

International Workshop on Assessing Co-Benefits from
Economic Development Projects and Emission Reduction Policies
Meeting Minutes

Meeting Date	July 10 2013				Time	09:00-17:20		
Venue	Hotel New OtaniChangfugong, Rose Mallow Function Room							
Sessions				Moderator	Name	Post	Organization	
Presentation and Speaker	Welcome and Opening remarks			Mr. Zhao Lijian, Director of Environmental Management Program, Energy Foundation China	Ms. Liu Hongzhi	Deputy Director General	Department of Science, Technology and Standards, Ministry of Environmental Protection	
					Mr. Lin Jiang	Senior Vice President	Energy Foundation	
	Session 1	INTERNATIONAL CO-BENEFIT STUDIES			Dr. Surabi Menon,	Director of Research	Climate Works Foundation	
					Dr. Gary Kleiman,	Senior Environmental Specialist	World Bank	
	Session 2	CHINA CO-BENEFIT STUDIES: MACRO LEVEL			Prof. He Kebin	Professor	Tsinghua University	
					Dr. Jiang Kejun	Professor	Energy Resources Institute	
					Dr. Hu Tao	Senior Associate	World Resources Institute	
	Session 3	CHINA CO-BENEFIT STUDIES: MICRO	Panel I: Sector		Prof. Tian Chunxiu, Division Director at PRCEE of	Prof. Mao Xianqiang	Professor	Beijing Normal University
						Dr. Zhou Ying	Associate Professor	Chinese Academy of Environmental Planning

		LEVEL	Panel II: City	MEP	Dr. Michael Benjamin	Chief	Monitoring and Laboratory Division, California Air Resources Board
					Ms. Karen Magliano	Deputy Director	Air Quality Planning & Science Division, California Air Resources Board
					Prof. Jun Bi	Professor	Nanjing University
					Prof. Qian Yi	Professor	Qingdao University of Science and Technology
		Session 4	DIALOGUE: Needs, Challenges and Opportunities for using a co-benefits approach for air quality management		Mr. Xie Hongxing, Director at Secretariat for Clean Air Alliance of China	Discussion held among representatives from all participating organizations	
	Wrap up and Adjourn				Dr. Surabi Menon, Dr. Gary Kleiman, and Mr. Lijian Zhao		
Outcomes	Welcome and Opening Remarks ➤ Ms. Liu Hongzhi <ul style="list-style-type: none">■ Current work of the Ministry of Environmental Protection (MEP) involves co-control of SO₂, NO_x and carbon emissions, HFC elimination, biodiversity conservation for climate change adaptation, and MRV.■ MEP attaches great importance to co-control of conventional pollutants and Greenhouse Gases (GHGs) emissions. MEP has carried out some researches and pilot projects to launch co-control, firstly in the industries with large emissions like cement, Iron & Steel, transport and thermal power. By co-control, initial estimates show reductions of 1.5 billion tons of CO₂, 4.7 million tons of SO₂ and 4.3 million tons of NO_x have achieved during the period from 2005 to 2010.■ Next steps: MEP is working with Energy Foundation China to establish national climate friendly environment						

	<p>management (Co-control) strategy and toolkits and pilot projects in cities and key sectors, and non-CO₂ climate forcers control. Besides, MEP is also working on environmental supervision for large scale projects like shale gas and CCUS, MRV, and climate change communications.</p> <ul style="list-style-type: none"> ➤ Vice President Lin Jiang <ul style="list-style-type: none"> ■ Energy Foundation China works in eight program areas, including low-carbon development paths, transportation, renewable energy, electric utilities, buildings, industry, environmental management, and sustainable cities. ■ Energy Foundation China's various projects address the issue of co-benefits and co-control, for example, energy efficiency, renewable energy, and environmental management programs. ■ To improve China's environment quality and environment & health system as well as to tackle climate change, air quality is a good starting point. <p>SESSION 1: INTERNATIONAL CO-BENEFIT STUDIES</p> <ul style="list-style-type: none"> ➤ Presentation I: <u>A Multi-pollutant Multi-benefits Approach to Air Quality Management and Climate Mitigation</u> <ul style="list-style-type: none"> ■ Dr. Surabi Menon presented Climate Works Foundation's researches on modeling and quantifying multi-pollutants emission reductions' benefits. Co-Benefits involve public health, agriculture and macro-economic development. Five case studies were given in power sector, transportation, industry, buildings and forestation. ■ Dr. Gary Kleiman presented World Bank's projects to address multiple benefits of multiple pollutants with quantification and monetization. Approaches were introduced about how multi-pollutant emission reduction programs are quantified to strengthen economic analysis. Solid Waste Management case in Brazil and BRT case in India showed that a comprehensive economic analysis depends on several measures and cannot work in isolation. ➤ Presentation II: <u>Reducing black carbon: an important way to reduce particle pollution and mitigate climate change</u> <ul style="list-style-type: none"> ■ Mr. Neil Frank introduced EPA black carbon report to Congress, including the negative effects of Black Carbon on global warming and public health, current emission levels worldwide, and potential source-tracking and reduction techniques. ■ Black carbon emissions affect the Earth in significant ways. In the U.S. PM2.5 air quality has improved due to black Carbon emissions reductions with major public health benefits.
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- Case studies have characterized the spatial and temporal distribution of Black Carbon and its emission sources, showing Black Carbon emissions in different areas vary in their sources. China has to target industrial as well as more carbon control in transport and residential sectors.
- More measurements are needed to better characterize the emission sources, particularly within urban areas

SESSION 2: CHINA CO-BENEFIT STUDIES: MACRO LEVEL

➤ Presentation I: Co-benefits of Black Carbon Control in China

- Prof. He Kebin introduced Particulate Matter emission levels in different part of China over the past 20 years.
- China started controlling Particulate Matters emission from 1990s, however control measures to Black Carbon emissions were not effective, leading to an increasing ratio of Black Carbon emissions to Particulate Matters emissions during the last 20 years.
- Black carbon emissions to SO₂ emissions ratio had declined in the last 20 years prior to a recent increase, which was due to the SO₂ emission control and reduction measures during the 11th Five Year Plan period.
- In comparison, transportation and domestic sources can better address co-benefits via black carbon control, which have more positive effect and larger potential. As the improving of the vehicle techniques and the completion of emission standard system, emission levels shall be significantly declined.
- To improve air quality central government will soon issue “*Ten Key Measures on Air Pollution Control*”, aiming at pushing energy restructure, or even economic restructure, which will have huge co-benefits on climate mitigation.

➤ Presentation II: Achieving China’s Energy, Air Quality and Climate Goals: An Assessment of 2050 Co-Benefit Scenarios

- Mr. Jiang Kejun from Energy Research Institute of NDRC introduced China’s economic situation and possible energy consumption / carbon emissions peak.
- As the second largest economy, China needs to change its climate negotiation strategy to take more responsibilities. China is currently discussing the possibility of CO₂ peak by 2025, earlier than previous peak point estimates of 2030, or 2050.
- China has to restrict coal consumption as soon as possible to achieve an air quality improvement to an acceptable

	<p>level by 2020, but obviously it needs strict policies and specific guidelines to support it. The new State Council <i>Ten key Measures on Air Pollution Control</i> aims to play this role. If coal consumption cap target can be achieved, coal consumption peak may come before 2020, so CO₂ emission may peak before 2025.</p> <ul style="list-style-type: none"> ■ With Energy Foundation support a couple years ago, ERI's model analysis show China can achieve significant emission reductions for major conventional pollutants (SO₂, NO_x, PM_{2.5}, BC, Mercury), and CO₂ reductions by 2020. <p>➤ Presentation III: <u>Co-control Methodology at Different Levels</u></p> <ul style="list-style-type: none"> ■ Dr. Hu Tao presented his research on different co-control methodologies. ■ Different abatement techniques may contradict each other ---- some achieve carbon reduction while increasing sulfur or nitrogen emissions simultaneously, and vice versa. Examples are SCR, which increases 5 tons of CO₂ when reduce 1 ton of sulfur; CCS, which causes significantly increase in sulfur and nitrogen when reduce 1 ton of carbon; and for FGD, which controls 1 tons of sulfur when add 5.4 tons of carbon. ■ Structure measures including shut down polluting enterprises, improving energy efficiency and renewable energy normally have good co-benefits results ■ We use monetized Air Pollutants Equivalents (all air pollutants plus CO₂) to assess the most cost effective technique in the industry sectors, areas and local plans. <p>SESSION 3: CHINA CO-BENEFIT STUDIES: MICRO LEVEL</p> <p>Introductory Remarks by Moderator Tian Chunxiu, of MEP PRCEE.</p> <ul style="list-style-type: none"> ■ Co-benefit and co-control have gained more and more attention recently. ■ MEP PRCEE has been doing research on GHGs and air pollutants control in iron & steel, cement, and transport. ■ MEP PRCEE is working with Energy Foundation for co-control research and toolkits development in cement industry and iron & steel industry. <p>Panel I: Sector</p> <p>➤ Presentation I: <u>Co-control of Air Pollutants and Greenhouse Gases in Iron and Steel Sector</u></p> <ul style="list-style-type: none"> ■ Prof. Mao Xianqiang from Beijing Normal University presented his research on the co-control in Chinese Iron and Steel industry.
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	<ul style="list-style-type: none"> ■ Prof. Mao introduced the current Chinese iron and steel production situation and the air pollution bringing by this industry. His current analysis is only focusing on different control measures for SO₂, NO_x and CO₂. Next step will involve particulate matters and Black Carbon. ■ Results from the abatement cost analysis showed prevention measures, such as energy efficiency and industrial restructure, and upfront measures, such as EMS, are more cost-effective than end of pipe solutions. ■ In China, through still debating, the over capacity issue in iron and steel industry is commonly realized and recognized by the governments. In the near future, there will be much emission reductions for both conventional pollutants and CO₂ by phasing out old facilities. ■ Barriers: <ul style="list-style-type: none"> - Emission reduction target and related requirements have been set for companies, while there is a lack of industrial guidelines for co-control. Investigation showed this was one of the technical barriers. - In terms of management barrier, there is alack of efficient long-term government plan for multi-pollutant control. - Initial capital may bring big economic barrier to the projects due to current recession of the industry. ■ Prof. Mao's team is working in Taiyuan for a co-control pilot in iron and steel sector. <p>➤ Presentation II: <u>Identification of the main industrial sources contributing to CO₂, SO₂ and NO_x in China</u></p> <ul style="list-style-type: none"> ■ Dr. Zhou Ying presented CAEP's research on identification of the emission co-related sources in industries. ■ The U.S. experts talked more about "multi-pollutants co-benefits", while Chinese experts talked more about "co-control". She believed this was because there are urgent needs to do co-control in China. Research model was based on a CAEP database, which has 1.57 million industrial sources' emission of SO₂, NO_x in 2007. CO₂ emission was calculated based on IPCC's methodology. Their research addresses 90% of SO₂ emissions, 67% NO_x emissions, and 85% CO₂ emissions are due to fossil fuel use. ■ A concept "co-related sources" or "CNS" was created to identify those SO₂, NO_x and CO₂ emission sources in similar sectors. Big emitters of SO₂ and NO_x are also big contributors to CO₂ emissions. ■ CAEP identified 1347 companies that are most influential CNS among which 64% are power and heating companies, the rest belongs to iron & steel, chemical and mining industries. ■ CAEP is now also identifying the waste landfill and breeding industry co-related sources.
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	<ul style="list-style-type: none"> ■ Future need: how to effectively calculate abatement potential and costs. <p>➤ Presentation III: <u>California's Action to Reduce Black Carbon</u></p> <ul style="list-style-type: none"> ■ Dr. Michael Benjamin talked about California's experiences in air pollution control. ■ From early 1960s till late 1980s PM_{2.5} had decreased by 60% in California. ■ California has tough targets to cap air pollutants and published roadmap for achieving these targets. For climate change there will be a new roadmap later this year. ■ Charts showed a dramatic economic growth and diesel consumption in California after 1960s, while Black Carbon had decreased by 90%. ■ Ways to achieve this were low emission vehicles, new energy, particulate matters emission standards, old vehicle and old engine elimination through public transportation, strict diesel standards, domestic burning limit, etc. ■ Administrative means and market tools should be used at the same time. <p>Panel II: City</p> <p>➤ Presentation I: <u>Methodology for Co-Benefit Analysis for Air Pollution and GHG Emission Control Policies at Suzhou city</u></p> <ul style="list-style-type: none"> ■ Prof. Bi Jun from Nanjing University introduced his co-control methodology research by Suzhou case. ■ Nanjing University team is working with Suzhou to develop Suzhou's low carbon development plan, and is also working with Suzhou EPB on air pollution control policies. ■ Great attentions have been paid to urban development in Suzhou by considering multi-factors' contribution to GHGs and air pollutants, including urban population, land use change, industrial structure, transport and construction development. He also evaluated CO₂ emissions' impact on health, agriculture and global warming. ■ Through energy restructure by 2030, 32 million tons of CO₂ can be reduced in Suzhou. ■ Next step in Suzhou involves pollutants prediction under different GHGs emission scenarios, health risk assessment, air pollution control management system, GHGs and air pollutants co-control assessment, and non-health benefit quantitative assessment methodology. <p>➤ Presentation II: <u>Co-Benefit Analysis for Air Pollution and GHG Emission Control Policies for Urumuqi city</u></p>
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- Prof. Qian Yi from Qingdao University of Science and Technology presented his study on the co-control of air pollutants and GHGs in Urumqi city.
- Multiple reasons were identified that lead to bad air quality in Urumqi: heavy industrial structure, natural characteristics, fast growth of transport, pollutant coming from outside, bad industrial siting, etc. Previous control measures were not very effective, now Urumqi must deploy co-control strategy.
- Our suggestions include key priorities for future co-control work in Urumqi city, including: (1) prevention first, to focus more on prevention of air pollutants from the sources, by restructure the energy source and industry, so that the policies developed not only target the end-of-pipe control, but also the upfront control; (2) coordinated approach first, to focus more on coordination of different policy interventions, including coordination among different government agencies; (3), focusing more on market signals: including tax, price reforms to encourage co-control. The research results gained attention from Xinjiang Provincial leaders.
- Next steps will focus on economic approaches including introducing tax to coal, and other pricing signals to encourage public transport and industrial adjustment.

SESSION 4: DIALOGUE: Needs, Challenges and Opportunities for using a co-benefits approach for air quality management

Introductory remarks by moderator

- Mr. Xie Hongxing is in charge of the secretariat of Clean Air Alliance of China (CAAC), which was founded early this year with the support from Energy Foundation China. To address China's air pollution challenge, on January 23rd ten leading Chinese technical institutions in the field of air quality came together to establish CAAC. Dedicated to improving China's air quality, the Alliance sets up a platform for communication and cooperative projects, promoting best practices, and supporting the policymaking process. CAAC is working with Energy foundation to establish a Co-control Collaborative Network to help create a dedicated platform to facilitate knowledge exchanges, communication and cooperation for relevant experts and professionals.
- In this session every organization talks about their researches related to co-benefits and co-control, future needs, challenges and opportunities.

➤ **Fu Lu (CAI-Asia)**

Clean Air Asia has been working on air quality management from the start. In 2010 they also organized co-benefits training for city representatives. Her major concern is when there is conflict between pollution control and GHG reductions, how to deal with such conflicts. Right now, the local government is under a lot of pressure to make air quality improvements, and probably this is more important than GHG reductions, so how to communicate with them about considering GHG emissions reductions, especially if there is conflict.

➤ **Bi Jun (Nanjing University)**

To advocate local government for co-control, it is important to convince them that co-control is a win-win strategy for multi-pollutants abatement and reaching the standards. Prof. Bi agrees right now the local government's priority is air quality, and they pay less attention to GHG reductions. Prof. Bi suggest to start with the promotion of measures with strong positive co-benefits, and for measures with conflicts benefits, a methodology is needed for decision-making, and before that, good estimates of benefits and costs are very important. He thinks it is important to promote the idea of co-control, and maybe introduce policy requirements for air quality planning, where a section can be required on co-benefits analysis.

➤ **Hu Tao (WRI)**

In addition to developing the methodologies, draft technical guidelines and relevant case studies are needed for local decision makers. .

➤ **Zhou Ying (CAEP)**

MEP has not yet published any document for co-control. There will possibly be one for cement industry in the near future. CAEP are now doing climate friendly pilot work. No matter air pollutants or carbon emissions local governments have to achieve their emission reduction targets. By using co-control technical means local government can decrease the abatement cost for reaching the standards. Many pilot regions are happy to cooperate with CAEP because they really achieve some targets. When competing with the other places, the title of climate friendly pilot makes these regions stand out. She hopes there will be more pilots and more case studies to support our further research. She also thinks a good platform to communicate with key researchers in this area is necessary, most of the

	<p>key researchers are in this room and we could start from this conference.</p> <ul style="list-style-type: none"> ➤ Bi Jun (Nanjing University) Data source is a big headache in China. When you perform a policy or a plan you find there is heavy lack of accurate data, which may potentially affect the research conclusion. There is also a lack of research interests. There are less than 100 people who are doing research related to the co-control in China, including some graduate students. We need to promote this idea to more researchers and policy makers. It is important for NDRC and MEP to work together on GHGs and air pollutants co-control. ➤ Qian Yi (Qingdao University of Science and Technology) Co-control case studies in more regions and more industries is necessary for drafting guideline mentioned by Prof. Hu previously, and then can discuss with local government. ➤ Mao Xianqiang (Beijing Normal University) In the U.S. one government department is responsible for both GHGs and air pollutants control, but in China two separate departments manage them respectively. This is a challenge, but is also a chance. It is not because NDRC and MEP not willing to cooperate together, but are both worried about in the future such co-control issue will be responsible by the other one. It is a power game. The state council needs to elevate co-control to a strategic height. ➤ Hu Tao (WRI) Economic development is not bound to bring environment pressure. Like Japan. Economic restructure is very important. The state council should coordinate NDRC and MEP. China needs not only co-control targets, but also applicable policy means and guidelines to help local governments achieve the targets. For the moment, in most occasions, China is using administrative requirements for both air pollutants and GHGs without relevant guidelines and policy tools. ➤ Tian Chuan (NCSC) NCSC provides climate / low carbon policy and decision support for NDRC, and NCSC is interested in energy policies and the co-benefits. NCSC is willing to build a cooperation platform with other organizations to get database support and local government feedback in terms of policy performance. CAAC's suggestion on building an information sharing
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platform on co-benefits and control would be very valuable, and NCSC would like to participate in.

➤ **Wang Xuan (RAP)**

RAP as an NGO is interested in air quality and climate change. Power sector is a main source for GHGs and air pollutants emissions. RAP focus on how to achieve co-benefits while decreasing abatement cost.

The U.S. has a lot of good experiences in integrating environment planning to power planning. There can be learnt by us.

➤ **Tian Chunxiu (Policy Research Center for Environment and Economy, MEP)**

PRCEE provides policy recommendations to MEP. Policy suggestions to the government should be based on research conclusions and assessments. However there is a lack of applicable and efficient methodologies. PRCEE hopes Energy Foundation could support for more methodology development.

➤ **Jiang Kejun (ERI, NDRC)**

Prof. Jiang hopes more analysis could be conducted on achieving more aggressive targets for pollutants and CO₂. Sometimes researchers are even more conservative than the government, and are behind the government policy making. Researchers should be more forward looking and develop aggressive policy scenarios for the government, for example, for China to achieve not only 35 µg/m³ PM_{2.5}, but also 25 µg/m³, 15 µg/m³, or even 10 µg/m³. Then researchers can develop what kind of policies needed, what are the costs, and what are the benefits (including avoided health care costs). Prof. Jiang hopes researchers could continue discussions and communications on this topic and develop some fast action research work, since the policy evolvement is very fast, such as the State Council Ten Measures on Air Pollution Control, and the 13th five-year-plan will be coming up in 2014.

WRAP UP AND ADJOURN

➤ **Dr. Gary Kleiman**

- We've been using different terms (co-control and co-benefits) for the same concept, which is that there are win-win opportunities, many of which are not included in current assessments
- We at the WB want to hear more about how to break barriers to spread this message
- What aspects of available tools would you like to see be expanded or developed?

	<ul style="list-style-type: none"> ■ We think that the case studies you've worked on are very valuable, and we need more case studies ■ When there is win-win it's no problem, but how do we measure the tradeoffs that exist? ■ Broader analysis is necessary to show net benefit: in the steel industry, if SO₂ is down but CO₂ is up, but in transport we can reduce CO₂ and cut costs, it's hard to tell independently if it is worth it; looking together we see we have net reductions in both pollutants and in cost, so this is a win-win approach that can be presented to the NDRC, MEP, local governments, etc. <p>➤ Dr. Surabi Menon</p> <ul style="list-style-type: none"> ■ We are really eager to support the work here, need to know needs and input from policymakers, more case studies for guidelines ■ We want to help make more tools available for use. When using economic and technical tools for analysis there are different challenges in different areas. ■ We also want to make a high level report from this workshop, to present our results later. Your inputs are very valuable. We would welcome more communications on this. <p>➤ Mr. Zhao Lijian</p> <ul style="list-style-type: none"> ■ We need co-benefits analysis for either controlling air pollution or coping with climate change. We need policies and measures to promote co-control and maximize co- benefits. ■ Co-benefits can be used in either way. GHGs reduction can bring local air pollutants emission reduction, and vice versa. In China, right now, air quality is a great policy opening, and there will be a lot of work and policies developed to improve air quality. Therefore we need to focus on achieving GHG emissions co-benefits from air quality policies. Air pollutants and Black Carbon reduction can bring reductions in GHGs emissions simultaneously. Coal cap policy under air quality management is another big area that could bring big GHG reductions. ■ Different abatement techniques for conventional pollutants and GHGs may contradict each other. We need more analysis for it. Sometimes a reasonable negative co-effect is acceptable. ■ Modeling and monetizing co-benefits should be used to support policy-making, while the tools have to be simplified. ■ Resource tax, or carbon tax, or tax focusing on coal consumption can be introduced to curb China's coal consumption, and achieve great co-benefits.
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	<ul style="list-style-type: none"> ■ From industry level, we have varied standards related to environment emissions, energy conservation and clean production. Ways to integrate them need to be considered. Co-control guidelines and co-control assessment system for each industry can be set up to help them achieve reduction targets. ■ At city or regional level, It is very important to integrate co-benefits analysis and co-control to air quality attainment planning and low carbon planning. ■ EF China and CAAC plan to build a co-control information-sharing platform for experts to share information and collaborate together. 		
Highlights	<ul style="list-style-type: none"> ➢ China recognizes the co-benefits generated from co-control policies and measures, and MEP has been working on both the national strategy and city & sector pilots with participation and support from Energy Foundation China; ➢ International experience and expertise are highly appreciated by both Chinese researchers and policy-makers. ➢ To support efficient policy making, simplified tools for modeling and quantifying co-benefits are needed. ➢ Co-control technical guidelines, standards, as well as case studies are needed to support actions from key industrial sectors. ➢ China has huge potential both at the city level and the sector in conducting co-control policies and measures. ➢ Now, strong political attention and policy efforts makes air quality a good entry point to promote co-control in China, and significant co-benefits can be achieved from the coal consumption caps set for the improvement of air quality. ➢ Environment tax or resource tax can be one of the economic measures with strong co-benefits. ➢ Co-control is a new approach and more communication and knowledge exchanging is needed in China., and EF is working with CAAC to establish a co-control network to facilitate communication and cooperation. 		
Prepared by	Yuan Lin, Lijian Zhao, Tonny XIE	Date	25 July 2013