

2.2.2 Fuel changes in the reactor

It is appropriate to briefly review the changes in the fuel that occur during its life in the reactor core. In a typical 1000 *MW* light water reactor for power generation, the core contains 75,000 *kg* of low-enriched uranium usually in the form of UO_2 pellets (1000 *kg* of fuel typically generates about 45 *kWh* of electricity). During operation in a critical state, the ^{235}U fissions or splits producing heat in a chain reaction that also produces plutonium, other transuranic elements and fission products. The fission fragments and heavy elements increase in concentration so that, after 18-36 months, it becomes advantageous to replace the fuel rods. At this point the fuel still contains about 96% of the original uranium (the term *burnup* is used to refer to the 4% used) but the fissionable ^{235}U is now less than 1% compared with the initial, enriched 3.5 – 5%. About 3% of the used fuel is waste product and 1% is plutonium. It is worth noting that much greater burnup (up to 20%) can be achieved in a fast neutron reactor.