

tions, the Committee recommends that development of the wood densification industry should be encouraged in Canada. This means that increased emphasis in R&D should be placed on improving combustion technologies for densified biomass fuels and on developing end uses and markets for the densified biomass product.

Some environmentalists are expressing concern about the growing popularity of residential, as opposed to industrial, wood burning. Carbon monoxide, particulate matter and polycyclic organic matter (POM) are all emitted from wood stoves and fireplaces, and a draft paper prepared by Battelle for the Environmental Protection Agency in the United States concerning industrial and commercial wood combustion, stated that

...low-temperature wood-burning units tend to produce more undesirable atmospheric emissions than do the larger units which operate at higher temperatures and with greater turbulence ... it may be that the small residential wood-burning units are capable of producing larger quantities of POM emissions than the commercial/industrial-size wood-burning boilers... (Budiansky, 1980, p. 770)

Thus there is a danger that increased residential use of firewood may have detrimental effects on the environment. The POM emitted by wood stoves and fireplaces contains benzo [a] pyrene and other known or suspected carcinogens and may represent a significant health hazard and cancer risk in certain locations.

Wood is now recognized as a serious source of air pollution. Vail, Colorado, and many communities in New Hampshire and Vermont (particularly in valleys susceptible to particulate haze) have already been forced into coming to grips with the smoke and haze resulting from the residential wood-stove boom. (Budiansky, 1980, p. 769)

## CONCLUSION

The Committee sees increased use of firewood for home heating as a means of substituting a renewable energy source for oil and as a good way of making people aware of how they use energy in their lives. This may help Canadians develop a personal feeling for the importance of conservation. Nonetheless, the Committee is concerned about the increased use of firewood in homes, particularly in urban areas.

## RECOMMENDATION

The Committee recommends that a study of how the increasing combustion of wood in urban areas will affect air quality should begin

immediately. Such a study should be completed before expanded use of firewood is recommended for urban centres.

## RECOMMENDATION

Fire safety regulations should be reviewed and strengthened so that the installation and use of wood stoves and fireplaces does not lead to a tragic increase in the incidence of fires in homes using fuel wood.

### B. GASIFICATION

When wood is exposed to heat it first begins to lose moisture then decomposes (pyrolyzes) into a variety of compounds depending upon temperature, the rate of heating and the presence or absence of oxygen. The wood itself does not burn, rather it is the products of pyrolysis which do. In the presence of ample supplies of oxygen, these products combust completely to form predominantly carbon dioxide (CO<sub>2</sub>), water and ash. In the absence of oxygen, the main gaseous pyrolysis products are carbon monoxide (CO), hydrogen (H<sub>2</sub>) and some CO<sub>2</sub>, collectively known as synthesis gas.

Gasification of wood under pyrolytic conditions is a highly useful process because it converts a bulky and difficult to handle raw material into a flexible fuel. The synthesis gas produced can be piped easily; it can be used to fire fossil-fueled systems; or it can be combusted to generate electricity. In addition, the chemical composition of this gas can be adjusted by adding hydrogen to give the proper ratio of carbon to hydrogen to allow efficient synthesis of methanol.

## RECOMMENDATION

The Committee believes that the technology of biomass gasification should be funded on a priority basis in biomass R&D. It has the potential of allowing greater use of wood (and other biomass feedstocks) to fire systems which traditionally have used fossil fuels. It is perhaps the last part of the technology of methanol synthesis from biomass which must be improved upon to assure commercialization of this alcohol fuel option.

### 4. PEAT

#### A. THE NATURE OF PEAT

Peat is partially decomposed organic matter which is made up principally of decayed *Sphagnum* moss,