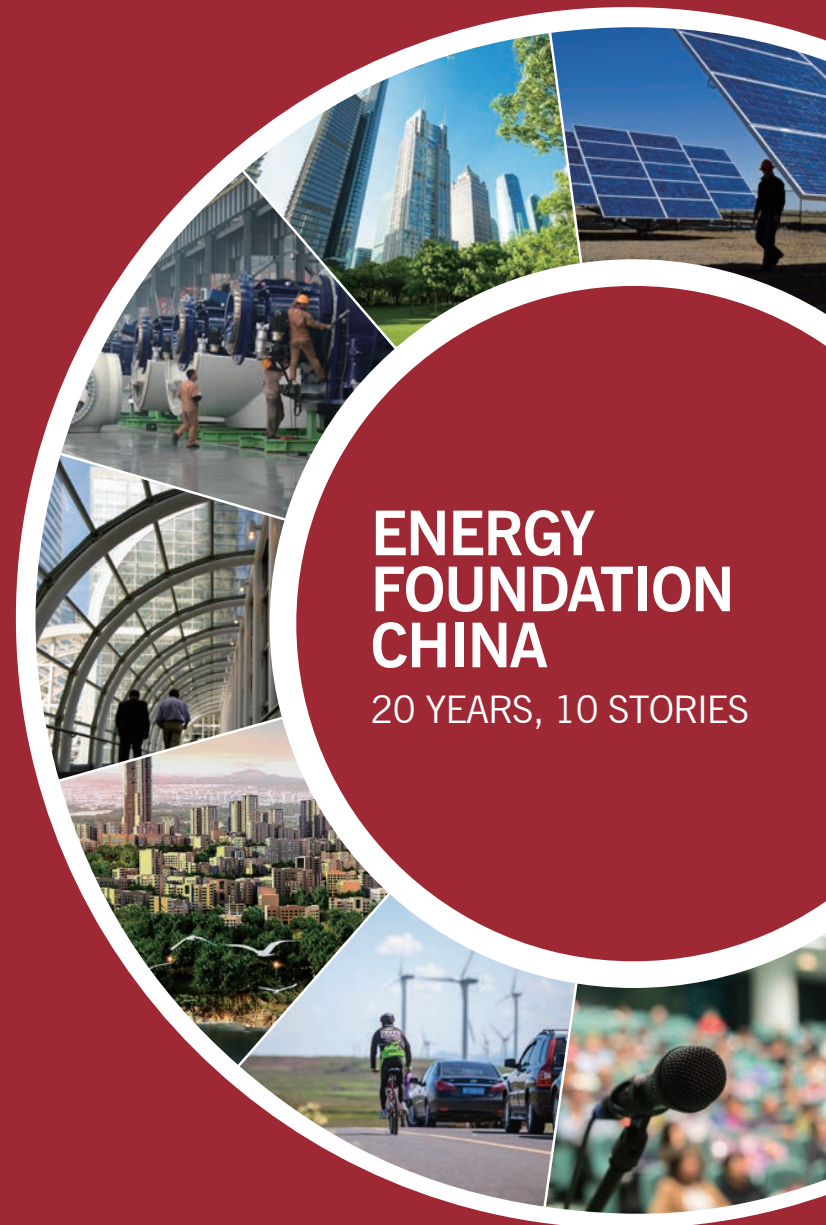




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ENERGY FOUNDATION CHINA

20 YEARS, 10 STORIES

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Introduction

Energy Foundation China is a professional grantmaking charitable organization registered in California, U.S. It has started working in China since 1999, and dedicates to China's sustainable energy development. The foundation's China representative office is registered with the Beijing Municipal Public Security Bureau and supervised by the National Development and Reform Commission of China.

Our vision is to achieve prosperity and a safe climate through sustainable energy. Our mission is to achieve green house gas emissions neutrality, world-class air quality, energy access, and green growth through transforming energy and optimising economic structure. We deliver the mission by serving as a regrantor, facilitator, and strategic advisor.

With a view to assisting China in coping with development, energy, environment, and climate challenges, we support policy and standard research, capacity building, and international cooperation across seven fields: power, industry, transportation, cities, environmental management, low carbon economic growth, and strategic communications. In addition to the sector-by-sector work, we also intend to contribute to crosscutting and integrated issues that have big impact on China's decarbonized development, through six task forces: Long-Term Strategy for Decarbonization, Belt and Road Initiative, Track II Cooperation, Electrification, Air Quality, and Urbanization.



By the end of 2018, Energy Foundation China had funded 2,739 projects operated by 750 grantees in China, of total amount of over 300 million dollars. The grantees include leading policy research institutes, academies, industry associations, local energy efficiency institutions, and NGOs in China and abroad, such as the Development Research Center of the State Council, the Energy Research Institute of the National Development and Reform Commission, the National Center for Climate Change Strategy and International Cooperation, the Chinese Academy of Environmental Planning, the Chinese Academy of Sciences, the Chinese Academy of Social Sciences, Tsinghua University, the Institute of Public and Environmental Affairs, the Innovation Center for Energy and Transportation, etc.

Key funders:

- William and Flora Hewlett Foundation
- David and Lucile Packard Foundation
- Children's Investment Fund Foundation
- John D. and Catherine T. MacArthur Foundation
- Laura and John Arnold Foundation
- Oak Foundation
- ClimateWorks Foundation
- Kigali Cooling Efficiency Program
- Pisces Foundation



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Energy Revolution and Low-Carbon Future for the Humankind



Zou Ji

CEO & President,
Energy Foundation China



The year of 2019 is a rather unusual year. It's the 70th anniversary of the founding of the People's Republic of China. It coincides with the 40th anniversary of the establishment of diplomatic relations between China and the United States. This is also the year that many Chinese from all walks of life have just reviewed the 40 years of reform and opening up of the country. The people are now eyeing a new phase of development in the coming decade and beyond. The country is poised to usher in formal implementation of the Paris Agreement as well, which is known as "the best chance we have to save the one planet we have." Standing at this important juncture, Energy Foundation China happens to be celebrating its 20th birthday as an environmental philanthropy in the country. While we are filled with emotions reminiscing about our past, our eyes are firmly set upon the future.

In the past 20 years, the world has witnessed the rise of a global revolution on energy—which is surely just a prelude of more profound changes to come—and the trend of de-carbonization in power generation, transportation, construction, and industry. Green and low-carbon development has gradually become a reality in our lifetime. China has achieved remarkable economic development during this period. But as the world's largest energy consumer and the largest source of energy growth, it also faces enormous pressure in the area of environmental pollution, challenges on energy security, and threats from climate change. By now, the country has come to realize that its economic growth cannot continue to rely on the extensive development model of high investment and heavy resources consumption. And her people are gradually strengthening their resolve and speeding up actions with regard to a low-carbon transformation of the economy. China has actively promoted green development and decarbonization with concrete actions, such as the introduction of the most stringent law in history on air pollution prevention and control, enhancement of supervision and law enforcement, drastic adjustment of energy structure, optimization of economic structure, and cultivation of fresh momentum. At the same time, China has actively participated in the global fight against climate change, acting as a pillar of support for the international efforts from the Kyoto Protocol to the Paris Agreement. It's fair to say that China has been gradually undertaking a dazzling strategic transformation as its economy matures. It is now taking up the responsibility of a major world power in the area of environmental protection, and contributing Chinese wisdom toward related global governance. So far, the country has provided one of the most exciting stages for global energy revolution and development path innovation. This is the fundamental reason why Energy Foundation China has steadfastly put down roots here. And during this period, we are very fortunate to have attracted an outstanding staff who are hardworking and dedicated to our cause.

Energy Foundation China has been pushing forward with a culture of philanthropy in our endeavor to help explore the future for China to achieve economic prosperity and climate safety through cooperation. The foundation was founded in San Francisco, and established its name in the area of sustainable energy practices and cooperation between China and the United States. Since entering China in 1999, we have been exploring about: how best to utilize the expertise of charities from around the world in order to match the scale and speed of China's energy transformation; how to make charitable funds play a role of seed capital so as to make greater contributions to the development of Chinese renewable energy and improve its efficiency; how to make the most of charity foundations' role as a bridge and a service platform for international cooperation, so that best practices and innovative ideas at home and abroad can become catalysts for accelerating energy transformation in China and the world at large. For two decades, we have had the privilege of supporting China's top

think tanks, research institutes, universities, industry associations, and fast developing civil society organizations to carry out fruitful works in promoting sustainable energy. By the end of 2018, we had funded more than 2,700 projects, operated by over 750 grantees in China, with grants exceeding \$300 million.

Here are some of the major initiatives undertaken by Energy Foundation China:

- We were among the first organizations to call for a renewable energy law in China and were invited by the National People's Congress to provide technical assistance to the drafting of such a piece of legislation.
- We took the lead in introducing voluntary agreements on energy conservation, and provided support for the design and implementation of both “Energy Conservation Actions for 1000 Enterprises” and “Energy Conservation and Low-Carbon Actions for 10,000 Enterprises”.
- We took action early on to support research on the China VI emission standard for passenger vehicles, promoted dialogue and cooperation between the Chinese automotive industry and various stakeholders, and actively introduced international experiences in this area to China. In order to facilitate the world's most stringent vehicle emission standard by the Ministry of Ecology and Environment, we also provided support on policy research.
- We were among the first to introduce and promote practices of the “people-centered” urban planning concept, and assisted major cities such as Kunming, Chongqing, and Shanghai in launching policies and pilot projects on humanized urban planning and design.
- For over 10 years, we have provided support for the study of coordinated management and control of atmospheric pollutants and greenhouse gases. Now, such measures are ready for full-scale implementation.
- We are supporting China to study its Long-Term Strategy for Decarbonization, one of the earliest 2050 reports in the country on energy and carbon emission strategy for the medium and long-term.
- We were the first in the field to launch the concept of “strategic communications” in supporting think tanks, research institutions, key media organizations, and non-governmental organizations over promotion of issues related to sustainable energy and green development, and in facilitating broad participation of stakeholders in this area.

Casting our eyes over the horizon, we are full of passion and expectation about the future. A modern China working for the benefit of 1.4 billion people and global development has to be supported by a sustainable system of clean and low-carbon energy. The energy revolution will be accompanied by China's journey to meet the country's goals of achieving modernization in 2035 and building a modern power in 2050. In the next 20 to 30 years, we will bear witness and participate in China's development of energy technology, energy structure change, energy efficiency improvement, and other comprehensive changes in the energy system. To this end, we will strive to make ourselves a practical investor with vision and strategic planning, a diligent facilitator of exchanges and cooperation between China and the international community, and an earnest advisor in the field of energy and sustainable development. Today, as China has further demonstrated its resolve to reform and open up, Energy Foundation China is more determined than ever to build on our past successes in China. We will unreservedly contribute our own experiences and insights to help the realization of a “Beautiful China.”

I have often been asked how I would describe Energy Foundation China if they are a person. My answer is that they are passionate, professional, pragmatic, and good at cooperating and learning. They are someone who would look up to the stars, full of ideals, and at the same time act out their beliefs in a down-to-earth manner. They believe that both China and the world can achieve prosperity and climate safety through continuous improvement of sustainable energy; they believe that energy is not an isolated issue, and there is a need to take a comprehensive view on energy, the environment, climate change, economic development, and other related issues. Our team and partners are working tirelessly to propose ways to significantly increase usage of renewable energy, improve energy efficiency, optimize economic structure, and promote China's green and low-carbon development, as well as world-leading air quality.

“Someday, with our sail piercing the clouds, we will mount the wind, break the waves, and traverse the vast, rolling ocean.” This quote from Li Bai, the great Tang poet, is rather fitting here at the end as all the people of Energy Foundation China will, as always, through thick and thin, seek truth and be pragmatic, gather wisdom, and work together with our partners to create a sustainable and prosperous future with climate safety for all!





Let Renewable Energy Lead China Forward

Renewables have become an important part of China's energy supply. Since the promulgation and implementation of the monumental Renewable Energy Law, this industry has entered a period of rapid development. In 2018, new increase and the total of installed capacity of hydro, wind, and photovoltaic power in the country both ranked number one in the world. In the same year, the proportion of renewable energy as part of its total energy consumption continued to increase with installed capacity of renewable power generation accounting for 38.4 percent of the total, actual generation being 26.7 percent of total, and its proportion of primary energy consumption reaching 12.4 percent. China's clean and decarbonized energy system has begun to take shape.

In the past 20 years, Energy Foundation China has cooperated with leading renewable experts to provide support to and participate in researches related to international experiences, policies, pilot demonstration programs, and capacity building efforts. It has made great contributions to pushing for renewables gradually taking up a leading role in the Chinese energy system. And it has continuously helped establish consensus and explore pathways for building a renewable energy centric country for the future.

Drawing Support for the Renewable Energy Law From Scratch

From the early days of reform and opening up in late 1970s to 2000, China's energy efficiency increased significantly, managing to support a quadrupling of gross domestic product with only a doubling its energy consumption. However, problems began to surface and worsen as the Chinese economy rapidly expanded, such as insufficient energy supply, obsolete energy structure, serious environmental degradation, and heavy dependence on energy import. People began to ask for solutions and talk about large-scale development of renewable energy in China.

In November 2000, EF China stated at its meeting of the Senior Policy Advisory Committee that China should draft a renewable energy law as soon as possible in order to promote utilization of renewable energy as part of fossil fuel substitution efforts. This was the first proposal for renewable energy legislation in China. It also opened up wide-spread discussions on this subject in China.

Between 2001–2003, EF China provided support to pre-research projects on renewable energy legislation. Through detailed demonstration and analysis of experiences from abroad, research teams identified feasible ideas and principles of this kind of legislation and a basic framework for constructing similar systems in China. As a result, the Renewable Energy Legislation Research Report came out in August 2003. It was China's first publicly-released comprehensive research report on this subject, providing a basis for subsequent systematic research. Back then, EF China also sponsored a series of seminars and forums on related topics. At the 2002 International Symposium for Renewable Energy Policy, government officials, experts, and scholars from the United States, Europe, and other countries provided insights from their own experiences and practices in this field, further propelling Chinese explorations in this area.

In June 2003, the Standing Committee Chair's Meeting for the 10th NPC identified renewable energy law as part of the legislative agenda for the year. Mao Rubai, chair of the NPC's Environmental and Resources Protection Committee,

personally took the lead in conducting in-depth research on this subject. During the period, teams responsible for research and drafting were made up with personnel from the committee, the National Energy Administration (NEA), the Energy Research Institute (ERI), and other Chinese research institutions. They carefully studied and borrowed international experiences in this field. EF China's team of multinational experts were invited to provide professional insight and analysis for these research and drafting teams. Under intense efforts from various stakeholders, the Renewable Energy Law went through its drafting and deliberation process in just over a year. It was approved by the Standing Committee of the NPC in February 2005 and officially took effect on January 1, 2006. It established a framework that included aggregate targets, categorized electricity prices, mandatory grid access, cost sharing, and special funds, acting as a strong legal basis for the industry and representing an milestone in the development of renewable energy in China.

After the law's introduction, EF China continued to provide support to various stakeholders on matters concerning implementation. In 2007, it supported a symposium hosted by the Chinese Renewable Energy Industries Association on the first anniversary of the law. Officials from seven ministries led by the Environmental and Resources Protection Committee and the NDRC discussed about achievements and problems related to implementation, laying the foundation for the subsequent roll out of further rules and measures. In addition, EF China provided support to policy research on the establishment of important regulatory systems, assisting the ERI, Tsinghua University, the China Association of Circular Economy, and other institutions. They carried out a series of studies on a system of categorized electricity prices, a cost-sharing system, and implementation of management measures. Specifically, the Policy Study on Categorized On-Grid Electricity Prices for Photovoltaic Power in 2013 received significant attention and has become an important reference point for policy discussion in this area, contributing to steady development of the photovoltaic industry.

In the meanwhile, EF China actively promoted local implementation of relevant regulations, and supported pilot projects in Jiangsu, Fujian, Jilin, Gansu, Sichuan, and Beijing by assisting in necessary researches on development goals and specific implementation plans for provincial and municipal governments. The foundation also invited experts to evaluate implementation on the ground, and then published a series of reports, such as Review and Evaluation of the Implementation of the Renewable Energy Law, The Development Report on the Renewable Energy Industry in China, and A Compilation of the Renewable Energy Law and Related Policies.

According to Wang Zhongying, head of the ERI, EF China was the first international organization to provide technical assistance and analytical research to China with regard to renewable energy legislation. Over the years, it has been steadfast in its support for analysis and education programs that inform policy research, enforcement, and related policy mechanisms, making important contributions to the establishment and growth of China's renewable energy industry, the construction of a system with a high penetration of renewable energy, and the promotion of energy transformation.

Promoting the Improvement of Various Policy Mechanisms for Renewable Energy

Renewable energy development requires a systematic approach. It not only needs legal support and guidance, but also a series of top-down design and implementation work on policy, planning, funding, and technology. To this end, EF China has supported a large number of analysis and education projects by various Chinese institutes over a long period of time.

In 2007, China issued the Medium- and Long-Term Plan for National Renewable Energy Development. Since 2009, it has successively proposed target ratios of non-fossil energy as part of primary energy consumption in 2015, 2020, 2030, and 2050 and corresponding energy development strategies. With an eye on actual implementation of plans and strategies, EF China supported a number of industry roadmap studies in the past 10 years, such as the Development Roadmap Study on Wind and Photovoltaic Power Industrialization by

the ERI and the Chinese Wind Energy Association and the 2050 High-Penetration Renewable Energy Scenario Analysis and Implementation Roadmap by the National Renewable Energy Center, in order to provide detailed analysis and feasible pathways for industries.

Research on renewable energy quotas is an important direction supported by EF China. Since 2002, it has begun to support pre-research on the subject, engaging in feasibility analysis of quota target establishment, system framework design, and operation mechanism, and exploring ways for renewable energy to participate in electricity market from the angle of trading mechanisms. It has also sponsored academic seminars, international exchanges, and capacity building activities, in order to provide solid technical support to and share practical research information with government officials, experts, and enterprises in the field. In May 2019, China issued a notice to guarantee renewable electricity consumption. After 17 years of research, the quota system was finally introduced, and various provinces and cities were identified as responsible for their consumption with minimum proportion targets. The industry believes that this is one of the key mechanisms for China's renewable energy development in the future.

With increasing installed capacity of renewable energy and the lag of power grid construction, the problem of wasted wind and solar energy has become increasingly prominent as a bottleneck for the growth of renewable energy in China. Since 2009, EF China has provided support to the ERI on conducting a series of studies to explore support conditions with regard to the grid, and models and pathways for China to achieve sustainable and large-scale development in this area. In addition, it provided support to the National Renewable Energy Center over introducing the U.S. experiences on Utility Variable-Generation Integration Group and leading the formation of the China Variable-Generation Integration Group. The goal was to disseminate discussions of technologies, practices, institutional mechanisms, and policy measures, and build a platform for experts, research institutions, and enterprises to reach a consensus over viable solutions.

As a relatively new field of renewables in China, distributed power generation gradually shows its future potential. Since 2005, EF China has sponsored researches on related policies, financing mechanisms, pilot demonstrations, business models, and promote its development and that of smart energy Internet. In 2009, it supported research on the planning and construction of a new energy model city and a smart microgrid demonstration project based on the concept of distributed renewable energy in the Turpan's New District, Xinjiang. The research findings provided important support to the project, and helped it become the first commercialized microgrid demonstration project in China. In 2016, EF China provided support to the Chinese Renewable Energy Industries Association over its efforts of carrying out research on the technology roadmap for distributed power generation in China. It made scenario analysis and prediction for the period of 2016 to 2020 after comprehensively analyzing the technology's potential, economic viability, problems and obstacles, and trend of development, based on relevant information from home and abroad. In 2017, the foundation supported the green power action project on analyzing pathways for establishing a market-based pilot project for the technology in China.

China's renewable energy development has begun to focus on quality over quantity. Renewable energy will gradually become mainstream with types of technology and application models involved undergoing profound changes. And people will increasingly bear witness to its economic benefits. "With the advent of the 5G Internet era, China's electrification will be an inevitable trend in the future. There will be increasing demand for energy from industry, buildings, and transportation. And the decarbonization of the power sector is set to become an integral part of China's economic transformation. EF China will strive to increase the penetration of renewable energy as part of the total, reduce the consumption of fossil fuels, and promote a sustained deep decarbonization of the power sector by strengthening institutional reforms and technological innovations," said Dr. Lijin Zhong, the Chief of Staff and acting director of the Clean Power Program of EF China.



Improvement in Air Quality and Reduction of GHGs at the Same Time

In China, air pollution is arguably the most pressing environmental problem. In the meantime, climate change is the most serious environmental crisis in the world. And the two are highly correlated. “For 20 years, Energy Foundation China has committed to air quality improvement, viewing it as an important strategic opportunity to reduce GHG emissions. We have provided support to researches and international exchanges for the formulation, upgrade, and implementation of relevant regulations, standards, and systems, and actively promoted coordinated controls to achieve synergy. We believe that the co-control framework that we have pushed will play an increasingly more important role with implementation and improvement in the future,” said Mr. Liu Xin, director of the Environmental Management Program at EF China.

Improving Top-Down Design of Atmospheric Management to Promote Coordinated Control

The most important legal basis for fighting air pollution is the Law on the Prevention and Control of Atmospheric Pollution. China’s Air Law was first enacted in 1987, then revised in 1995 and 2000. Back then, its prevention and control of soot-heavy air pollution was effective and remarkable. However, upon entering the new century, it became increasingly difficult for the law to contain the rapidly changing pollution picture and fight a new and complicated set of atmospheric pollutants. The result was an explosion of smog across China. Faced with such a situation, EF China began to call for an upgrade of the law, providing much-needed analysis and education along the way. In 2009, it supported publicly-released research that proposed 5 directions and 13 areas for optimized management of air pollutants, based on international experiences. Specifically, it pushed for: the establishment of a management system with air quality standards at its heart; enhanced implementation of attainment planning and management of non-attainment regions; a discharge permit system for stationary sources of pollution; innovation in energy-saving and emission reductions in industries; improvement in mobile source control on fossil fuel automobiles and fuel quality; formulation of low-emission transportation planning; establishment of regional air quality management offices to control both GHGs and atmospheric pollutants; strengthening of policy co-ordination over energy and environmental issues; establishment of regulatory measures and trading systems with regard to electricity, transportation, and industry, aiming for energy conservation and emission reductions. This research was held in high regard by the former Ministry of Environmental Protection (MEP, now the Ministry of Ecology and Environment) and reflected in local anti-pollution regulation in Beijing.

At the time, the United States was already a global leader in the formulation and implementation of regulations and standards related to air pollution control. It boasted huge potentials in providing positive experience to the improvement of China's atmospheric management. Since 2009, EF China has provided support to the annual Conference of Sino-U.S. Regional Air Quality Management, facilitating regular exchanges on air pollution control between the Chinese ministry in charge of environmental affairs and the U.S. Environmental Protection Agency. It also helped officials and experts go to the United States and learn about local experiences on dealing with pollution. China was a good student, learning about the various aspects of air pollution fighting, such as cap control, quality management, attainment planning, pollutant discharge permits, system of standards, and coordinated control.

In 2013, the National People's Congress and the MEP launched the revision process of the Air Law. EF China took this opportunity to support extensive analysis concerning attainment planning, transferable discharge permits, supervision of law enforcement, information disclosure, and coordinated control, with air quality standards at the core. In late 2014 and April 2015, it also sponsored two seminars on the issues.

Along with its partners and various stakeholders, EF China was excited to witness the birth of "China's strongest air law in history" in 2015, with official implementation in 2016. The newly revised legislation contained many things that had been thoroughly studied by our grantees, such as a management system with air quality at the core and strengthening of source control; in addition, coordinated control of GHGs and criteria pollutants appeared for the first time as part of a law.

Exploring the Path of Co-Control in Practice

A key focus of EF China was the exploration of effective coordinated control methods and their implementation.

In September 2013, the Chinese government issued the five-year National Action Plan for Air Quality in order to promote a major clean-up of air pollutants throughout the country. During its implementation, some key regions encountered difficulties with regard to matters on enforcement. In 2014, EF China provided support to Tsinghua University to research whether the Beijing-Tianjin-Hebei region can achieve its 2017 goal on PM2.5 improvement. The study was regarded by many stakeholders as being very helpful to the success of the action plan, with rigorous analysis covering the following areas: mandatory coal selection and processing and ban on the use of high-sulfur coal in the region, installing diesel particulate filter for existing fleet of vehicles, reduction of steel production in the Hebei province, and comprehensive upgrade of pollution control for steel, cement, coking enterprises—all of which are about of source control measures with synergistic benefits. One of the people who praised the research was Zhang Gaoli, China's Deputy Premier at the time, prompting the MEP to come up with an directive for enhanced air pollution control in the region (2016-2017) and other similar plans which strengthened the control of disaggregated coal, polluting enterprises, steel and building materials production, and diesel vehicle related pollution.

In 2017, the action plan reached its final year. In order to strengthen air pollution control for the coming years, EF China provided support to Tsinghua to carry out a follow-up research to analyze effectiveness of measures related to source control, such as structural adjustment in energy, industry, and transportation, on air pollution control, and the synergistic effect on the reduction of carbon emissions. This research report was later submitted to relevant experts at the State Council. In June 2018, China renewed the monumental air effort with a three-year Action Plan for Blue Sky. It proposed major structural adjustments in four key areas: industry, energy, transportation, and land use.

From 2013–2018, the annual average concentration of PM2.5 in major cities nationwide fell by 30 percent, with that of Beijing falling by 43 percent, thanks to the implementation of the law, the five-year action plan, and the new three-year action plan. And the clean heating initiative reached over 10 million households in the rural area with elimination and substitution of disaggregated coal as an objective. According to Tsinghua's evaluation of the five-year action plan's synergistic effect, sulfur dioxide, nitrogen oxides, and PM2.5 fell by 59, 21, and 33 percent respectively across the nation, while carbon dioxide emissions fell by 3 billion tonnes.

In March 2018, China decided to establish the Ministry of Ecology and Environment (MEE), and transfer climate change management functions to the newly created ministry, providing a favorable institutional arrangement for the coordinated control of criteria pollutants and GHGs. In June 2019, the MEE and EF China signed the Framework Agreement on Cooperation (2019–2023). According to the agreement, the two sides plan to carry out in-depth cooperation in policy research, capacity building, pilot projects, and international cooperation and communications with regard to coordinated control of air quality and climate change during the next five years.

Zhao Yingmin, Vice Minister of Ecology and Environment, said at the signing ceremony of the cooperation agreement that EF China has steadfastly supported China's environmental protection and climate change efforts, and engaged in green and low-carbon work throughout the years. He also commended EF China's outstanding contributions, along with other organizations, toward the country's achievements in environmental development.

Clean air and climate safety are extremely important to people's pursuit of a better life. The strategy of co-control provides an efficient and viable solution for the biggest environmental problems we face. "With the continuous advancement of air quality management and GHG emission reductions, EF China is expanding the breadth and depth of coordinated control, to include various pollutants such as PM2.5 and ozone, criteria pollutants and GHGs, and carbon dioxide emissions and non-carbon dioxide emissions. And by promoting accelerated compliance of urban air quality standards, we seek to achieve higher goals with the reduction of both criteria pollutants and GHG emissions, and help China attain world-class air quality and climate safety," Mr. Liu said.



Sensible Efficiency Standards Lead to Energy Saving and Emission Reductions

“During the Global Climate Action Summit held in San Francisco in September 2018, Minister Xie Zhenhua, China’s Special Representative for Climate Change Affairs, enthusiastically talked about how Energy Foundation China raised \$2 million for the 2012 Hundred Energy Efficiency Standards Promotion Project (HEESPP), providing timely and strong support for the smooth progression of the project,” Dr. He Ping, Industry Program Director of EF China proudly recalled, when talking about the foundation’s efforts on improving industrial energy efficiency in the country.

The HEESPP is the epitome of the foundation’s 20 years of support for the continuous improvement of China’s industrial energy efficiency standards. The industrial sector is still the biggest consumer of energy, accounting for about 70 percent of the country’s total energy consumption. “Upgrading industrial energy efficiency standards is a relatively simple endeavor, but it can lead to valuable improvement of the big picture. On the one hand, it can promote reduction of energy consumption, thereby reducing greenhouse gas and air pollutant emissions; on the other hand, it will help transform advanced energy saving technology into higher productivity, which ultimately brings about better development of Chinese industries,” Dr. He said.

Since 1999, EF China has supported many milestone events and projects in China’s industrial energy efficiency improvement process, including many energy-related policy researches, analysis for standards development and revision, capacity building, and dissemination of best practices. The foundation wins recognition for its work and established friendship and trust with our Chinese and overseas partners.

Building a Solid Foundation for Efficiency Improvement in China

Over the last 40 years, China has experienced unparalleled industrial development, providing a strong engine for economic growth. This is especially the case since the beginning of the 21st century. In 2008, China’s industrial output was six times of the 2000 level of 4.5 trillion RMB. But at that time, China’s industrial sector faced a multitude of challenges, with many of the country’s industrial products leaving much to be desired in terms of quality and sophistication. And their production was not comprehensively covered by efficiency standards. Existing energy efficiency standards were not updated in time due to a lack of funds and other factors. This reality became a

serious obstacle that prevented the Chinese industrial sector from upgrading itself. Between 2006 and 2010, experts discovered that the country was in dire need of creating or revising more than 100 energy efficiency standards.

In order to improve China's industrial energy efficiency standards as soon as possible and guide development of the sector, the National Development and Reform Commission (NDRC) and the Standardization Administration of China (SAC) jointly launched the HEESPP in 2012. This was the largest wave of national standard setting actions since 1950s. EF China provided \$2 million in research funding, a timely and significant support for the project.

Supervised by the NDRC and the SAC, the China National Institute of Standardization (CNIS) took the lead in the HEESPP, organizing various stakeholders, such as industry associations for steel, cement, chemical, and nonferrous metal, as well as major enterprises, over standard development and revision work. After nearly two years, more than 100 new or updated standards were publicly released. As of 2015, the second phase of the project was successfully completed too. A total of 206 national standards related to energy conservation were issued in the two phases, laying down a strong foundation for China's industrial efficiency improvement. In the meanwhile, the implementation of the project greatly boosted China's capacity for standard setting, opening a door for China's participation in the formulation of international standards.

Leading the Charge for Energy Management System Standards in China

Between 2006 and 2010, efficiency standards propelled a flurry of corporate energy-saving actions in China. However, its effect struggled to meet high expectations, since a large number of enterprises had not yet formed an effective energy-saving system at the management level. And there was insufficient integration of targets, systems, and measures over energy saving.

At the time, many organizations, including the International Organization for Standardization, recognized the importance of an effective energy management system for energy conservation in enterprises and studied how to apply advanced management methods to guide enterprises to carry out planning, implementation, monitoring, and evaluation in this area.

Responding to the needs, EF China has worked with domestic institutions to promote the implementation of energy management systems in the country. One of its focuses is Shandong, a populous manufacturing province in Eastern China that has actively pushed for energy conservation and accumulated rich experiences in the process. With the support of EF China, Shandong took the lead in conducting research on an energy management system standard in 2008. It introduced advanced tools from overseas and carefully localized them by marrying international experiences with conditions on the ground in the province. In 2011, Shandong implemented the country's first provincial standard for energy management system.

The province's experiences provided valuable references and lessons for the introduction of the National Energy Management System

Requirements in 2012. In the same year, the NDRC launched the world's largest enterprise efficiency campaign—the Ten Thousand Enterprises Energy-Saving Campaign—requiring all participating companies to establish a sound energy management system. The objective was for them to continuously improve energy efficiency.

In the end, the campaign exceeded its original goal of energy saving: 250 million tonnes of standard coal, which is equivalent to reducing the emission of 660 million tonnes of carbon dioxide. It proved that energy management system is indispensable in our efforts to clean up the environment.

In addition, EF China provided support to pilot programs and actual enforcement of energy management system standards in Shanxi, Yunnan, Shanghai, and other regions. It also supported the development of the 10 Guidelines for Energy Management Systems and the accompanying best practice case studies, providing references to all those who are interested.

Aside from helping companies improve energy management, EF China is committed to sharing the experiences of China's practices on energy management to the world and promoting international exchanges and cooperation. In recent years, the Clean Energy Ministerial (CEM) has launched an initiative to strengthen energy management in the industrial sector and established the Energy Management Leadership Award. The foundation has always encouraged Chinese stakeholders to participate in. In 2017, China took part in the award for the first time, with the China National Heavy Duty Truck Group and the Capital Airport successfully entering the 10 companies shortlist.

Helping Upgrade China's Cooling Energy Efficiency Standards

China is the world's largest producer, consumer, and exporter for air conditioners, with a 70 percent share of global production of room air conditioners. However, the energy consumption of refrigeration equipment has been increasing, as the demand for cooling continues to go up, indirectly generating more and more carbon emission, which is a major driver of global warming. It is estimated that, a temperature rise of 0.5 to 1 degrees Celsius can be avoided by the end of this century if the global energy efficiency of refrigeration products can be greatly improved with a green transformation.

EF China's support for energy efficiency standards for cooling products, such as air conditioners and refrigerators, dates back more than a decade. Over the years, it has made significant contributions to the improvement of the standards through its support for research projects, seminars, exchanges, and other activities, together with various stakeholders. Now, the foundation seeks to continue its efforts on strengthening the current standards, in order to elevate the industry to a higher level. In 2018, EF China launched a three-year long China Cooling Efficiency Program with an initial investment of \$5 million, under the support of the Kigali Cooling Efficiency Program (K-CEP), which was initiated by 18 foundations and individual donors around the world. The focus was on research related to the

formulation of refrigeration energy efficiency policies and the revision of energy efficiency standards, with efforts also spent on increasing the market share of energy efficient air conditioners.

EF China has provided more than \$1 million in funding for the study on multi-split air conditioning energy efficiency standard. It hopes that it can conduct economic and environmental analysis over the entire process of production, distribution, and recycling, in order to provide significant analysis and education support for the development of more rigorous standards.

In this project, an important focus for EF China is to promote a more ambitious improvement program for cooling energy efficiency at the national level. Since 2018, it has supported in-depth research over the impact of the cooling industry on future energy growth and carbon emissions, as well as the necessity and importance of further improvement of its energy efficiency. We have continued to provide analysis and education to this field by organizing seminars, forums, and discussion sessions. At the end of 2018, the NDRC decided to commence work on the formulation of the National Green Cooling Action Plan. EF China became a research partner of this project, joining a group of more than 10 organizations led by the CNIS and the China Refrigeration and Air Conditioning Industry Association. Other participants included industry associations, domestic and foreign research institutions, and large cooling enterprises. On top of experiences gained in China and around the globe, EF China and others concentrated their efforts on a number of studies, developing multi-angled analysis for the project. With their support, China released the action plan six months later, laying out a blueprint for green and efficient cooling in the nation. It is widely viewed as a milestone event in this field.

In June, at the 2019 Green Cooling Conference, officials from NDRC spoke highly of the significant roles that EF China, the CNIS, and several industry associations played during the entire process of formulating the action plan.

In February 2019, the K-CEP presented the Best Partner Award to EF China in recognition of its extensive and effective cooperation with various partners in China's cooling energy efficiency projects.

At the same time, EF China has actively promoted and participated in the sharing of China's green cooling experiences with other countries. During the 2nd Belt and Road Summit held in April 2019, the NDRC, the United Nations Economic and Social Commission for Asia and the Pacific, EF China, and other institutions jointly launched the Belt and Road Green Cooling Initiative, under which cooling industry associations, research institutes, and air conditioning manufacturers from China, the United States, Japan, Brazil, Europe, and other countries and regions will carry out extensive exchanges and cooperation to improve cooling energy efficiency and fight climate change.

In order to achieve its modernization goals by 2050 and fulfill its commitments of the Paris Agreement, China urgently needs to change from a high-energy-consumption and low-value-added world factory to a green and innovative manufacturing power. "In the next 5–10 years, we will continue to support the improvement of China's energy efficiency standards, and encourage technological innovation, adjustment in industrial energy-consumption pattern, and the use of alternative energy sources, thereby promoting accelerated decarbonization of China's industrial sector and helping create a strong and responsible manufacturing power for the world," Dr. He said.





Market Mechanisms Propel China's Green Growth

Once upon a time in China, smog was a foreign concept, something people talked about when London or Los Angeles was mentioned. But since early this century, it has become the focus of the whole country. New words, such as “airpocalypse,” were invented to describe situations where existing vocabularies failed with their insufficiency. The government came up with stringent measures, such as shutting down polluting factories, strengthening supervision and law enforcement at the ground level. Throughout China, vigorous campaigns have been widely carried out in order to stamp out pollution. At the same time, global efforts on addressing climate change has created a major opportunity for China to accelerate the transformation of its economy. As a result, policy measures for energy conservation and emission reduction have sprung up in recent years.

The strong responses had an immediate effect. But the key to solving underlying problems now concerns the way we use market mechanisms to promote green growth and voluntary emission reductions on the part of enterprises, and how we should integrate environmental and climate issues into economic policies.

This is exactly the direction that Energy Foundation China is pushing for. It has worked from providing publicly-released analytical research for China's first environmental tax law to helping plan and establish a national carbon market.

Exploring the Path to China's First Environmental Tax Law

As early as 1978, China began to employ economic means to control pollutant emissions. A system of discharge fee was formulated and implemented at that time, which relieved some of the pressures on the environment brought by economic development. However, its legal basis is relatively weak as part of an administrative system, which led to inadequate enforcement.

By the end of the 1990s, environmental tax has become a hot topic among the international academic community. It internalizes the social cost of environmental pollution and ecological degeneration into production costs and market prices. Based on the principle of “polluter pays,” it can effectively inhibit damages to the ecological system by enterprises and lead to survival of the fittest through market mechanisms. In China, the switch from discharge fees to taxes was also becoming part of the official agenda. A well-designed environmental tax law would be more market-oriented and sustainable than the discharge fee system, ushering in greater effectiveness and stricter requirements.

Since 2007, EF China has taken the lead in supporting discussion and research related to environmental tax law among peers and stakeholders. First, it focused on carbon tax, a particular kind of environmental tax. In 2008, it provided support to the Chinese Academy of Fiscal Sciences (CAFS) to complete the country's first comprehensive plan for a carbon tax, sparking unprecedented discussions on carbon pricing. Since then, EF China has supported a series of studies on the key aspects of environmental tax, effects and problems of the ongoing pollution fee reform, and green tax reform at the macro level, providing technical assistance for the design of environmental taxes.

Environmental tax legislation affects the entire country, involving many different government departments, such as the State Administration of Taxation, the Ministry of Finance, and the Ministry of Environmental Protection (now the Ministry of Ecology and Environment). EF China has worked with their think tanks and created opportunities for open discussion between experts and policymakers, promoting dialogue and collaboration across departments. It has also provided technical assistance and analytical research to help inform drafting efforts.

In order to let more people understand such legislation, EF China's partners actively engaged media organizations, attracting significant attention from the public and policymakers. Among them, Jia Kang, president of the CAFS and Wang Yi, deputy dean of the Institute of Science and Development (ISD), Chinese Academy of Sciences, published opinion articles during national parliamentary sessions for many consecutive years, expounding the significance of an environmental tax law. Their work helped the topic gain wide support in the country.

After extensive efforts, China's Environmental Protection Tax Law was approved in 2016 and took effect on January 1, 2018. As the country's first "green tax law," it stipulates that environmental taxes—instead of discharge fees—shall be levied on air pollutants, water pollutants, solid waste, and sound noise. According to statistics on tax returns of 2018, the introduction of the tax has created remarkable benefits by encouraging green growth.

Supporting the Establishment of China's Carbon Market

Around 2007, China overtook the United States to become the world's largest emitter of greenhouse gases. For the country, reduction of the emission is not only an important duty as a responsible world power, but also an inevitable move in its transition to a low carbon economy. It requires more reliance on effective market mechanisms and smart economic policies. Successful carbon markets in the EU and California can provide valuable lessons for China.

Effectively, carbon market is a trading system for emission rights. Under the constraints of cap control, greenhouse gas emission rights, including that of carbon dioxide, become scarce resource for the purpose of trading activities. In practice, it has been proven that the market not only helps encourage voluntary emission reduction on the part of emitting enterprises, but can also be used to direct capital and funds to cleaner companies, thereby reducing cost of emission for the whole society, and promoting conversion of old to new and outdated to advanced.

From very early on, EF China recognized the explosive potential of carbon trading. Since 2011, it began to promote the establishment of a market in China. At that time, the National Development and Reform Commission (NDRC) was just starting to contemplate about a plan for doing so. EF China invited officials from the NDRC's Climate Change Department (CCD, now part of the Ministry of Ecology and Environment) and local governments to visit the World Bank, the U.S. Environmental Protection Agency, and other institutions in North America, to learn about the Regional Greenhouse Gas Initiative and Canadian experiences in establishing carbon markets in

order to strengthen the country's resolve in this area. EF China also supported a series of international seminars, focusing on the feasibility of carbon trading in China and potential technology options, thereby promoting a change of domestic discussion from theories to operational aspects of the carbon market. The seminars invited top-notch carbon market professionals from the U.S. and Europe to share their first-hand experiences with experts and policymakers in China.

In late 2011, the NDRC issued a policy document that launched carbon trading pilots in Beijing, Tianjin, Shanghai, Chongqing, Shenzhen, Hubei Province, and Guangdong Province. EF China quickly provided financial and technical support to the promulgation of carbon trading programs in four of the pilot regions: Beijing, Shanghai, Tianjin, and Guangdong. The research projects supported by the foundation focused on evaluation and reporting of emission data, design of a quota auction system, and establishment of management procedures.

In December 2017, China's national carbon market was officially launched. Since then, EF China has worked to support its operation and further improvement.

The national market involves multi-sectoral and interdisciplinary collaboration. To strengthen communication, EF China supported ISD to create a platform for carbon pricing policy dialogue, inviting various government departments at both national and local levels, which helped enhance mutual understanding and eliminate differences among stakeholders. And they also managed to refine carbon market policies and improved their compatibility with other policies. During dialogues, experts conducted in depth discussion on key issues including the market's goals, its legal basis, economic impact, and governance in the context of administrative changes in the setup of relevant government departments.

EF China also supported Tsinghua University's research on design issues related to the carbon market. Analyses on cap targets, allocation methods, and implementation paths have helped inform relevant policymaking.

In the process of building the carbon market, people harbored concerns about its effect on the economy. EF China provided support to theoretical and empirical research on the relationship between carbon markets and economic development, and introduced experiences from the EU and North America through international seminars. "California's economy has not been hit by its carbon market. Actually, it gained new business opportunities and attracted more talents because of its strong emission reduction policy, which helped the state's development become more sustainable," said Fu Sha, Director of Strategic Planning and acting director of the Low Carbon Economic Growth Program at Energy Foundation China. "I hope that these lessons can enhance the confidence of Chinese regions in growing the carbon market."

EF China's contribution in this field was recognized by Deputy Director Jiang Zhaoli of the CCD. He said that the foundation played a vital role in the early days of introducing carbon trading to China, drawing on its wealth of international experience to help the country implement a working system on the ground. It first worked on local pilot projects, then provided intellectual and financial support in many key phases during the establishment of the national carbon market, thereby ensuring its smooth development, said Director Jiang.

"In the future, China is going to have more room for development in the area of low carbon economic policies. We will continue to provide analysis and education for the formulation and continuous improvement of carbon market, carbon tax, resource tax, fuel tax, environmental tax, and other pricing policies. We will also seek to rely on correct price signals to curb environmental damage, guide the market to a low carbon, sustainable direction, help China achieve its emission reduction targets, and provide a powerful engine for the low carbon transformation of its economy," Ms. Fu said.



Key to Building Livable and Sustainable Cities in China

Over the past 40 years, the people in China have watched their city roads getting wider and wider, with more and more motor vehicles running on them. Unfortunately, they also bore witness to the ballooning problems of traffic congestion and air pollution. Wang Zhigao, director of the Low Carbon Cities Program of Energy Foundation China, felt increasingly worried. “The car-oriented model of urban development and chaotic expansion have led to a variety of urban diseases. What people need is a livable place that is low carbon, prosperous, vibrant, and humane,” he said.

In the 21st century, China has experienced a rapid process of urbanization. According to the data from the country’s National Bureau of Statistics, from 2002 to 2011, China’s urban population grew by an average of 20.96 million people per year. And this has given rise to challenges with regard to the environment, transportation, energy, climate security, and people’s daily life.

Since 2008, Energy Foundation China has committed itself to helping China build “people-oriented” cities. And the key in doing so is to find out how to deal with air pollution, traffic congestion, and carbon emissions from transport. Through many trials and experiments, the foundation finally found a breakthrough point: “transit-oriented development” (TOD) as an urban development concept for China.

Introducing TOD to China

In the 1990s, Peter Calthorpe, a founder of the Chicago-based “Congress for the New Urbanism,” came up with the ideas of TOD for urban areas. The concept is about carrying out high-density hybrid development in an area with a radius of 400–800 meters and a 5–10 minute walk from the center of public transportation. It is characterized by the integration of office, business, entertainment, education, and residence into a highly accessible area. Since then, this concept has been widely used in urban development in the United States, Japan, Singapore, Hong Kong, and many other countries and regions. It has become an important method to solve the problems of modern urban development.

“People can comfortably meet their needs for daily life, shopping, entertainment, leisure, and work within walking distance in the TOD area. Multiple areas are connected through efficient systems of public transportation, which is also conducive to an improvement of the jobs-housing balance,” Mr. Wang said, “TOD’s success on an international scale has inspired us to take up this concept in China.”

In early 2010, as Kunming began exploring for ways to improve the planning and construction of the city’s new Chenggong district, Energy Foundation China invited Mr. Calthorpe to China. We asked him to provide support to the TOD concept plan in the central district of Chenggong covering 10 square kilometers. Eventually, Kunming adopted the plan and transformed it into an official document on urban planning for implementation in the area. “We have taken the lead in promoting the TOD concept and contributed valuable experiences at both the regional and the national level. I am deeply impressed by Energy Foundation China for their enlightened ideals as well as their exceptional professionalism. Over the years, we have been through many trials and tribulations, but never wavered in carrying out TOD’s planning and design concepts. And the result clearly shows that our perseverance has been hugely beneficial to the city,” said Li Liang, former director of the Kunming Municipal Bureau of Planning.

The significance of the Chenggong Project cannot be overstated as it pioneered a new thinking over urban planning in China. When most cities in China were still building broad avenues and grand plazas, Chenggong New District practiced narrow streets, dense road network, and small block size while integrating other ideas, such as mixed land use and bus priority. The planning project of Chenggong New District has been highly regarded by China’s Ministry of Housing and Urban-Rural Development. Senior officials from the ministry spoke about and recommended case studies on the project at national conferences. The project was included in the first batch of six pilot projects of Green Eco-Cities in China, receiving 50 million RMB of funding from the central government.

Energy Foundation China also explored and promoted the design of streets and public spaces based on TOD principles and the people-oriented ideals of urban space.

“One of the 18 oddities of Chongqing, walking is faster than driving,” this outlandish colloquial saying is actually a true portrayal of the traffic situation of Chongqing, the hillside metropolis in Southwestern China. In 2009, Chongqing invited Energy Foundation China to provide support for the pre-study of the planning of the traffic system in the Yuzhong Peninsula of Chongqing with an emphasis on the pedestrian-dominated commuting of the city. In 2011, Chongqing selected a number of streets in Yuzhong District to carry out pilot projects, based on research proposals, in order to re-activate its “grey spaces,” increase the number of facilities that will enable people to communicate, move around, and take rest. The projects also sought to guide motor traffic and ensure pedestrian safety through intelligent designs of road markings. Upon completion of the projects, roads that favored motor vehicles and were difficult to navigate by pedestrians were transformed into streets with easy access to public transportation, rich culture, and intelligent spatial layout. The project won a top prize of the 2013 National Award for Urban and Rural Planning and Design. Since then, the city has also established similar projects in other districts.

Shanghai is another major Chinese metropolis that has benefited from works done by Energy Foundation China, which started its presence there in 2013. Since then, it has supported a range of design studies on streets and spaces. In 2016, the “Shanghai Guidelines on Street Design,” which received inputs from analysis and education supported by Energy Foundation China, was officially released. This is the first such guideline in China to systematically explore humanized design for urban street from the perspective of the “complete streets” approach and won a top prize of the 2017 National Award for Urban and Rural Planning and Design.

TOD Phenomenon Takes China by Storm

Since 2010, Energy Foundation China has also supported research and pilot projects in Jinan, Zhuhai, and Xiamen, as well as provinces of Jiangsu and Guangdong, helping various regions develop urban planning in line with TOD concepts and regional characteristics, thus prompting more and more cities to take up TOD pilot projects. And during this process, the progresses made in planning, design, and construction with regard to TOD attracted great attention at the national level.

In March 2014, China officially published its “National Plan for New Type of Urbanization (2014-2020),” which stated that, “The compact model with high density, functional mix, and transit-oriented features shall become the most accepted way for urban development.” This was the first time the central government explicitly proposed adopting the TOD model in an official document to guide China’s urban development toward a more compact and low carbon direction.

In December 2015, the Ministry of Housing and Urban-Rural Development officially published the “TOD Planning and Design Guidelines”—after Energy Foundation China supported the China Academy of Urban Planning and Design to conduct such a preliminary study in 2013—requiring cities to optimize functional layout and spatial structure for urban areas. By that time, dozens of Chinese cities were carrying out TOD-related projects. According to a rather conservative estimate, the implementation of the guidelines by Chinese cities will bring about reductions in carbon emissions to the tune of 130 million tons each year after 2030.

In February 2016, not long after a national conference on urban development, China issued a directive to strengthen the country’s oversight on urban planning and construction, requiring all urban development in the future to abide by the principles of smaller block sizes, dense road network, and sustainability, while giving priority to walking, cycling, and public transportation. Since then, this has accelerated the spread of the people-oriented TOD concept across the nation.

In the past 10 years, the TOD concept has blossomed and bore fruit both at the policy-making level and on the ground in China. Energy Foundation China has been engaged in dozens of pertinent studies, in order to provide analysis and education support to the development and revision of more than 20 national standards on urban planning and green transportation.

At the same time, the foundation has assisted in the training of hundreds of government employees every year since 2008. They are either leading officials or key technical personnel from local governments. Many of them learned and gradually accepted the TOD concept through the training.

Energy Foundation China has successfully married the TOD concept with local conditions in China. And through continuous refinement, we summed up the “ten principles” of people-oriented urban planning in China. We also helped the compilation and publication of “Emerald City.” Authored by Calthorpe Associates, the China Sustainable Transportation Center, and engineering firm Glumac, it is a practical manual book on the ways to implement these principles for urban planning in China. Since then, the World Bank has re-edited the book and translated it into four other languages for circulation around the world.

A True “People-Oriented” City

A city is a vessel with the people-oriented approach at its core. Although the concept of TOD has gained wide-spread acceptance and been put into practice in China, a true “people-oriented” city is also about seeking to meet a full range of people’s aspirations and demands for bettering their life with limited carbon emissions. “Considering China’s socio-economic development and urbanization are entering a new stage, we are faced with an aging population, uneven supply of basic public services, widening income gaps, and a growing middle class prone to more practices of high carbon consumption. In addition to meeting people’s ever increasing material needs, it is equally important to guide the society to build a low carbon lifestyle and consumption model. In this area, Energy Foundation China is committed to seeking an overarching low carbon solution based on the TOD concept. Our hope for the future is that cities in China can achieve comprehensive, coordinated, and high quality development with regard to economy, society, and the environment, and become a green, open, inclusive, and sustainable home for all of her people,” said Wang Zhigao.



Helping Chinese Buildings Go Green

Over the past decades, the rapid growth of China's economy and the accompanying urbanization has turned many areas of the country into vast construction sites. According to statistics on 2018, energy consumption for buildings in China accounts for nearly 50 percent of the total, after taking account of all the related items, such as production and transportation of building materials. This number will continue to rise as the urbanization process continues.

"Without significant mitigation from the building sector, China will not be able to meet its international commitment of peaking carbon emissions around 2030. And the goal of global carbon neutrality by 2050 cannot be achieved," said Dr. Wang Zhigao, director of the Low Carbon Cities Program at Energy Foundation China.

Green and low-carbon development in the sector has been a top priority for the foundation. In the past 20 years, it has promoted the entire process of setting up China's green building standards, from voluntary to mandatory, and from individual buildings to entire urban blocks. The foundation has also assisted in promoting and improving nearly zero-energy buildings.

Helping Set Up the First National Standard on the Evaluation of Green Buildings

In 2006, China's first national "Standard for Green Building Evaluation" (hereinafter referred to as the Standard) was released, proposing the concept of green buildings which entailed conservation of energy, land, water, and materials, environmental protection, and pollution reduction. This officially launched a government campaign on green building evaluation in China and prompted the building sector to move toward decarbonization.

After the introduction of the Standard, we focused our attention on its implementation across the country. Since 2007, Energy Foundation China has provided significant support to research and pilot projects in places like Shanghai, Shenzhen, Sichuan, Tianjin, Chongqing, and Hainan, tailoring them to suit local conditions.

After the devastating magnitude-8.0 Sichuan earthquake in 2008, the foundation provided support to a series of projects on school design and standard setting in order to build durable and green schools for the children in the disaster zone. For this purpose, we invited Robert K. Watson, the founder of the LEED Green Building Rating System in the United States, Dr. Khee Poh Lam, Dean of the School of Design and Environment at the National University of Singapore, and other well-known experts from around the world. Eventually, more than 20 schools were rebuilt as green schools in the

area without much of an increase in cost. The new schools provide energy-efficient lighting, as well as natural ventilation and heating that is comfortable for occupants. These projects became models for school building at the time, and helped the development of design guidelines and technical manuals, which later informed the housing department of Sichuan when it decided to release the province's "Design Standards for Green Schools."

On the road to building a green and low-carbon city, Shenzhen, a megacity now boasting a bigger GDP than its close neighbor Hong Kong, has been an excellent pioneer and a model for major urban centers in China. As early as 2008, Energy Foundation China and the Shenzhen Housing Development Bureau signed a memorandum of cooperation to provide support for green buildings research in the city and to build it into a showcase area for green buildings in China. In 2010, Shenzhen took a lead nationally with its mandatory requirement for government subsidized housing to follow green building standards; in 2012, it released the "Plan for Guangming New District (2007-2020)," becoming the first city in the country to have mandatory requirement on green buildings for all of the constructions in an entire district. This represented the first systematic practice of the green city concept. "It's a milestone for green building development, going from voluntary to mandatory, providing us with an excellent model for practices on the ground with regard to the promotion of the Standard in the country," Dr. Wang said.

Since then, the district has become the first national demonstration zone on green buildings and is among the first batch of eco-city pilot projects of the Ministry of Housing and Urban-Rural Development, receiving an award of 50 million RMB, or \$7.3 million, from the state.

"For more than a decade, Energy Foundation China has leveraged its resources and expertise, to provide research and education support to the improvement of planning systems, policy systems, and institutions for building energy efficiency. It has supported research on related standard systems, technical systems, and promotion models. It is an active participant and a staunch supporter of the green development and has made outstanding contributions to the revolution of energy production and consumption in the building sector," said Wu Yong, the president of the China Association of Building Energy Efficiency.

Pushing Toward Net Zero Emissions

When promoting the Standard, we found that one of the major obstacles to the development of green buildings in China is the generally held belief that a green building is much more expensive than an ordinary building.

In order to fully understand the cost of green buildings, in 2011, Energy Foundation China provided support to the first economic analysis of green buildings in China. The study found that the extra cost associated with an entry-level one-star green building has dropped to very close to zero. In order to further allay people's concern about cost, in April 2012, the Ministry of Finance and the Ministry of Housing and Urban-Rural Development jointly proposed to speed up development of China's green buildings through government subsidies and other means. This official edict reflected many of the research findings that Energy Foundation China supported.

In the initial stage, the Standard is a one-size-fits-all national standard. It does not differentiate between different types of buildings and varying climate across regions. Therefore, large-scale implementation has faced many difficulties at the ground level. The foundation

held the belief that it is necessary to develop a more detailed standard system based on differentiation. Since 2008, it has supported research on green building evaluation standards tailored to types of building and climate at both the national and the local levels. And it has provided solid researches and help to the roll-out of green building evaluation standards for school campuses and hospitals, and local standards in Beijing and Hainan. In addition, the foundation provided support for five consecutive years to the building-up of green building evaluation capabilities from national to local levels, helping practitioners in this area to familiarize themselves with evaluation methods and to successfully carry out evaluation work. All of these efforts provided strong support to the expansion of green buildings in China.

At both the national and local levels, foundation was laid for the introduction of more stringent policy measures on green buildings. In January 2013, China released a Green Building Action Plan, which set out a roadmap for green building development by 2020, and made it compulsory for government-funded buildings to implement relevant standards from 2014 onwards. Research supported by Energy Foundation China was recognized and reflected in this official document. "The release of this policy document marks the beginning of the green building trend of China's building industry, going from voluntary to compulsory, and from individual buildings to entire urban areas," Dr. Wang said.

By the end of 2018, cities and towns across the country had built a total of 2.5 billion square meters of green buildings, accounting for nearly 40 percent of new residential construction in urban areas. Energy Foundation China realized that the popularity of green buildings in China represented an opportunity to shift to a higher level. "We found that the green building certification at that time was heavy on the design side and light on operation, with design label for green building accounting for 95 percent, while label for actual building operation only at 5 percent. In order to guarantee quality and performance of the concerned buildings, we must have strict requirements for actual energy savings during the operation phase," Dr. Wang said. To this end, in 2018, Energy Foundation China supported a study to revise the Standard. The study proposed that green building certification should be based on actual energy-saving data for a 12-month period. Later, this proposal was submitted to decision-makers when they considered revising the standard.

In recent years, the trend internationally is to push buildings to be as close to zero energy consumption as possible until reaching net zero. This is also something new being promoted by the foundation and its partners. Minimal building energy consumption must come from enhanced thermal insulation, renewable energy, and advanced energy recovery technologies—this ideal is also known as Green Building 2.0. In 2019, the Ministry of Housing and Urban-Rural Development issued its "Technical Standard for Nearly Zero-Energy Buildings (NZEBS)," which for the first time stated targets on energy consumption control for ultra-low-energy buildings, NZEBs, and zero-energy buildings.

For the future, Dr. Wang believes that energy-saving renovation of existing buildings and electrification in the sector are important new directions in order to reduce carbon emissions from buildings. "We are trying to combine green financing with energy-saving refitting of existing buildings, seeking to enlist the help of market forces to transform and upgrade buildings, so as to achieve economies of scale and marketization of high-performance buildings such as NZEBs and even zero-energy buildings," he said. "And given the future is likely to have a high level of renewable energy based power supply, electrification in the building sector will play an important role in reducing end-users' environmental pollution and carbon emissions. To this end, we are firmly continuing our exploration for a truly green future."

The China Academy of Building Research building, one of China's first nearly zero-energy buildings. Photo Courtesy by China Academy of Building Research



Improved Standards Give Birth to Cleaner Cars in China


In September 2018, Mr. Gong Huiming, representing Energy Foundation China, went up the podium in San Francisco for the 2018 Climate and Clean Air Awards and received the Transformation Policy Award from the United Nations Environment Programme. “This is an important recognition of EF China’s efforts on helping China in launching the world’s most stringent emission standard for heavy-duty vehicles (China VI) and its national campaign on clean diesel engine. It is also a reflection of our efforts to reduce automobile pollutants in China,” said Mr. Gong, director of the foundation’s transportation program.

For the last 20 years, EF China has been steadfast in its support for the constant improvement and tightening of China’s automobile emission standards and fuel quality standards. Today, China has some of the world’s most stringent standards on auto emission. And fuel quality in the country has been greatly improved with decreasing sulfur content, thus finally achieving integrated management over vehicles and fuel.

From China I to China VI, a Follower Turned Into a Leader

In the early 1980s, very few people could foresee that the bicycle kingdom’s “reform and opening up” was going to create the world’s largest market for automobiles, let alone doing so in such a short period of time. Back then, China issued a series of emission standards regarding automobile exhaust. However, due to a lack of experience, the earliest standards did not form a cohesive system. Since the late 1990s, the country has chosen to learn from European experiences in this area. In 2001, the China I Emission Standards for Light-duty Vehicles was issued, imposing numeric limits over the emission of carbon monoxide, hydrocarbons, nitrogen oxides, and particulate matter. Since then, the country has had an effective system of vehicle emission standards with a process of continuous update.

With China I as a starting point, EF China has helped introduce international experiences and promote continuous improvement of automobile emission standards. Under its support, Michael Walsh, the former Deputy Assistant Director of the U.S. Environmental Protection Agency for mobile source pollution control, and the International Council on Clean Transportation (ICCT) have assisted the Ministry of Ecology and Environment (MEE, and its predecessors the Ministry of Environmental Protection and the Environmental Protection Administration), its research institution Vehicle Emission Control Center (VECC), and the Environmental Standard Institute (ESI) of the Chinese Research Academy of Environmental Sciences over technology, management, and strategic consulting services related to vehicle emission control. It has provided significant support to the China-U.S. Motor Vehicle Pollution Prevention and Control Forum by inviting international experts to conduct in-depth dialogues in China, and organizing Chinese experts on academic visits, exchanges, and training to the United States and Europe. In 2010, EF China extended valuable support to the city of Beijing in carrying out a feasibility study of the Beijing V Emission Standard, introducing advanced international practices and propelling the city to upgrade its emission standard in 2013. Later, this experience helped provide a useful lesson for the tightening of the national standard.



With the collective research contribution of the VECC, the ESI, the now defunct Beijing Automotive Research Institute, Tsinghua University, and the China Automotive Technology and Research Center, the country has completed an incredible upgrade of vehicle emission standards, eventually catching up with the most advanced in the world in merely 16 years. At the same time, China has developed into the world's largest automobile market. In 2018, the total number of automobiles on the road in China reached 240 million, thus making auto pollutants a major source of air pollution in many big cities in the country. This has really lent added urgency to the work of establishing more stringent emission standards which will play a key role in guiding the automotive industry to eliminate weak and polluting enterprises and reversing the increasingly severe air pollution. In the end, it will contribute toward efforts on fighting global climate change.

In 2014, Energy Foundation China provided support to the VECC in launching pre-research on the China VI standard based on actual conditions on the ground throughout the country. This work provided the earliest research recommendations for the formulation of the new standard. Then, the MEE decided to entrust the VECC to organize various stakeholders from the auto industry to help draft the China VI standard. This is the first time that an environmental research institution became the leading organizer for drafting a vehicle emission standard.

During its research process, EF China had been made keenly aware of the importance of participation by the auto industry in terms of the formulation and implementation of standards. Therefore, it had often pushed for inviting auto businesses to participate in the research and discussion. In the end, representatives of automobile companies participated in all six research groups of the China VI standard, even taking up leading roles for some research items. This created favorable conditions for building consensus between environmental regulators and automobile companies and laying down foundation in advance for future enforcement.

Under the joint efforts, China launched China VI, its first vehicle emission standard uniquely suited to the local conditions in the country. As part of it, China VI for light-duty vehicles was released at the end of 2016 and due to be implemented on July 1, 2020; China VI for heavy-duty diesel vehicles was released in June 2018 with implementation starting on July 1, 2019. Recommendations supported by EF China, such as improvement in testing and procedures, enhanced control over actual road emissions and evaporative emissions, and requirements on particulate matter concentration, were adopted as part of the standard. Compared with China I back in 2000, the latest standard will reduce emission of nitrogen oxides and particulate matter per vehicle by 96 percent and 98 percent respectively for light-duty vehicles, and by 94 percent and 97 percent for heavy-duty vehicles. This makes it one of the most stringent auto emission standards in the world. China has completed this significant upgrade from almost non-existent to world-leading in less than 20 years. By comparison, the U.S. took 30 years to complete this process.

In February 2017, the VECC presented the “Outstanding Contribution Award for the Establishment of the China VI Emission Standard for Light-Duty Vehicles” to EF China. “The foundation has been responsible for providing an innovative insight, a rich international experience, and a platform for multi-disciplinary dialogue from planning to research, laying important foundations for the smooth development and implementation of the standard,” said Ding Yan, deputy director of the VECC.

A Synchronization of Fuel Standards and Emission Standards

When it comes to auto emission, fuel quality is often the key. In advanced economies, fuel quality standards and emission standards

are often updated and implemented simultaneously. In China, fuel standards had lagged behind emission standards for a long time. Specifically, the lag for gasoline is about two years, and three to four years for diesel. This had seriously delayed the upgrading of emission standards and held back the country from meeting its targets on emission reduction.

In this area, the most important thing is that the rate of reduction of sulfur content in fuel standards should be consistent with requirements of emission standards. Since 2004, EF China has promoted desulfurization in fuel products. However, the industry was worried about related costs, which had caused significant resistance. In 2005, EF China supported an International Symposium on Desulfurization of Automotive Fuel and a report titled “Costs and Benefits of Reduced Sulfur Fuels in China.” The report stated that implementation of both auto emission standards and low-sulfur fuel standards could achieve maximum environmental and public health benefits with minimal cost, as the cost of reducing sulfur content would be shared by both businesses and consumers. For the next seven years, EF China provided support to a series of economics and cost related research and seminars, actively prodding all parties concerned to exchange views on low-sulfur fuel technology and related cost issues. In September 2013, the National Development and Reform Commission issued a financial policy for the upgrade of fuel quality in China, which was based on the principles of reasonable compensation to increased cost, higher price for higher quality, and polluter made to pay for damages. It set the tone for price increases under the upgrading of gasoline and diesel standards and paved the way forward for the upgrade of fuel products from China III to China IV and V fuel quality standards.

When promoting the desulfurization of fuel products, EF China came to the realization that one urgent issue that needed to be dealt with was the so-called synchronization of fuel and emission standards, which is about the difficulty to incorporate the increasingly stringent emission requirements into the formulation of fuel quality standards in a timely manner. This is due to the fact that emission standards and fuel standards are handled by different government departments separately in charge of the environment and petrochemicals. Since 2008, EF China has provided support to the learning of international experiences and presented analysis on the necessity and feasibility of the synchronization. In addition, it called upon the fuel agencies to reach out to environmental experts in its process of research and discussion, and take into account of the needs on the emission side. EF China also provided opportunities for dialogue, communication, and cooperation between the environmental sector and the petrochemical industry in its projects. Through all these efforts, it managed to facilitate the petrochemical industry and the environmental sector in interacting with each other, thereby providing favorable conditions for fuel standards to catch up with the pace of advancing emission standards.

Since 2017, the country has implemented China V standard on gasoline and diesel, with the sulfur content limit at 10ppm, which is 93.7 percent and 99.5 percent lower than the corresponding requirements of the China III standard in 2009. This means that it only took eight years for China to achieve the goal of fuel quality leapfrog, from falling far behind Europe and the U.S. to drawing level with Europe and pulling ahead of the latter. At the same time, the new fuel standard was finally released simultaneously with updated emission standards on a national level, thereby achieving the goal of synchronization. The latest China VI standard for gasoline and diesel implemented in 2019 is another big improvement from its predecessor China V, further tightening the restrictions on olefins and vapor pressure.

Today, China has the world's most stringent auto emission standards and toughest auto fuel standards, but this is merely the beginning of another long march. “In the future, EF China will continue to push the second largest economy to establish a more stringent regulatory system for vehicle emission, in order to ensure supervision of compliance and effective enforcement of the standards,” Mr. Gong said.



Toward Zero Emission Vehicles

“During the few years around the turn of this millennium, the streets of Beijing were filled with yellow taxi vans—locals jokingly likened them to ‘noisy locusts.’ Soon, these tiny boxes on wheels were replaced by red Xiali, mini hatchbacks with Japanese origin, as a staple of taxi fleet in China. Its number kept rising until people would say ‘all under the heaven is red.’ Since then, China’s auto sales had grown at an average rate of more than 20 percent per year, eventually making it the world’s largest auto market,” Gong Huiming, director of the Transportation Program at Energy Foundation China, recalled.

The rapid expansion of China’s economy and its fast-growing auto industry create massive conveniences and comforts for its people with more and more automobiles on the road. But there are also unforeseeable negative consequences, such as a rapid increase in dependence on imported oil and a growing problem of air pollution.

To address these problems while meeting people’s transportation needs, an effective way is to develop vehicles powered by renewables, which will not only greatly reduce vehicle emissions, but also accelerate the low-carbon transformation of the entire transportation sector. And this has been the direction of EF China’s unrelenting efforts since early 2000s.

Helping New Energy Vehicles Take Hold in China

In 1997, Toyota launched the world’s first mass-produced electric-gasoline hybrid vehicle Prius, successfully rolling it out in more than 40 markets and taking the world by a “hybrid storm.”

Shortly thereafter, new energy vehicle research in China became the focus of a major national technology project, with attention on hybrid power. In conjunction with the country’s priorities in this area, EF China worked hard to promote the development of hybrid technology, exploring for ways to apply it to public transportation, vehicle rental, and other industries in Beijing and Shenzhen. It also provided support to studies of technical and economic feasibility, and evaluation of potential for energy savings and emission reductions. However, hybrid technology was not a mainstream consideration for the Chinese auto market, despite good evaluation results. This was mainly due to cost issues and the auto industry’s deficiency in the technology.

Since then, the Ministry of Science and Technology (MOST) has taken a lead in cultivating major research projects, and is committed to the development of various types of new energy vehicles, focusing on hydrogen fuel cell vehicles, pure electric vehicles, plug-in hybrid electric vehicles, and methanol vehicles. China used the 2008 Beijing Olympic Games, the 2010 Shanghai World Expo,

and other major sporting events as venues for small-scale demonstrations of these technologies. However, these projects never attained economies of scale for commercial releases, with costs remaining high and various technical aspects untested in the market. This showed that while government policies are important, market is the crucial element with regard to promoting rapid deployment of new energy vehicles.

For the period of 2006 to 2010, the Chinese government formulated a strategy on energy-efficient and new energy vehicles, putting related R&D and commercialization on the agenda. In 2009, the MOST, the Ministry of Finance (MOF), the National Development and Reform Commission (NDRC), and the Ministry of Industry and Information Technology (MIIT) jointly launched the Project of Ten Cities and Thousands Vehicles to demonstrate electric cars at the local level. The financially subsidized project sought to initiate deployment in 10 new cities each year for the next three years. Each city would launch 1,000 new energy vehicles, to be used in public transportation, rental, government fleet, sanitation, and postal services, all operated for demonstration purposes. It was widely believed in the industry that this would be a stepping stone linking laboratories and mass market.

Sensing this opportunity, EF China strategically supported the technical assistance organizations behind this project in selecting demonstration cities and carrying out designing works. For this, it raised nearly \$500,000. Throughout the years, it also provided support to the China Automotive Technology and Research Center (CATARC) and China Society of Automotive Engineers over their evaluation work of the Ten Cities Project, such as the assessment of the technical feasibility and energy-saving potential of new energy buses in Beijing and Kunming. Based on their evaluation of the projects, they presented a series of analysis findings, such as how to achieve stricter efficiency requirement on braking energy recovery, enhanced battery safety management, better utilization of efficient air conditioning systems, and fast-charging for public vehicles and slow-charging for private vehicles in general. Many of them were later reflected in government policy documents, both at the central and the local levels. By 2012, there were 25 demonstration cities participating in the Ten Cities Project, with a total of 27,400 new energy vehicles in operation as the end of the project approached.

In the same year, the Chinese State Council issued the Development Plan for the Energy Conservation and New Energy Vehicle Industry (2012–2020). A year later, the MIIT, the MOF, the NDRC, the MOST, and other government agencies issued a policy document to announce China's decision to continue efforts in this field. As of 2015, 88 cities had launched pilot projects for new energy vehicles, gradually expanding their usage from the public fleet to private consumers at large.

During this process, issues such as charging infrastructure bottleneck, consumer perception and acceptance, and sustainability of financial subsidies had all become increasingly prominent. EF China provided support to the CATARC, Beijing Institute of Technology, Tsinghua University, Beijing Transport Institute, and other institutions in carrying out targeted research on these challenges. Their findings paved the way forward for the official guidelines on vehicle charging infrastructure and improvement of consumer sentiment over electric vehicles.

After the large-scale demonstration projects and heavy promotion between 2009–2015, battery technology made rapid progresses and turned mass production into reality. This led to a rapid decline in the cost of electric vehicles. In the end, China's new energy vehicle

sector gradually moved from its multi-pronged development of various technologies to heavy emphasis on all-electric vehicles, entering into a period of rapid market expansion.

Letting the Market Decide

In order to help the nascent market for new energy vehicles grow, the Chinese government set up special funds to subsidize auto companies and consumers. For example, buyers are exempt from purchase tax while producers of electric vehicles and fuel cell vehicles can receive state subsidies of up to 60,000 and 250,000 RMB (\$8,500 and \$35,000) per vehicle respectively in the early stage, with even more subsidies for buses.

The cultivating effect of subsidies in the early days was indeed significant, but with rapid growth of the new energy vehicle market, official subsidies gradually became unsustainable, exerting huge pressure on government finances. On the other hand, new energy vehicle companies' excessive dependence on subsidies stifled innovation. In 2015, analysis supported by EF China suggested that China should change from “universal subsidies” to “targeted subsidies.” For example, a ceiling of total subsidy should be set up and gradually reduced; subsidies should be linked to technical indicators, such as energy efficiency; more subsidies should be used to encourage pioneers and innovators; and important policies need to be released early with a transition period. Shortly thereafter, in April, the MOF issued its policy on financial subsidy for new energy vehicles in the years of 2016–2020, which clearly stated that subsidies would gradually decline and there would be more targeted policies.

At the same time, EF China has been exploring more sustainable and market-based incentives to help China's new energy vehicle sector develop as financial subsidies get gradually reduced.

Needless to say, China should learn from international experiences in this field. California was once one of the most air polluted areas in the United States with automobile exhaust as an important source of pollution. In 1990, the State introduced the Zero Emission Vehicle (ZEV) credits trading scheme, which mandated the sales ratio of ZEVs and allowed enterprises to purchase credits to meet compliance. This policy pushed carmakers to produce cleaner vehicles, thereby reducing air pollution and carbon emission. It has been proven to be effective and made important contributions to cleaner air and lower carbon emission in California.

As early as 2013, EF China provided support to the Innovation Center for Energy and Transportation on importing the concept of ZEV credits into China and promoted discussion on the feasibility of the policy in China. In 2014, it provided support to the CATARC and the University of California, Davis on holding China's first international seminar on ZEV credits policy, inviting experts from the California Air Resources Board to give in-depth introduction of plans and experiences. It also lent support to programs in which government heads and experts from the MIIT, the NDRC, and other departments went to the United States to study practices in California. In addition, through UC Davis, the International Council on Clean Transportation, and international experts lead by Dr. Michael Wang of the Argonne National Laboratory, it provided significant support to follow-up policy research.



Separately, EF China funded policy studies to provide technical support for ZEV credits in line with China's conditions, including on how to assign quotas, or coordinate with other policies such as average fuel economy credits for enterprises and carbon markets. In September 2017, the MIIT officially launched the Corporate Average Fuel Consumption and New Energy Vehicle Credits for passenger vehicle enterprises. The system draws on California's experience with ZEV credits and is tailored to conditions on the ground in China. It combines fuel economy credits with new energy vehicle credits for carmakers. The policy requires the companies to reach a certain level with regard to new energy vehicle credit and allows it to be used as fuel economy credit to meet official requirements. Its ultimate aim is to stimulate the R&D, production, and sales of new energy vehicles.

"Introduction of the double-credits program has made China the first country in the world to implement a ZEV quota system at the national level. It will stabilize the new energy vehicle market, which has been reeling from the gradual loss of subsidies, and promote quality enhancement for vehicles. It is of great significance to establishing a fair and reasonable environment of market competition," Wu Zhixin, deputy general manager of the CATARC said. "EF China has played an important role in China's effective learning of the California experience and the development of the double-credits program based on its peculiar national conditions."

Since the beginning of the Ten Cities Project, China's new energy vehicle market has seen huge growth, surpassing annual sales volume of 1.25 million units at the end of 2018, with production and sales ranked first in the world for four consecutive years. And a series of more ambitious plans have been introduced in various regions. Hainan Province has taken the lead nationally in announcing that it will gradually ban the sale of fossil-fuel vehicles from March 1, 2019.

"For the next step, we will focus on the zero-emissions transformation of China's transportation sector by providing meaningful support to projects related to new energy vehicles. The objective ultimately is to make zero-emission transportation a common goal for the entire global community. Therefore, EF China will continue its efforts on ensuring effective implementation of existing new energy vehicle policies, making timely assessment and summarization of China's experiences, and looking for opportunities for further improvement. Also, we will strengthen our support for comprehensive electrification pilot projects at the local level. Finally, we will fully explore opportunities for an organic integration of large-scale new energy vehicles development with renewable energy, smart grid, urban planning of charging infrastructure, and control of air pollution, so as to promote a smooth marriage of national strategy and local programs," said Gong Huiming.





The Story of Our Experiences

“Stories give shape to experience and allow us to go through life unblind. Without them, the stuff that happens would float around in some glob and none of it would mean anything. Once you have a version of what happened, all the other good stuff about being human can come into play. You can laugh, feel awe, commit a compassionate act, get pissed, and want to change things.”

—Alex Tizon, a Pulitzer Prize-winning journalist.

“I’m in total agreement with these words from Mr. Tizon. Good communications can give people an excellent understanding of your story and win over their heart and mind. It can also give birth to an enthusiasm for change. Climate change is becoming the underlying theme for all the important issues in the world. Therefore it is an exciting challenge to tell a good story of climate change and low-carbon transformation, in order to cultivate ambition and encourage action for saving humanity in the face of climate calamity,” said Jing Hui, Director of Strategic Communications at Energy Foundation China.

The foundation’s strategic communications program was established in 2015. “While the other teams of EF China provide analysis and education by sponsoring research and pilot projects, our job is to tell the story of energy transformation in a way that helps relevant parties make informed choices,” said Ms. Jing. After four years of hard work by her team, their efforts are now beginning to bear fruits in the areas of issue promotion, awareness heightening, and behavior changes among the public at large with regard to low-carbon transformation.

Getting the Issue of Diesel Pollution Taken Seriously

When China launched the three-year National Plan on Defending Blue Sky in 2018, diesel trucks were listed as one of the most important areas in need of clean-up. Barely two to three years ago, there was still little public interest in air pollution caused by diesel emissions, while industry experts knew full well that diesel vehicles, which accounted for only 6.4 percent of all motor vehicles, emitted 63.6 percent of nitrogen oxides and 99 percent of particulate matter in China. Back then, the key question for the strategic communications team was how they could attract more attention to and raise the priority level of this matter among stakeholders.

In 2016, in order to bring this topic to public attention, EF China provided support to the Asian Clean Air Center over their research in areas such as the Beijing-Tianjin-Hebei region where there was heavy pollution from diesel vehicles and ships. The center focused on issues such as a lack of supervision, poor fuel quality, and serious pollution for ports in its report Facts on China’s Diesel Pollution. At the press conference for its release, experts impressed upon the journalists present the seriousness of diesel pollution and an urgent need for control. In just over 10 days, the number of

related news articles exceeded 200. Many readers expressed strong concern about pollution by diesel vehicles. This wave of reporting effectively made diesel pollution a key topic in the area of air pollution control.

In order to promote discussions on a wider scale, EF China provided support to the public advocacy campaign Clean Up the Black Tail. Project partners placed advertisements on diesel vehicle hazards at eight subway stations in Beijing and encouraged people to participate in the supervision of polluting vehicles by calling hotline 12369. The project also helped set up the #CleanBlackTail social media topic for discussion. Within four months, the topic trended, with pageviews as high as 1.34 million, number of posts over 90,000, and a short video on diesel pollution played for over 1.1 million times. The project also teamed up with Tencent.com, one the biggest internet conglomerates in China, to roll out photo essays on diesel pollution, with pageviews reaching 200,000 in one month and receiving more than 1,000 comments. It is credited with educating the masses of serious pollution and harm effects associated with diesel.

As public concerns continued to mount, focuses quickly shifted to finding a solution. Since September 2017, Energy Foundation China has provided support to a thorough investigation of China's freight industry, examining all the problems of the industry—which mainly relies on diesel vehicles—and interviewing industry experts for answers. In March 2018, the first Chinese Freight Industry Sustainability Survey was published. It analyzed solutions with regards to environmental protection, energy conservation, efficiency, safety, and costs. The report was subsequently featured by more than 30 media outlets. #SustainableFreight related topics on Weibo—China's Twitter-like service—were read 2.15 million times, creating a new wave of discussions on finding solutions for diesel pollution.

This issue has since received significant attention from top Chinese leaders and become an important part of the three-year National Plan on Defending Blue Sky. In 2018, China identified control for diesel trucks as one of the seven landmark campaigns in its war on pollution and in January 2019, issued the National Action Plan for the Pollution Control of Diesel Trucks. It proposes that by 2020, the sight of black smoke emitted by diesel trucks in the country would be basically eliminated. In April, the city of Beijing introduced a local diesel vehicle action plan to ensure the pollution is quickly brought under control.

“The promotion of a policy can greatly benefit from improved priority status of related topics in public discourse and changes of perceptions and attitudes from various stakeholders, in addition to relying on research and pilot projects,” Ms. Jing said. “Smart communications over the topic of diesel pollution control leads to enhanced visibility, effectively building a platform for all parties involved to discuss matter at hand and eventually reach a consensus on the issue.”

Empowering the Field

One of the directions that EF China is working toward is to bring best practices and effective tools of public communications into the field, helping everyone improve their capabilities in the area and tell a good story of climate governance and energy revolution.

In 2017, EF China launched a capacity building program to provide experience sharing and training opportunities in the form of workshops for communication personnel from various organizations. Recognizing the different goals of each organization and their disparate requirements for communication capabilities, EF China developed a tailor-made strategic communication course on climate and energy issues after three months of detailed research, a first in the country. The workshop has been successfully held twice, providing training for nearly 30 organizations in the field.

Many participants have gained a deep understanding on how to conduct effective public and stakeholder communications concerning climate and energy issues. However, most organizations have limited funding for communications work. For them, it is difficult to put good ideas into practice, thus limiting innovation in this area. In July 2019, EF China launched a “Small Grants” project for strategic

communications to support small-scale and effective communication activities, providing opportunities for innovative climate stories with the previously neglected perspective.

In the meanwhile, EF China has also provided compacity building to government campaign personnel in charge of environmental and climate issues. It has helped them explore and share how to effectively marshal public support and participation in pollution control campaigns. Within two years, more than 170 such personnel from Yunnan, Shandong, Henan, and Hebei provinces participated.

Changing Public Behavior

When it comes to solving environmental problems and responding to climate change, public support and participation is a key. Good communications can greatly enhance the public's awareness and lead to a transformation of their behavior. This area has gradually become a focus of EF China's strategic communications work.

In order to address the problem of disaggregated coal burning, China introduced a series of clean heating policies. However, villagers in many regions resisted them. This is due to various reasons, such as unfamiliarity toward the policies, difficulty in changing old habits, economic constraints, and a lack of supporting infrastructure.

In 2017, EF China helped the Center for Environmental Education and Communications, a research institution supervised by the Ministry of Ecology and Environment, carry out a communications project for the management of disaggregated coal in China's rural areas, emphasizing the necessity to work on the basis of the target audience's perceptions and needs. The project released a report titled Coal-burning Management Report for Beijing-Tianjin-Hebei, which analyzed people's concerns about cost, efficacy, and maintenance of alternative solutions, before examining the current policies, institutional mechanisms, markets, and public communication efforts concerning clean heating. It came up with a tailor-made communication tool kit for rural disaggregated coal pollution control, providing useful guidance for grassroots communication work. From 2018 to 2019, EF China provided support to the center over their pilot program on the communication tool kit in rural Hebei. Based on the preferences and actual needs of local audience, it designed verses, slogans, and TikTok videos covering policies, prices, safety, and maintenance, successfully enhancing understanding and boosting confidence among the local population.

“This project has provided us with a new way to work on public communications and public behavior guidance concerning air pollution control. Communications work needs to be based on the target audience's actual needs for work and living, and in keeping with their culture and traditions. Only then, can we ensure that our message will touch their hearts, which in turn leads to changes on the ground. EF China has brought in international experience and fresh thinking on strategic communications to provide valuable support for research and pilot programs of the project,” said Jia Feng, Director of the Center for Environmental Education and Communications.

Beginning in 2018, EF China began to focus on the issue of decarbonization of the consumer sector. Domestic consumption has been the most significant driving force for China's economic growth for five consecutive years, with demand for resources and energy growing strongly. Studies show, GHG emissions related to residential consumption now account for 52 percent of the total emissions in the country. In order to achieve China's carbon peak targets, decarbonization in the consumer sector is absolutely imperative. On its intervention of low-carbon consumption by communications project, EF China will work with partners, businesses, communities, media organizations, and other stakeholders to promote the low-carbon consumption concept and behavior change of the Chinese public.

“We look forward to continually exploring all skills and tools related to communicating climate and low-carbon issues, helping one other to understand problems at hand and build a green, low-carbon, and prosperous future with strong ambition,” Ms. Jing said.