

Carbon markets are at a crossroads. As of 2021, 30 emissions trading systems were in force globally, covering [16–17%](#) of global greenhouse gas (GHG) emissions. Last year, climate negotiators in Glasgow finalized the Paris Agreement [rulebook](#) for international cooperation through carbon markets, clearing the way for the expansion of emissions trading and carbon pricing worldwide.

But the next phase of market-based programs for reducing GHG emissions raises significant questions for policymakers, from nitty-gritty design issues like measuring and reporting mechanisms to bigger picture concerns such as whether these systems can reduce pollution at the pace needed to meet climate goals.

For the last two years, researchers at Tsinghua University, the California-China Climate Institute (a UC-wide initiative housed at UC Berkeley), the UCLA School of Law, and Wuhan University have collaborated on research considering the design and implementation of emissions trading systems, with a focus on China's national rate-based system, which launched in 2021 and is the world's largest by emissions covered, and California's economy-wide GHG trading system, which has now been in operation for a decade.

Today, our research groups are launching two reports that detail key findings from this international research collaboration:

- [The Theory and Practice of China's Carbon Emissions Trading System - Key Issues in China's National ETS and Case Study of Hubei Pilot ETS](#), from Tsinghua and Wuhan universities, sheds light on the thinking behind Chinese ETS design;
- [Key Governance Issues in California's Carbon Cap-and-Trade System](#), from our team at UCLA Law's Emmett Institute on Climate Change and the Environment and the California-China Climate Institute, summarizes current debates and controversies over emissions trading and offers detail on key design elements and lessons from the California ETS.

The reports follow from a series of events and private dialogues led by the university researchers to share ideas and best practices for emissions trading systems, considering issues such as data quality; compliance; monitoring, reporting, and verification (MRV); auctions; allowance allocation approaches; offsets; and the use of financial instruments in carbon markets.

Following are some of my key takeaways (detailed in this and another forthcoming report) about the appropriate role of emissions trading in climate change policy and general thoughts on improving the effectiveness of carbon markets.

Lessons from California's Cap-and-Trade Program

- ***Emissions trading as part of a portfolio of climate policies.*** One of the key lessons from the California approach to emissions trading is the importance of a portfolio approach, where cap-and-trade is one among an array of climate policies, including the Renewable Portfolio Standard, the Low Carbon Fuel Standard, energy efficiency policies, advanced clean car and truck programs, and methane control policies.

I don't think this is a controversial position. And I think it is the way China will use emissions trading. However, there are still some who advocate for carbon pricing to be the central climate regulatory tool ("front and center" as an IMF report has put it) with other policies being "complementary." But current experience with the existing emissions trading systems suggests that a portfolio approach with more modest expectations for emissions trading is warranted.

Emissions trading can serve to create incremental incentives to reduce emissions; it can raise revenue; it can support the build-up of emissions monitoring and enforcement systems - among other things. But the idea that emissions trading can do the heavy lifting for the rapid emissions reductions we need has just not been borne out in practice.

- ***Continual reform to improve ambition, integrity, and buy-in.*** Emissions trading systems are often launched with relatively lenient design features, typically justified as giving the system a chance to "learn-by-doing" and to gain political buy-in for approval of a program. Yet it can be difficult to make emission trading systems more environmentally ambitious after program launch.

Emissions trading systems need ongoing review and reform to improve environmental ambition, to ensure the integrity of emissions reductions, and to take advantage of any opportunities to improve the political-economy dynamics of emissions trading and climate policy in general - for example by distributing revenues to build political support. A few more notes on continual reform:

- ***Ambition*** - Emissions trading system first and foremost must produce sufficient emissions reductions. The promise of carbon pricing has been the potential to reduce emissions at lower cost. But allowance surpluses have been cited as the cause of low allowance prices and for dampening the price signal for polluting firms. This is part of the challenge of emissions trading systems: Prices that are too high can have unwanted economic impacts - particularly on trade-exposed industries - and will face intense lobbying and political blowback; but prices that are too low will simply not

drive emissions reductions in the intended way. Most ETS have fallen on the prices-too-low side.

- *Integrity* - Emissions trading systems must also guarantee the integrity of emissions reductions and do well the basic work of tracking emissions. The California system has done a good job on monitoring, reporting, and verification, establishing a robust system for tracking most GHGs. But there is also evidence that, for example, methane emissions are being undercounted. Offsets have been one of the most contentious aspects of the ETS and have been challenged as weakening the environmental integrity of the California ETS. The challenges of ensuring that offsets represent real, quantifiable, permanent, verifiable, enforceable, and additional emissions reductions are real. California has perhaps the most comprehensive protocols on offsets in the world, but this has not quieted concerns. As a compromise, California law (AB 398) has limited offsets to 4% of compliance obligations for the 2021-2025 period and capped the offsets without in-state benefits that can be utilized for compliance.
- *Expanding opportunity* - Emissions trading systems can also alter the political economy of climate policy by raising revenue and distributing that revenue in ways that build political support and help to reduce emissions. California's system uses revenues from auctioning allowances to fund its Greenhouse Gas Reduction Fund (GGRF) and to limit cost increases to electricity users.

Systems and processes for continual reform and oversight are important for identifying issues and instituting improvements to the environmental performance of emissions trading systems. In California, we see this, among other places, in the Scoping Plan process, and through such oversight institutions as the Legislative Analyst's Office (LAO) and the Independent Emissions Market Advisory Committee (IEMAC) - established in 2017 under AB 398.

- ***Do no harm.*** Continual reform is necessary so that emissions trading systems do not become merely symbolic regulation, or even worse create harmful negative consequences for climate policy - by for example subsidizing fossil fuel use or preempting useful complementary regulations.

Implications for China

What are the implications of the California experience for China's national carbon ETS?

The Chinese ETS commenced last year in a classic "learning-by-doing" mode with relatively generous benchmarks that subsidize more efficient coal- and gas-fired power plants, while also "taxing" less efficient plants. Even Chinese researchers admit that the initial

environmental effect of the system will be modest and are evaluating a range of potential reforms to the program. Potential reforms include:

- Moving from a tradeable performance standard to a mass-based, cap-and-trade system. It would be interesting for Chinese regulators to consider moving more aggressively here in the power sector, given the availability of alternative electricity sources like wind and solar.
- Auctioning allowances rather than giving them away for free; Tsinghua's own [research](#) has shown that the addition of auctioning (i.e., reducing or eliminating free allocations of allowances) would accelerate emissions reductions including through greater fuel switching to non-fossil technologies.
- Using the revenue from auctions to support climate initiatives, limit economic impacts, ease job transitions, and build political support.
- Developing strong protocols and oversight mechanisms for offsets, which are sure to expand in China as the ETS matures.
- Focusing on data accuracy and MRV.
- Accelerating reforms needed to improve ETS performance; the launch of the Chinese ETS highlights the need for reforms in other parts of the Chinese system - like electricity grid dispatch reforms and regional grid integration. There is a chance the ETS could help to push along such reforms, but it is by no means inevitable. The failure of necessary reforms could also hamper ETS effectiveness.

As a closing note, we reiterate our firm belief in the importance of continued international collaboration on climate change policy. This work, we hope, will serve to make complex emissions trading systems more transparent to the world and to lay the groundwork for improving the effectiveness of climate change policy and regulation.

Thanks to the UCLA team (Daniel Carpenter-Gold, Andria So, Siyi Shen, Cara Horowitz, Shuhui Guo, Anson Lyu, Calvin Huang), CCCI (Dr. Fan Dai, Aimee Barnes, Jenn Perron), Tsinghua University (Dr. Zhang Xiliang, Yu Runxin), and Wuhan University (Dr. Qi Shaozhou, Dr. Yang Guangxing) for their work on this project. We are grateful to the Berggruen Institute and the China Institute for Innovation and Development Strategy for their generous support of this effort. The project team would like to thank issue experts at the California Air Resources Board for their time, expertise, and insights into this collaboration. Thanks to Terry Tamminen for his work to develop and promote this project at the outset.

Later this summer, our team will release a second report on California's experience on emissions trading with further analysis of the California carbon ETS, the RECLAIM trading

system, and China's national carbon ETS. Stay tuned.