Integration of China's National ETS with Provincial/Municipal Pilots

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MIT MANAGEMENT SLOAN SCHOOL

Integration of ETS pilots: A few questions

1. Should pilots coexist with national system, or partly or fully merge?

2. How to coordinate monitoring, reporting, and verification to ensure data quality?

3. How to establish official responsibility for meeting both national and provincial ETS requirements in performance evaluations?

4. How to resolve conflicts with provincial-level policies that affect CO_2 emissions (e.g. renewable energy, air pollution)?

Why not just stick with provincial systems?

- Our first study suggested that…
  - National CO_2 market has 20% lower welfare loss, compared to individual provincial markets (static CGE model).
  - This comparison was not strongly affected by assumptions on electricity price pass through, capital vintaging, or natural gas supply.

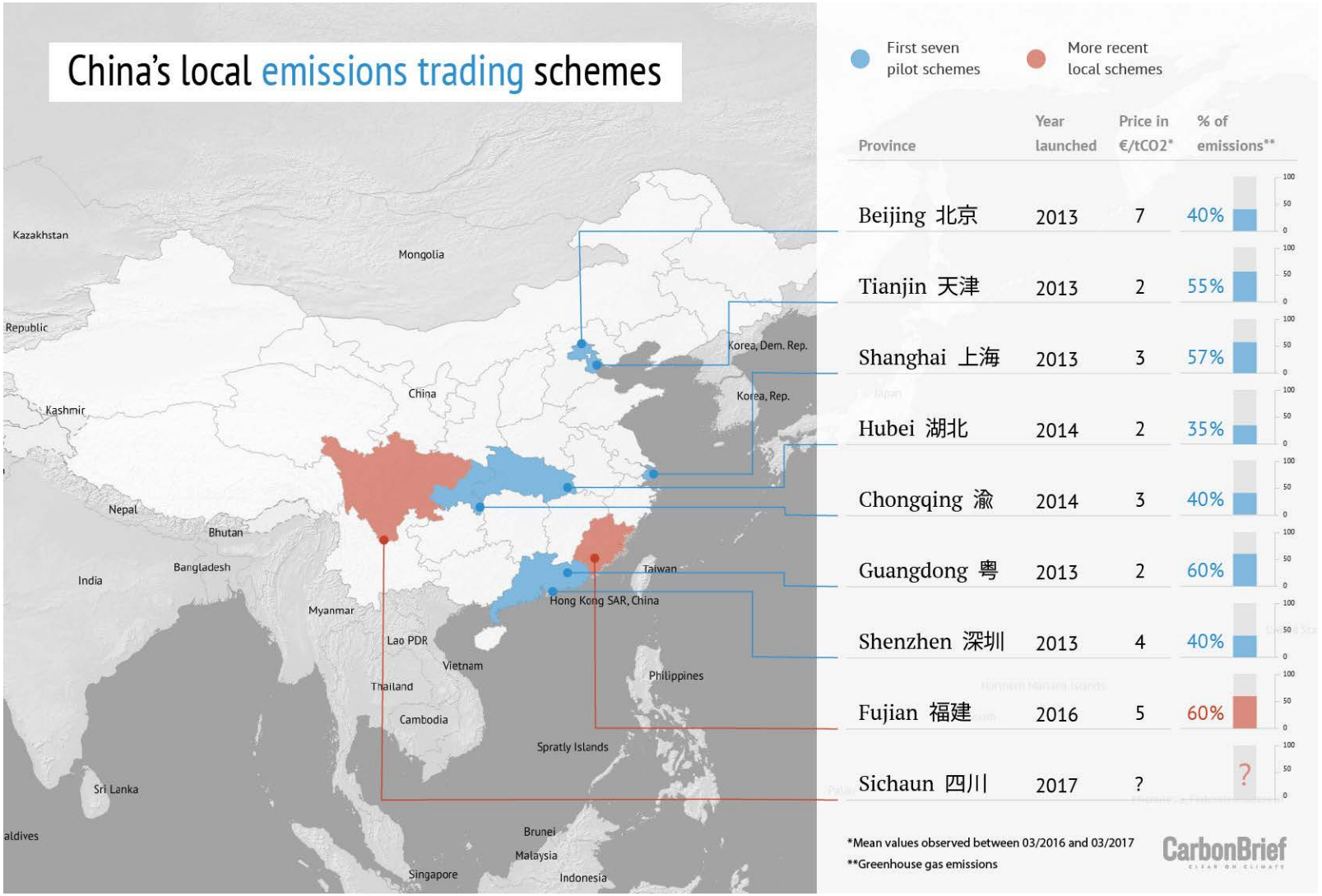
% change

	Base case
Scenario PT:	
CO_2 intensity	−17.4
CO_2 emission	−18.8
Welfare change	−1.5
Scenario NT	
CO_2 intensity	−17.4
CO_2 emission	−18.6
Welfare change	−1.2

Source: Zhang et al., *Energy Economics*, 2013.

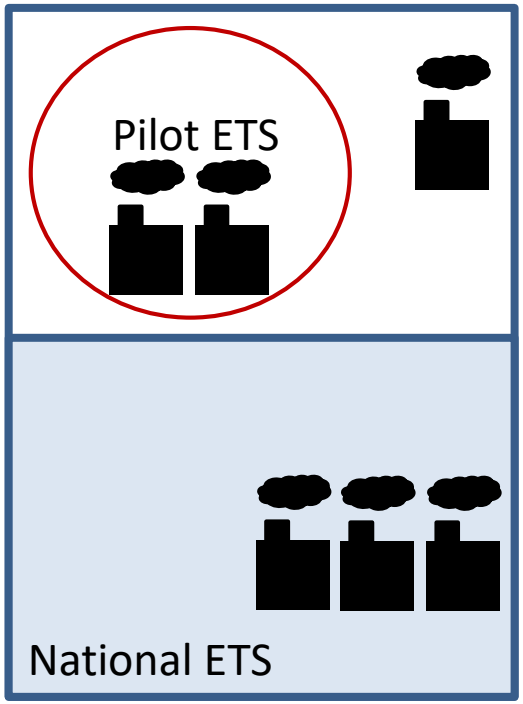
- This study ignored many details that could affect welfare in both directions.
- Build national ETS on top of pilots?

How to handle pilots on the road to a national ETS?

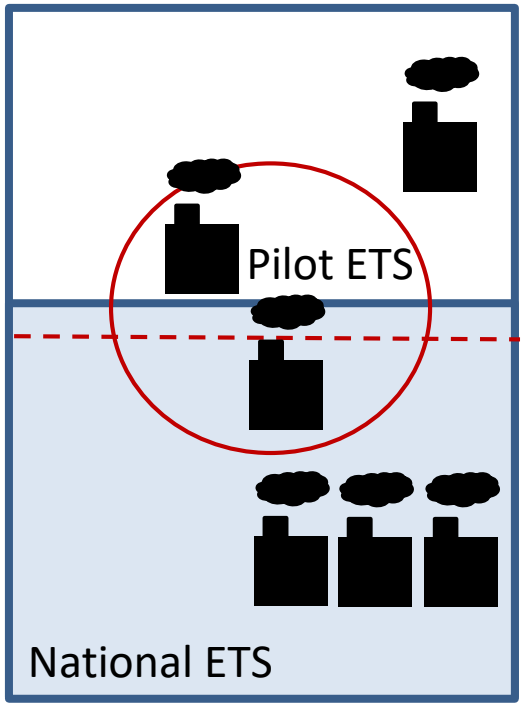


Which setup is superior?

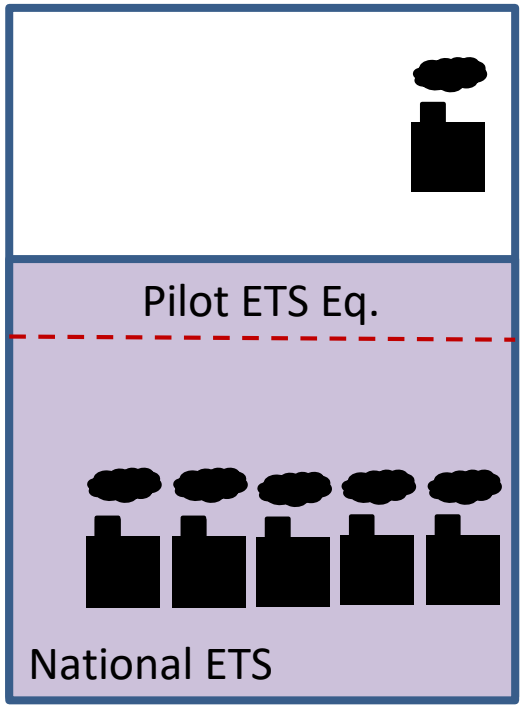
Systems cover equivalent CO_2 emissions volumes.



Separate systems
Two separate CO_2 prices.
Pros: Allows pilots to continue.
Cons: Reductions not efficient, potential MRV conflicts, challenges



Partial integration
Single CO_2 price (?).
Pros: Retains some provincial discretion.
Cons: Potential MRV conflicts → hot air, undermines ambition

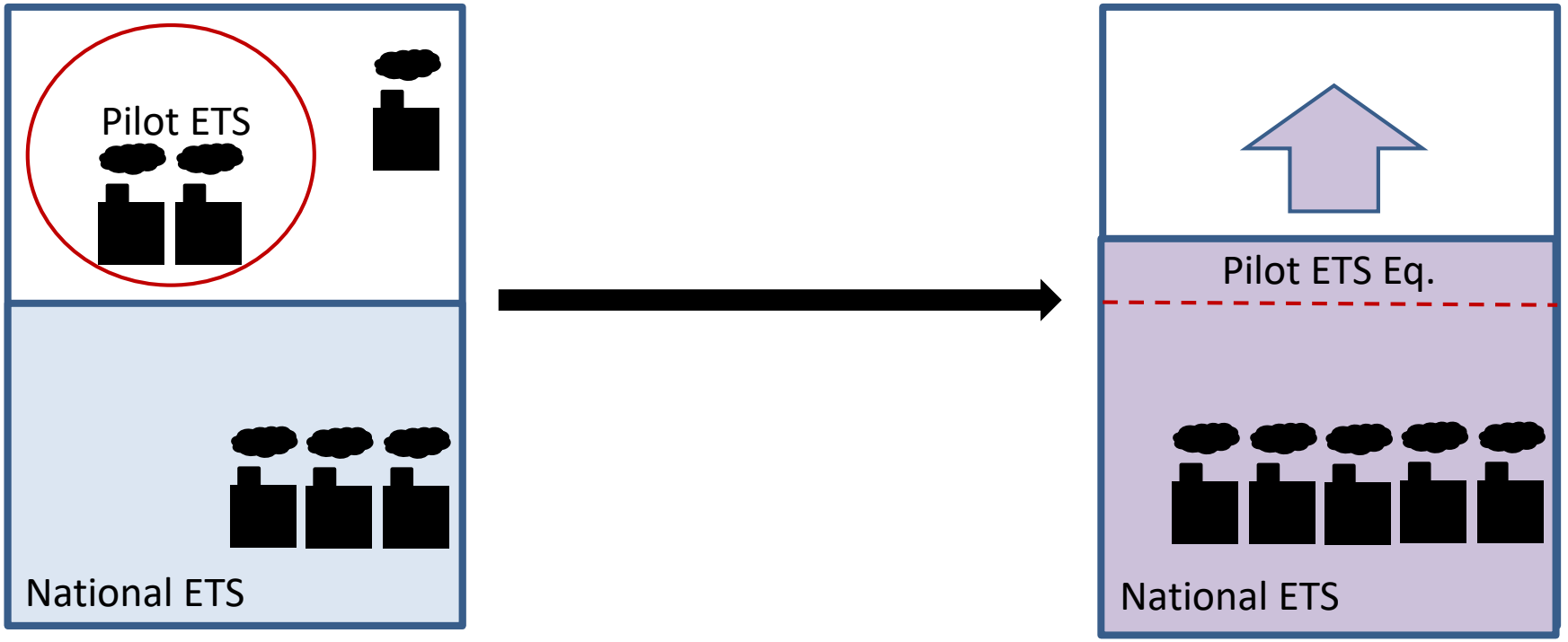


Full integration
Single CO_2 price.
Pros: Retains pilot coverage.
Cons: Undermines pilots, prevents provinces from raising level of ambition

Leakage to non-covered firms is a possibility in all scenarios!

A possible path…

Systems cover equivalent CO_2 emissions volumes.

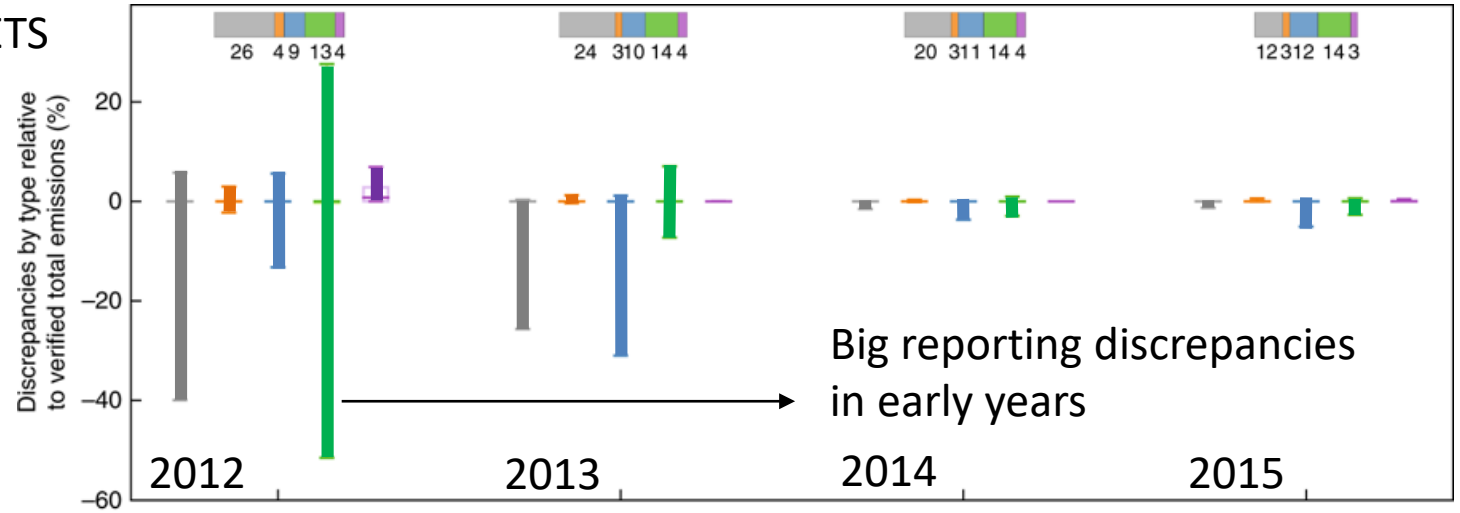


1. Start by allowing distinct systems.
2. Harmonize MRV, penalties for non-compliance nationally.
3. Work towards common level of pilot coverage.

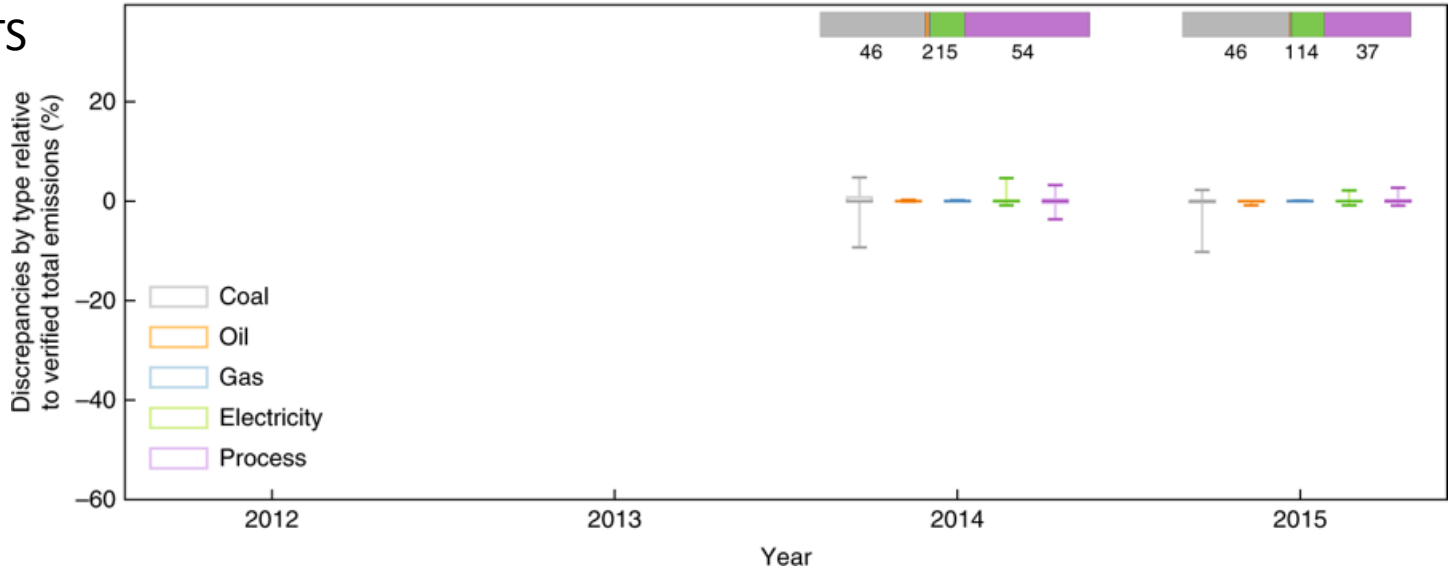
3. Merge provincial and national systems. Firms in pilots may have incentives to join national system, if CO_2 price lower.
4. Increase coverage.

Evidence from China's CO_2 emissions trading pilots: Firms need time to build emissions reporting capabilities

Beijing ETS



Hubei ETS



Source: Karplus & Zhang Groups Collaborative Research; Zhang et al., 2019, *Nature Climate Change*.

Thank you!

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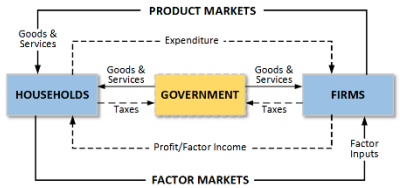
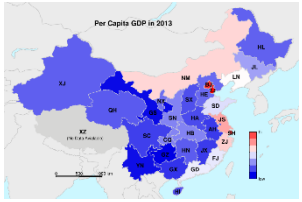
To assess the impact of climate policy in China we developed the Regional Emissions Air Quality Climate and Health (REACH) Framework





Policy Scenarios

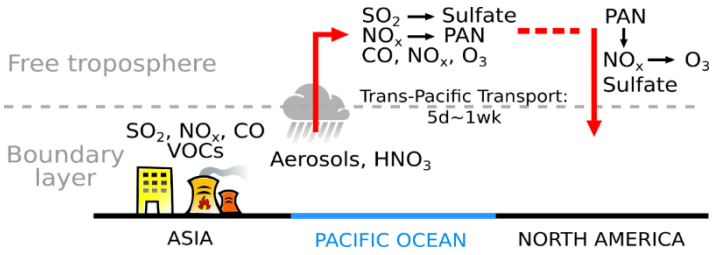
1 Energy-Economic Model
China Regional Energy Model (C-REM)

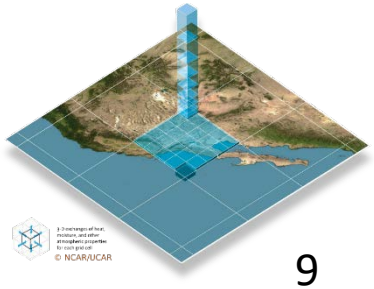
2 Projected Emissions
REAS emissions inventory

3 Atmos. Chemistry model
GEOS-Chem

4 Health Effects
Uses latest estimates from Chinese sources

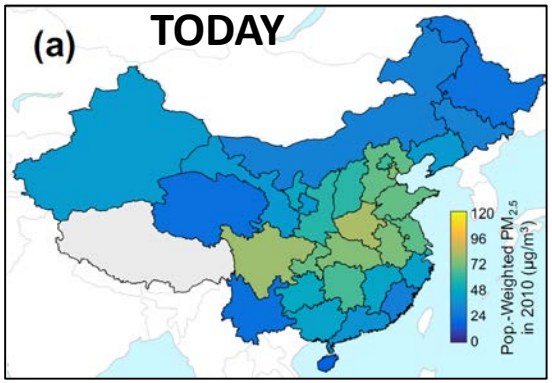
Air Quality

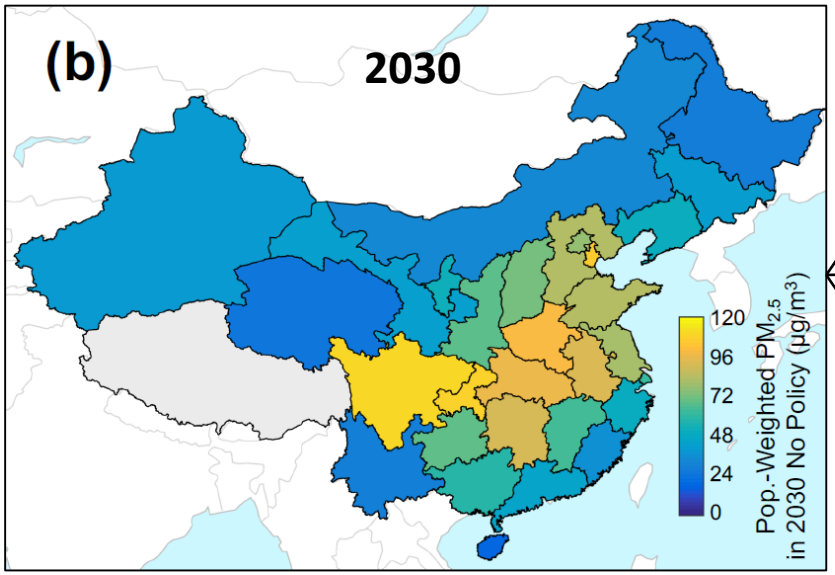




Source: Li et al. 2018, *Nature Climate Change*. (Karplus & Selin Group Collaborative Research)

Modeling impacts of a CO_2 pricing system

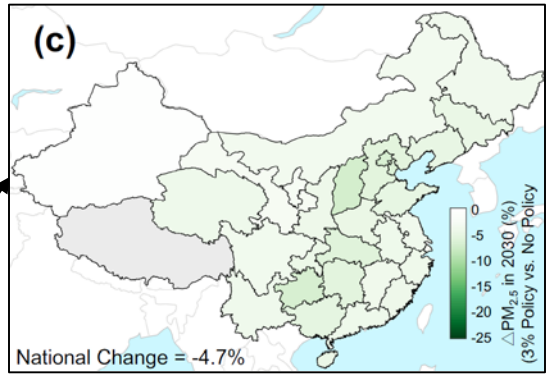




Annual CO_2 intensity reduction targeted by climate policy

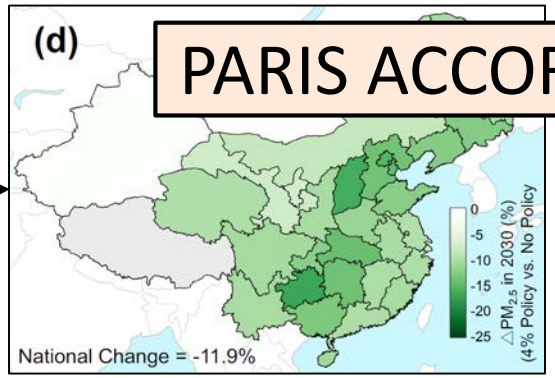
2030 **Change in $PM_{2.5}$**

3%/yr



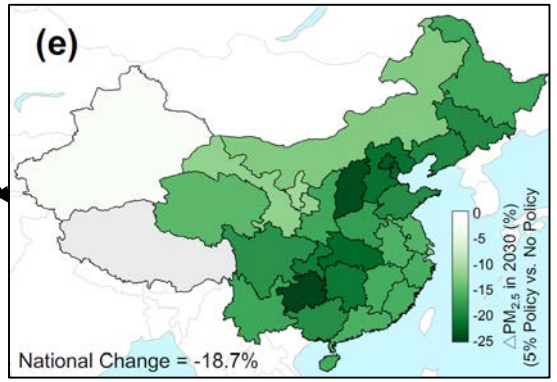
-4.7%

4%/yr



-11.9%

5%/yr



-18.7%

Climate policy results in significant reductions in air pollution – but not sufficient to meet air quality goals. (Need complementary measures.)

Source: Li et al. 2018, *Nature Climate Change*. (Karplus & Selin Groups Collaborative Research)