plants compared to hydro and nuclear generating plants. The method of estimation used in the study is the seemingly unrelated regression estimation method.