INNOVATION CENTER FOR ENERGY AND TRANSPORTATION
能源与交通创新中心

ANNUAL REPORT 2015

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ABOUT *i*CET

The Innovation Center for Energy and Transportation (*i*CET), a professional think tank in the areas of clean transportation, sustainable development, and cleantech innovation, is an independent non-profit organization registered in Beijing and California. *i*CET's mission is to strengthen global collaboration and provide decision makers at all levels with the urgently needed innovative solutions to solve the energy, environment, and climate crises amid our fast changing world.

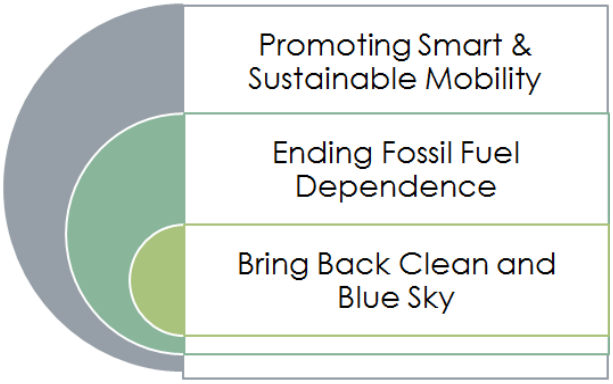
Over the years, *i*CET has carved out an unique reputation as a leader in promoting innovative clean energy and climate policies in China and beyond. We recognize the urgency of environmental challenges and commit to the values and principles of innovation, sound scientific research, independence, and practicality. We focus on transformational changes in technologies and policies, harness private-public partnership on problem solving, embrace green lifestyle and sustainable development to cherish our planet.

We do so through four core programs: The Clean Transportation Transformation Program (formed in 2006) aims to accelerate the transition to low-carbon and clean vehicles through standards, policies, technology promotion and consumer engagement; The Climate -Smart Polices and Practices Program (formed in 2008) facilitates carbon "Measurable, Reportable and Verifiable (MRV)" Principle on the corporate and government levels through free online reporting tool and trainings; The Cleantech Innovation Program (formed in 2012) creates online and offline multi-stakeholder platforms for advancing clean technology collaboration and innovation among China, U.S. and beyond; and The Big-Data & Sustainability Program is our new initiative dedicated to a *Live-Cycle* methodology development for jump-starting new generation of groundbreaking approaches to measure, monitor, and report greenhouse gas (GHG) emissions and criteria pollutions from diverse emission sources and industrial processes on real-time real-data basis.

All of *i*CET's four programs are inter-connected and enable innovative policy designs and breakthrough technological solutions to control, reduce and eventually eliminate emissions with unprecedented effectiveness and efficiency.

CLEAN TRANSPORTATION TRANSFORMATION PROGRAM

*i*CET's Clean Transportation Transformation Program's (CTTP) mission is to dramatically reduce fossil energy use and carbon emissions, bring back blue sky and promote sustainable mobility through intelligent decision making by consumers and decision-makers enabled by sound scientific information and big data analytics. The challenges we address are three-fold:

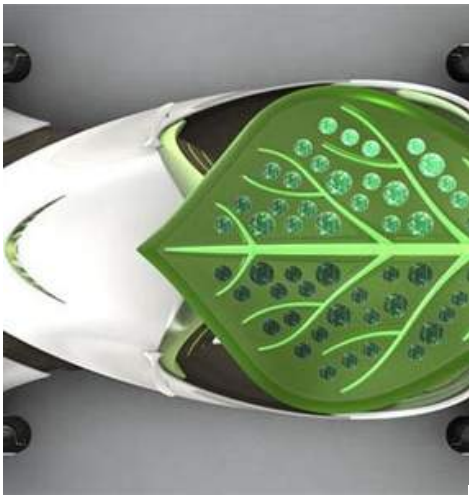


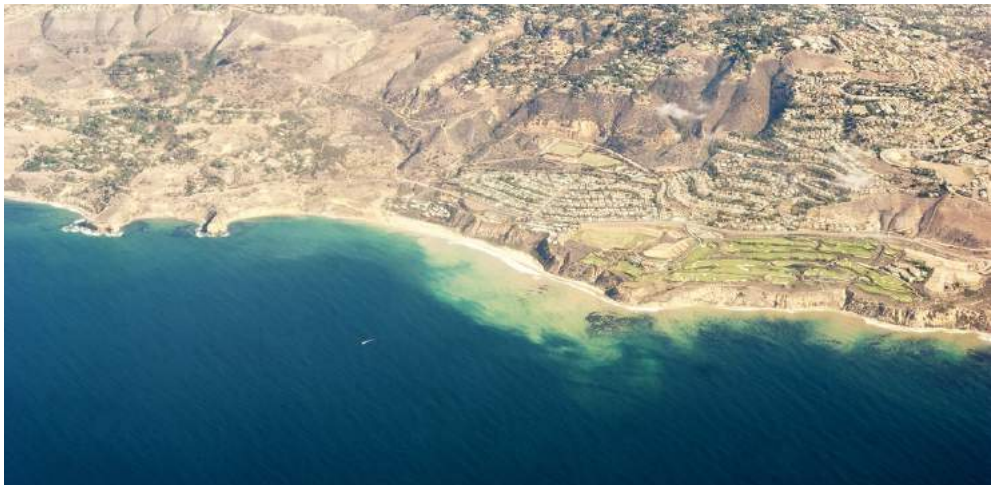
As the world's largest and fastest growing auto market and oil consumption base, China's shift towards cleaner means and sources of transportation has the potential to shape the future of global mobility. Our mission, therefore, strives to create high-impact results through engaging the following stakeholders:

Government decision makers to develop effective policies, standards and tools on clean transportation system, new energy vehicles and infrastructures.

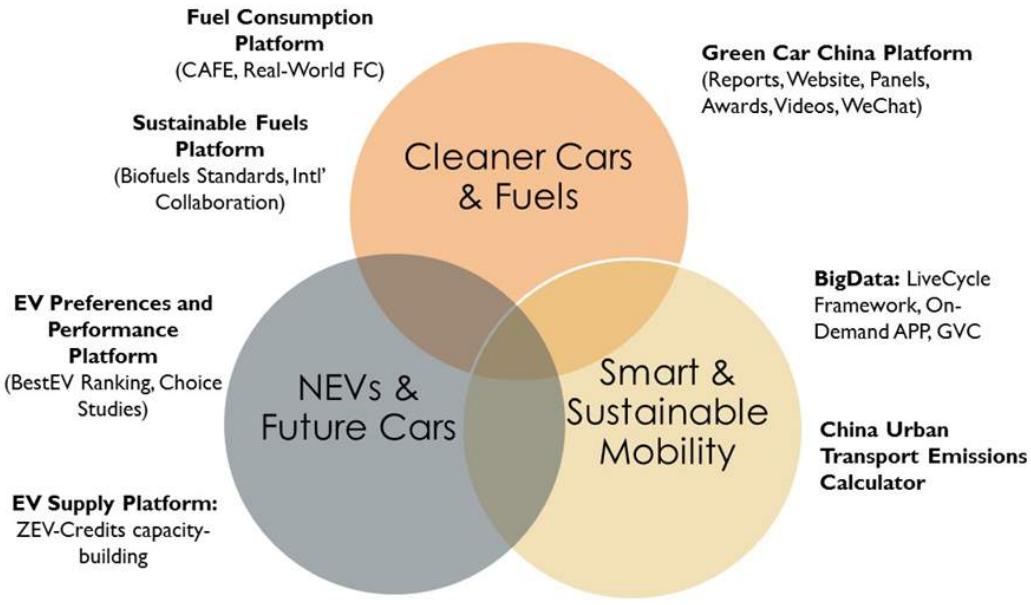
Consumers are well informed and be able to make intelligent decisions on green purchasing and travel choices.

Automakers are motivated to make cleaner and innovative products, and held accountable for environmental performance of their products.





CTTP develops innovative approaches and tools for advancing clean transportation transformation, engages multi-stakeholders to achieve our shared vision, and combines the best international practices with sound scientific analyses suited to local conditions. Our key work areas are:



Cleaner Cars and Fuels - Lowering fuel consumption rate of conventional vehicle fleet dramatically to the 5L/100km target and promoting sustainable biofuels.

NEVs and Future Cars - Developing a *BestEV* evaluation system and introducing California Zero-Emission Vehicle (ZEV) credit trading program for enhancing NEV supply and clean transportation innovation.

Smart & Sustainable Mobility - Developing China Urban Transport Emissions Calculator (CUTEC) toolkits. Pioneering Big-Data Live-Cycle analysis using Uber and Taxi fleet data in a pilot project.

CLIMATE SMART POLICIES AND PRACTICES PROGRAM

Climate change is one of the world's greatest challenges, bringing to light the urgent need for innovative solutions. The climate crisis requires the world to rapidly deplore new technologies, reform its existing business model and foster new social responsibility from corporations and ordinary citizens.

The Climate-Smart Policies and Practices focuses on innovative approaches that *i*CET is developing to address climate challenges: to strengthen greenhouse gas emission data management and MRV capability,and promote international collaboration on climate-smart technology innovations:

China Climate Registry

Establishing a robust greenhouse gas measurement, reporting and verification (MRV) mechanism is the foundation and building block for any climate policies and action plans. *i*CET's China Climate Registry (CCR) is the first online voluntary GHG registration and educational system (www.ChinaClimateRegistry.org) for governments, communities, and business to calculate and report their carbon inventories and footprint.

Sharing International Best Practices

Conducting carbon Cap-and-Trade research and introducing California's Landmark Climate Legislation (AB32) and Transfer of Best Practices to China.

Introducing California's Zero-Emission Vehicle (ZEV) Credits and Trading Mechanism and its Potential Suitability for China

Introducing the innovative California ZEV-Credits program and evaluating its effectiveness through a case study of the world's leading electric automaker Tesla Motors, expert interviews, quantitative impact assessments, and extensive meta-analysis.

Studying Credit Trading Mechanism for Low-Carbon Transportation

Investigating credit and carbon market trading mechanism among fuel consumption standards, ZEV credits and carbon market cap-and-trade system.

BIG DATA AND SUSTAINABILITY PROGRAM

On December 7th 2015, *i*CET presented its vision for "Transportation in the Era of Big Data: Applying Live-Cycle™ Methodology Framework on the Development of Big Data Analytical Studies for Urban Transportation System" at the UN Framework Climate Change Conference (COP21) in Paris, attracting broad interest from many international organizations. The plan has received support from the National Geographic Society through a grant via its Air and Water Conservation Fund in China.

The emergence of "Big-Data", "Cloud-Computing" and "Vehicle Connectivity" in recent years have created new data resources and the technical capacity to capture and verify transportation activity data in real time. *i*CET is promoting a public-private collaboration using big-data presented as new deep visibility weapon to quantify GHG impacts on environment and economy and meet urban transportation and climate change challenges. *Live-Cycle*™ approach includes the following three pillar elements:

Big-Data Enabled MRV

MRV (Measuring, Reporting, and Verification) protocol is the foundation to quantify and verify the environmental impact caused by mobile emission sources. *Live-Cycle*™ approach could one day replace traditional methods of relying on sample statistics and lab test (test-cycle) information, thus ushering in an era of big data that is based on real-time, accurate, and life-cycle information.

Measuring (and "ranking") "Sustainability"

Live-Cycle™ methodology will allow "sustainability" to be measured and quantified in the real-world condition. Through deep visibility and quantification analysis of the impacts of individual activities, *Live-Cycle*™ will help decision-makers develop more comprehensive and efficient low carbon plans and policies, as well as strategies for sustainable urban development and better solutions for socio-economic and environmental problems.

Enabling Eco-System Dynamic Analytics

Live-Cycle™ methodology integrates real-time urban transportation data from various ICT platforms to gain deep visibility of urban system dynamics. In particular, ride-hailing service providers have accumulated rich validated trip data that can enable in-depth analysis of travel behavior and traffic dynamics. Precise measurement using accountable and auditable data gives policy makers and city planners a crucial tool to accurately quantify behavioral impacts on environment, society and economy, thereby unlocking capacity for effective sustainability actions.

CLEANTECH INNOVATION PROGRAM

As the world's largest carbon emitter, fastest growing economy, and home to many of the world's most polluted cities, China is constantly looking to collaborate with global cleantech leaders for promoting its sustainable development. In the Fall of 2012, with support from strategic partners in both China and the US, *i*CET created its Cleantech Innovation Program, in order to identify and promote clean technology policies, practices, and business solutions in China through global multi-stakeholder collaboration.

U.S.-China Cleantech Center

The U.S.-China Cleantech Center (UCCTC) is a joint-partnership program between *i*CET and the U.S. Department of Commerce dedicated to promoting U.S. clean energy and environmental protection technologies and best practices to China. UCCTC brings together leaders from top companies and the sustainability field to network, promote and seek out new clean technologies, and shape the green future.

Tech Bank

We have created a Tech Bank covers 8 clean technology sectors: New Energy, Energy Efficiency, Clean Transportation, Recycling, Energy Storage/Distribution, New Materials, Waste/Pollution Treatment, Monitoring and Analysis. This online clean technology solutions platform is designed to promote deep technical cooperation between U.S. and China, and provides immediate access to the people and resources crucial in turning China's pressing energy and environmental challenges into partnership opportunities for private and public sector stakeholders.

Greenmaker Space

Greenmaker Space is a cross-border incubation program delivering mentorship and education to support U.S. and Chinese innovative cleantech startups. This Cross-border Incubation Eco-system for mentor-driven technology innovation and market validation, offers U.S. and Chinese firms access to the resources and connections critical to commercializing and growing their clean energy and environmental ideas and technologies.

City Partnership

With high environmental technology demands from China, we developed strategic partnerships with several Chinese cities and business districts : Tianjin, Dongying, Yixing , Changzhou, and Zhuhai to name a few. Through high level industry exchanges, capacity building workshops, and environmental protection technologies and management training, we assist city governments, local industrial insiders in improving their knowledge on clean technology, encourages the adoption of relevant policies and best practices, and promotes opportunities for commercial green technology exchange.

HIGHLIGHTED NEW PROJECTS

BestEV:

Bottom Up EV Ranking for Inspiring EV Commercialization

BestEV 中国最优电动车

Local and national policymakers have taken agressive steps to spur consumers' interests to accelerate NEV commercialization. Despite their efforts, however, public knowledge and market supply of high-quality EVs have remained sluggish. The BestEV project aims to create an innovative evaluation methodology and consumer engagement platform to increase public knowledge and awareness on EVs performance and quality issues, producing data-driven,and consumer experience-based ranking system.

The BestEV project commenced in August 2015 and receives strong support from the Energy Foundation. A transparent scientific methodology was developed in consultation with 28 experts, a steering committee was formed including major EV and auto related media outlets, corporations, universities and research institutions. Marketing plan for branding and outreach development guidelines was formed through consultation with various stakeholders.

China Urban Transport Emissions Calculator (CUTEC):

Simple and accessible tool for measuring transport emissions and assessing policy

Recognizing the role transport plays in China's severe air quality issues, the central government recently introduced several strong mitigation targets. In the private transport sector, policies translate to an overall energy consumption intensity reduction of 6%, and a carbon intensity reduction of 7%, reduction of average PM10 by 10% between 2012 and 2017 in major cities, a PM2.5 reduction target of 15 - 25% in three strategic corridors of economic development (the Beijing-Tianjin-Hebei corridor, the Yangtze River Delta corridor and the Pearl River Delta corridor). Subsequently, local governments are seeking evidence-based tools for informing effective transport policy. *i*CET initiated the creation of a tool that will enable city policymakers to make clearly informed choices on effective methods to reduce vehicle emissions as a step towards lower CO2 emissions and better air quality (including CO, HC, PM2.5, NOx, CO2, SOx and PM10). In the Shenzhen pilot study, CUTEC demonstrated the capability of assessing the potential impact of different policy options and scenarios. In 2016 the tool will be expanded to include real-world emission factors through collaboration with the new LiveCycle™ Framework Development recently announced by *i*CET.

Big Data Informing Transport Decision-Making:

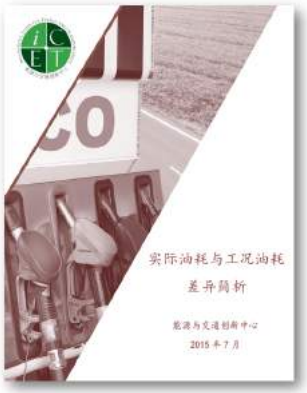
Live-Cycle™ Framework Development

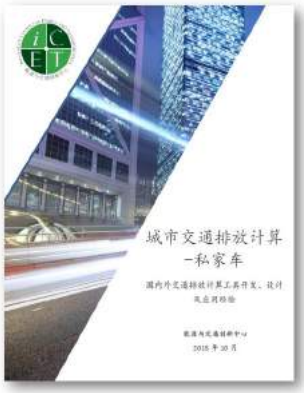
On December 7th 2015, Dr. Feng An presented *i*CET's vision for "Transportation in the Era of Big Data: Applying *Live-Cycle*™ Methodology Framework on the Development of Big Data Analytical Studies for Urban Transportation Systems" at the UN Framework Climate Change Conference (COP21) in Paris, attracting broad interest from international organizations.

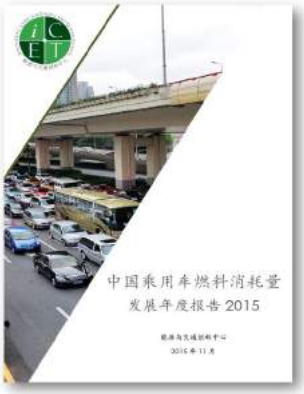
The *Live-Cycle*™ framework methodology has gained support from the National Geographic Society due to its innovative utilization of the GVC framework and big data analytics to conduct comprehensive, and dynamic analysis of systems and behaviors using big volume factual and real-time data. Through in-depth analysis of the impact of individual activities in the value chain system, the *Live-Cycle*™ framework methodology will be able to help decision-makers across different sectors to develop more comprehensive and efficient low-carbon plans and policies, as well as strategies for sustainable urban development and better solutions for socio-economic and environmental problems.

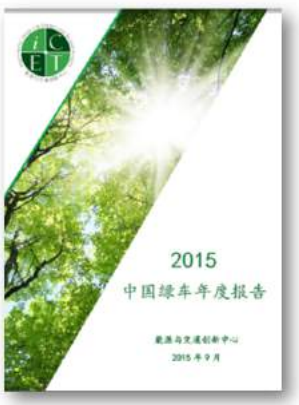
"Transportation in the Era of Big Data: Public-Private Cooperation on Transportation Data", will serve as an anchor project for "Big Data and Sustainability" and the *Live-Cycle*™ framework methodology, with initial studies focusing on the urban transportation system in Chengdu, China. The project will integrate real-time urban transportation data from various information and communications technology (ICT) platforms (such as Uber and other ride-hailing apps, GPS, smart city applications, public transportation systems, etc.) to gain a better understanding of the usage of transportation systems in the real world.

MAJOR REPORTS







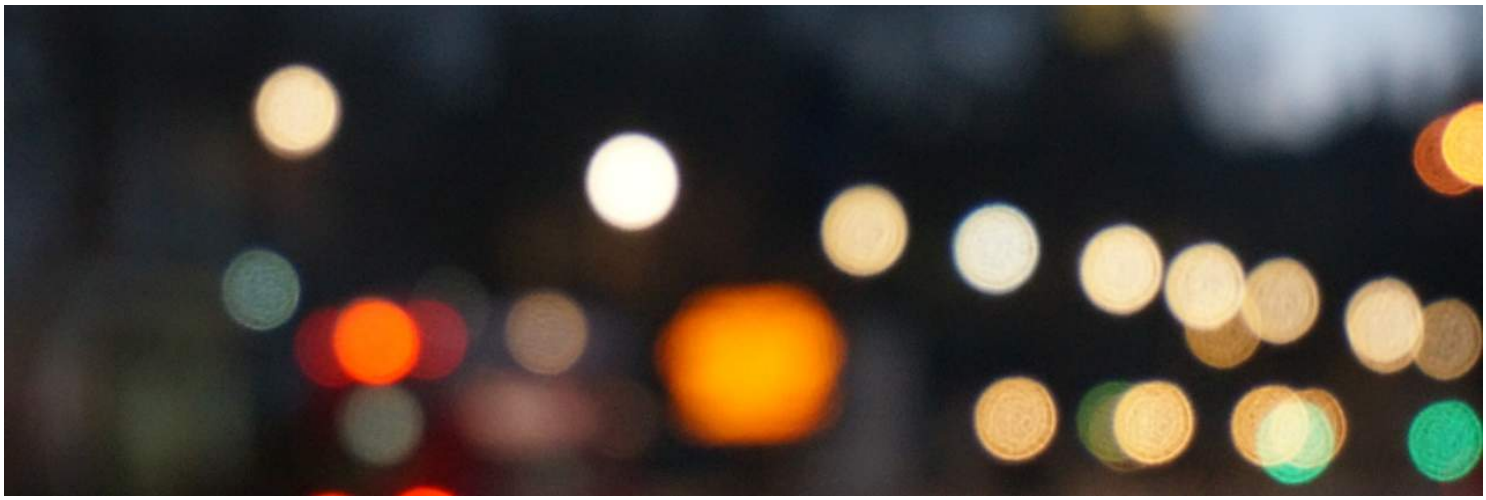


2015 China Average Fuel Consumption Study Report *(December 2015)*

It has been nine years since China's fuel consumption standards went into their implementation phase. During this period, China's domestic average fuel consumption improved slowly from 8.16L/100km to 7.22L/100km with an average annual decrease of about 2%. The new phase IV standard will be enforced starting from 2016, it requires a sharp fuel consumption decrease of 2 L/100km in the next five years at an annual rate of 6%. This report utilizes key indicators to analyze and track the development and trend of China's vehicle standard implementation for each and every automakers in China, include domestic brands, joint-ventures and import brands.

2015 Green Car China Annual Report *(September 2015)*

*i*CET's 5th Green Car China report presents the top green performing models out of China's top 50 selling cars of 2014, as well as top 10 green performing models in each of nine different car segments (hybrids, small, compact, mid-size, large, luxury, SUV, MPV, sports car). This year, the Toyota LEXUS CT200h achieved the best overall green score. The China Green Car Ranking received continuing support from the United Nation Environmental Program (UNEP) and China Ministry of Environmental Protection (MEP).



Calculating Urban Transportation Emissions - Private Vehicles: Lessons from existing tools' development, design and implementation *(August 2015)*

This report is designed to provide context to *i*CET's City Transport Emissions Calculator and screen existing transport emissions modeling approaches available in China and abroad, as well as best-practices and limitations for measuring urban transport emissions. The calculator, which is being developed, is meant to be simple to use, include state-of-the-art default values, and be publicly available, both online and through MoT's clean urban transport planning lab.

China Real World and Certified Fuel Consumption Gap Analysis *(July 2015)*

Although the "light vehicle fuel consumption test method" standard was released over ten years ago (in 2004) and light vehicle labeling regulation was released over five years ago (in 2010), most vehicles' actual fuel consumption is higher than the certified fuel consumption value. Today's status is even more complex, since there is little information on actual fuel consumption levels. *i*CET, in collaboration with China's BearOil App, collected over 210,000 valid samples of fuel consumption levels reported by drivers from various locations in China between 2008 and 2014. An average of the reported values was compared with China's fuel consumption certification. The analysis performed in this study introduces a novel attempt to provide stakeholders with some insights that could hereafter be more thoroughly studied.

Zero Emission Vehicle Credits: China Program Design Inputs Brief *(June 2015)*

This brief is meant to inspire Chinese EV stakeholders to converse on the topic of ZEV program design and to determine an action plan for China. It follows a previous *i*CET report described the California ZEV program, evaluated its effectiveness through qualitative and quantitative research, and studied its history and inception process. The work was introduced to national and local stakeholders in China, including the government, academic, and private sectors, through workshops, roundtables and meetings. The process of stakeholder engagement was important in itself, as it unveiled concerns and challenges facing a China-tailored program.

2014-2015 China and International Biofuel Regulations and Policies Update Report *(December 2015)*

This report provides an update on national and international biofuel policies and developments in 2014/2015, serving government and industry decision makers' efforts to promote China's sustainable biofuels development.

Biofuel's price is highly influenced by the oil price in China as well as globally, which is why the historic bottom price of less than 40 dollars per barrel posed great challenges to the biofuel industry. However, the Chinese government and the international community have encouraged the positioning of biofuels as alternative low carbon fuel, especially in the transportation sector. Advanced technology biofuels instead of grain-based biofuels are becoming the key focus, and China has recently canceled its subsidies for grain-based and is observing related global developments, such as the EU's cap percentage for such fuels as renewable transportation fuels.

China Green Car Methodology Update and Report *(February 2015)*

*i*CET's China Green Car (CGC) ranking system methodology is based on the American Council for an Energy-Efficient Economy (ACEEE)'s methodology,a globally leading vehicle life-cycle health and environment impact assessment. As ACEEE updates its methodology year after year, and as China's data inputs collected by *i*CET also evolves rapidly, this report analyzes these changes and provides timely revisions and updates. Furthermore, this report studied the life-cycle emissions and health impacts of electric vehicles (EVs) and included a new evaluation and ranking methodology tailored for EVs in China.

The Chinese Automotive Fuel Economy Policy *(February 2015)*

*i*CET was invited by the Transport Division of the UNEP to contribute to the Global Fuel Economy's Initiative (GFEI) online database by composing an updated version of the Chinese Automotive Fuel Economy Policy,for the second year in a row. Most willingly,CTTP composed the update brief which was quickly posted on the GFEI and UNEP related websites.

MAIN EVENTS

COP21 Press Conference: Innovation for a low-carbon future (December 2015)

BestEV Methodology Expert Consultation Meeting (December 2015)

2015 Annual CAFC Report Release and Panel Discussion (December 2015)

ADB China Railway Emission Reduction Workshop (October 2015)

Green Car China 2015 Award Ceremony (September 2015)

Global Clean Vehicle Summit (September 2015)

MOU signing ceremony with Beijing Environmental Exchange Center (September 2015)

Hybrid and EV Test Drive and Ride Day: Increasing Public Awareness (September 2015)

Zero Emissions Vehicles (ZEVs) Beijing Stakeholders Roundtable (May 2015)

Zero Emissions Vehicles (ZEVs) Shenzhen Stakeholders Engagement Workshop (March 2015)

U.S. - China Clean Air Technology Exchange Meetings (September 2015)

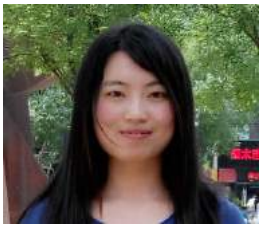
U.S. - China Cleantech Cooperation Event (April 2015)

TEAM MEMBERS

Dr. Feng An
Executive Director

Maya Ben Dror
Program Director
Clean Transportation

Liping Kang
Program Manager
Clean Transportation



Lanzhi Qin
Research Analyst
Clean Transportation

Alex Morales
Senior Analyst
Big Data and Sustainability

Emma Wang
Program Officer
Clean Transportation/
Big Data and Sustainability

Jeff Horowitz
Program Director
Cleantech Development

Rainning Bao
Program Manager
Cleantech Development

Maggie Liu
Program Officer
Cleantech Development

Li li Zuo
Program Officer

Jennifer Jia
Communication Officer

Jingnan Zhou
Program Assistant

Mengni Zhang
Program Assistant

Li Chen
IT Specialist

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Junfeng Li

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Jim D. Boyd

Former Commissioner of California Energy Commission

President, Boyd Group Consulting

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Dr. Daniel Sperling

Acting Director of Energy Efficiency Center,Founding Director of Institute of Transportation Studies, UC Davis

Dr. Fuqiang Yang

Senior Adviser, Climate, Energy and Environment for the NRDC

Dr. Dadi Zhou

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Director,China Energy Economy Professional Committee

Katherine Blumberg

Director,Climate and Health Programs of the International Council on Clean Transportation

Dr. John DeCicco

Professor of Practice of School of Natural Resources and Environment Research Professor,University of Michigan Energy Institute

Elizabeth Economy

Director,Asia Studies of the Council on Foreign Relations

Expert on China-U.S. relations

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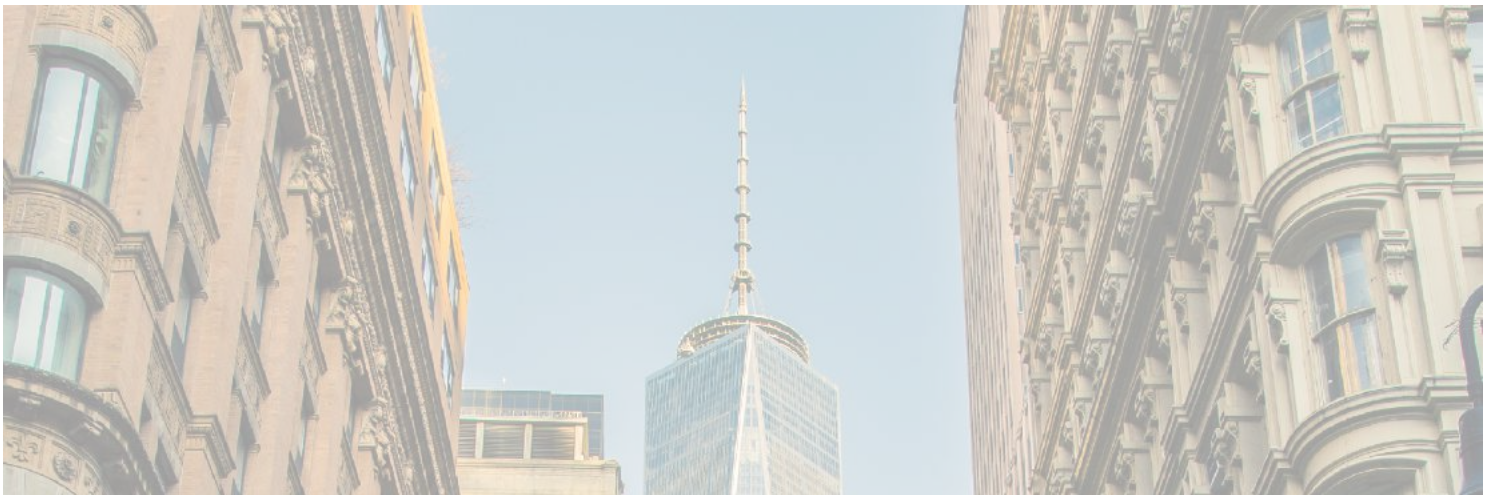

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www.icet.org.cn

info@icet.org.cn