CHAPTER 3
ISSUES: FOSSIL FUEL USE AND MINING

Industrialized societies need uninterrupted supply of energy from different sources. The consumption of energy per capita is on the rise, compelling us to look for more and more energy alternatives. Broadly we can categorize these alternatives as renewable and non-renewable ones. Logically, we should use renewable sources of energy as far as possible for our needs; however, the available technologies are not viable for a large scale use of these sources. Dependence on non-renewable energy sources has created a scenario; wherein on one hand we are faced with the acute shortage of these resources and on other hand environmental degradation is caused from local to global scales due to emissions of green house gasses, changes in the landscapes, deterioration in soil and water resources and serious depletion in the forest covers, etc.

3.1 Consumption profile of different energy resources

There is a steady shift in the energy consumption pattern from wood to other available, so called "cleaner fuels" such as coal, petrol, etc. since industrial revolution onwards (Figure. 3.1). There are different energy sources in use; however, there is a strong dependence on the hydrocarbon fuels to meet the energy requirements. This source of energy, i.e., hydrocarbon is over stressed, the known reserves are depleting fast and promise for new discoveries is bleak. Such a scenario in the energy sector is compelling us to look for new alternatives and also incorporate less preferred sources more and more. Other important factor is per capita consumption of fuels, due increase in the energy consumption levels, energy crisis appears to be more serious issue globally. The present day share of energy consumption from different sources is shown in figure 3.2.

3.2 Importance of coal and lignite as energy sources

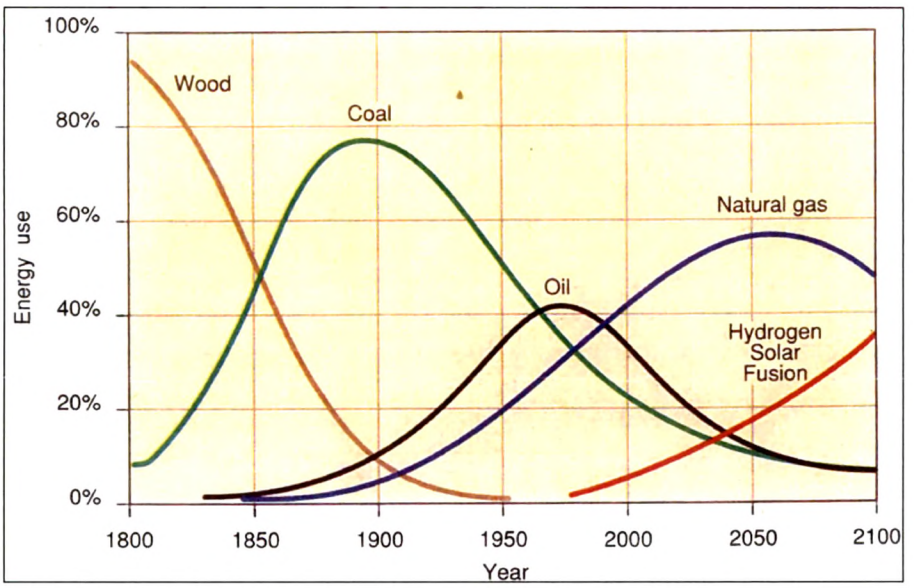

Figure 3.1: The history of energy sources for humans is marked by changes from wood, to coal, to oil; further sources may be natural gas, hydrogen, solar and fusion. (Source: Dorothy *et. al.*, 1997)

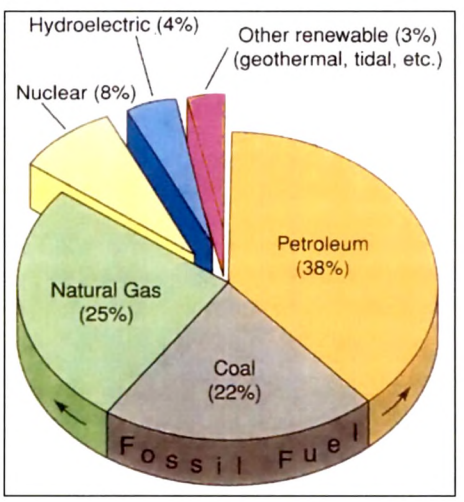

Figure 3.2: The energy consumed is provided from a variety of resources. (Source: Dorothy *et. al.*, 1997)

It is obvious inference from, figure 3.1 that the hydrocarbon availability is on decline and there will be a matching and increased dependence on the consumption of coal and lignite as a substitute for the hydrocarbons, resulting in the increased production of coal

and lignite in the future. Hence it is important to study environmental issues linked with the coal and lignite mining.

3.2.1 Nature of mining

Coal deposits in India belong to Gondwana Super group rocks of Carboniferous age and are mined by under ground mining methods because of the huge thickness of the over burden. This mining method is comparatively more hazardous than open cast mining. The associated hazards are: under ground fire, gas leakage, subsidence, water inundation, etc.

The lignite occurrences in India and Gujarat are of Tertiary age and are mined by open cast mining methods; opencast mining is considered to be a safer mining operation for the personnel working at the mine site. Associated hazards are ground slope instability, changes in local landscape, accumulation of acidic water, depletion in local water resources, forest cover reduction, etc.

3.2.2 Issues related to mining and use of lignite

The burning of coal and lignite has increased the atmospheric CO_2 and SO_2 levels globally. These gases are considered as one of the major causes of the global warming as well as acid rain phenomenon (Dorothy *et. al.*, 1997). Figure 3.3, shows the global SO_2 emission from industrialized era onwards.

The lignite and coal ash produced from the thermal power plants is a potential hazard in terms of heavy metal contamination in the region affected by the fly ash. The increased level of Se, Hg and As in particular (Dorothy et. al., 1997) is a more serious pollution causing health problem to the plants, animals and human beings.

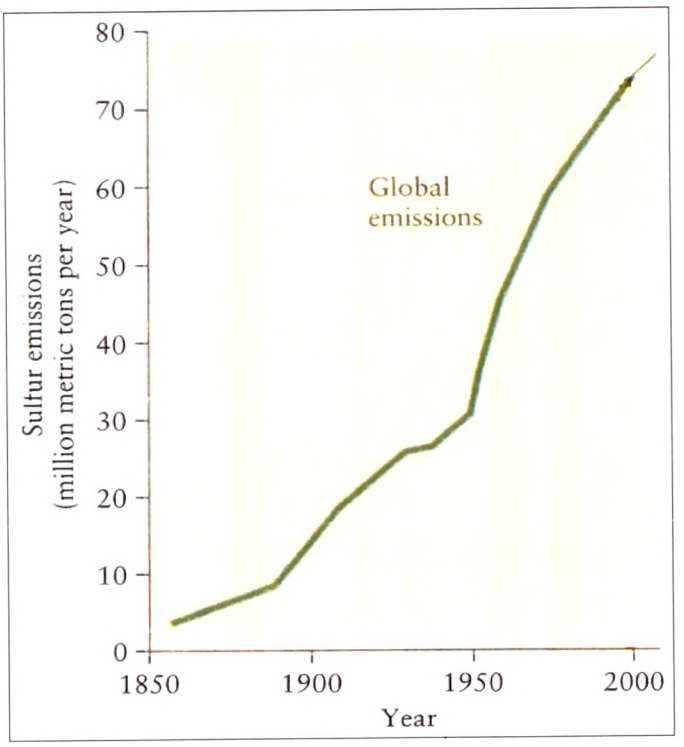

Figure 3.3: Emission of SO_2 at global level (Dorothy *et. al.*, 1997)

The nature of environmental issues range from landscape changes to water regime degradation, toxicity increase due to the release of heavy metals, acid mine water around the mine, increase in the green house gases due to use of lignite as a fuel, to some extent air quality in term of SPM and noise levels due to mining are also to be studied for the environmental impact assessment and management studies.