Asia Journal of Social Innovation and Development
https://www.ajsid.org/index.php/pub

Research Note

Research on Carbon Zero Emissions Machine That Converts CO2 into Energy and New Materials

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Received: 20 August 2026; **Revised**: 1 September 2026; **Accepted**: 9 September 2026; **Published**: 10 September 2026

Abstract: This article analyzes the reasons for the aggravation of carbon emissions and atmospheric pollution after current decarbonization, current desulfurization, denitrification, and dust removal, and the direction and quantity of CO2 and atmospheric pollutants transferred by current decarbonization. We calculate the pathways and quantities of CO_2 and atmospheric pollutants added by current decarbonization. Considering the high cost of current decarbonization, the "transfer and increase" law of CO_2 after current decarbonization and atmospheric pollutants after standard emissions has been established. The hazards of 'current decarbonization' are revealed. We have successfully researched and developed high-tech patents for zero-emission greenhouse-gas machines at the source of haze, no transfer of pollution, no increase in pollution, and production of energy and new materials from CO2. A major technological issue of global carbon emissions is solved.

Keywords: current decarbonization; huge cost; transfer pollution; increase pollution; greenhouse gases; atmospheric pollutants; zero greenhouse gas emission machine at the source of haze; environmental protection; co_2; production of new energy; new material

1. Preface

The emissions of greenhouse gases such as CO_2 and atmospheric pollutants (SO_2, NO_x, dust, CO_2, etc.) are particularly serious global environmental pollution challenges. Air pollutants produce a large amount of acid rain and haze, directly damaging people's esophagus, respiratory tract, and lungs, leading to lung cancer. Carbon emissions have led to "sustained global temperature rise", "accelerated glacier melting, rising sea levels", accelerated extinction of five species, food and water crisis, increased health risks, and huge economic losses.China and other countries around the world are working hard to control carbon emissions and air pollution [1]. In terms of addressing air pollutants, enterprises in China such as thermal power plants, steel plants, cement plants, paper mills, and sugar factories that emit boiler flue gas have successively implemented the "Provincial Air Pollutant Emission Standards", "People's Republic of China Air Pollutant Emission Standards", and "People's Republic of China Air Pollutant Ultra Low Emission Standards", and invested heavily in three technological transformations, namely "desulfurization, denitrification, and dust removal". As a result, air pollutants such as haze are becoming increasingly severe in various parts of our country. First, in Beijing. In December 2023, the average concentration of SO_2 in Beijing was 3μg/m^3, a year-on-year increase of 50.0% and a month on month increase of 50.0% [2], in February 2025, the average concentration of SO_2 in Beijing was 4μg/m^3, a year-on-year increase of 33.3%, unchanged from the previous period [3], In September 2022, the average concentration of NO_2 in Beijing was 24μg/m^3, an increase of 14.3% year-on-year and 60.0% month on month [4], in October 2023, the average concentration of NO_2 in Beijing was 32μg/m^3, an increase of 10.3% year-on-year and 45.5% month on month [5]. In December 2023, the average concentration of NO_2 in Beijing was 40μg/m^3, an increase of 66.7% year-on-year and 48.1% month on month [6]. In November 2024, the average concentration of NO_2 in Beijing was 32μg/m^3, an increase of 18.5% year-on-year and 6.7% month on month [7]. Then came the "Beijing Tianjin Hebei" [8,9], in terms of addressing carbon emissions, the United Nations Framework Convention on Climate Change, signed in 1992, was first held in Berlin, Germany at the United Nations Climate Change Conference, followed by the Kyoto Protocol, Paris Agreement, and Copenhagen World Climate Conference in 1997. China proposed the "3060 Dual Carbon Target" in 2020, and all provinces in the country are actively promoting "carbon peak", "carbon neutrality", and "energy conservation and carbon reduction". As a result, carbon emissions in various regions of our country are becoming increasingly severe, according to the BP World Energy Statistical Yearbook 2022, China's total CO_2 emissions reached 10.523 billion tons in 2021, a year-on-year increase of 5.8%, accounting for 31.1% of the world's total CO_2 emissions. China has pledged to the world to achieve carbon neutrality by 2060, and the situation of emission reduction is quite severe [10]. With the increasingly severe impact of greenhouse gases, various emission reduction technologies have emerged. For the CO_2 emission reduction problem in the coal conversion process, efficient energy-saving emission reduction technologies coupled with renewable energy emission reduction technologies, carbon capture and storage/carbon capture utilization and storage (CCS/CCUS) CO_2 comprehensive utilization, etc. can be used to achieve CO_2 emission reduction [11]. Firstly, Beijing. Finally, in China as a whole, the scope of carbon emissions and air pollutants (haze) is becoming wider and longer, and the concentration is also increasing. The impact of atmospheric pollutants and greenhouse gases on the natural environment, climate change, and traffic safety poses a huge threat, causing great harm to residents' work, life, and health. The "carbon zero emission machine" dissociates and decomposes CO2 into energy C, which is then produced into new materials such as activated carbon, nanocarbon, and synthetic diamond, completely solving the world's problem of greenhouse gas CO2 emissions and benefiting all mankind. It is a social innovation that brings enormous economic benefits.

2. The Hazards of "Current Desulfurization" in Carbon Emission Reduction

2.1. The Direct Emission of Atmospheric Pollutant SO_2 When Burning 1 Ton of Raw Coal

$$S + O_2 = high\ temperature = SO_2 \tag{1}$$

Burning 1 ton of coal with 1% sulfur content emits 20 kg of SO_2 per ton of raw coal. Burning 1 ton of coal with 6% sulfur content emits 120 kg of SO_2 per ton of raw coal.

2.2. Current Compliance Emission of Atmospheric Pollutant SO_2 in Desulfurization Processes

The standard emission of SO_2: 120 kg/ton of raw coal × 10% = 12 kg/ton of raw coal.

2.3. Current Atmospheric Pollutants Transferred During Desulfurization (SO_2, NO_x, Dust, CO_2)

$$2CaO + 2SO_2 + 2O_2 = 2CaSO_4 \quad (2)$$

2.3.1. Current Desulfurization of 120kg SO_2 Consumes CaO

$$120kg \times (40 + 16)/(32 + 16 \times 2) = 105kg/ton\ of\ raw\ coal \quad (3)$$

2.3.2. Direct CO_2 Emissions from a Factory Producing 105kg CaO

$$CaCO_3 + High\ temperature\ combustion\ of\ coal = CaO + CO_2 \quad (4)$$

The factory producing 105kg CaO emits CO_2: 105kg×(12+16×2)/(40+16)=82.5kg.

2.3.3. Production of 105kg CaO Requires Consumption of $CaCO_3$

$$105kg \times (40 + 12 + 16 \times 3)/(40 + 16) = 187.5kg = 0.1875\ tons \quad (5)$$

2.3.4. Energy Coal Consumed in the Production of CaO from $CaCO_3$

(1) The theoretical consumption of calcining 1 ton of $CaCO_3$ is 54.3kg of pure C, while the actual industrial production consumption is C: 110kg~230kg. The consumption of "energy coal" for calcining 0.1875 tons of $CaCO_3$: 0.1875 tons×230kg=43kg/ton of raw coal. (2) The energy and electricity consumption of "current desulfurization": power loss from burning 1 ton of 1% S-containing coal for desulfurization: 6kWh/ton of raw coal; the average coal consumption for power supply is about 300 grams per kilowatt hour; power loss from burning 1 ton of 6% S-containing coal for desulfurization: 36kWh/ton of raw coal; the average coal consumption for power supply is about 1.8kg/kWh. (3) The energy and electricity loss of burning 1 ton of 6% S-containing coal for desulfurization theoretically requires the consumption of energy coal: 36kWh/1 ton of raw coal x 1.8kg/kWh=64.8kg/ton. (4) The total energy coal consumed by burning 1 ton of 6% S-containing coal for desulfurization with an actual efficiency of 70% is 154kg/1 ton of raw coal (43kg/ton+64.8kg/1 ton of raw coal)/70%. (5) Direct CO_2 emission of 82.5kg from $CaCO_3$ calcination for decarbonization: Processing 1 ton of carbon dioxide (captured using CCUS technology) does not directly consume coal, but consumes a large amount of steam and electricity generated by coal-fired power generation, indirectly consuming 0.14-0.2 tons of standard coal. The actual consumption is about 0.2~0.3 tons of raw coal. The energy coal consumed for decarbonization of 82.5kg of CO2: 82.5kg/ton x 0.3 tons/ton of raw coal=25kg/ton of raw coal. (6) The total energy coal consumed for desulfurization of 1 ton of raw coal: 154kg/1 ton of raw coal+25kg/1 ton of raw coal=179kg/ton.

2.3.5. Current Desulfurization Transfer of Atmospheric Pollutants and Transfer of Carbon Emissions

The total energy consumption for desulfurization of 1 ton of raw coal is 179kg/ton, and the emissions of transferred atmospheric pollutants and transferred carbon emissions are generated, as shown in Table 1. (1) The SO_2 emissions transferred from "current desulfurization" are 0.179 tons × 120kg/ton of raw coal=21.5kg/ton of raw coal. (2) The NO_x emissions transferred by "current desulfurization": 0.179 tons×(66kg+512kg)/ton of raw coal=103.5kg/ton of raw coal. (3) The dust emissions transferred from "current desulfurization":0.179tons×300kg/ton of raw coal=53.7kg/ton of raw coal. (4) The CO_2 emissions transferred by "current desulfurization" are 0.179 tons × (12+16 × 2)/12=656.34 kg/ton.

Total: desulfurization transfers atmospheric pollutant emissions and carbon emissions=835.04kg/ton.

Table 1. The transfer of SO_2, NO_x, dust, and CO_2 emissions from energy coal consumed by "current decarbonization", "current desulfurization", and "current denitrification"

Name	Percentage	Coal emiss-ions	complianc e discharge	Energy consump-tion	Transfer emissions(SO_2)	Transfer emissions (NO_x)	Transfer emiss-ions (dust)	Transfer emissions (CO_2)	Transfer emissions (SO_2+NO_x+dust+ CO_2)	Total
Desulfurizati on	5%~10%	120	12	179	21.5	103.5	53.7	656.34	(835.04)	1146.04
Denitration	10%~25%	578	144.5	637.8	76.536	368.6484	191.34	2338.6	(2975.1244)	4335.4244

Dust removal	1%~2%	300	3	4.9	0.588	2.83	1.47	17.97	(22.858)	330.758
Decarbonisation	25%~86%	3667	916.75	1100.1	132	635.9	330	4033.7	(5131.6)	10815.45
Total		4665	1076.25	1921.8	230.624	1110.8784	576.51	7046.61	(8964.6224)	16627.6724

2.4. "Current Desulfurization" Increases Atmospheric Pollutant Emissions

The current desulfurization system has increased atmospheric pollutant emissions, resulting in a desulfurization standard emission of 12kg/ton of raw coal and desulfurization transfer of SO_2, NO_x, dust, and CO_2 emissions of 835.04kg/ton of raw coal, which equals 847.04kg/ton of raw coal.

2.5. Energy Coal Consumed by Burning 1 Ton of Raw Coal for "Current Desulfurization"

$$154kg/ton\ of\ raw\ coal + 25kg/ton\ of\ raw\ coal = 179kg/ton\ of\ raw\ coal \qquad (6)$$

2.6. Increased Costs of Current Desulfurization

$$0.179\ tons\ of\ energy\ coal\ x\ 1380\ yuan/ton\ = 247.02\ yuan/ton\ of\ raw\ coal \qquad (7)$$

2.7. Hazards of Current Desulfurization

(1) The current standard emissions of desulfurization are one of the main culprits causing smog. (2) Desulfurization transfers atmospheric pollutants. (3) Desulfurization increases carbon emissions. (4) Desulfurization increases the consumption of energy coal. (5) Desulfurization increases costs.

3. The Hazards of "Current Denitrification" in Carbon Reduction

3.1. Direct Emissions of Atmospheric Pollutants (SO_2, NO_x, Dust, CO_2)

$$2N_4 + 2O_2 = High\ temperature = 2NO + O_2 = High\ temperature = 2NO_2 \qquad (8)$$

Burning 1 Ton of Raw Coal Containing N4+ for Atmospheric Pollutants

(1) Burn 1 ton of raw coal with N^{4+} content between 1% and 3% [12], with a value of 2%. 20 kg N^{4+} reacts chemically with O_2, resulting in the emission of NO_2: 66kg/ton of raw coal.

$$N_2 + 2\ O_2 = High\ temperature = 2NO + O_2 = High\ temperature = 2NO_2 \qquad (9)$$

(2) Burning 1 ton of raw coal at high temperature causes a chemical reaction between N_2 and O_2 in the air, resulting in NO_2 emissions of 155.826×(14+16×2)/14=512kg/ton of raw coal.

(3) Total direct emissions of NOx: 66kg/ton of raw coal+512kg/ton of raw coal=578kg/ton of raw coal.

3.2. Current NO_x Emission Standards for Denitrification (15%~25%)

$$578kg/1\ ton\ of\ raw\ coal\ x\ 25\% = 144.5kg/1\ ton\ of\ raw\ coal \qquad (10)$$

3.3. The Current Energy Consumption for Denitrification and NO_x Transfer

$$1.267\ tons \times 50\% = 0.6335\ tons/ton\ of\ raw\ coal \qquad (11)$$

3.3.1. The Current NH_3 Consumption for Denitrification and NO_x Transfer

(1) The NO reduction reaction of "$4NH_3$+4NO+O_2" enriched with O_2

$$4NH_3 + 4NO + O_2 = 4N_2 + 6H_2O \qquad (12)$$

(2) Reduction reaction of NO_2 with O_2 deficiency in $8NH_3$+$6NO_2$ +O_2

$$8NH_3 + 6NO_2 + O_2 = 7N_2 + 12H_2O \qquad (13)$$

(3) $4NH_3$+$2NO_2$+O_2 NO_2 reduction reaction with O_2

$$4NH_3 + 2NO_2 + O_2 = 3N_2 + 6H_2O \quad (14)$$

The direct emission of NO_2 from NO_x is 578kg/ton of raw coal, and the reduction reaction of NO_2 requires the consumption of NH3: 578kg/ton ×4 (14+1×3)/2 (14+16× 2)=427.22kg/ton of raw coal.

(4) Rapid denitrification reaction (with O_2 conditions)

$$2NH_3 + NO + NO_2 = 2N_2 + 3H_2O \quad (15)$$

3.3.2. Currently, the Production of NH_3 Through Denitrification Requires an Amount of H_2

(1) Current denitrification leads to the transfer of atmospheric pollutants to additional NH3 production plants. (2) Denitrification consumes 427.22kg of NH_3 and requires the production of H2.

$$2NH_4Cl + Ca\ (OH)\ 2 = CaCl_2 + 2H_2O + 2NH_3 \quad (16)$$

$$N_2 + 3H_2 = 2NH_3 \quad (17)$$

H_2 quantity: 427.22kg/ton of raw coal x 3×1×2/2 (14+1×3)=75.39kg/ton of raw coal.

(3) Electrolyzing water produces 75.39kg of H_2, consuming 1267kg/ton of coal as energy

$$2H_2O = electrolysis = 2H_2 + O_2 \quad (18)$$

Using 56kWh of electricity to electrolyze water and produce 1kg of H_2, burning 0.437 tons of standard coal produces 1456kWh of electricity. Producing 75.39kg of H_2 through electrolysis of water consumes energy coal: 75.39kg×437kg/26kg=1267kg/ton of raw coal. Calculated at 50%: 50%×1.267 tons/ton of raw coal=0.6335 tons/ton of raw coal.

(4) Forward reaction of ammonia denitrification:

$$4NO + 4NH_3 + O_2 = 4N_2 + 6H_2O \quad (19)$$

308.572kg of NO requires 174.86kg of NH_3 for denitrification. NH_3 high-temperature reverse reaction.

$$4NH_3 + 5O_2 = 4NO + 6H_2O \quad (20)$$

(5) The energy and electricity loss of denitrification actually consumes energy coal: 3kg/1 ton of raw coal/70%=4.3kg/1 ton of raw coal.

(6) The current total energy consumption for denitrification is coal: 633.5kg/ton of raw coal+4.3kg/1 ton of raw coal=637.8kg/1 ton of raw coal.

3.3.3. "Current Denitrification": 1 Ton of Raw Coal Combustion Transfers SO_2, NO_x, Dust, and CO_2

Burning 1 ton of raw coal for NO_x denitrification consumes 637.8kg/1 ton of coal, transferring atmospheric pollutants (SO_2, NO_x, dust, CO_2, etc.) and carbon emissions, as shown in Table 1:

(1) The SO_2 emissions transferred from "current denitrification": 0.6378 tons×120kg/ton of raw coal=76.536 kg/ton of raw coal. (2) The NO_x emissions transferred by "current denitrification": 0.6378 tons×(66kg+512kg)/ton of raw coal=368.6484kg/ton of raw coal. (3) The dust emissions transferred from "current denitrification": 0.6378 tons×300kg/ton=191.34kg/ton of raw coal. (4) The CO_2 emissions transferred by "current denitrification": 0.6378 tons×(12+16×2)/12kg/ton=2338.6kg/ton.

Total: The SO_2, NO_x, dust, CO_2 transferred by "current denitrification" are 2975.1244kg/ton.

3.4. Current Denitrification Increases Atmospheric Pollutants and Carbon Emissions

Current denitrification increases atmospheric pollutants (SO2, NO_x, dust, CO_2, etc.) and carbon emissions=NO_x standard emissions of 144.5kg/ton of raw coal+"current denitrification" transfers SO_2, NO_x, dust, CO_2, etc. emissions of 2975.1244kg/ton of raw coal=3119.6244kg/ton of raw coal.

3.5. "Increased Energy Consumption of Coal Caused by Current Denitrification"

$$633.5kg/ton\ of\ raw\ coal + 4.3kg/1ton\ of\ raw\ coal = 637.8kg/1ton\ of\ raw\ coal \quad (21)$$

3.6. Increased Costs of Current Denitrification

$$Energy\ coal\ 0.6378\ tons/ton\ raw\ coal\ x\ 1380\ yuan/ton = 880.164\ yuan/ton\ raw\ coal \qquad (22)$$

3.7. Hazards of Current Denitrification

(1) NO_x emission standards are one of the main culprits causing smog. (2) The current denitrification process transfers SO_2, NO_x, dust, CO_2. (3) The current denitrification process increases SO_2, NO_x, dust, CO2. (4) The current denitrification process increases the consumption of energy coal by 637.8kg/ton of raw coal. (5) The current cost increase for denitrification is 880.164 yuan/ton of raw coal.

4. The Hazards of "Current Dust Removal" in Carbon Emission Reduction

(1) The "current dust removal" directly emits atmospheric pollutants "dust": 300kg/ton of raw coal. (2) The standard emission of "dust" for "current dust removal" (1%) is 3kg/ton of raw coal. (3) The current dust removal system transfers SO_2, NO_x, dust, CO_2, etc. The energy and power consumption of burning 1 ton of raw coal for dust removal: 5kWh~10kWh. The energy and power consumption of energy coal: theoretical value of 10kWh × 1000kg/3000kWh/ton=3.4kg/ton of raw coal, actual energy coal consumption with 70% efficiency: 3.4kg/ton of raw coal/70%=4.9kg/ton of raw coal, transferring SO_2, NO_x, dust, CO_2, etc., as shown in Table 1. The SO_2 emissions transferred by "current dust removal": 0.0049 tons × 120kg/ton of raw coal=0.588kg/ton of raw coal. The NO_x emissions transferred by "current dust removal": 0.0049 tons x (66kg+512kg)/ton of raw coal=2.83kg/ton of raw coal. The dust emissions transferred by "current dust removal": 0.0049 tons x 300kg/ton of raw coal=1.47kg/ton of raw coal. The CO_2 emissions transferred by "current dust removal": 4.9kg × (12+16 × 2)/12/1 ton of raw coal=17.97kg/1 ton of raw coal. Total: "Current dust removal" transfers SO_2, NO_x, dust, CO_2=22.858kg/1 ton of raw coal. (4) The increase of SO_2, NO_x, dust, CO_2 in "current dust removal": The increase of SO_2, NO_x, dust, CO_2 in "current dust removal" equals the standard emission of 3kg/ton of raw coal in "current dust removal" + the transfer of SO_2, NO_x, dust, CO_2 in "current dust removal" equals 25.858kg/ton of raw coal. (5) The current dust removal system increases the consumption of energy coal: 3.4kg/ton of raw coal/70%=4.9kg/ton of raw coal. (6) The increased cost of current dust removal: 0.0049 tons x 1380 yuan/ton=5.934 yuan/ton of raw coal. (7) The hazards of current dust removal: The standard emission of dust is one of the main culprits causing haze.

5. Implementation Methods and Hazards of "Current Decarbonization" ("Dual Carbon" Energy-Saving and Carbon Reduction)

5.1. Formation and Direct Emissions of CO2 During the Combustion of Raw Coal

Burning 1 Ton of Raw Coal Will Release a Large Amount of CO_2

$$C + O_2 = high\ temperature = CO_2 + calorie \qquad (23)$$

(1) Burning 1 ton of raw coal produces a CO_2 ratio of 2:1×(12+16×2)/12=3.667 tons/ton of raw coal. (2) Calcium carbonate calcination emits CO2: 105kg×(12+16×2)/(40+16)=82.5kg.

5.2. Current CO_2 Standard Emissions for Decarbonization

$$3.667\ tons/ton\ of\ raw\ coal\ x\ 25\%\ (\sim 85\%) = 0.91675\ tons/ton\ of\ raw\ coal \qquad (24)$$

5.3. "Current Decarbonization" Transfers SO_2, NO_x, Dust, CO_2

5.3.1. "Current Decarbonization" Consumes Energy Coal

$$3.667\ tons/ton\ of\ raw\ coal\ x\ 0.3 = 11001\ tons/ton\ of\ raw\ coal \qquad (25)$$

5.3.2. CCS/CCUS Technology for CO_2 in Current Decarbonization

Processing 1 ton of CO_2 (captured using CCUS technology) does not directly consume coal, but consumes a large amount of steam and electricity generated by coal-fired power generation, indirectly consuming 0.14-0.2 tons of standard coal. The actual consumption is about 0.2~0.3 tons of energy coal. Burning 1 ton of raw coal will produce 3.667 tons of CO2 per ton of raw coal.

(1) The CCUS cost of CO_2 reaches $600 per ton of CO_2. (2) The storage methods of CO_2 can be divided into two categories: geological storage and oceanic storage. Geological storage is the injection of supercritical CO_2 into geological structures such as depleted oil and gas fields, deep saline aquifers, and unmineable coal seams. The sealing mechanisms include dissolution in formation water (dissolution), physical sealing (cap rock sealing), and mineralization (CO_2 reacts with rock layers to generate carbonate minerals). Ocean storage refers to the transportation of CO_2 through pipelines or ships to the deep seabed for storage, but it may cause pollution and negative impacts on the environment. In fact, CCS/CCUS causes significant pollution to the environment.

5.3.3. Energy Coal Consumption in Current Decarbonization

$$3.667\ tons \times 0.3\ tons/1\ ton\ of\ raw\ coal = 11001\ tons/1\ ton\ of\ raw\ coal \qquad (26)$$

5.3.4. Current Decarbonization Generates CO_2 Transfer of SO_2, NO_x, Dust, CO_2

The current decarbonization consumes 1.1001 tons of coal per ton of raw coal, resulting in the transfer of SO_2, NO_x, dust, and CO_2 emissions, as shown in Table 1. (1) The SO_2 emissions transferred from "current decarbonization": 1.1001 tons×120kg/1 ton of raw coal=132kg/1 ton of raw coal. (2) The NO_x emissions transferred from "current decarbonization": 1.1001 tons x (66kg+512kg)/1 ton of raw coal=635.9kg/1 ton of raw coal. (3) The dust emissions transferred from "current decarbonization": 1.1001 tons x 300kg/1 ton of raw coal=330kg/1 ton of raw coal. (4) The CO_2 emissions transferred from "current decarbonization": 1.1001 tons x (12+16 x 2)/12kg/1 ton of raw coal=4033.7kg/1 ton of raw coal.

Total: SO_2, NO_x, dust, CO_2 transferred from "current decarbonization"=5.1316 tons/ton of raw coal.

5.4. Current Decarbonization Increases SO_2, NO_x, Dust, and CO_2 Emissions

The increase in SO_2, NO_x, dust, and CO_2 due to "current decarbonization" equals the standard emissions of CO_2 + the transfer of SO_2, NO_x, dust, and CO_2 due to "current decarbonization" equals 6048.35kg/ton of raw coal.

5.5. "Current Decarbonization" Increases the Consumption of Energy Coal

$$3.667\ tons \times 0.3\ tons/1\ ton\ of\ raw\ coal = 11001\ tons/ton\ of\ raw\ coal \qquad (27)$$

5.6. Increased Costs of Current Decarbonization

$$Energy\ coal: 1.1001\ tons \times 1380\ yuan/ton = 1518.138\ yuan/ton\ of\ raw\ coal \qquad (28)$$

From Table 1, it can be concluded that burning 1 ton of raw coal for the treatment of current air pollutants (SO_2, NO_x, dust, CO_2, etc.) and carbon emissions (only calculating "primary desulfurization, primary denitrification, primary dust removal, primary decarbonization") requires a total consumption of 1921.8kg of energy coal ≥ 1 ton of raw coal, resulting in a total treatment cost of 2652.084 yuan/ton of raw coal for "primary desulfurization, primary denitrification, primary dust removal, primary decarbonization". At the same time, a total of SO_2 emissions of "primary desulfurization, primary denitrification, primary dust removal, primary decarbonization" are generated, with SO_2 emissions of 2230.624kg/ton of raw coal ≥ 120kg/ton of raw coal. Direct discharge, dust direct discharge: 576.51kg/ton raw coal ≥ 300kg/ton raw coal, CO2 direct discharge: 7046.61kg/ton raw coal ≥ 3667kg/ton raw coal.

Spending huge amounts of money on the treatment of current air pollutants (SO_2, NO_x, dust, CO_2, etc.) and carbon emissions not only transfers environmental pollution but also increases it. Therefore, environmental pollution is becoming increasingly widespread and severe.

5.7. Implementation Methods and Hazards of "Current Decarbonization"

(1) Selling CO_2 to third parties can easily lead to illegal emissions. (2) Production of dry ice from CO2 has high energy consumption and high cost. It produces more CO2. (3) Ground storage of CO_2: Due to limited ground space, it cannot be sustained. (4) Production of methanol from CO_2 and hydrogen: The production cost of hydrogen is high, and the total amount of air pollutants and carbon emissions increases without reduction. (5) CO_2 underground storage: generates H_2S_04, HNO_3, H_2C_03, leaks, posing significant hazards. CO_2 underground storage: Inject the standard emissions of "5%~10% SO_2, 10%~25% NO_x, 1%~2% dust" after the current "desulfurization, denitrification, and dust removal" into the underground at a depth of 1000 to 2000 meters under high pressure together with 85% CO_2, and undergo violent chemical reactions with the groundwater to generate "H_2S_04" water, "HNO_3" water, "H_2C_03" water, and "strong scale hard" water.

$$SO_2 + H_2O = H_2SO_4 \tag{29}$$

$$4NO_2 + 2H_2O + O_2 = 4HNO_3 \tag{30}$$

$$CO_2 + H_2O = H_2CO_3 \tag{31}$$

After 5 years, underground "H_2S_04" water, "HNO_3" water, "H_2C_03" water, and "strong scale hard" water will seep into the surface water. People in China and around the world no longer have clean water to drink. The cost of purifying "H_2S_04" water, "HNO_3" water, "H_2C_03" water, and "strong scale hard" water has increased from the current 4 yuan/ton of drinking water to 1000 yuan/ton, but there is still no clean drinking water. CO_2 sequestration, like landfilling 30 years ago, poses a greater threat to all humanity and requires technological innovation and transformation, as shown in Table 2.

Table 2. Spending huge amounts of money on "current decarbonization," "current desulfurization," and "current denitrification" to transfer and increase SO_2, NO_x, dust, and CO_2 emissions, leading to more severe environmental pollution

Name	Percentage	Coal emissions	compliance discharge	Transfer emissions	Increase emissions	Energy consumption	governance cost	Managing hazards	Total
Desulfurization	5%~10%	120	12	835.04	847.04	179	247.02	Consuming huge funds	2,240.1
Denitration	10%~25%	578	144.5	2,975.1244	3,119.6244	637.8	880.164	Transfer pollutants	8,335.2128
Dust removal	1%~2%	300	3	22.858	25.858	4.9	6.762	Increase pollutants	363.378
Decarbonisation	25%~86%	3,667	916.75	5,131.6	6,048.35	1100.1	1,518.138	H_2S_04, HNO_3, H_2C_03, Dust, water	18,381.938
Total		4,665	1,076.25	8,964.6224	10,040.8724	1921.8	2,652.084		29,320.6288

6. "Carbon Zero Emission Machine (Haze Source Greenhouse Gas Zero Emission Machine)" Achieves "Zero Emissions of SO_2, NOx, Dust, and CO_2", Low-Cost Production of CO_2 as New Energy and New Materials

6.1. Technical Principles and Core Advantages of "Carbon Zero Emission Machine"

6.1.1. Technical Principle

The "carbon zero emission machine" (haze source and greenhouse gas zero emission machine, invention patent number: 201410087809.2) adopts a "separate, graded, and classified" method for air pollutants such as dust, sulfur dioxide, nitrogen oxides, and greenhouse gases such as carbon dioxide emitted from the combustion of energy sources such as coal, oil, and natural gas. The first stage intangible mesh coarse filter, the second stage hydraulic medium filter, and the third stage electrostatic fine filter each consist of 16 core components, for a total of 48 core components. The invisible mesh coarse filter is composed of an electromagnetic field and a precious metal catalyst.

It decomposes atmospheric pollutants such as SO_2 and NO_x, as well as greenhouse gases such as CO_2 into N^{4+} 、S^{4+}、C^{4+}、O^{2-} positive and negative ions, and finally reduces them to S, C, N_2, O_2, and aggregates dust into large particles of green and environmentally friendly building materials. The first level reduces atmospheric pollutants and carbon emissions by over 99.5%. The second level involves adding a small amount of additives and catalysts to a certain pressure liquid to convert atmospheric pollutants and CO_2 into green and environmentally friendly building materials. The second level reduces atmospheric pollutants and carbon emissions by over 99.8%. The third level electrostatic fine filter, based on electrical principles, aggregates small dust into large particles of green and environmentally friendly building materials. Level 3 reduces atmospheric pollutants and carbon emissions by 100%.

6.1.2. Main Technical Advantages

The "carbon zero emission machine" (haze source and greenhouse gas zero emission machine, invention patent number: 201410087809.2) is firstly "environmental protection technology", secondly "new energy technology", and thirdly "new material technology".

(1) Environmental protection advantages: achieving 100% zero emissions of air pollutants and 100% zero emissions of CO2, comprehensively solving major technical problems of global air pollution. Comprehensively address major global carbon emission technology issues. Eliminate smog. Solved the world's biggest crisis, the world-class major technological challenge of environmental pollution

(2) Advantages of new energy: Converting CO2 into new energy C has solved the world's biggest crisis, the "energy crisis," which is a world-class major technological challenge.

(3) Advantages of New Materials: Converting CO2 into New Energy C and New Material C, and then converting New Material C into New Materials "Activated Carbon", "Nano Carbon", and "Artificial Diamond". (4) Social benefit advantage: Achieving 100% zero emissions of air pollutants and 100% zero emissions of CO2, comprehensively solving major technical problems of global air pollution. Comprehensively address major global carbon emission technology issues. Eradicating smog has enormous social benefits. (5) Economic benefits advantage: turning waste into treasure, with revenue-generating capacity, and huge economic benefits. Eliminate carbon emissions. No pollution transfer, no pollution increase, no environmental pollution, and a 90% reduction in environmental operating costs. It has revenue-generating capacity and huge economic benefits.

6.2. Environmental Protection Technology of "Carbon Zero Emission Machine"

The "carbon zero emission machine" environmental protection technology has achieved "carbon zero emissions" and "zero emissions of atmospheric pollutants", solving the world-class major technical problem in the field of "environmental protection" where global greenhouse gas emissions are becoming increasingly serious; it has solved the world-class major technical challenges in the field of environmental protection, such as the increasingly severe global air pollution and environmental pollution.

6.3. Energy Technology of "Carbon Zero Emission Machine"

The "carbon zero emission machine" energy technology has achieved the conversion of CO2 into "energy C" at 1380 yuan/ton and new material O_2 at 1000 yuan/ton, turning waste into treasure. It has solved the world-class major technical challenges in the field of "environmental protection" where global greenhouse gas emissions are becoming increasingly severe, and at the same time alleviated the world-class major technical challenges of the global "energy crisis".

6.4. New Material Technology for Carbon Zero Emission Machines

The new material technology of the "carbon zero emission machine" has achieved the conversion of 1380 yuan/ton of "energy C" and 1380 yuan/ton of "material carbon C" into 10000 yuan/ton of new material "activated carbon", 200000 yuan/ton of new material "nanocarbon", and over 2 million yuan/ton of new material "artificial diamond". Transform a little treasure into a big treasure.

6.5. The Enormous Social Benefits of the 'Carbon Zero Emission Machine'

The 'carbon zero emission machine' will achieve 'zero emissions of air pollutants', 'zero carbon emissions', and create enormous social benefits for the world - benefiting all mankind.

6.6. The Huge Economic Benefits of the 'Carbon Zero Emission Machine'

The 'carbon zero emission machine' will create enormous economic benefits for the world and generate huge profits for the benefit of all humanity.

6.7. The Main Physical and Chemical Mechanisms of the "Zero Emission Greenhouse Gas Machine at the Source of Haze"

$$CO_2 = dissociation = C^{4+} + 2O^{2-} \tag{32}$$

$$C^{4+} + 4(-e) = Reduction = C \tag{33}$$

$$2O^{2-} + 4\ (+e) = Reduction = O_2 \tag{34}$$

6.8. "Zero Emission Machine for Greenhouse Gases at the Source of Haze" Detection

Invention patent number 201410087809.2: Actual testing of a zero emission greenhouse gas machine for haze sources. (1) Before starting the "zero emission machine for greenhouse gases at the source of haze", 100% of CO_2 and atmospheric pollutants were emitted (as shown in Figure 1). (2) After starting the "zero emission machine for greenhouse gases at the source of haze", CO_2 and air pollutants have 100% zero emissions (as shown in Figure 2).

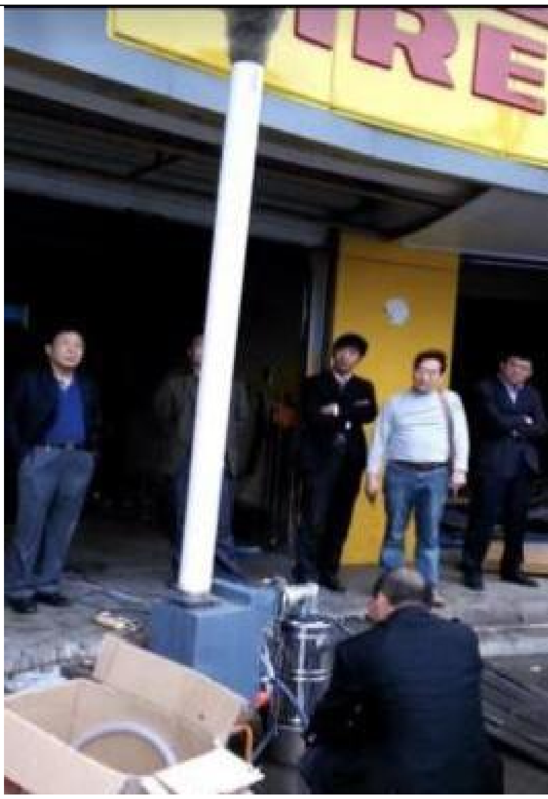

Figure 1. Before starting the "Haze Source Greenhouse Gas Zero Emission Machine", "Air Pollutants" and "CO_2" are emitted at 100%

Figure 2. After activating the "Haze Source Greenhouse Gas Zero Emission Machine", "Air Pollutants" and "CO_2" achieve 100% zero emissions

6.9. "Haze Source Greenhouse Gas Zero Emission Machine" "Detection Data"

The "carbon zero emission" detection data of the invention patent number 201410087809.2 "Haze source greenhouse gas zero emission machine" is shown in Table 3.

Table 3. Haze Source Greenhouse Gas Zero Emission Machine "CO_2" and "Zero Emission" Detection Data

atmospheric pollutant	Test times	Emissions before startup (mg/m^3)	Emissions after startup (mg/m^3)	emission reduction (mg/m^3)	Emission reduction rate
CO_2	1	68819	0	68819	100%
CO_2	2	69798	0	69798	100%
CO_2	3	81869	0	81869	100%

6.10. Social innovation of "zero emission greenhouse gas machine at the source of haze"

The "Carbon Zero Emission Machine" (Invention Patent No. 201410087809.2 "Haze Source Greenhouse Gas Zero Emission Machine") dissociates and decomposes greenhouse gas CO2 into energy C, which is then produced into new materials such as activated carbon, nanocarbon, and synthetic diamond, completely solving the world's problem of greenhouse gas CO2 emissions and benefiting all mankind.

7. Conclusion

7.1. Main Hazards of "Current Desulfurization"

(1) The current desulfurization standard emission of 5% to 10% SO_2 is the "culprit" and source of underground "sulfuric acid water" and surface "sulfuric acid water" caused by the underground storage of carbon dioxide. (2) Spending huge amounts of money. (3) Increase energy consumption. (4) Transfer environmental pollution. (5) Increase environmental pollution.

7.2. Main Hazards of "Current Denitrification"

(1) The current denitrification (10%~25%) NO_x emission standard is the "culprit" and source of underground "nitrate water" and surface "nitrate water" caused by the underground storage of carbon dioxide. (2) Spending huge amounts of money. (3) Increase energy consumption. (4) Transfer environmental pollution. (5) Increase environmental pollution.

7.3. The Main Environmental Pollution Hazards of "Current Dust Removal"

(1) The current dust removal standard emission of dust is the "culprit" and source of the underground "heavy water scale and hard water" and surface "heavy water scale and hard water" caused by the underground storage of carbon dioxide. (2) Spending huge amounts of money. (3) Increase energy consumption. (4) Transfer environmental pollution. (5) Increase environmental pollution.

7.4. The Main Environmental Pollution Hazards of "Current Decarbonization"

(1) The current decarbonization (25%~86%) of CO_2 emissions is the "culprit" and source of underground "carbonated water" and surface "carbonated water" caused by underground carbon dioxide storage. (2) Spending huge amounts of money. (3) Increase energy consumption. (4) Transfer environmental pollution. (5) Increase environmental pollution.

7.5. Summary of the Main Hazards of "Current Decarbonization", "Current Desulfurization", "Current Denitrification", and "Current Dust Removal"

In summary, the main hazards of "current decarbonization", "current desulfurization", "current denitrification", and "current dust removal" include meeting emission standards.

Spending huge amounts of funds, increasing energy consumption, transferring environmental pollution, and increasing environmental pollution, especially the underground storage of CO_2, due to the standard emissions of atmospheric pollutants (SO_2, NO_x, dust, CO_2), "underground sulfuric acid water", "underground nitric acid water", "underground carbonated water", "underground heavy scale hard water" are generated during the underground storage of carbon dioxide. Three years later, groundwater infiltrates into the surface, causing "surface sulfuric acid water", "surface nitric acid water", "surface carbonated water", "surface heavy scale hard water". People no longer have clean water to drink. If the cost of purifying "sulfuric acid H_2S_04", "nitric acid HNO_3", "carbonic acid H_2C_03" and "strong hard water" with particularly severe dust increases from the current 4 yuan/ton of drinking water to 1000 yuan/ton, it will also be difficult to obtain pure water for drinking. CO_2 underground storage, similar to landfill 30 years ago, poses a greater threat to all humanity and requires technological innovation and transformation.

7.6. Carbon Zero Emission Machine and Social Innovation

The "carbon zero emission machine" dissociates and decomposes CO_2 into energy C, which is then produced into new materials such as activated carbon, nanocarbon, and synthetic diamond, completely solving the world's problem of greenhouse gas CO_2 emissions and benefiting all mankind. It is a social innovation that brings enormous economic benefits.

Author Contributions

Conceptualization, F.H., F.Y. (Fan Yijun) and F.Y. (F.Y. (Fan Yuhua)); Methodology, F.H., F.Y. (Fan Yijun) and F.Y. (Fan Yuhua); Software, F.H., F.Y. (Fan Yijun) and F.Y. (Fan Yuhua).; Verification, F.H., F.Y. (Fan Yijun), F.Y. (Fan Yuhua), F.Y. (Fan Yuanyuan), and F.R.; Formal analysis, F.H., F.Y. (Fan Yijun) and F.Y. (Fan Yuhua); Investigation, F.H., F.Y. (Fan Yijun) and F.Y. (Fan Yuhua).; Resources, F.H., F.Y. (Fan Yijun) and F.Y. (Fan Yuhua); Data management, F.H., F.Y. (Fan Yijun), and F.Y. (Fan Yuhua); Writing - Initial Draft Writing, F.H. ; Writing - Review and Editing, F.H., F.Y. (Fan Yijun), F.Y. (Fan Yuhua), F.Y. (Fan Yuanyuan), C.L. and F.R. ; Visualization, F.H., F.Y. (Fan Yijun), F.Y. (Fan Yuhua) and F.R.; Supervision, F.H. and C.L.; Project Management, F.H. ; Financing acquisition, F.H. and F.R. All authors have read and agreed to the published version of the manuscript.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

The data supporting the report results can be accessed through detailed information in the references, including links to publicly archived datasets analyzed or generated during the research process. Hereby formally declare.

Acknowledgments

The authors have reviewed and edited the output and take full responsibility for the content of this publication.

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. Niu, G.; Liu, B. Reflections on countermeasures to improve environmental air quality in Tianjin. *Tianjin Economy* **2014**, 35–37.
2. HouPeng Fan, YiJun Fan, Yuhua Fan, Yuanyuan Fan, LanFang Chen, Rubin Fan; et al. Research on "Huge Cost Transferring and Increasing Air Pollution Desulfurization" and "Zero Emission of Air Pollutants". In Proceedings of the 12th International Academic Conference on Energy Materials and Environmental Engineering (ICEMEE 2026), online, June 12 to 14, 2026.
3. China Environmental Monitoring Center. National Urban Air Quality Report, February 2025; China Environmental Monitoring Station: Shenzhen, China, 2025; pp. 70–71.
4. HouPeng Fan, YiJun Fan, Yuhua Fan, Yuanyuan Fan, LanFang Chen, Rubin Fan; et al. Research on "Huge Cost Transferring and Increasing Air Pollution Denitrification" and "Zero Emission of Air Pollutants". In Atlantis Advances in Applied Sciences, Proceedings of the 2026 International Conference on Environmental Pollution and Sustainable Resource Management (EPSRM 2026), 2026; Atlantis Press: online, 2026. https://www.epsrm.com/ (accessed on 20 August 2026).
5. China Environmental Monitoring Center. National Urban Air Quality Report, October 2023; China Environmental Monitoring Station: China, 2023; pp. 65–66. https://www.cnemc.cn/jcbg/kqzlzkbg/index_1.shtml (accessed on 20 August 2026)
6. HouPeng Fan, YiJun Fan, Yuhua Fan, Yuanyuan Fan, LanFang Chen, Rubin Fan; et al. Research on "Huge Cost Transferring and Increasing Air Pollution Denitrification" and "Zero Emission of Air Pollutants". In Proceedings of the 12th International Academic Conference on Energy Materials and Environmental Engineering (ICEMEE 2026), 2026.

7. China Environmental Monitoring Center. National Urban Air Quality Report, November 2024; China Environmental Monitoring Station: China, 2024; pp. 73–74. https://www.cnemc.cn/jcbg/kqzlzkbg/index_1.shtml (accessed on 20 August 2026)
8. Wang, W.; Wu, W. Practical Technology of Flue Gas Desulphurization and Denitrification in Thermal Power Plants; China Water Resources and Hydropower Press: Beijing, China, 2009; ISBN 978-7-5084-6057-4
9. Zhang, H.; Chen, Y.; Xie, B. Atmospheric Pollution and Climate Change; Anqi, A., Yang, D., Eds.; Meteorological Press: Beijing, China, 2022.
10. Xie, K.; Wang, Y.; Tian, Y. General Theory of Clean Coal Conversion; Chemical Industry Press: Beijing, China, 2024; pp. 8–11.
11. BP. BP World Energy Statistics Review 2020. Available online: https://www.energy-analytics-institute.org/wp-content/uploads/2021/07/bp-stats-review-2020-full-report.pdf (accessed on 20 August 2026).
12. Zhou, Y. Introduction to Coal Mining, 2nd ed.; Coal Industry Press: Beijing, China, 2015; pp. 20–21.