

limited extent, and are only of local value where timber cannot be procured. They have proved of very great service to the diggers, inasmuch as the interior of Otago would be almost uninhabitable if such fuel did not exist. The brown coals occur at the base of a great marine formation underlying limestone, clays, and sandstones, which have a thickness of many hundred feet. These coals vary in quality from bituminous coals of the highest value to those of very inferior quality. In valuing these coals, I am in the habit of considering them according to the quantity of constitutional water which they contain, which is a very fair indication of their value as a fuel—those coals which have least water in their composition burning more freely and giving out more heat than those which have water combined with them. The two classes of coals thus distinguished are termed anhydrous and hydrous. The anhydrous coals in New Zealand are equal, and in many cases, in my opinion, superior as fuel to most of the samples of coal obtained from Australia, or even from many parts of England.

31. Are they in equally compact form?—Their specific gravity is not so high, but that is on account of their containing less ash or incombustible matter. This causes them to be somewhat friable; but in other respects they are equally compact. In the case of the Grey River coal, and several others, 95 per cent. of the whole coal is combustible, which is a very high proportion for a bituminous coal. The common brown or hydrous coals are found throughout the Islands, almost wherever the horizontal marine formations already alluded to are in contact with the older rocks. The anhydrous coal is more limited in its distribution, and in many cases has been undoubtedly produced by local modification of hydrous seams owing to the disturbance of the strata. In the North Island, the only coals which come under the class of anhydrous, are the Kawakawa coals, near the Bay of Islands. The thickness of the seam at Kawakawa is about thirteen feet. I have never been able to satisfy myself of the existence of more than one seam.

32. What is the quality of this particular coal at the Bay of Islands?—It has intense heating properties but has a good deal of dirt, containing sulphur irregularly dispersed through it, so that a good deal of trouble has to be expended in getting the coal clean. Where this has been done, it has invariably given satisfaction as a steam generator. When not carefully screened, it acts injuriously on furnace bars.

33. Would not this disadvantage to a great extent disappear as the mine becomes developed?—Probably it would. I do not think the workings are yet below the level of the lowest outcrop.

34. Is it coal calculated to compete with the Newcastle coal?—Certainly, for local consumption. It is largely used for driving machinery on the Thames Gold Field; but the quality is too variable, as at present extracted at least, for the use of ocean-going steamers, as they could not run the risk of having their furnace-bars injured. At Whangarei the same coal has been worked to a very considerable extent; but the operations have been suspended, the quality and thickness of the seam being inferior to that at the Bay of Islands, and the expense of obtaining the coal considerably greater.

35. What cause, in your opinion, has prevented the full development of the Kawakawa Coal Mine?—The want of sufficient capital at first retarded the proper development of the mine. Now it is being worked more energetically, but whether profitably or not I cannot say.

36. Are the arrangements for shipping coal from that mine complete?—I understand they are being now completed. Hitherto the coal has required to be handled three times in being placed on board vessels, which greatly increases the cost of its production. When the contemplated arrangements are completed, there will only be one handling of the coals. There are very important and extensive deposits of brown coal, which may be considered as intermediate between the hydrous and anhydrous, in the Waikato Basin. These deposits have a most important influence in assisting the steamboat navigation of the Waikato River, and its various branches; and there is no doubt they would be largely used in Auckland, were the land transport between the Waikato and that city provided for.

37. *Hon. Dr. Renwick.*] Are the Waikato coals free from sulphur?—Yes, they are remarkably free from sulphur, but are not adapted to ocean-going steamers, their bulk being too great in proportion to their heating qualities. Many years ago I suggested a plan how this defect might be overcome, and a valuable artificial fuel manufactured from coals of this description, by depriving them of their moisture, and supplying its place with a small percentage of bitumen; but it has never been practically tried as yet. Towards the East Cape, although the country has not yet been examined, there is reason to believe that coal seams of considerable value exist. Between the Mokau River on the West Coast, and the sources of the Whanganui River, coal seams are also known to exist, but their exact nature is not yet ascertained. The chief deposits of anhydrous coal in New Zealand are on the west coast of the Middle Island. I produce a map showing the area occupied by these coal-bearing deposits, and indicating where seams have actually been discovered. As a rule these coal seams occur in rugged country, and in rather inaccessible positions; but by the proper use of inclined tramways, —and in many cases, probably, wire tramways—many of them might be profitably worked. At the present time the coal is only being worked from two places, namely, on the Grey River, where the seam is over eighteen feet in thickness, and is remarkably pure and free from irregularities either in structure or quality. The roof is generally hard and sound, and the mining operations are of the simplest character. Hitherto the mine has been worked above the water level, so that there is no expense incurred for pumping or hauling. I estimate the quantity of coal ascertained to exist in the one mine already open as several millions of tons. The coal dips to the west. The formation continues to the north for seven or eight miles, and rises to a considerable altitude in the mountains to the eastward. Immediately to the north, in the extension of the present mine, faulted ground has been reached; but whether it cuts off the coal or not is not yet determined. I do not think, however, that a seam of such thickness and steadiness of quality will run out in such a short space. Further to the north small irregular seams have been discovered, the thickness being four feet. In the south, within the Province of Canterbury, the coal formation is chiefly below the water level, and the coal seams which exist have not been properly followed.

38. *The Chairman.*] Is the Grey River coal equal in quality to the Newcastle coal?—I consider it superior, because every part of it may be rendered available, the smallest slack forming, without any difficulty, coke of the highest quality—better coke than you could get in any part of the world.

39. To what cause do you attribute our failure to drive the Newcastle coal out of the market?—