



6th Bluetech Technology Manual

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中关村创蓝清洁空气产业联盟
Bluetech Clean Air Alliance

Bluetech Clean Air Alliance

Bluetech Clean Air Alliance (BCAA) is a non-profit professional organization focusing on the development of clean air technologies and industries in China and the world through technology transfer, technology assessment and demos, investment service, IP protection, and policy research. BCAA is evolved from the Clean Air Alliance of China, an integrated platform launched in 2013 by 10 leading Chinese research institutions to tackle China's severe air pollution problem. Over nine years' operation, the Alliance has conducted and participated in various clean air research projects, carried out pilot projects in 12 provinces and cities in China, published 50 policy and market research reports, assessed over 400 advanced clean air technologies from 20 countries, established collaborations with partners across 20 countries, and carried out a series of activities and pilot work in the field of green technology intellectual property awareness raising and high-value patent cultivation.



Contents

Bluetech Award Introduction	4
Process	4
Approach	5
Assessment	5
Highlights of Bluetech Award	6
5th Bluetech Award Categories	14
Category 1: Diesel engine emission reduction technologies & clean energy substitutes	14
Category 2: Coal combustion emission control & clean energy substitutes	15
Category 3: VOCs substitution and pollution prevention	15
Category 4: Indoor air pollution control	16
Category 5: Advanced pollution source and air quality monitoring	16
Category 6: Innovative waste incineration emission control and its substitution technology	17
Bluetech Future Unicorn Competition	17
Bluetech Winners	19
Development and application of zeolite SCR after-treatment system for diesel vehicles	20
Ductless filtration technology (activated carbon and HEPA)	24
Particle sensor	28
Novel VOCs Microfluidic Gas Chromatography Technology	32
Optical Gas Imaging (OGI) for VOCs detection & quantification	36
A novel carbon sequestration biotechnology that utilizes industrial tail gas	40
CN VI Diesel exhaust system for light vehicle	44
Previous Winners	47

Bluetech Award Introduction

The Bluetech Award is launched in 2015 to seek and promote high-quality international clean air technologies. Technologies that submitted will undergo a standardized evaluation process that verifies practical results, where the selection committee will examine environmental benefits, technical performances and financial advantage. The winners will receive ample support from the Bluetech Clean Air Alliance (BCAA) and its partners to expand their ability to create a blue sky for everyone.



International: We seek technologies from leading countries around the world, work with international experts in our selection process, and leverage international media coverage.

Objective and Scientific Process: We use a uniform, systematic assessment methodology to examine all technologies for practical, real-life results. Our methodology includes document review, expert analysis, on-site examinations and lab tests.

Result-oriented: Our procedure focuses on real-world results.

Systematic Dissemination: Participants get featured dissemination at the Bluetech Forum, and through our official website, custom local matchmaking sessions, video releases, WeChat platforms, and media partners.

Process



Approach

Gathering clean air technologies from China and overseas, the Bluetech Award provides a platform for technologies to validate and demonstrate core competencies. The Award uses the Clean Air Technology Assessment Methodology to examine real-world results, analyzing environmental benefits, technological performances and financial viabilities to find breakthrough potentials.

Assessment

- 1** **Form Bluetech Assessment Expert Panel**
Includes international clean air technology experts, industrial and testing experts.
- 2** **Preliminary Assessment Plan**
Design preliminary assessment plan for each category to carry out essential technology screening for advanced assessment.
- 3** **Preliminary Assessment**
Using preliminary assessment plan to conduct quick evaluation based on technology or product performance data as provided by the applicant.
- 4** **Advanced Assessment Plan**
Design specific assessment plan for every technology to assess its breakthrough potential in environmental, technical, and financial fields.
- 5** **Advanced Assessment**
Using advanced assessment plan to assess technology which includes document review, on-site investigation and laboratory testing.
- 6** **Assessment Conclusion and Reports**
A full assessment report and simplified assessment report are issued for each assessed technology.
- 7** **Publicize Assessment Result**
The assessed technology will be recorded into Bluetech Platform.

Highlights of Bluetech Award

Award Categories Match the Need to Support Local Implementation

The Bluetech Award aims to promote best available clean air technologies to help tackle China's air pollution problems. Air pollution is a very complex issue. Different cities face very different sources of pollution due to varied economic development levels, energy structures, and urban modes. How to help cities to develop their own clean air action plans with reference of the most advanced technology is key to accelerate the pace of restoring blue skies. CAAC was launched 10 local clean air pilots since 2014. This year's bluetech categories are closely linked to the technology needs from these pilots.

Beijing-Tianjin-Hebei: Air pollution in Beijing, Tianjin and Hebei (Jing-Jin-Ji) Region and its surrounding areas has attracted significant attentions all over the world. It is estimated that if the coal burning pollution in rural areas during winter can be eliminated, the PM_{2.5} concentration can be reduced by 20% in Jing-Jin-Ji, and 40% for Beijing alone, which is more than the emission transportation sector and power plants combined. Hence, the coal pollution prevention and control for non-power sector is also selected as a technology category for 2016 Bluetech. Winners in this category will have opportunities to support the development of the Technological Guidance of Jing-Jin-Ji Household Coal Pollution Control, and participate in the local technology demonstration projects.

Shenzhen: Shenzhen is China's leader in clean air efforts, who has already achieved the national PM_{2.5} standards and committed to achieve EU level PM_{2.5} standard by 2020. As the 3rd largest container terminal in the world, one of the biggest challenges for Shenzhen is the emission control for port, which contributes to 13% of Shenzhen's total PM_{2.5} emission. 2016 Bluetech Award Campaign has selected diesel engine emission reduction & clean energy substitutes to call for advanced technology in the related field to help Shenzhen tackle this problem.

Changzhou: VOCs and its secondary products are toxic and cancerous, harming public health. The 13th Five Year Plan listed VOCs as important contaminants, pushing some major cities and provinces to create their own VOCs control plans. For Changzhou, one of China's most important chemical manufacturing bases, VOCs is one of its major contaminants. The emission amount of VOCs in Changzhou is about 51,540 ton per year. Bluetech Award Committee selected VOCs substation, monitoring and pollution prevention as one of the technology categories in Bluetech Award this year to control VOCs emission and ultimately

protect public health.

Shanxi, etc.: Many provinces and cities including Shanxi and Inner Mongolia are gradually enhancing delicacy management in improving the environment and air quality while abating the pollution caused by coal use. In 2017, Shanxi issued the action plan for air pollution prevention and treatment for the province. The plan proposes actions that allow to meet comprehensive governance requirements for VOCs in key sectors while continuing to strictly control the coal pollution. The VOCs alternation and pollution treatment technologies gathered by Bluetech platform are capable to assist Shanxi in the treatment of VOCs. Futhermore, the plan also requires strengthening coping with heavy pollution regulations and improving the capacity of provincial and municipal air quality monitoring, early warning systems and response teams, all these requirements increase the need to investon technology for monitoring air quality and pollution sources. The monitoring technology provided by the Bluetech platform is able to help Shanxi to enhance the monitoring of air quality and at the same time to improve its management capacity.

Global Award

Three Bluetech Award assessed nearly 300 technologies. Those applicants came from 20 countries including China, USA, France, Germany, United Kingdom, Japan, New Zealand, Australia, Malaysia, Switzerland, Denmark, Holland, Sweden, Isrel, Italy, India, Finland, Poland, Norway and Canada.

We have received strong support from many cooperative agencies in the past four years. Those agencies are listed below.

China Association of Environmental Protection Industry – Committee of Vehicle Emission Control	Air & Waste Management Association (US)
China Association of Environmental Protection Industry – Committee of VOCs Pollution Control	US-China Clean Tech Center
Chinese Society of Environmental Sciences – Professional Committee for Pollution Prevention and Control of Volatile Organic Compounds Xiamen Environment Protection Vehicle Emission Control Technology Center	UK Trade & Investment Clean Air Alliance UK
The Chemical Industry and Engineering Society of China- Water Borne Coatings Committee	VERT Association (Swiss)
China Electric Vehicle Charging Technology and Industry Alliance	Swiss clean technology association
China Highway And Transportation Society	World Future Council (Germany)
3iPET International Platform for Environmental Technology	France Chamber of Commerce and Industry
TEDA Low-carbon Economic Promotion Center	Clean Cluster Denmark
China Machinery & Environmental Industry Development Center	China Culture Desk (Austria)
ESCO Committee of China Energy Conservation Association	Italian Chamber of Commerce
IE Expo	International Laboratory for Air Quality and Health (Australia)
Japan International Cooperation Agency	Commonwealth Scientific and Industrial Research Organization (Australia)
Japan External Trade Organization	New Zealand Trade & Enterprise
IVL Swedish Environmental Research Institute Beijing Representative Office	International Council for Local Environmental Initiatives (Korea)

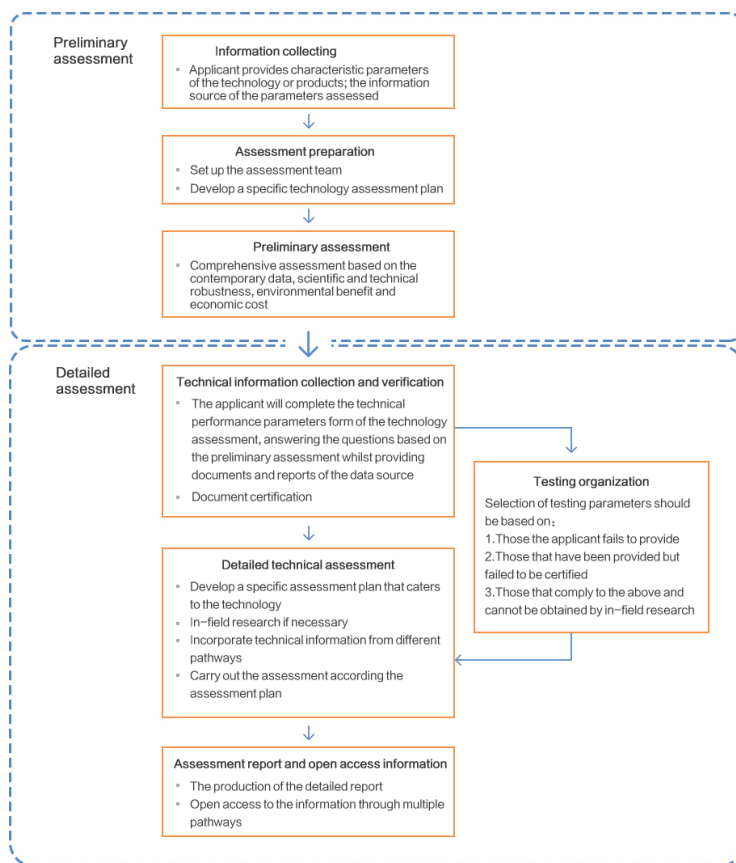
China-Britain Business Council	International Fund for China's Environment
US-China Energy Cooperation Program	Chambre de Commerce et d'Industrie Française en Chine
Water Borne Platform	Plug and Play
National Big Data Alliance of New Energy Vehicle	Young Green Tech. Entrepreneurs Forum
World Bank	Bay Area Council
Cteam	Prospect Silicon Valley
Zhongguancun International Environment Protection Industry Promotion Center	World Alliance for Efficient Solutions
Centre of Excellence for Research on Clean Air	Aquilaris
Sino Italian Cooperation Program for Environmental Protection	danish embassy
Iranian Embassy	Smogathon
Swisscleantech	Council of Industry and Technology Alliances in Z-park
Japan Science and Technology Agency	Beijing Institute of Collaborative Innovation
Los Angeles Cleantech Incubator	US-China Energy Cooperation Program
Energy Foundation China	China Association of Environmental Protection Industry – Committee of Vehicle Emission Control
China Council for Industrial Environmental Protection (CIEP)	Green Finance Committee of China Society for Finance and Banking
Canada-China Business Association	bio.china-nengyuan.com
European Union Chamber of Commerce in China	China Energy Net
China Association of Private Equity	IE Expo
Beijing Global Village Environmental Education Center	Swiss Chinese Chamber of Commerce
State of Green(Denmark)	International Fund for China's Environment
China-Britain Business Council	Chambre de Commerce et d'Industrie Française en Chine
Sino-Sweden innovation& Entrepreneurship center	Korea Association of Energy, Climate Change and Environment

Professional Assessment

Bluetech technology assessment is a tool that supports the relevant performance of the clean air technology with systematic assessment. It uses real-world application results as the core basis of evaluation, adopts and combines methods such as document review, technical analysis, expert review, on-site surveillance, and laboratory testing, and eventually tackles the environmental benefit, technical performance and economic feasibility of these technologies.

To guarantee the objectivity and professionalism of the assessment, Innovation Center for Clean-air Solutions has organized experts to edit the following documents:

- *The Outline of Bluetech Clean Air Technology Assessment*
- *Bluetech Clean Air Technology Assessment: Methods and Procedure*
- *Bluetech Clean Air Technology Assessment: Technical Performance*
- *Bluetech Clean Air Technology Assessment: Environmental Benefit*
- *Bluetech Clean Air Technology Assessment: Economic Cost*



Bluetech Acceleration

In order to encourage the development of award-winning technologies and other outstanding green innovations, BCAA and its partners jointly established the "Bluetech Acceleration Platform". By setting up technology demonstration projects, providing intellectual property strategy training, carrying out high-value patent cultivation pilot projects, and organizing publicity and resource connection, the Platform opens up an "accelerated channel" for the application and promotion of related technologies in China and the world.

Technology Demonstration Projects

Among the demonstration projects, BCAA will cooperate with local departments such as Development and Reform Department and Environmental Protection Department, to support technology enterprises to obtain demonstration and pilot opportunities for practical application in China according to the needs of the implementation of relevant environmental policies. Technology enterprises also have the opportunity to apply the Bluetech technology assessment method to carry out the systematic third-party assessment on the technical performance, environmental benefits, and economic costs related to the technology in the demonstration application process. The evaluated demonstration projects can also be included in the Bluetech online demonstration platform for display.

IP Strategy Training

Conducting awareness training programs on intellectual property (especially patents and commercial secrets) for technology companies, research institutes, investment funds, incubation platforms, and industry alliances focusing on clean technology can not only improve their deep understanding of the intellectual property system, increasing the emphasis on patent quality, and discover how to use the rules of the patent system to carry out the effective business competition. But also can enhance their cognition of relevant parties to the intellectual property management system, guide the enterprises to establish an effective intellectual property management system according to their development stage and technical characteristics, so as to systematically manage the risks related to intellectual property and promote the generation and maintenance of rights.

High-value patent Cultivation Pilot

BCAA will select leading technology enterprises in the clean technology field to carry out pilot projects and organize a professional intellectual property service team to cooperate with

them. According to the development stage, competition status, and industry characteristics of the enterprise, BCAA will closely combine the mining and layout of patents, the business strategy and research and development of the enterprise and carry out targeted patent layout to help enterprises cultivate high-value patents and patent portfolios (including international patents).

Project and Resource Matchmaking

Investment matchmaking: combining with the development stage of the enterprise, BCAA will help the technology enterprises to dock with the corresponding capital resources.

Industry seminar: according to the specific needs of the air quality improvement work of the country and provinces/cities, representatives of relevant departments, experts, industry organizations, and technology enterprises will be invited to hold industry seminars on relevant topics.

Local demand matchmaking: BCAA will organize technical enterprises to communicate with environmental protection departments and demand-side enterprises according to the demands of provincial and municipal environmental protection management.

Investor salon: combining with the characteristics of technology, enterprises, and industries BCAA will assist enterprises to connect with capital resources and achieve rapid development.

Pilot Demonstration

The Bluetech award technologies have the opportunity to be demonstrated at the annual Bluetech conference, which is attended by 300 to 400 people each year. In past conferences, participants include attendees from national and local environmental protection departments, technology companies, experts and industry organizations, investors, and media. The technical representatives can communicate directly with the domestic and foreign authoritative experts, and obtain the propaganda support from the domestic and foreign media, thereby expanding the popularity and influence of the technology on a global scale.

Dissemination

We-media platform: The award winners can enjoy systematic demonstration, promotion and spreading on we-media platforms such as Bluetech's website, public WeChat accounts and email promotion via the Alliance.

Bluetech media seminar: The Bluetech clean air media seminars refer to a series of activities launched by the Center for Environmental Education and Communications under the Ministry of Environmental Protection and the Innovation Centre for Cleanair Solutions (ICCS), which aims to deal with important issues such as air pollution prevention and control and carry out idea sharing and in-depth exchanges. The technologies winning the award, will be able to take part in the Bluetech media seminars, and also could be demonstrated during the seminars.

Bluetech's Remark: Bluetech's Remark is a promotion brand introduced by BCAA, which is through interviews in the field of clean air, and by partnering with the media, providing excellent technologies with the opportunity of perform a systematic promotion.

Promotion through cooperative media: Bluetech has established an in-depth cooperation with renowned media agencies both in China and overseas, to jointly promote the advanced technologies

International promotion: Bluetech has established cooperation with 60 institutions in 20 countries, allowing the award winning technologies to be promoted across the globe under the support of our partners. Futhermore, the Alliance is building the California-China Acceleration Partnership with the partner in California, with an aim to promote these technologies and enlarge their global influence via the clout of Silicon Valley.

6th Bluetech Award Categories

Category 1: Diesel engine emission reduction technologies & clean energy substitutes

The number of motor vehicle ownership in China has reached 295 million by 2016, producing total pollutants of 44.7 million tons per year. In China's megacities like Beijing, Shanghai, Guangdong and Shenzhen, the increase rate for car ownership, the average mileage for passenger vehicles, and the car density in urban areas remain at high level, and the contribution of vehicle emissions to local air pollution keeps rising. Diesel vehicles are believed as the most significant problem, as they are responsible for up to 70% of all vehicle NOx emissions, and up to 90% of all vehicle particulate matter emissions. Furthermore, emissions from diesel powered non-road vehicles, such as ships, port machinery, agricultural machinery and general engineering machinery, are also believed to cause significant air pollution (especially NOx and particulate matters emissions) due to lack of control. Cities like Shanghai and Shenzhen have already begun to employ new energy (e.g. LNG) and emission control technologies (e.g. DPF) in their policy making to control non-road vehicle emissions.

We are looking for the following types of diesel engine emission control technologies:

Fuel treatment technologies, such as diesel fuel treatment, clean energy (e.g. LNG) etc.

Engine combustion optimization technologies, such as Exhaust Gas Recirculation, fuel injection optimization techniques, etc.

Engine emission control technology, such as Diesel Oxidant Catalyst, Particulate Oxidation, Catalyst, Selective Catalytic Reaction, Diesel Particulate Filter, etc.

Category 2: Coal combustion emission control & clean energy substitutes (non-power sector)

Coal is the major energy source in China. It contributes approx. 60% of the primary energy consumption and has become one of the main pollution sources. Due to governmental

preferential policy, emission control for coal-fired power plants has been conducted in many cities. However, emissions from disaggregated coal in non-power sectors should not be underestimated. The PM2.5 source apportionment analysis for Jing-Jin-Ji region shows that disaggregated coal emission has contributed about 25% of local PM2.5 emissions. According to the government work report in 2017, China is addressing pollution caused by disaggregated coal combustion with measures including advancing clean winter heating in the northern region and replacing coal with electricity and natural gas in more than 3 million households, and eliminating coal fire stoves in the urban built-up areas of cities at or above the prefecture level. The Plan for Clean Winter Heating in the Northern Region (2017-2021) mandates the clean heating accounting for 100% of the total winter heating fuels in the 2+26 key controlled cities and 70% in the whole northern region.

We are looking for the following type of Emission Control Technology for Non-electrical Coal Combustion:

Alternative clean energy & renewable energy technologies.

Advanced heating technology, such as waste heat recovery technology, etc.

Other related technology.

Category 3: VOCs substitution and pollution prevention

Volatile organic compounds (VOCs) are the key precursors for ozone and PM2.5, and the main contributors for the current complex regional air pollution in China. VOCs and the relating secondary pollutants have adverse impact on human health, and some are also carcinogenic or mutagenic. As the China launches the official “war on pollution,” the 13th Five Year Plan has listed VOCs as an important contaminant, and quantified VOCs emission reduction targets. In July 2016, the Ministry of Finance and the Ministry of Industry and Information Technology jointly issued an Action Plan for Reduction of VOCs in Key Industries, which ruled that by 2018 the emissions of VOCs in 11 Key Industry sectors must decrease by more than 3.3 million tons from 2015’s cap.

We are looking for the following type of Emission Control Technology for VOCs monitoring and control technologies:

Low VOCs substitutes, such as low VOCs paint, low VOCs solvents, etc.

Leak Detection and Repair (LDAR) related technologies, such as leak detection technology, leak repair technology, etc.

End of pipe VOCs control technologies, such as VOCs recycling technology, VOCs destruct system, etc.

Other technologies that address VOCs pollution.

Category 4: Indoor air pollution control

People spend, on average, 70% of their time in indoor environment and therefore are potentially more exposed to indoor air pollutants. In addition to outdoor pollution infiltration, there are also many pollution sources in indoor environments, which causes high indoor air pollution that are often more severe than the outdoor air. As people are becoming more aware of air quality and health, concerns on the indoor air quality have also been raised.

We are looking for the following types of indoor air purification technologies:

Central HVAC system purification technologies.

Decentralized purification technologies, such as indoor air purifiers, vehicle air purifiers, etc.

Category 5: Advanced pollution source and air quality monitoring

In order to effectively conduct air pollution prevention work, it is essential to know the specific air pollution characteristics of the area and its major pollution sources. Advanced monitoring technologies are able to provide real time, accurate and comprehensive air quality data, which can support air quality management, policymaking and strategic planning. Hence, the Bluetech Award has selected the advanced pollution source and air quality monitoring as one of the technology categories.

We are looking for the following types of advanced monitoring technologies:

Ambient and indoor air quality monitoring technologies.

Pollution source monitoring technologies, such as online monitoring devices, portable devices.

Other advanced air pollution monitoring technologies, Dust/TSP monitoring etc.

Category 6: Innovative waste incineration emission control and its substitution technology

The world produces 490 million ton waste every year, in which China produces 150 million ton of them. There are approximately 7 billion ton of waste have been accumulated around Chinese cities. Along with the urbanization, waste use to be a big burden that has restrained city development. Thanks to the technology development, the potential of waste has been explored and now it has been considered as the “urban gold mine” or “rich resources in wrong place”. Waste treatment had a late start but grow fast in China. The waste incineration, as one of the most effective garbage disposal approach, has been advocated. According to the 13th FYP, it is requested to build waste incineration power generation capacity by 7.5 million kW. Nevertheless, waste incineration could jeopardize the environment without proper management and control measures. This year, Bluetech Award has selected this category to look for world leading technologies in helping China better manage the waste treatment works.

We are looking for the following types of advanced monitoring technologies.

Waste incineration related technology such as advance incinerator;

Acid gas and heavy metal control technology, such as advanced bag filter system;

Dioxin control technology, such as incineration temperature control system;

Related waste emission control technology, such as leachate control technology;

Other waste incineration substitution technology, such as anaerobic fermentation, garbage compost etc.

★ Bluetech Future Unicorn Competition

The Unicorn is defined as a start-up company that values 1 billion or more. The Bluetech Future Unicorn competition aims to identify, foster, and accelerate the future giant of clean technology start-ups. This competition welcomes all the companies and individual competitors with ideas or inventions in clean air technology.

6th Bluetech Winner Introduction

The 6th Bluetech Award officially began in August 2020, and completed technology gathering in December. The Bluetech Award looks for breakthrough potential from these technologies in terms of environmental benefits, technical performance and economic feasibility. This year, we are excited to announce that 7 technologies win Bluetech Award.

Disclaimer

The Bluetech Clean Air Alliance (BCAA) undertook the mandate to organize the Bluetech Award Clean Air Technology Schemes and entrust Innovation Center for Clean-air Solutions (ICCS) as a technical support entity to carry out relevant technical assessment work. BCAA organizes this event in accordance with relevant laws and regulations and also based on the principles of objectivity, fairness, and justice. In order to ensure the seriousness and scientificity of the award, we have clearly required all participating entities that:

1. The intellectual property of the technologies that participate in the event of Bluetech Award (Participating Technology) shall belong to the participating entity, or the participating entity shall be legally granted a license to use the Participating Technology and shall have the right to submit the Participating Technology to the event of "Bluetech Award".
2. The participating entities shall truly disclose the information related to the Participating Technologies, include but not limited to inventors, applicant, technical parameters, legal status, etc.

BCAA will organize experts in related fields to make objective assessment on the evaluation technology based on the relevant information provided by the participating entities.

BCAA hereby acknowledges that the award of Bluetech Award shall be based on the information, data and documents provided by the participating entities and we have only conducted onsite verification for a few technologies which had applied for the technology assessment. Hence, we are not able to guarantee the authenticity and accuracy of all information, data and documents. BCAA does not take responsibilities for any un-authorized use of relevant technology information in any form of distribution in the internet. BCAA reserves the right of final interpretation to the above statement.

Bluetech Winners

In the 2020 Bluetech clean air technology campaign, 7 technologies win the Bluetech Award. The winners cover diesel engine pollution control category, VOCs substitution and pollution prevention, indoor air pollution control category, advanced pollution source and air quality monitoring category coal and coal combustion emission control & clean energy substitutes (non-power sector). The technologies and applicants are listed below.

Technology/Product	Applicant
Diesel engine emission reduction technologies & clean energy substitutes	
Development and application of zeolite SCR after-treatment system for diesel vehicle	CATARC (Tianjin) Automotive Engineering Research Institute Co.,Ltd.
CN VI Diesel Exhaust System for Light Vehicle	Wuxi weifu lida catalytic converter co.,ltd.
VOCs substitution and pollution prevention	
Novel VOCs Microfluidic Gas Chromatography Technology	Nanova Environmental, Inc.
Optical Gas Imaging (OGI) for VOCs detection & quantification.	Thermo Fisher Scientific (China) Co. Ltd.
Indoor air pollution control	
Ductless filtration technology (activated carbon and HEPA)	Kunshan Erlab D.F.S Co., Ltd
Advanced pollution source and air quality monitoring	
Particle sensor	Shandong Mingchuan Automobile Group Co., Ltd.
coal combustion emission control & clean energy substitutes (non-power sector)	
A novel carbon sequestration biotechnology that utilizes industrial tail gas	Beijing Shougang Lanzatech New Energy Technology Co Ltd.

Development and application of zeolite SCR after-treatment system for diesel vehicles

Category:

Diesel engine emission reduction technologies & clean energy substitutes

Applicant:

CATARC (Tianjin) Automotive Engineering Research Institute Co.,Ltd.

Country:

China

Company Introduction:

CATARC (Tianjin) Automotive Engineering Research Institute Co., Ltd., wholly owned by CATARC, integrates the advantageous resources of CATARC in automotive engineering development, and was officially established in April 2009. The company is committed to improving the technical competitiveness of the automotive industry. It has built a world-class performance development platform around the five technical directions of electronics and electronic control, NVH, energy conservation and emission reduction, active and passive safety, new chassis, and more than ten performance fields. The company can provide the industry with full life cycle technical services such as product engineering technology development, the localization of tool-like hardware and software, product supply and joint research of the "being hit in the throat" technology, and continue to lead the digital transformation of traditional engineering technology research and development capabilities. The company has become one of the best domestic providers of automotive product research and development technology solutions and strives to build an internationally competitive automotive product technology research and development service organization.

National Engineering Laboratory for Mobile Source Emission Control Technology is constructed under the leadership of National Development and Reform Commission (NDRC) and is led by CATARC. Aiming at the prevention and control of national mobile source pollution and air quality, taking the technology of mobile source exhaust emission and evaporation emission control as the mainline, facing significant demand for the technology and engineering of mobile source pollution emission control

In terms of industrialization, the production process of one-step synthesis of zeolite materials, a formula for catalytic coating slurry containing multiple additives and a method for coating surface-active thin layer modification have been developed. The product consistency has been improved.

System integration technology developed the accurate prediction method of the ammonia storage and temperature distribution inside the catalyst and the SCR real-time injection control strategy, which realized the high conversion efficiency of the SCR and low ammonia leakage (<10 ppm) under transient operating conditions of the engine. A urea injection control strategy optimization method based on the SCR aging coefficient was developed to realize the dynamic matching of the urea injection volume with the aging degree of the catalyst.

Technology Performance:

Table1 Key technical indicators of SCR

No.	Item	Parameter
1	Ignition temperature of NO _x (T ₅₀)	≤141
2	Active window of NO _x (T ₉₀)	173-600
3	Active window after hydrothermal aging (T ₉₀ , 750 -24h-10%H ₂ O)	210-460
4	Active window under Carbon hydrogen atmosphere (T ₉₀ , C ₃ H ₆ 200 ppm)	190-550

Table2 Catalyst sample coating performance

No.	Item	Parameter
1	Dropout rate	≤2%
2	The largest difference in active component element content within 25.4 mm of the coated catalyst	≤5.1%

Table3 Emission performance of after - treatment device

No.	Item	Parameter
1	Conversion efficiency of NO _x	>95%
2	NO _x emissions under WHSC	0.12
3	NO _x emissions under WHTC	0.32

Economic Performance

The diesel vehicle market with an annual increase of 4 million units will continue to drive the market capacity of the National VI after-treatment system to 80-100 billion yuan. After the results of this project are promoted and applied (based on a 20-30% market share), the output value of the system products will reach 6-24 billion yuan.

Application Status:

The zeolite materials technology of this project has been transformed into achievements in a company in Shandong, and the annual output value will reach 150-200 million yuan per year. The catalysts technology has been industrialized in a company in Sichuan. After implementing the National VI regulations, the expected economic benefits will be up to 120 million yuan per year. The results of this project were further applied to many domestic self-owned brand after-treatment companies. Related products have been successfully applied in various National VI engines from well-known domestic engine manufacturers, which effectively improved the cold start performance and reliability of the SCR system.es.

Ductless filtration technology (activated carbon and HEPA)

Category:

Indoor air pollution control

Applicant:

Kunshan Erlab D.F.S Co., Ltd

Country:

China

Company Introduction:

Erlab invented the ductless filtering technology in 1968 for laboratories to efficiently protect the health of laboratory personnel and purify the polluted air inside from any chemical. Through more than 50 years of continuous innovation and commitment to safety, performance, energy efficiency and sustainability, Erlab patented activated carbon technology has been chosen as the trusted partner by more than 15, 000 customers when it comes to safe, sustainable, modular, energy-efficient and smart laboratories.

From its original professional and industrial application, Erlab expanded its lab-grade quality air filtration offer to other spaces, from classrooms to offices and commercial buildings. This technology is easy-to-install with no ductwork, saving time and money while still delivering healthier air, guaranteeing laboratory-grade air quality by filtering all gas, viral and bacterial pollutants at the source.

Technology Description:

Ductless filtration technology combines both physical and chemical adsorption mechanisms, the modular “Flex®” revolving filtration system of 4 parts: Pre-filter and/or HEPA particle filter, Main activated carbon filter, Fan box and Second-layer safety backup filter.

The principle of ductless filtration technology is that fan creates a negative pressure. The airflow flows from bottom to top to ensure that the chemical substances in the cabinet do not leak. Then, those substances go through the different filtration layers where it will be absorbed or retained. Finally, the clean air returns to the room, achieving the requirements of zero pollution and zero-emission. The “clean

air” is defined and regulated by the China JG/T 385-2012 standard which requires the exhaust air to not exceed 1% of the PC-TWA (Permissible Concentration – Time Weighted Average) as defined by the China National Health Commission for occupational health (GB.Z 2.1-2019). This technology overcome the 4 main technical barriers of activated carbon filtration for use in laboratory:

- Increased the types of chemicals which can be filtered,

- Increased the adsorption capacity of the filter

- Inhibited the desorption while extending the filter lifetime

- Customized applicability and filter lifetime assessment services according to the real situation of each laboratory (every lab is different)

Technology Performance:

- Adsorption 700 of the most common chemicals.

- Increasing the filter adsorption capacity drastically.

- Guarantees desorption will not be triggered below 180°C.

- Customized applicability and filter lifetime assessment services according to the real situation of each laboratory

- Save energy of the expensive laboratory ventilation (more than 90% savings).

- Improve the air quality inside and outside the laboratory by capturing the pollutants at the source.

- Get rid of piping and no need to connect to the building ventilation system: Protection anywhere anytime!

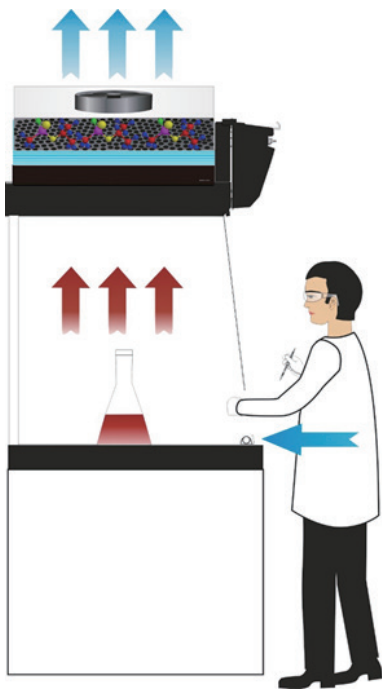
Economic Performance:

Ductless filtration technology is easy to install and can move anywhere. Also, there is no need for any complicated ventilation system connected (Exhaust system, Air supply system, VAV variable air volume control system Air conditioning system, humidifier/dehumidifier, filter system). This technology can save on construction costs and operating costs (no need for expensive fresh-air supply, operating costs can be typically reduced by more than 50%). Taking the example of Tianjin University, it is estimated that nearly 3 million cost is saving in ten years by using of ductless fume hoods.

Application Status:

Wide application in the chemical laboratories of Pharmaceuticals & Life sciences, testing services (CDC, FDA, EMC, CIQ, PSB, private companies, etc.), F&B / FCMG, Water & waste treatment, Schools & Museums, flavor & fragrance, chemical engineering, oil & gas, automotive, semi-conductor, etc.

Typical applicable chemical operations: weighing, general chemical handling (rotary evaporator, titration, extraction, sampling), automatic instruments (HPLC, 3D printers, gas chromatograph), chemical and waste chemical storage, room air purification, etc.



Schematic diagram and product example of Ductless filtration technology

Particle sensor

Category:

Advanced pollution source and air quality monitoring

Applicant:

Shandong Mingchuan Automobile Group Co., Ltd.

Country:

China

Company Introduction:

Shandong Mingchuan Automobile Group Co., LTD., founded in March 2017, is located in Nanhai New Area, with a total output value of 150 million yuan and 67,099 square meters. It is a technology-oriented enterprise mainly engaged in the design, research and development, production and sales of diesel vehicle exhaust after-treatment system, mobile source pollution monitoring and treatment system. The company is the first to research and develop the most advanced PM particle sensor technology enterprises. The innovation experiment base of Wuhan University of Science and Technology has been jointly built with Wuhan University of Science and Technology. The Sino-German Marine Rescue Technology and Equipment Research Center were jointly established with the Navigation School of Shandong Jiaotong University and the Sino-German Marine Rescue Technology and Equipment Research Center. At present, it has undertaken 1 technical innovation project in Shandong Province, and won the title of "Shandong Province specialized, Special and New Small and Medium-sized Enterprise" in 2021.

Technology Description:

The particle sensor technology of our company is used to monitor the particulate matter in automobile exhaust. This product meets the vehicle standard, and this product has large dynamic range, high reliability, accurate accuracy and adaptability to harsh working conditions. This technology uses laser backscattering method to measure particles. This technology can keep the key components away from the high temperature and high pollution exhaust environment by optimizing the detection principle according to the working conditions of the vehicle. At the same time,

regeneration function can be configured according to the working condition, which can improve service life and data reliability of the sensor.

Technology Performance:

Particle sensor technology is based on the optical method, which can monitor the concentration of engine exhaust particulate matter at low cost, real-time, and accurately.

This technology can upload data to the cloud platform through the interface and IoT communication module to realize real-time tracking management of background / mobile phones.

The sensor integrated heat insulation and heat dissipation design with high temperature and corrosion resistance. At the same time, it has patented dust-proof and anti pollution structures, and has preheating and regeneration functions.

Relevant Parameters:

The working temperature of sensor probe: - 40 ~ 650 °C.

Working hours: 20000 hours.

Range: 0 ~ 65 mg / M³ (mass concentration of particles), 0 ~ 100% (opacity)

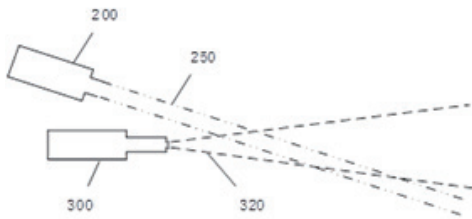
Resolution: 0.01 mg / M³ (mass concentration of particulate matter), 0.1% (opacity)

Economic Performance:

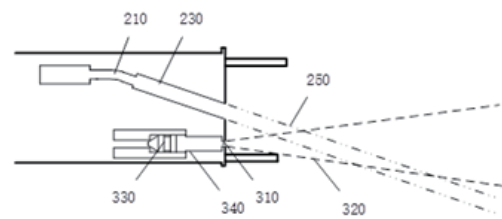
The particle sensor has stable performance, miniaturization, integration and low cost (lower than 40% of the cost of equivalent products in the market). It can monitor the concentration of particulate matter in engine exhaust economically and accurately in real time. It can reduce the frequency of regularly going to the testing station to test vehicle emission data every year. Particulate matter sensors cost 600 to 1,500 yuan.

Application Status:

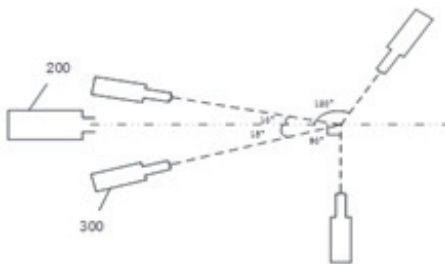
In recent years, the country has been vigorously controlling environmental pollution, and the plan to protect the blue sky has been carried out steadily. The Ministry of Ecology and Environment issued regulations requiring real-time monitoring of particulate emissions from diesel vehicles, and the diesel particulate sensor is the best choice to meet this requirement. This diesel engine particulate matter sensor, with stable performance, low price, easy to use and other characteristics, is widely used in diesel vehicles.



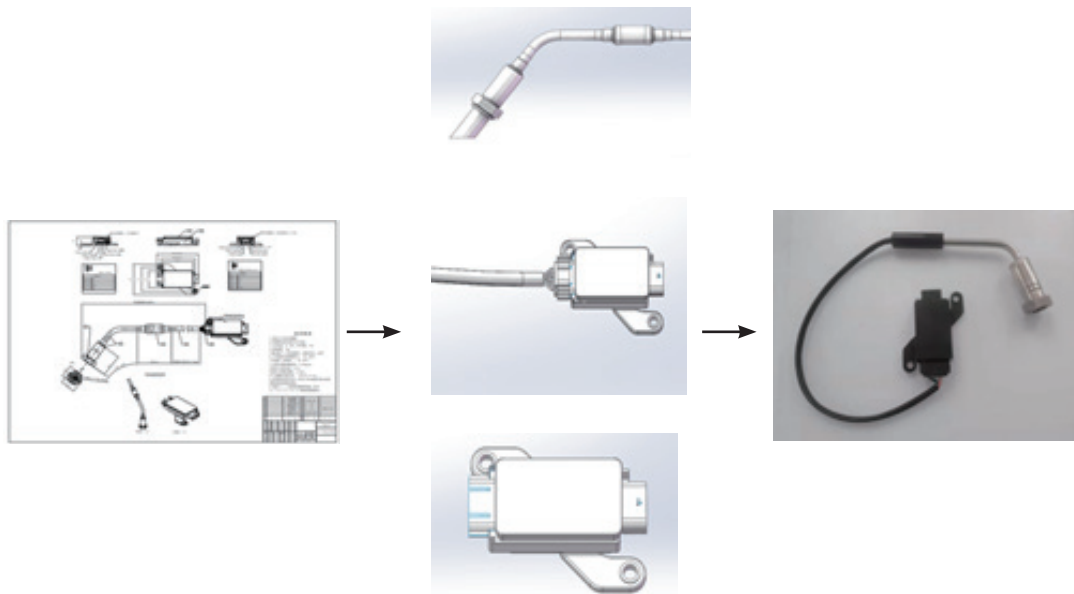
Infrastructure diagram of environmental monitoring equipment



Schematic diagram of improved structure



Schematic diagram of front scattering and back scattering, schematic diagram of angle / Mie scattering



Particle sensor product example

Novel VOCs Microfluidic Gas Chromatography Technology

Category:

VOCs substitution and pollution prevention

Applicant:

Nanova Environmental, Inc.

Country:

China

Company Introduction:

Nanova Environmental, Inc. is a US company established in Columbia, Missouri, and provides innovative technologies, products, and services to advance environmental monitoring and environmental protection. Our highly qualified teams are dedicated to innovations and patented cutting-edge technologies beyond industry standards. We have been actively cooperating with renowned universities and many environmental organizations to promote innovative technology and convenience to the world.

Our R&D team consist of highly talented and educated engineers and scientists. Our state-of-the-art technology is supported by researchers from notable universities such as University of Missouri, University of Michigan and Ohio State University. We are confident to provide the world with revolutionary products and services.

Technology Description:

The patented design of the microfluidic chromatography system has almost zero "dead volume", a built-in micro thermal desorption unit, a high-efficiency VOC capture unit, millisecond heating to release VOCs. The gas line is made from PTFE, PEEK, SS and other top materials with outstanding chemical resistance, greatly minimizing the residuals in the system, eliminating tailing effect and contaminations of VOC from inside the system, and reducing the full width at half maximum (FWHM) of the peaks to less than 5 seconds with greatly improved peak symmetry and system resolution.

The patented MEMS technology is adopted in the non-destructive PID sensor. Based on the non-destructive ultraviolet photoionization detection principle, the PID does not consume samples and as a result, can be combined with a secondary instrument; The

microchannel has a diameter of 380 μm , which allows for zero dead volume and longer gas detection time, greatly improving molecular ionization process, the sensitivity and the dynamic linear range to make the detection limit less than <1 ppb.

The multi-channel delta-sigma 32-bit differential data acquisition unit has lower noise and higher signal accuracy to guarantee the improved the performance, anti-interference capability and data repeatability of the instrument. A unique algorithm for enhanced fitness and repeatability of the temperature curve ensures an average temperature difference within 0.07 Celsius degrees across the set temperature range (typically 0.02 Celsius degrees), highly consistent results, and minimal system error from the instrument.

Microfluidic ionization chamber based on MEMS technology

Based on gas chromatography (GC) and photoionization (PID) detection

Thermal desorption system, GC separation system and PID detection system are all integrated into one unit.

The invented compact gas chromatography can be used to analyze organic and inorganic components such as VOCs in air and water.

Technology Performance:

380 μm gas channel design and no dead volume

Micro ionization chamber requiring no make-up gas

Low carrier consumption < 5 mL/min

LOD < 1 ppb (benzene)

FWHM < 2 s (benzene)

Miniature of detector

Economic Performance:

The microfluidic design requires a carrier gas of only 3 ml/min and an average power consumption of 50 W.

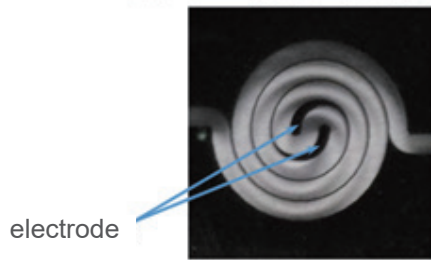
The product has automatic sampling, remote control and report viewing, needs maintenance only once a month, greatly saves labor and consumables cost for on-site operation.

On-site analysis to reduce the deviation during the sample collection, transportation, and storage, reflecting the real condition of the environment at the site, supporting environmental law enforcement and risk warning timely and reliably.

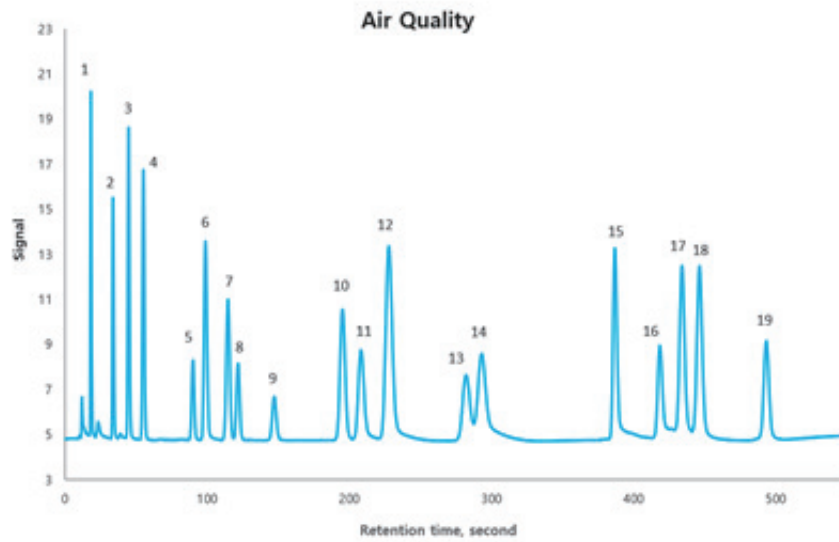
Application Status:

No.	Customer
	China
1	Groundwater VOC Online Detection Project Team of Ministry of Science and Technology / Zhang Jing
2	Gansu Provincial Environmental Monitoring Center Station
3	Haibei Prefecture Ecological Environment Bureau
4	Chengdu Center for Disease Control and Prevention
5	Jiangsu Provincial Center for Disease Control and Prevention
	International
6	USEPA
7	Philips, Holland
8	Sunwoo engineering, Korea
9	Civil Environmental Consulting, US

Microfluidic ion chamber based on MEMS technology



380 μm
Microfluidic
channel



Optical Gas Imaging (OGI) for VOCs detection & quantification

Category:

VOCs substitution and pollution prevention

Applicant:

Thermo Fisher Scientific (China) Co. Ltd.

Country:

China

Company Introduction:

Thermo Fisher Scientific Inc. (NYSE: TMO) is the world leader in serving science, with annual revenue of approximately \$35 billion. Our Mission is to enable our customers to make the world healthier, cleaner, and safer. Whether our customers are accelerating life sciences research, solving complex analytical challenges, improving patient diagnostics and therapies, or increasing productivity in their laboratories, we support them. Our global team of more than 90,000 colleagues delivers an unrivaled combination of innovative technologies, purchasing convenience and pharmaceutical services through our industry-leading brands, including Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific, Unity Lab Services and Patheon.

Technology Description:

Optical Gas Imaging (OGI) is an innovative thermal imaging technology that utilizes high sensitivity infrared cameras for detecting minute fugitive emissions of industrial gases. Gas leak detection cameras enable the quick and safe detection and visualization of fugitive emissions leaks; thus, OGI can find and repair leaks quickly, prevent significant damage, and avoid revenue loss while complying with regulatory compliance.

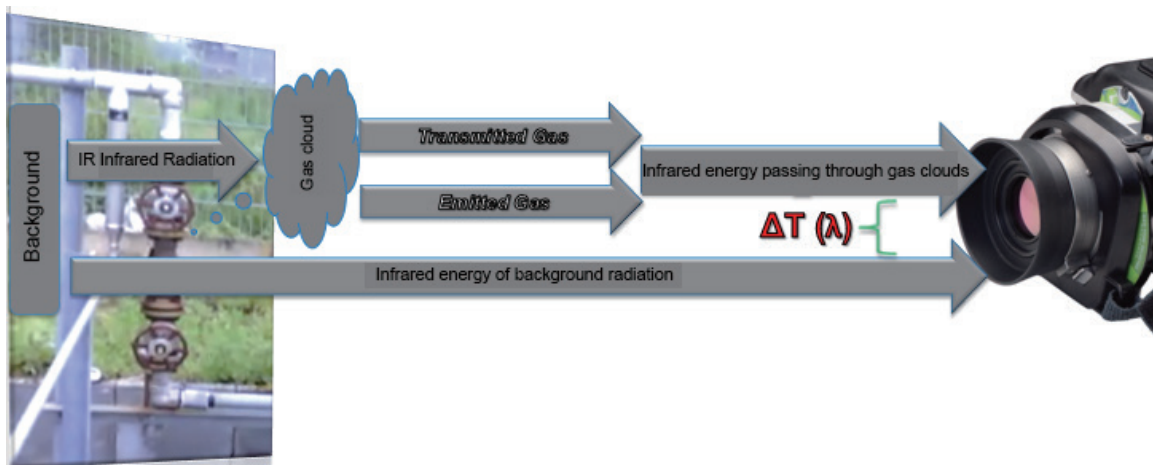
The technology is based on a mid-wave infrared, cryogenically cooled MCT detector for imaging volatile organic compounds (VOCs). a $3.3\mu\text{m}\pm 0.13\mu\text{m}$ (at half height), bandpass hot filter is installed in the OGI camera between the lens and the detector. This filter transmits radiation only in the spectral region where VOCs absorb or emit thermal energy radiation. The thermal energy that reaches the detector is then transformed into an image. The thermal energy that passes through a gas plume will

be change and will cause a contrast difference in the generated image. This contrast difference makes the gas plume visible in the image (looks like a smoke in the image).

Comparing with other detection methods, one of the great advantages of OGI is the significant advantage of rapidly locating leaking components without interrupting industrial processes.

Economic Performance:

In most cases, the cost of OGI gas imagers can be recovered at the time of the initial survey, and in some cases at the time of the initial detection of gas leaks. According to incomplete statistics, OGI Gas imagers can help customers detect or reduce leaks by more than 90%, with significant safety and economic benefits.



Schematic diagram and product example of OGI

Application Status:

As an innovative and efficient gas detection technology, optical gas imaging (OGI) technology has been rapidly developed and applied in recent years.

Overseas applications

Optical Gas Imaging (OGI) as a Moderator for Interdisciplinary Cooperation, Initiated by the Norwegian Environmental Agency (NEA) □ Reduced Emissions and Increased Safety. A total of 95 leaks were found (10 known + 85 previously undetected leaks)

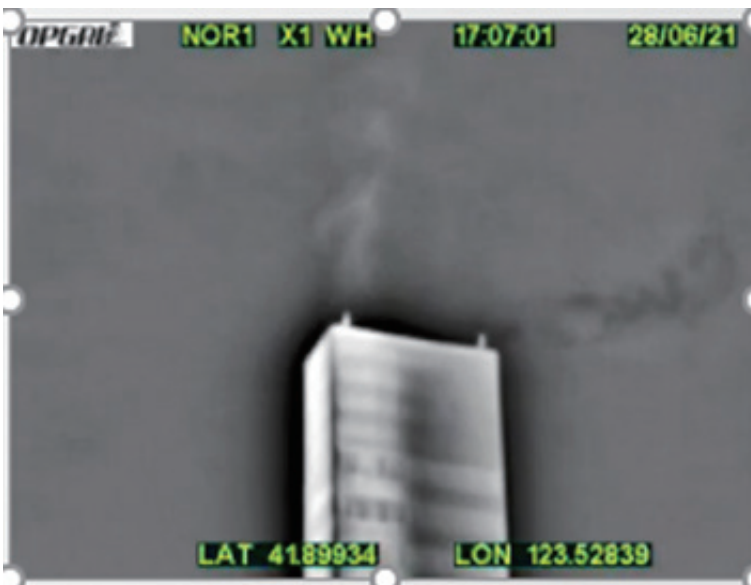
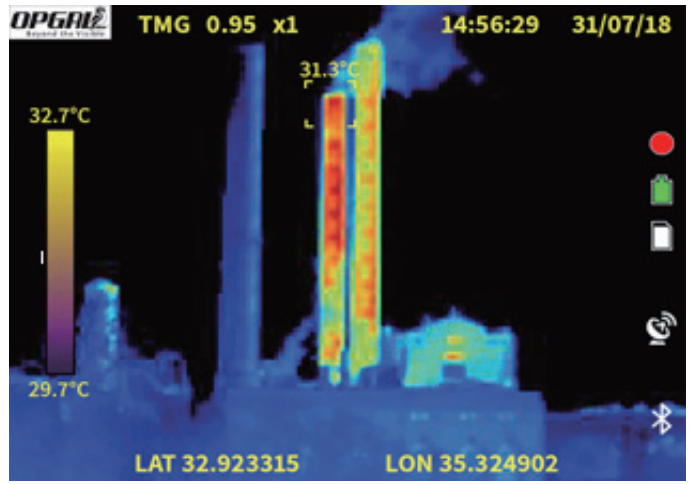
Detection of gas leakage from landfills using optical gas imaging coupled with fence monitoring system of odor by IOMS in Italy. 66% reduction of methane emission and 83% decrease of monthly critical events

OGI cameras for environmental regulation enforcement at petrol stations in Israel can reduce fugitive hydrocarbons leaks by up to 85%, Stop the flow of noxious and potentially explosive fumes and Recover expensive products.

China applications

Shandong, Zhejiang, Jiangsu and Guangdong provincial and municipal EPBs use OGI for VOCs emissions surveillance.

Quite a few Petrochemical companies use OGI to do LDAR as well as for safety purpose.



Product example of OGI

A novel carbon sequestration biotechnology that utilizes industrial tail gas

Category:

Coal combustion emission control & clean energy substitutes (non-power sector)

Applicant:

Beijing Shougang Lanzatech New Energy Technology Co Ltd.

Country:

China

Company Introduction:

Beijing Shougang Lanzatech New Energy Technology Co Ltd., established in November 2011, is a high-tech sino-foreign joint venture enterprise controlled by Shougang Group and a pilot enterprise of mixed-ownership reform in Beijing. The company adopts the world's leading biological fermentation technology to directly convert industrial tail gas into high value-added products such as ethanol fuel and protein feed, realizing the highly efficient and clean utilization of industrial tail gas resources. The technological process effectively solves the global carbon crisis and implements general secretary Xi Jinping's important instructions regarding "peak carbon emissions and achieving carbon neutrality." It is a paragon of the reinvention of industrial process engineering as well as being of great significance to the reduction of carbon emissions, replacement of fossil fuels, security of national energy and food resources, development of non-grain based liquid biofuel technology, and establishment of a green low carbon circular economy.

Technology Description:

The technological process utilizes the fermentation bacterial strain *Clostridium autoethanogenum* and carbon monoxide within industrial tail gas from steel and iron, metallurgy, calcium carbide, phosphorus, etc. industrial processing plants as raw material. The technological process comprises six key technologies, with fermentation being the core technology. These technologies include feed gas pretreatment, high-efficiency fermentation, distillation and dehydration, bacterial protein concentration and desiccation, tail gas treatment and heat recovery, and wastewater treatment. Through

the world's first 300-ton pilot plant and many technical improvements after dozens of tests, successfully get through the many technical optimizations and dozens of rounds of tests. While successfully producing ethanol, also the first time to develop a new kind of bacterial protein. The success of technology from the laboratory to the pilot, achieving the revolutionary technological breakthrough involving the transformation of gaseous inorganic carbon to organic carbon. In May 2018, a giant leap was made and the project progressed from the pilot stage to a large-scale commercial operation stage and completed the construction of the first commercial plant which can produce 45,000 tons ethanol per year. After three years of continuous and stable running, the economic, environmental, and social benefits have been remarkable. Each ton of ethanol produced can reduce carbon dioxide emissions by 2.5 tons. In addition, the application of ethanol as a biofuel (with gasoline) can reduce carbon dioxide emissions by a further 1.5 tons.

Technology Performance:

Mild reaction conditions, short technical flow process, carbon sequestration can be realized in a single process under normal temperature and low pressure where carbon-containing gas is converted into ethanol and bacterial protein.

Raw materials come from various sources, including industrial tail gas from iron and steel, metallurgy, calcium carbide, petrochemical oil refining, silicon carbide, syngas, coal, etc industries. There is also the potential for syngas from agricultural and forestry wastes such as straw and urban garbage to be utilized in the future.

High fermentation efficiency, fast reaction speed, and continuous production.

Economic Performance:

Compared with burning for electricity, the economic benefit of ethanol production through biological fermentation of industrial tail gas is two times higher than power generation. Furthermore, the energy utilization efficiency is almost one time higher than power generation.

There is an obvious cost advantage to non-grain sourced ethanol production. Compared with grain-sourced ethanol production, the average total cost is reduced by more than 30%.

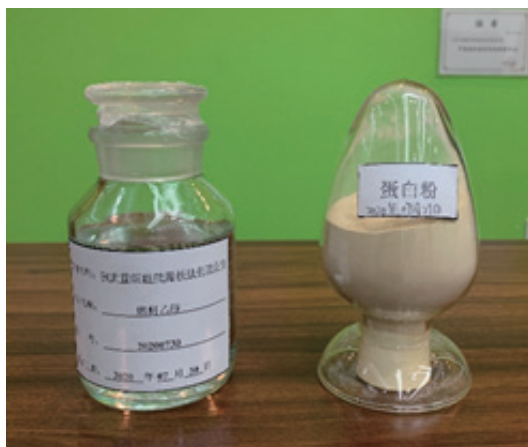
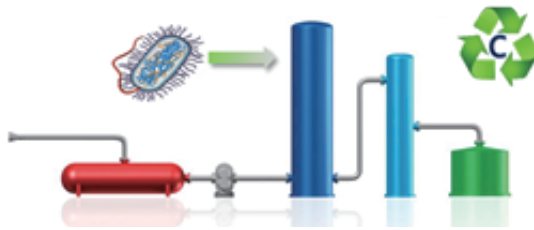
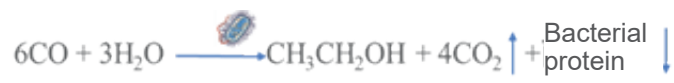
The technological process has a high rate of return on investment, with a payback period of 4-5 years.

Application Status:

Product application: The company's ethanol fuel has successfully been incorporated into the E10 system. PetroChina and Sinopec have well recognized the ethanol fuel. At the same time, it has entered the international and domestic trade markets and the aviation fuel, petrochemical refining, chemical materials industries.

The company's bacterial protein has been included in the national feed materials catalog and is currently supplying the domestic aquatic feed market, universities, and other scientific research institutes.

Project development: 2 projects have begun operation, 2 new projects are under construction, and more than 10 strategic cooperation agreements have been signed.



Schematic diagram and product example of carbon sequestration biotechnology that utilizes industrial tail gas

CN VI Diesel Exhaust System for Light Vehicle

Category:

Diesel engine emission reduction technologies & clean energy substitutes

Applicant:

Wuxi weifu lida catalytic converter co.,Ltd.

Country:

China

Company Introduction:

Wuxi Weifu Lida Catalytic Converter Co.,Ltd. (WFLD), with the after-treatment of automobile, motorcycle and non-road machinery emissions and purification of industrial exhausts as its leading industry, is the subsidiary company share-controlled by Weifu High-Tech Co.,Ltd.(000581). In 2004, WFLD joint-ventured with a foreign company to set up Wuxi Weifu Environmental Catalysts Co.,Ltd. (WFEC), which specialized in R&D, production, sale and technical service of catalysts. The company integrates after-treatment system with catalysts and provides customers with the most comprehensive “one-stop” solution. WFLD is the backbone enterprise in the after-treatment industry of domestic internal combustion engines. The technology level, market scale and production capacity of WFLD take the leading position in domestic China and it's the most important supplier of China's own brand automobile exhaust after-treatment products.

The exhaust after-treatment products, successfully developed by the company through applying the independent technology and patent, can make the vehicle emissions meet Europe/CN V, VI requirements and the performance of these products is better than that of peer manufacturers, reaching the advanced level of the same kind products in foreign developed countries. They can be constantly optimized, upgraded, and sustainably developed, and are widely applied in petrol vehicles, diesel vehicles, motorcycles, general machinery and industrial catalysis, to provide great support to the product upgrading of the automobile manufacturers.

Technology Description:

The emission characteristics of light diesel vehicles and the CN 6 emission regulations requirements provide a tightly coupled urea soot double effect post-treatment system. The system's structural design can promote the mixing of urea droplets and gas flow to ensure the ambient temperature of urea pyrolysis and hydrolysis, and improve the atomization degree and distribution uniformity of urea under medium and low load. The problems of traditional layout space limitation and low NOx catalytic conversion efficiency of conventional integrated SCR catalyst are solved. At the same time, the post-processing system has simple structure. According to the characteristics of the tightly coupled purifier, the doc part and DPF part of the purifier can be arranged in V-shape or right angle, which is flexible and convenient. Through the connection of compact mixing device, the space occupied by the purifier is greatly reduced, the temperature loss is reduced, and the average exhaust temperature of DPF is improved, the temperature loss is reduced and the average exhaust temperature of DPF is improved. In addition, a baffle is set at the rear end of DOC to prevent the direct injection of urea beam by the gas flow after DOC and reduce the impact of gas flow on urea particles.

Technology Performance:

The tightly coupled urea soot double effect post-treatment system can not only meet the requirements of higher NH3 mixing uniformity of SCR system to improve NOx conversion efficiency, but also meet the requirements of higher flow rate uniformity and higher soot distribution uniformity of DPF system to reduce the risk of soot blockage and uneven regeneration.

Economic Performance:

The monthly sales volume is 10000 units. The cumulative sales volume has reached 180000 units, creating a total output value of about 630 million CNY.

The liner coverage is reduced by more than 10%.

The casting cost is reduced by stamping, and the cost of a single set is reduced by 80RMB / set.

Application Status:

It is mainly applied to light trucks of CN VI diesel vehicles. It has been applied in batches in major diesel engine manufacturers, realizing the market-oriented application of tightly coupled CN VI exhaust treatment systems and integrated products, providing core guarantee for winning the blue sky defense strategy.



Product example of OGI

Previous Winners

1st Bluetech Award Winners

Technology	Applicant
Diesel Engine Pollution Control Technology	
Multi Functional Diesel Performance Additive	Total Petroleum (Shanghai) Co., Ltd.
Diesel Particulate Filter System	Wuxi Weifu Lida Catalytic Converter Co., Ltd.
VOCs Pollution Control Technology	
Low Emission Control Technology for Valves	Garlock Sealing Technologies (Shanghai) Co., Ltd.
Indoor Air Purification Technology	
Mayair Electric-Pocket Technology	Mayair Technology (China) Co., Ltd.
EKEAIRTM MKJ-4000 Air Purification Disinfectant	Jiaying Sanyin Environmental Purification Technology Co., Ltd.

2nd Bluetech Award Winners

Technology	Applicant
Diesel engine emission reduction technologies & clean energy substitutes	
Air Powered Start-up System	Shanghai ShenZhou Vehicle Energy Saving & Environmental Protection Co., Ltd.
Ammonia Storage and Delivery System (ASDS)	Faurecia China
Ultra-low emission* control for coal-fired power plants	
The Deep Desulphurization Technology of Flue Gas by Slurry Atomization and Swirl Flow Field	Beijing Chutian ruiping Environmental Technology Co.,Ltd
Coal combustion emission control & clean energy substitutes (non-power sector)	
Zeta Electrode Boiler	Beijing Zeta Energy Technology Corp.
Indoor air quality monitoring and air purification	
Intermetallic Compound Parer-like Membrane Air Purification Technology	Intermet Techonology Chengdu Co., LTD.
Escaping Current Particle Measurement	Pegasor Oy

3rd Bluetech Award Winners

Technology/Product	Applicant
Coal combustion emission control & clean energy substitutes (non-power sector)	
Catalytic Candle Filter (CCF) Technology for Multi-Pollutant Exhaust Emissions Control	Dürr Paintshop Systems Engineering (Shanghai) Co.,Ltd.
Comprehensive Utilization Technology of Low Temperature Waste Heat Recovery of Blast Furnace Slag Flushing Water and Steam	Beijing IVYQUEN Energy Saving Technologies Ltd.
Integrated Condensing Gas Boiler Technology	Suzhou Boehmer Thermo Products Co.,Ltd.
VOCs substitution, monitoring and pollution prevention	
Improved Vapor Recovery Unit	SYSTEM ENG SERVICE CO.,LTD. Japan
Advanced pollution source and air quality monitoring	
Fast, Multi-point Magnetic-sector Mass Spectrometry VOCs Online Monitoring System	Thermo Fisher Scientific Inc.
Environmental Air Quality On-line Monitoring System	ShangHai DST Technology Co., Ltd.
Bluetech Future Star	
Particle Agglomeration Inducer (PAI)	PEMRED AG
Large Straw Biological Anaerobic Fermentation System	Tsingtao CASHT Energy & Engineering Co., Ltd.
Copper/Zinc Energy Super-Storage Batteries	Cumulus Energy Storage Ltd.
Hexa-Cover	TopOasis (Beijing) Environmental Technology Co., Ltd.
Phage-based Chemical Sensor Networks	BioInspira, Inc.
Beijing Viready Technology Co., Ltd.	Beijing Viready Technology Co., Ltd.

4th Bluetech Award Winners

Technology/Product	Applicant
Advanced pollution source and air quality monitoring	
PM _{2.5} Sensor Grids for Urban Air Quality Monitoring	Beijing Municipal Environmental Monitoring Center
TT24-7xr	Markes International
Simple VOC Detection Technology using Interference Enhanced Reflection (IER) Method: Handy VOC Sensor	O.S.P Inc.(Japan)
Onboard Air Quality Monitoring System	Nova Fitness Co.Ltd.
High Spatio-Temporal Resolution of Mobile Real-Time VOCs Monitoring System	Guangzhou Hexin Instrument Co.,Ltd.
VOCs substitution and pollution prevention	
XPO® Ultra Low NO _x Gas Burner	Honeywell
Large-scale Dairy Farm Sewage Classification and Treatment Technology	Huameng Kechuang
Bluetech Future Unicorn	
Electric Airplane	Ampaire Inc.
Bluetech Future Star	
Bi-Modal Real-Time Air Quality Solution	Clarity Movement Co.& Ramboll Group A/S
Modular Unit of Indoor Air Purification (MUIAP)	Air Liquide Group
Waterless Printing Technology to Enable Elimination of VOCs	Toray International (China) Co., Ltd.
Supercritical Carbon Dioxide Coating Apparatus	Kami Electronic Industry Co., Ltd.& Nagase Co., Ltd.
Cogeneration of Power and Heat	SunOyster Systems GmbH
Wearable Air Purifier	ATMOBLUE

5rd Bluetech Award Winners

Technology/Product	Applicant
Diesel engine emission reduction technologies & clean energy substitutes	
Disel Exhaust Cool Particulate Regeneration (CPR)	Global Clean Diesel
Coal combustion emission control & clean energy substitutes (non-power sector)	
Ultra Low Emission Filtration and Dust Collection Technology	Donaldson (China)Trading Co., Ltd
Technology of Selective Circulation of Sintered Flue Gas for Energy Saving and Emission Reduction	Beijing KBSC Environmental Engineering Co.,Ltd
Indoor air pollution control	
Permanent Attachment Technique for Nano-sized photocatalysis Material	Liontrunk (Beijing) Technology Company Limited
Advanced pollution source and air quality monitoring	
Wide Temperature Nanometer-scaled Ultrafine Particle Dilution Generation and Number Concentration Measurement Systems	Beihang University
Bluetech Future Star	
User Side Voltage Quality Optimization Technology Based on Regulations of Electromagnetic Balance	Anhui Gemini Electrical Technology Co., Ltd.
Nano Photocatalyst Air Purification and Self-Cleaning Technology	Dalian Thinpair Technology Co., Ltd.



BlueTech Award

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