

## The Waste of Our Fuel Resources

Remarks presented by I.C. White, State Geologist of West Virginia

To the Conference of the Governors of the United States

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Mr. President, Governors, and Gentlemen:

A great geologist once said, "The nations that have coal and iron will rule the world." Bountiful nature has dowered the American People with a heritage of both coal and iron richer by far than that of any other political division of the earth.

It was formerly supposed that China would prove the great storehouse from which the other nations could draw their supplies of carbon when their own had become exhausted, but the recent studies of a brilliant American geologist in that far-off land, rendered possible by the generosity of the world's greatest philanthropist, tell a different story. The fuel resources of China, great as they undoubtedly are, have been largely overestimated, and Mr. Willis reports that they will practically all be required by China herself, and that the other nations cannot look to her for this all important element in modern industrial life.

A simple glance at a geological map of the United States will convince anyone that nature has been most lavish to us in fuel resources, for we find a series of great coal deposits extending in well scattered fields almost from the Atlantic to the Pacific and from the Lakes to the Gulf, while even over much of New England and the coastal plains vast areas of peat, the primal phase of coal, have been distributed. But coal of every variety from peat to anthracite is not all of nature's fuel gifts to fortunate America: great deposits of both petroleum and natural gas occur in nearly every State where coal exists and in some that have no coal. What greater dowry of fuels could we ask when we find them stored for us within the bosom of our mother earth and all three of the great types, coal, petroleum and natural gas, only awaiting the tap of the pick and drill to bring them forth in prodigal abundance?

What account can we have as a nation give of our stewardship of such a vast fuel treasures? Have we carefully conserved them, using only what was necessary in our domestic and industrial life, and transmitted the remainder like prudent husbandmen, unimpaired to succeeding generations? Or have we greatly depleted this priceless heritage of power, and comfort, and source of worldwide influence, by criminal waste and wanton destruction? The answer should bring a blush of shame to every patriotic American; for not content with destroying our magnificent forests, the only fuel and supply of carbon known to our forefathers, we are with ruthless hands and regardless of the future applying both torch and bomb to the vastly greater resources of this precious carbon which provident Nature had stored for our use in the buried forest of the distant past. The wildest anarchist determined to destroy and overturn the foundations of government could not act in a more irrational and thoughtless manner than have our people in permitting such fearful destruction of the various sources of our power and greatness. Let me enumerate some of the details of this awful waste of our fuel resources that has been going on with ever increasing speed for the 40 years last past.

First let us consider how we have wasted Natural Gas – the purest form of fuel, ideal in every respect, self-transporting, only awaiting the turning of the key to deliver to our homes and factories heat and light and power. Partial Nature has apparently denied this great boon to many other lands. It is practically unknown in France, Germany, and Great Britain, our chief competitors in the world of industry. Even wood and coal must first be converted into gas before they will burn, but here is the fuel of which nature has given us a practical monopoly, lavish in abundance, already transmuted into the gaseous stage and stored under vast pressure to be released in our bidding when and where we will. The record of waste of this best and purest fuel is a national disgrace.

At this very minute our unrivaled fuel is passing into the air from uncontrolled gas wells, from oil wells, from giant flambeaus, from leaking pipe-lines, and the many other methods of waste at the rate of not less than 1,000,000,000 cubic feet daily and probably much more.

Very few appear to realize either the great importance of this hydrocarbon fuel resource of our country, or its vast original quantity. Some of the individual wells, if we may credit the measurements, have produced this fuel at the rate of 70,000,000 cubic feet daily, the equivalent in heating value of 70,000 bushels of coal, or nearly 12,000 barrels of oil. In my humble opinion the original amount of this volatile fuel in the United States, permeating as it does every undisturbed geologic formation from the oldest to the most recent, rivaled or even exceeded in heating value all of our wondrous stores of coal.

Suppose that it were possible for some Nero, inspired by a mania of incendiarism, to apply a consuming torch to every bed of coal that crops to the surface from the Atlantic to the Pacific, and that the entire coal supply of the Union was threatened with destruction with a very few years, what do you think would happen? Would our State Legislatures sit undisturbed, panoplied by such a carnival of fire? Would the governors of 30 States remain silent while the demon of flame was ravaging the coal resources of the Republic? Certainly not; there would be a united effort by the Governors and Legislatures of all the States in the Union to stay the progress of such a direful conflagration; even the sacred barriers wisely erected between State and Federal authority in the Constitution would melt away in the presence of such awful calamity and the mighty arm of the Nation would be invoked to help end the common peril to every interest. And yet this imaginary case is an *actual one* with the best and purest fuel of the country, equal probably in quantity and value for heat, light, and power to all of our coal resources. This blazing zone of destruction extends in a broad band from the Lakes to the Gulf and westward to the Pacific, embracing in its flaming pathway the most precious fuel resources of the continent. No one can even approximate the extent of this waste. From personal knowledge of conditions which exist in every oil and gas field, I am sure the quantity will amount to not less than 1,000,000,000 cubic feet daily, and it may be much more. The heating value of a billion cubic feet of natural gas is roughly equivalent to that of 1,000,000 bushels of coal. What an appalling record to transmit to posterity!

From one well in Eastern Kentucky there poured a stream of gas for a period of 20 years, without any attempt to shut it in or utilize it, which was worth at current prices more than \$3,000,000. Practically the same conditions characterized the first 25 years of Pennsylvania's oil and gas history, and the quantity of wasted gas from thousands of oil and gas wells in western Pennsylvania is beyond computation. In my own state of West Virginia, only eight years ago, not less than 500,000,000 cubic feet of this precious gas was daily escaping into the air from two counties alone, practically all of which was easily preventable but by a moderate expenditure for additional casing. When it is remembered that 1,000 cubic feet of

natural gas weighs 48 pounds, and that 6,000 cubic feet of it would yield a 42-gallon barrel of oil when condensed, so that a well flowing 6,000,000 feet of gas is pouring into the air daily the equivalent of 1,000 barrels of oil, what would our petroleum kings think if they could see this river of oil (for the equivalent of 1,000,000,000 feet of gas is more than 160,000 barrels of petroleum, and of practically the same chemical composition as benzine or gasoline) rushing unhindered to the sea? Would they not spend millions to check such a frightful waste of this golden fluid? And would they not be the first to appeal to the National Government for aid in ending such stupendous destruction of property? And yet because natural gas is invisible, and its waste is not so apparent to the eye as a stream of oil or burning coal mine, the agents of these oil magnates have not only permitted this destruction of the Nation's fuel resources to continue, but even have prevented by every means in their power the enactment of legislation to stop this frightful loss of the best and purest fuel that Nature has given to Man.

There can be no doubt that for every barrel of oil taken from the earth there have been wasted more than 10 times its equivalent in heating power, or weight even, of this best of all fuels; and much more than half of this frightful waste could have been avoided by proper care and slight additional expenditures in oil production.

In justice to the great oil-producing corporations it must be acknowledged that they have not permitted much waste of petroleum except what has been sprayed into the air by their awful waste of gas, and also that their handling of petroleum has been from the beginning, a model of business economy and management. The great mistake of the oil-producing interests has been in not properly apprehending the enormous fuel value of the natural gas they were destroying, and in not demanding legislation for its protection instead of successfully throttling and preventing it in every state of the Union except one — Indiana. When the people of that rare state awoke to the fact that the richest mineral possession was being rapidly wasted, they rose to the occasion, and although it was largely a case of "Locking the stable door after the horse was stolen," they effectually prevented any further useless waste of natural gas. This Indiana statute, which has been declared constitutional by our highest courts, says in effect to the oil producers, "You can not take the oil from the ground, where Nature has safely stored it, until you provide a method of utilizing the accompanying gas or volatile oil as well;" and it also says to both the producer and consumer of natural gas, that it is against "Public policy to waste this valuable fuel, and that it will not be permitted to either party." This Indiana statute for the conservation of petroleum and natural gas should be enacted in into law in every State where these precious fuels exist. Why has it not been done? Let the answer be found in the history of my own state, where the waste of natural gas has been exceeded only by that of our sister State of Pennsylvania.

For ten years your speaker has appealed in his official capacity as State Geologist to the Legislature of West Virginia to put some check on this frightful waste of our State's most valuable resource. Three patriotic governors, including our present able Executive, Governor Dawson, have in every biennial message besought the Legislative branch to end this criminal destruction by appropriate legislation; but some unseen power greater than Governor or Legislature has so far thwarted and palsied every effort to save to the State and the Nation this priceless heritage of fuel, so that although five successive Legislatures have attempted to deal with the question in biennial sessions, not an effective line has yet been added to the statutes — and at this very hour not less than 250,000,000 cubic feet of gas, and possibly more than double that quantity, is daily being wasted in this one State alone, 80 per cent of which is easily and cheaply present preventable.

Why should a few oil producers in their insane haste to get rich quickly, or add to fortunes already swollen beyond safety to the Republic, be permitted thus to despoil the entire country of the choicest fuel?

But surely if men have thus permitted the loss of our gaseous fuels, often because they could neither see the substance itself nor realize the extent of what they were doing, certainly they would not be so wasteful of the solid fuels, the coal beds, something they can readily perceive and handle and weigh? The record here is also want to make every citizen of our Nation feel distressed and humiliated, for of the total quantity of coal we have produced since mining for commercial purposes began, amounting to above 5,000,000,000 billion tons, at least an equal amount and possibly more has been left in abandoned mines and irretrievably lost. You who are unacquainted with the details of mining operations and of the structure of coal beds will doubtless wonder how such a vast loss of fuel could take place. There are many causes for this enormous waste in the extraction of coal. Let me enumerate a few of them:

First: the individual coal bed is not all pure coal and this is especially true if it be very thick. Some of it consists of layers of sulphurous or bony coal, rich in carbon, but containing more ash, sulphur, or earthy material than first-class coal should hold; and the purchaser refuses his patronage to the party who sends him coal high in ash. There being no market for such coal, the operator leaves it unmined if it be in either the roof or the bottom of his coal bed; and if it be interstratified with the pure coal, as frequently happens, he simply throws it along with the other mine refuse into the gob-heaps within the mine, or piles it in the hillocks of culm containing shale clay and other waste material at the entrance. The quantity of this impure coal varies from 10% to 50% in nearly every coal bed, and it would probably average 25% in all the mines of the country. This material is rich in carbon, both fixed and volatile, and when utilized through the agency of producer gas and the gas-engine will yield much more power than the same weight of the best Cardiff or Pocahontas coal when the steam-engine is the agency of conversion. Why should our great manufacturing industries permit one-fourth of our entire coal resources to be thus wasted and permanently lost when the researchers of the Technical Branch of the United States Geological Survey have fully demonstrated the practicability of converting these impure coals into great sources of power? If in all new installations provision were made for the use of gas-engines a large portion of these impure coals could be utilized, and our purer types of fuel could be preserved for other purposes.

Second: In the mining of coal, it is necessary to support the overlying strata over large areas of the mine in order that the coal may be even partially taken out; and hence it is the common mining practice temporarily to utilize about 50% of the solid coal itself in the shape of supporting pillars for the protection of roadways, air courses, working rooms, etc. On account of accidents, like falling roof rock, "squeezes", "creeps," "crushes," mistakes in mine engineering, bad roof, and other causes, many of these huge pillars are frequently submerged and surrounded with broken rock material, and thus another large proportion of every coalbed and (varying from 10 to 50%) is utterly lost; so that approximately 25% more of the Nation's coal resources is wasted from these largely preventable causes.

With 50% of our coal left in the abandoned mines from which it can never be recovered except at enormous expense, one would think that the end had come to wanton destruction of our coal resources, but not so; third means, and one of unknown extent, has yet to be considered: Some of the

impure layers of coal may have a still larger percentage of earthy matter, and then they become partings of shale, the fossil muds and soils borne into and spread over the ancient peat-bogs by the draining streams of geologic time. These partings vary in thickness from a few inches to several feet. When thin, not exceeding 6 to 12 inches, the usual mining practice is to take them out and secure the coal; but where they attain a thickness of 18 to 24 inches, their removal entails too much expense for the production of bituminous coal under present commercial conditions, and hence the parting is not removed, and the underlying or overlying coal (as the case may be), is left in the mine usually in such a condition as to be practically irrecoverable. These parting shales often occur near the middle of the coal seam, and thus one-half of the bed will remain buried in mine rubbish with no possibility of ever securing its precious fuel. Very much akin to this is another kind of waste, of which we as yet cannot even approximate to the extent. It is well known that in very rich coalfields several (3 to 10) beds of coal may overlie each other in the same mountain, separated by from 5 to 200 feet of rock material. It often happens that the thickest and best of the beds may underlie all the others, and hence will be the first one mined, regardless of the fact that when the overlying strata breaks down, some and possibly several of the higher coal beds being so dislocated and disturbed and their areas so permeated with deadly gases from the abandoned mines below that much of this higher coal will be lost — just how much no one yet knows, though the fuel waste from this source must be large. Of course nearly all of this loss could be prevented by mining the higher beds first. Another deadly peril to deep coal mining is an incident of oil and gas production. Thousands of holes have been drilled through the coal measures to reach the productive oil and gas zones below. Many of them have found only natural gas, and unless the well was very large or profitable market near at hand, the casing has been drawn in the well abandoned. It is greatly feared that in such cases, another great menace will be added to the coal mining industry, since these abandoned oil and gas wells which penetrate the coal measures are numbered by the thousand, and no accurate public charts of the same ever been kept.

The same story of waste of fuel comes from every mining center. The experts of the United States Geological Survey report the quantity of fuel left unmined in the ground all the way from 40% to 70% of the total deposits. I shall not worry you with details from all over the country, but shall illustrate the rapid exhaustion of our fields by special reference to one great district, which many of you are personally familiar.

The mining of bituminous coal and the manufacturing industries dependent thereon originated in Pittsburg only about a century ago, and her citizens as well as all others may learn a useful lesson by recalling the history of this beginning. The earliest settlers found there cropping high in the steep hills which border the Monongahela river a thick bed of splendid coal. As roadways could not be constructed to the inaccessible cliffs where the coal was first discovered, some other method of securing it was necessary. At that time the buffalo roamed the vast plains of the middle West in countless millions, and these animals were so abundant even in the Pittsburg region that their skins were used for conveying the coal from the mines to the factories in the valley below, a few bushels of coal being sewed up in each hide and hold down the steep slopes. To our forefathers the supply of Buffalo appeared "inexhaustible", and yet less than a century of wanton slaughter has practically exterminated this noble animal. This passing of the buffalo illustrates in a striking way what will just as surely happen to vast areas are fuel resources, great as they are, even within the limits of the present century — unless our people awake to what they are doing and make a determined effort to instruct stop their destruction. The people generally have been so often told of their "inexhaustible" supplies of fuel that its waste has

not impressed them as a problem worthy of serious thought. They have generally believed that exhaustion was so remote that even its consideration concerned the present only in an academic way. Let us see about that. We shall take for our illustration the Appalachian coal field, which is conceded by all to be the richest in fuel of any on the continent. It is also the most important to the welfare of the country, since it is nearest the seaboard, and since it contains the vast both of our good coking coals upon which our pre-eminence in the iron and steel industry depends. With the exception of a few narrow strips close to regions of rock disturbance or folding in our western country, no first class coking coals have yet been discovered in the United States outside of this Appalachian basin.

It has long been recognized by all that the Pittsburgh district is located in the heart of the Appalachian field where fuel of every description is most abundant, and most accessible. You will pardon a personal reminiscence which illustrates how an eminent political economist regarded this favored region: It was my good fortune to accompany the lamented Blaine up the beautiful Monongahela river the last time that he visited his boyhood home, some twenty-odd years ago. He had acquired 1100 acres of Pittsburg coal lands in the vicinity of Elizabeth, about 22 miles above Pittsburg; and the party stopped there for a few hours to permit Mr. Blaine to examine his property — which he termed his “savings bank,” since he had acquired it by the occasional purchase of small farms during a period of several years. Being curious to know why he had made an investment of this kind so far removed from his home in Maine, I asked him how it happened. His reply impressed me deeply, because it contained a prophecy. He said that cheap fuel was the most important element in the life of a Nation, and that in looking the country over he had concluded that there was more of it easily accessible to the Pittsburg region than in any other portion of the country, so that the Pittsburg district would sometime become the manufacturing center of the world and that the investments in its coal fields could not fail to prove remunerative. The prophecy of that far-seeing statesman was fulfilled much sooner than he expected, since Pittsburg has certainly held first place among the work-shops of the world for the last decade. It is not generally known that the tonnage originating in the Pittsburg district and passing through it now exceeds that of the four greatest seaport cities of the world — London, New York, Liverpool, and Hamburg — combined; so that not only Pennsylvania but every State in the Nation is interested in perpetuating this empire of industry which our wonderful natural resources and the genius of the American people have conquered. How long can we hope to maintain this industrial supremacy in the iron and steel business of the world? Just so long as the Appalachian coal-field shall continue to furnish cheap fuel; and no longer. If the wasteful methods of the past are to continue; if the flames of 35,000 coke ovens are to continue to make the sky lurid within sight of the city of Pittsburg, consuming with frightful speed a third of the power and half of the values locked up in her priceless supplies of coking coal, the present century will see the termination of this supremacy. Many of you may not credit this statement, so let us do some figuring as an aid in forecasting the future. All will admit that no portion of the Appalachian field is richer in fuel resources than the Pittsburg district, and if we can estimate approximately how long its fuel will last, we shall have engaged in a rough way the productive life of the Appalachian field.

The Pittsburg Coal Company owned on January 1st, 1908 (according to its recent annual report), 143,000 acres of the Pittsburgh coal-bed, or practically one-seventh of the entire acreage of this famous seam remaining yet unmined in Pennsylvania. During the year it exhausted 2,241 acres, obtaining therefrom for all purposes 18,000,000 tons of coal, or an average of 8,000 tons to the acre, leaving in the ground about 5,000 tons per acre of waste and unmined fuel. Hence this average of 8,000 tons may

be taken as a measure of the total amount of first-class fuel that will be won under present mining methods from each acre of Pittsburg coal yet remaining on mined in the Pittsburg district.

In 1906, Pennsylvania produced 109,000,000 tons of bituminous coal, 84,000,000 of which came from the five counties of Allegheny, Fayette, Greene, Washington and Westmoreland, which will practically all of Pennsylvania's Pittsburg coal area. In 1907 Pennsylvania produced 129,000,000 tons of bituminous coal; and in the absence of exact statistics it is safe to say that at least 100,000,000 tons of this product came from the five counties in question and not less than 95,000,000 tons of it from the Pittsburg seam.

There remains unmined in Pennsylvania only one 1,100,000 acres of this great coalbed or a total available product of 8,800,000,000 tons of coal measured by the quantity (8,000 tons per acre) obtained by the best mining methods of a great corporation during 1907. This 8,800,000,000 divided by 95,000,000 yields a quotient of only 93 as the number of years this fuel in the Pittsburg seam will last if the present annual production should not be increased by a single ton. Who is there to say it will not be doubled even within the next decade?

The West Virginia productive area of this great bed is only about the same as that of Pennsylvania, so that this contiguous region can add only a few years to the life of the Pittsburg coal production.

It may be claimed that the Allegheny series of coals which underlie the Pittsburg bed may add greatly to the fuel resources of the Pittsburg district. This is in error, since the coals in the Allegheny and Conemaugh series appear to thin away and disappear as commercial propositions when they pass beneath the principal areas of the Pittsburg coal; while the active demand for coal at the seaboard will exhaust all of the productive areas of these lower and thinner coals, with our present wasteful mining methods, even before the Pittsburg bed fails.

The productive coal area of the Appalachian basin has been greatly over-estimated in every one of the six great states through which it passes from Pennsylvania to Alabama. The drill of the seeker for petroleum and natural gas, while it has wasted untold millions of precious fuel, has taught one useful lesson, viz: that there is a wide area, 50 to 75 miles in breadth, deep down in the center of the Appalachian basin, that is practically barren of commercial coal. This barren area begins with the lower measures just north from Pittsburg, and embracing large portions of the former supposed coalfields of both Ohio and West Virginia, passes southward into Kentucky, having a breadth of 25 miles where it enters that state.

To what extent the productive area of Kentucky, Tennessee, and Alabama will be affected by the southward extension of this barren belt, which is already cut the former estimates of Pennsylvania, Ohio, and West Virginia in half, do not yet know; but certain it is that all the great coal formations, instead of holding productive coal entirely across this great basin as formerly supposed, are productive only as fringes 20 to 30 miles in breadth around the borders of the basin, while the great central trough is practically destitute valuable coal. Hence with only a reasonable estimate for increased coal production, if the present wasteful mining methods continue, there will be but little coal for manufacturing purposes within 100 miles of Pittsburg at the opening of the next century, and practically no cheap fuel left in the entire Appalachian basin with which to maintain our supremacy in the iron and steel trade of the world.

The prospect is not a pleasing one to contemplate. That celebrated word-picture of Lord Macaulay in which he describes a future traveler as standing on a broken arch of London Bridge, in the midst of a vast solitude, sketching the ruins of St. Pauls, may find its substantial counterpart much nearer home than we could wish. True, the natural wealth of our beloved Union is so great and varied; our riches of soil, of forest, and of stream are so vast if preserved and their boundless possibilities thoroughly utilized, that we would probably have the advantage of all other nations in the struggle for existence, even after our fuel resources have been exhausted; but this is no reason why we should not do everything possible to conserve them so that we may retain to a remote future the great benefits which their possession assures.

Honorable Governors of the several States, the questions involved in this discussion are those in which you and your constituents are most vitally interested. Our patriotic President, ever watchful of the Nation's welfare and of the People's interest, ever alert to guard against dangers from without or the more insidious foes that would betray the people's liberties from within, has summoned you to a conference more important to the future of our Great Republic than any council that has ever before met in the history of our country. Our honored President would protect this Nation, not alone from perils on the ocean, but from the graver ones on land. The dangers that confront us on the Pacific as well as the Atlantic are serious and of far-reaching importance to the future of our country; and the People's President, under whose wise administration there is happily no North, no South, no East, no West, and to whom in his official capacity the rights of all citizens, whether rich or poor, white or black, look alike, will be sustained by united country in the request which he has made of Congress to provide "big sticks" in the shape of an adequate navy for both oceans as the surest and best guarantee of either peace or respect from the other nations of the earth. But the dangers that confront the great Republic from abroad are nothing compared to the perils that lurk in the shadows at home. What will it profit this nation to have won the wreath of industrial supremacy, if in our thirst for gold and sudden riches we permit corporate greed, as well as individual avarice and selfishness, to waste and devastate the various sources of our prosperity? For just as sure as the sun shines, and the sum of two and two is four, unless this insane riot of destruction and waste of our fuel resources which has characterized the past century shall be speedily ended, our industrial power and supremacy will, after meteor-like existence, revert before the close of the present century to those Nations that conserve and prize at their proper value their priceless treasures of Carbon.

Whatever is possible in the shape of legislation for the protection of our fuel resources should be done by the individual States which you represent. Twenty-nine of the 46 States of the Union produce coal; 24 of these produce more than a million tons annually, while practically the same number produce vast quantities of both petroleum and natural gas. The percentage of coal left in the ground beyond recovery, as we have seen, varies from 40 to 70 in the different fields, to say nothing of the wasteful and extravagant use of the portion extracted; while the wasted natural gas, the most precious fuel of all, is so vast that no one can even approximate the percentage. The task before you and your constituencies is indeed formidable. The forces of greed and selfishness are so entrenched behind corporate power and influence that to attack them may often appear to you as useless as the labors of Sisyphus; but as you love your States and Country I adjure you to take up this fight for the conservation of our fuel resources with the determination never to surrender until the forces of greed and avarice which are so rapidly sapping the very foundations of our country's greatness capitulate, and agreed to end the wild riot of destruction that has characterized the past



Mr. President, I greatly regret that the part assigned to me in this discussion has led along such unpleasant lines. The story of the awful waste of our most valuable natural resources is one of such a disgraceful character that its exposition to the world is necessarily mortifying to all patriotic Americans; but a sense of duty to our common Country demands that the truth be told, however humiliating to our national pride.

This Conference will not have met in vain if it shall result in awakening public sentiment to the peril which overshadows the Republic in this uncontrolled waste and dissipation of our fuel resources. These eminent Governors whom you have summoned to hear this narrative of rapine and devastation, to many of whom the story is new and almost unbelievable, owe you a debt of gratitude which they can only adequately repay by arousing the citizens in their respective States to such a realization of the gravity of the dangers which follow in the wake of unbridled waste that whatever is possible for legislation to accomplish may be speedily enacted into law. Forewarned is forearmed; and this Conference which has brought together so many influential citizens from every State in the Union should not fail to be productive of untold good to the Nation's future.



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