

## 2.1 Nuclear power

Nuclear energy is released when atoms are either split into smaller atoms (a phenomenon known as fission) or combined to form a larger atom (a phenomenon known as fusion). This monograph will focus on the production of power by harnessing atomic fission since that is the principle process currently utilized in man-made reactors.

Most of the energy produced by nuclear fission appears as heat in the nuclear reactor core and this heat is transported away from the core by conventional methods, namely by means of a cooling liquid or gas. The rest of the power generation system is almost identical in type to the way in which heat is utilized in any other generating station whether powered by coal, oil, gas or sunlight. Often the heat is used to produce steam that is then fed to a steam turbine that drives electric generators. In some plants hot gas rather than steam is used to drive the turbines. In the case of steam generating nuclear power plants the part of the plant that consists of the reactor and the primary or first-stage cooling systems (pumps, heat exchangers, etc.) is known as the *nuclear steam supply system* and the rest, the conventional use of the steam, is called the *balance of plant*. This monograph will not deal with this conventional power generation technology but will focus on the nuclear reactor, its production of heat and the primary coolant loop that cools the reactor core.