RTL power macromodeling is a mature research topic with a variety of equation and table-based approaches. Despite its maturity, macromodeling is not yet widely accepted as an industrial de facto standard for power estimation at the RT level. Each approach has many variants depending upon the parameters chosen to capture power variation. Every macromodeling technique has some intrinsic limitation affecting either its performance or its accuracy. Therefore, alternative macromodeling methods can be envisaged as part of a power modeling toolkit from which the most suitable method for a given component should be automatically selected. Thispaper describes a new multi-model power estimation engine that selects the macromodeling technique leading to the least estimation error for a given system component depending on the properties of its input-vector stream. A proper selection function is built after component characterization and used during estimation. Experimental results show that our multi-model engine improves the robustness of power analysis with negligible usage overhead. Accuracy becomes 3 times better on average, as compared to conventional single-model estimators, while the overall maximum estimation error is divided by 8.