The state of knowledge and outstanding issues with respect to the global mean energy budget of planet Earth will be described, along with the ability to track changes over time. Best estimates of the main energy components involved in radiative transfer and energy flows through the climate system do not satisfy physical constraints for conservation of energy without adjustments. The main issues relate to the downwelling longwave radiation and the hydrological cycle, and thus the surface evaporative cooling. It is argued that the discrepancy is 18% of the surface latent energy flux, but only 4% of the downwelling LW flux, and most likely that the latter is seriously astray in some calculations, including many models. Good knowledge of the total solar irradiance and its changes over time are vital. Beginning in 2000, the top-of-atmosphere radiation measurements provide stable estimates of the net global radiative imbalance changes over a decade, but after 2004 there is “missing energy” as the observing system of the changes in ocean heat content, melting of land ice, and so on, is unable to account for where it has gone. Based upon a number of climate model experiments for the 21st century where there is a stasis in global surface temperature and upper ocean heat content in spite of decade long periods with a known net energy input into the climate system, we infer that the main sink of the missing energy is likely the deep ocean below 275 m depth.