GLOBAL METHANE EMISSIONS
FROM THE WORLD COAL INDUSTRY

by

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ABSTRACT

The Coal Industry Advisory Board (CIAB) of the International Energy Agency (IEA) estimated the total methane emissions from worldwide mining, treatment and storage of coal to be approximately 25 million tonnes/year for 1990. Slightly more than one million tonnes of methane are utilized by the industry. Thus, the net annual discharge to the atmosphere is 24 million tonnes. Methane emissions data were available for the U.S., the U.K., former U.S.S.R., Australia, China, Germany, Poland and Czechoslovakia. Methane emissions for India and S. Africa were estimated from a linear correlation between the average depth of mining and specific methane emissions derived from the available data for the eight countries. These ten largest coal producing countries represented nearly 90% of world coal production in 1990. Total methane emissions for the world coal industry were calculated by prorating the methane emissions from these ten countries in proportion to coal production.

The reported values represent the best international data available at present. The net total emissions of 24 million tonnes/year are substantially less than some previously reported indirect estimations and constitute only 4 to 6% of the global methane emissions.

INTRODUCTION

Coal is our most abundant and the cheapest fossil fuel resource. Over the past two centuries, it has played a vital role in the stability and growth of the world economy. Total proven reserves of coal exceed 1 Tt and indicated reserves are estimated at 24 Tt (1). At the current world production rate of 5 Gt/year, at least two centuries worth of coal is yet to be mined. One of the greenhouse gases, methane, is a necessary byproduct of coal mining because it is syngentic in origin with coal.

At its October, 1991 Board meeting, the Coal Industry Advisory Board (CIAB) of the International Energy Agency (IEA) requested that the
Global Climate Committee (GCC) develop an estimate of global methane emissions from the coal industry. This report endeavors to develop such an estimate based on mine-by-mine estimates for the ten largest coal producing countries, which represented nearly 90% of world coal production in 1990. Eight of these countries (the U.S., the U.K., Australia, the former U.S.S.R., Germany, Poland, China and Czechoslovakia) provide reasonably good estimates of methane emissions from their coal mines. Reliable methane emissions data for India and South Africa, are not available at this time. Therefore, it was necessary to develop an estimate for these two countries based on the limited information that is available. (See Methodology section.)

Methane emissions from coal in the ten largest coal producing countries totaled approximately 22 million tonnes\(^*\) in 1990 (Table 1), the latest year for which information is available. Total methane emissions from the world coal industry are estimated to be approximately 25 million tonnes/yr. Slightly more than one million tonnes of methane are utilized by industry. Thus, the net annual discharge to the atmosphere is about 24 million tonnes.

Virtually all (95%) methane emissions from coal are produced by underground mines, even though deep mines represent only 54% of world coal production. The relatively low methane emissions from surface production are due to the shallow depths of surface minable reserves which are inherently low in methane content. Additionally, much of the world’s surface mined coals are low in rank, namely lignite, sub-bituminous and low rank bituminous coal, which do not contain much gas.

Figure 1 illustrates the relationship of gas content to coal reservoir pressure for various U.S. coal seams. The coal reservoir pressure generally increases with the depth of the coal seam; however, this relationship may vary significantly from one region to another. The mining process creates entries in mines that are nearly at atmospheric pressure and also breaks down coal into small pieces releasing methane

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* One million tonnes of methane at 15°C and an atmospheric pressure of 760 mm of Mercury = 1471 million cubic meters

** 1990 coal production data with underground and surface production breakdowns were provided by the National Coal Association, U.S.A.