

2.2.1 Thorium fuel cycle

The other naturally abundant element that can be used in a nuclear reactor fuel cycle is thorium, *Th*, whose stable isotope and fertile material is ^{232}Th . Unlike natural uranium, natural thorium contains only trace amounts of fissile material such as ^{231}Th that are insufficient to initiate a chain reaction. In a thorium-fueled reactor ^{232}Th absorbs neutrons to produce ^{233}Th and eventually ^{233}U that either fissions in the reactor or is processed into new nuclear fuel. Advantages of the thorium fuel cycle include thorium's greater abundance, better physical properties and reduced plutonium production. Though thorium fuel features in a number of proposed future reactor designs (see section 4.9.1) and in the high-temperature gas-cooled reactor (HTGR) (see sections 2.11 and 4.6) thorium cycles are unlikely to significantly displace uranium in the nuclear power market in the near future (IAEA 2005). However, both China and India have plans for thorium cycle use in the future (Thorium Cycle Plans 2015).