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## Tackling air pollution and extreme climate changes in China: Implementing the Paris climate change agreement

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### ABSTRACT

China still depends on coal for more than 60% of its power despite big investments in the process of shifting to nuclear, solar and wind power renewable energy resources alignment with Paris climate change agreement (Paris CCA). Chinese government through the Communist Party Central Committee (CPCC) ascribes great importance and commitment to Paris CCA legacy and history landmark implementation at all levels. As the world's biggest carbon dioxide emitter, China has embarked on "SMART" pollution and climate changes programs and measures to reduce coal-fired power plants to less than 50% in the next five years include: new China model of energy policies commitment on CO<sub>2</sub> and greenhouse gas emissions reductions to less than 20% non-fossil energy use by 2030 without undermining their economic growth, newly introduced electric vehicles transportation benefits, interactive and sustained air quality index (AQI) monitoring systems, decreasing reliance on fossil fuel economic activities, revision of energy price reforms and renewable energy to less energy efficient technologies development. Furthermore, ongoing CPCC improved environmental initiatives, implemented strict regulations and penalties on local companies and firms' pollution production management, massive infrastructures such as highways to reduce CO<sub>2</sub> expansion of seven regional emissions trading markets and programs for CO<sub>2</sub> emissions and other pollutants are being documented. Maximizing on the centralized nature of the China's government, implemented Chinese pollution, climate changes mitigation and adaptation initiatives, "SMART" strategies and credible measures are promising. A good and practical example is the interactive and dynamic website and database covering 367 Chinese cities and providing real time information on environmental and pollution emissions AQI. Also, water quality index (WQI), radiation and nuclear safety monitoring and management systems over time and space. These are ongoing Chinese valuable and exemplary leadership in Paris CCA implementation to the global community. Especially to pragmatic and responsible efforts to support pollution and climate changes capacity development, technology transfer and empowerment in emissions surveillance and monitoring systems and "SMART" integrated climate changes mitigation packages in global Sustainable Development Goals (SDGs) context, citizenry health and wellbeing.

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### 1. Introduction

China was part of the landmark Paris climate change agreement that set a course for our planet and future generations to move away from fossil fuels in the long term. Paris climate change agreement (Paris CCA) marks a collective responsibility, promise and robust milestone and paradigm shift into local/national adoption and implementation of Climate Change Mitigation and Adaptation (CCMA) framework (United Nations Framework on Climate Change (UNFCCC), 2015). China is part of the landmark Paris climate change agreement (Paris CCA) that sets a course for our planet and future generations, and

plans to implement Paris CCA policies and regulations, priorities, action plans and programs to reduce hazardous emissions from coal-fired power plants by 50% over the next five years and towards achieving the goals of less than 1.5 °C, development of renewable energy in the context of sustainable development and poverty alleviation by 2020. The landmark agreement legacy sets new opportunities in promoting pro-active climate change resilience and culture, innovative mitigation partnerships and pathways in moving forward global greenhouse gas emissions reduction, renewable energy development and contextual sustainable socio-economic development (United Nations Framework on Climate Change (UNFCCC), 2015). (See Fig. 1.)

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**Fig. 1.** A woman self-protection from air pollution and winter climate in Beijing, PR China (December, 2015)

Previous studies have been demonstrated that air pollution consequences have significant deleterious, complex and unpredictable impacts on climate change and health of local and global populations. Man-made and natural hazing processes on the climate and environment are responsible for the rising air pollution resulting climate change (Zhao et al., 2016b; Li et al., 2016a). In China, fossil fuels, coal-mining, coal-burning factories or other coal-related usage and or vehicle emissions impacts are increasing greater air pollution frequency and pattern variations. In addition, these pollutants varied in nature and extend from industrial hazards, dust storms and forest fires, and other chemical or volatile forms production, emissions and storage (Zhao et al., 2016b; Li et al., 2016a; Sabel et al., 2016). It has been documented that increasing pollution and climate changes have been associated with increasing likelihood of respiratory or cardiometabolic diseases, reduction of the quality of life, increasing years with disability (LYD) and disability adjusted life years (DALY) and premature deaths in most vulnerable populations (United Nations Framework on Climate Change (UNFCCC), 2015; Zhao et al., 2016b; Li et al., 2016a; Sabel et al., 2016; Coulibaly et al., 2016). However, China still depends on coal for more than 60% of its power despite big investments in shifting to solar, nuclear and wind power renewable energy sources development and implementation process.

As the world's biggest carbon emitter, China plans to reduce hazardous emissions from coal-fired power plants by 50% over the next five years (Zhao et al., 2016b; Coulibaly et al., 2016). In recent times, China has seen extremely high levels of air pollution, particularly coal-reliant north east zone and industrial heart of the country. Following criticisms that authorities were not doing enough to protect citizens' health, the government has stepped up in issuing health advisories and promised to take action to address pollution and second ever pollution red alert (Coulibaly et al., 2016; Zhang et al., 2016). Red means hazardous air pollution for three consecutive days. Air quality levels higher than 300 are considered hazardous and other related for climate, health, socio economic and environmental and consequences. A red alert is the highest of a four-level alert system instituted two years ago. The other colors are blue, yellow, and orange. It triggers advisory and warning system to residents to avoid outdoor activity, schools and classes' closure, odd-even license plate number traffic restrictions on vehicle use and sometimes forcing the closure of highways because of poor visibility, factories production and construction works restrictions, and importantly usage of personal protective equipment such as wearing air filtering face masks and running air purifiers in their homes (Wang et al., 2016b).

According to the World Health organization, particulate matter (PM)<sub>2.5</sub>, ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>) are type of indoor or outdoor pollution involving fine particles less than 2.5 μm (0.0025 mm) in diameter; a second type, PM<sub>10</sub>, is of coarser particles with a diameter of up to 10 μm. They often consist of fragments that are small enough to reach the lungs or, in the smallest cases, to cross into

the bloodstream as well. A build-up of PM<sub>2.5</sub> in the lungs has been associated with respiratory and cardiovascular illnesses, soft tissues and mental damages as major public health concern and burden among the most vulnerable elderly and children population ([http://apps.who.int/iris/bitstream/10665/69477/1/WHO\\_SDE\\_PHE\\_OEH\\_06.02\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf), 2005; Anger et al., 2015; Ministry of Environmental Protection, PR China, 2016).

The article examines local and national strategic integration of China greenhouse gas emissions and air pollution reduction policies and regulations, priorities, action plans and programs in line with the Paris CCA now and by 2020. It also pinpoints practical and accountable efforts of the Chinese government through the Communist Party Central Committee (CPCC) and related national agencies great importance to lead Paris CCA legacy and history landmark implementation commitment at all levels. Hence, galvanizing and fostering momentum in global community climate changes and pollution imperatives towards green and health environment and planet protection for future generations, contextual global SDGs accomplishments, and citizenry wellbeing.

### 1.1. Strengthening Paris CCA, air pollution, climate policy and regulations

Robust and effective local, government and all stakeholders' commitment and investment, sustainable policy direction, legal and governance framework under the UN climate conference (COP21), UN Framework Convention on Climate Change, short- and long-term Paris CCA outcomes is vital. Enabling and promoting smart and innovative climate change resilience through innovative policy decisions, regulations guidelines and financing mechanisms in strengthening country adaptation capacity to deal with climate change impacts and aptitude to recover from climate damage and harm (United Nations Framework on Climate Change (UNFCCC), 2015; Wang et al., 2016b; [http://apps.who.int/iris/bitstream/10665/69477/1/WHO\\_SDE\\_PHE\\_OEH\\_06.02\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf), 2005; Anger et al., 2015; Ministry of Environmental Protection, PR China, 2016). Extreme pollution and climate events insurance facility and policy, quick governments financing and national allocation on emergency pollution to climate change preparedness, strengthening surveillance and response, increasing awareness and education, and longer-term adaptation capability are imperative. The establishment of Chinese automated, real time and effective massive pollution monitoring systems has potential to measure, analyze and report daily air quality, air and GHG emissions fluctuations, and emerging consumption has been established in 362 cities including Beijing, Shanghai, Guangdong, Tianjin, Shandong, Guangzhou and Shenzhen, Hong Kong managed by the Ministry of Environmental Protection, PR China (<http://datacenter.mep.gov.cn/>) (Ministry of Environmental Protection, PR China, 2016). Moreover, increasing housing efficiency with good air exchanges technology facilities rather than heater dwellings in house biomass burning, and reduction of transportation system are also leading examples. Similarly, the recent China People's Political consultative conference resulted in the adoption 13th five year plan. The adoption comprised serial steps and practical measures implementation such as: shrinking of noxious gas emissions growth (18% reduction in carbon intensity by 2020), increasing clean energy production and consumption efficiency by installing 25% sustainable energy capacity worldwide, developing non-fossils fuels resources shared consumption by 2020, ongoing expansion of forest and vegetation biomass and its industry structure policies and reforms, while taking into account industrialization and urbanization needs (Ministry of Environmental Protection, PR China, 2016; Official Beijing government, RedAlert' Over Air Pollution Huffington Post BEIJING, 2015).

There is a need to build research and development (R&D) on climate changes and pollution mitigation and adaptation approaches and strategies on the changing pattern and dynamics in infectious diseases, zoonoses and emerging epidemics ecology, operational landscape and framework based on strategic climate partnership for resource mobilization, capacity development, climate mitigation and adaptation as well as renewable energy across China (United Nations Framework on Climate Change (UNFCCC), 2015; Coulibaly et al., 2016; Wang et al.,

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