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# 从公共健康视角看空气质量管理与气候变化：加州和中国的政策与技术选项

The Public Health Dimensions of Air Quality and  
Climate Change:  
Highlights of Policy and Technological Options  
from California and China

决策者摘要  
*Summary for Policymakers*

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## **About the California-China Climate Institute**

The California-China Climate Institute was launched in September 2019 and is a University of California-wide initiative housed jointly at UC Berkeley's School of Law (through its Center for Law, Energy, and the Environment) and the Rausser College of Natural Resources. It is Chaired by Jerry Brown, former Governor of the State of California, and Vice-Chaired by the former Chair of the California Air Resources Board Mary Nichols. The Institute also works closely with other University of California campuses, departments, and leaders. Through joint research, training, and dialogue in and between California and China, this Institute aims to inform policymakers, foster cooperation and partnership and drive climate solutions at all levels.

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## **SUMMARY FOR POLICYMAKERS**

Air pollution and climate change are linked issues with overlapping solutions and significant public health co-benefits. The connection between air pollution and climate change necessitates a cohesive policy approach to maximize health co-benefits and avoid unintended trade-offs.

Both California and China can achieve great health co-benefits through continued greenhouse gas emissions reduction and improved air quality in their jurisdictions. By synergistically addressing the issues of air pollution and greenhouse gas emissions, policymakers can successfully enhance public health outcomes.

### **Public Health Co-benefits**

#### *Lower Mortality and Morbidity, and Socioeconomic Benefits*

A growing body of literature has shown that air pollution and climate change contribute to disease morbidity. Therefore, effective air and climate policies have the potential to lower global mortality and morbidity rates. Moreover, as the burden of air pollution and climate change is unequally distributed across populations and communities, addressing air and climate problems will have larger public health co-benefits in vulnerable populations and disadvantaged communities. In addition, air and climate policies deliver socioeconomic benefits through improved public health outcomes. Recent studies show that effective air and climate policies can reduce health expenditures and foster human capital through increased productivity. Both California and China will economically benefit from public health improvement.

#### *Public Health Indicators and Available Monitoring Technologies*

Indicators help track momentum toward improved public health outcomes and enable jurisdictions to assess progress over time. Two major types of policy indicators are mortality and morbidity. Other indicators are socioeconomic; examples are indicators such as household medical expenditures, labor productivity loss, and community vulnerability. Given scientific uncertainties, public health policy indicators need to be revised and improved in the future.

In addition, technology aids in monitoring and analyzing public health indicators. Technical tools such as satellite-based remote sensing, air quality monitoring networks, and machine learning allow scientists and policymakers to measure climate health indicators with greater accuracy and granularity.

### **Best Practices in California and China**

Both California and China have ambitious air quality and climate targets and have been implementing various types of policies to achieve their goals. California has integrated public health into its air and climate policies, primarily by incorporating public health indicators in policies, establishing public health monitoring networks, and measuring implementation action. More attention has been paid to vulnerable populations in recent years to address environmental justice issues. Meanwhile, China is now a pioneer in mitigating air pollution and greenhouse gas emissions simultaneously. China has established a large-scale air quality monitoring program, as well as a comprehensive policy framework for climate change mitigation. Even though public health has not yet been a motivation for China's greenhouse gas policies, public health has been emphasized in climate adaptation policies, and efforts to assess the health impacts of climate change have been seen in several Chinese provinces.

Both jurisdictions provide good examples. Los Angeles successfully combines scientific research with policymaking and integrates public health indicators in its air and climate policies. Similarly,

Beijing and Shenzhen are actively devising public health indicators and further controlling air pollution and greenhouse gas emissions by implementing “coordinated control” policies and carbon markets.

### **Lessons Learned**

Important lessons can be gleaned from considering the public health co-benefits of air pollution and climate actions concurrently. California has demonstrated that public health co-benefits can serve as measurable, quantitative goals within climate and air quality policies. California has also made significant progress in incorporating environmental justice considerations into its work. On the other hand, China has excelled at developing highly sophisticated air quality monitoring tools and a comprehensive climate policy framework, and should further integrate public health indicators in its policies. Case studies from jurisdictions like Los Angeles, Beijing, and Shenzhen shed insights into real-world examples of how cities are considering air quality and climate change in tandem.

This report also identifies several key opportunities for moving forward: (1) Convene exchanges and training between jurisdictions in California and China to share lessons learned; (2) Utilize, replicate, and expand upon the use of technological monitoring and mapping tools; (3) Further implement “coordinated control” and regional management approaches; (4) Conduct more localized public health research; (5) Enhance the role of multi-stakeholder engagement in driving public health actions; and (6) Prioritize public health in air and climate policymaking agendas.