The Case Against Blanket Bans: A State Permitting Model for Solar Radiation Management

"Heat Wave Building Into the Ohio Valley and Eastern United States" by NASA Goddard Photo and Video is licensed under CC BY 2.0.

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Executive Summary

How can governments best protect people from extreme weather? There is growing interest in technologies that can, in principle, head off some of the worst impacts of rising global temperatures – in essence to "stabilize" the climate, or at least ameliorate the most worrying aspects of climatic shifts, while emissions reductions efforts continue. Such technologies include dispersing miniscule particles in the upper atmosphere to restore Earth's failing ability to reflect heat (often called "solar radiation management"). Solar radiation management (SRM) is in an early research phase and is not being used at any location, but this technology may be important in the coming years. Government is not yet keeping pace. State and federal policy currently lacks the tools to ensure these technologies develop transparently with careful public oversight.

Traditionally, states can pioneer policy approaches that move to the federal level. However, initial attempts at regulation of SRM have focused not on accelerating needed research and oversight capacity, but instead states have sought to shut down the ability of scientists to fully understand these issues via overbroad statutes that functionally lump together scientific inquiry and entirely hypothetical large-scale weather or climate modification activities. Although cloud-seeding activities have been underway for decades without major incident, and SRM science has been explored for many years but involves no deployments underway, this new burst of policy proposals would impose novel and sweeping criminal penalties on many legitimate and low-risk activities. Since 2023, lawmakers in thirty-eight states have introduced 133 bills aimed at prohibiting solar radiation management, weather modification, or both. Three states have enacted outright bans, and over twenty other legislatures have active proposals in 2026.

These proposed bans, by shutting down scientific capacity and ongoing drought reduction efforts, are counter-productive – they make it harder to protect the public from extreme weather and reduce public knowledge. The shared desire for improved policy is bipartisan and substantial: progressive legislators worry that climate change risks may eventually require careful and thorough assessments of emergency atmospheric interventions, while conservative legislators share an interest in supporting science but some have raised concerns that unauthorized weather modification and solar geoengineering may intrude upon personal rights, state sovereignty, and private property. Oversight and inquiry are at the core of the policy demand – but bans have been all that is on offer. Widespread opposition to the specific ban proposals, and the failure of the vast majority of these bills to pass into law, suggest that states have not yet found the right policy mix.

This paper argues that blanket prohibitions offer a poor answer to a legitimate governance problem. There is a real need for oversight of new technologies; at the same time, Americans rightly reject sweeping bans on research. Further, as other countries and private companies develop SRM approaches, America has a need to keep pace on innovation while protecting the public. The better approach therefore is not to criminalize science. We should instead assess approaches to extreme weather that could protect the public while also ensuring any substantial outdoor particle releases receive close scrutiny before they can happen. A narrowly drawn statute that empowers states to issue permits in the absence of federal action - one that prohibits

unpermitted large-scale SRM activity - better serves both constituencies. While the model bill does not endorse SRM deployment, it begins from the modest premise that states can best prevent unauthorized atmospheric interventions and still allow legitimate research to proceed under public oversight through a thoughtfully drawn permitting regime rather than broad criminal bans.

Both sides of the aisle have legitimate reasons to act. A permit regime serves the interests of both sides because it prohibits unauthorized activity and preserves supervised research pathways.

Introduction: A Bipartisan Surge in Demand for State Atmospheric Policy

A wave of state legislation is proposing to reshape the governance of atmospheric science in the United States. Since 2023, lawmakers in thirty-eight states have introduced 133 bills aimed at prohibiting solar radiation management, weather modification, or both. Three states have enacted outright bans — Tennessee in 2024, Florida and Louisiana in 2025 — and thirty-five others have considered similar measures. During the 2026 legislature, twenty-nine states had proposals under consideration, even though the vast majority have not become law. By any measure, these actions reflect a significant legislative movement that cuts across conventional political lines.

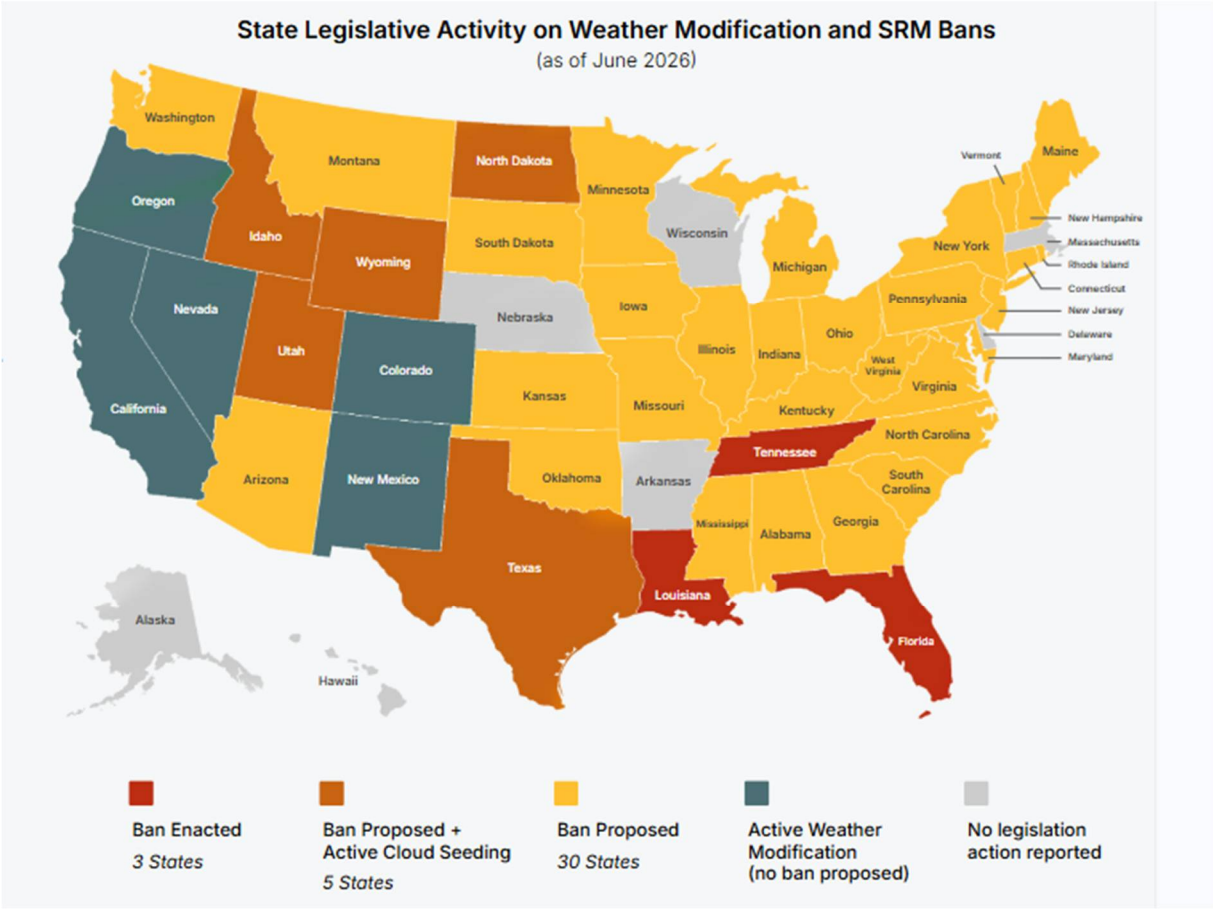
Each of these bills reflect the unique interests facing their states, and broad labels of “progressive” or “conservative” cannot capture the nuanced motivations behind the bills’ sponsors. That said, the bipartisan character of these developments is notable and arguably merges divergent motivations. Although progressive legislators generally have not originated or supported ban bills, there is a real demand for policy oversight because some environmental groups and climate-concerned legislators want to ensure that SRM research can proceed under careful public oversight. Their concern reflects a judgment that climate change risks might intensify to the point where emergency atmospheric interventions become necessary. If that occurs, political leaders will need a credible base of scientific knowledge to evaluate those options. Blanket bans, in this view, would foreclose the ability to study a potential emergency-response tool precisely when the information is most needed.

On the self-described conservative side of the aisles, the impetus is different but convergent. Legislative proposals from the right have arisen from distrust of unauthorized private or governmental atmospheric experimentation, concern about state sovereignty and personal liberty, and resistance to activity that may affect weather, agriculture, and property without consent. Some of this energy traces to the “chemtrails” conspiracy theory, which is the incorrect belief that ordinary aircraft condensation trails contain toxic chemicals dispersed by the government or by hidden organizations. Approximately ten percent of the American public holds this view, and figures across the political spectrum promote it. But the underlying concern about unaccountable atmospheric intervention extends well beyond that small but vocal community. Legislators who worry about government overreach have voiced as much interest in regulatory accountability as legislators who worry about unchecked private enterprise.

To be sure, active voices on both ends of the political spectrum have argued strongly for innovation on extreme weather prevention and climate stabilization through expanding the American science base. However, these voices have not yet found their way into the majority of bills before state legislatures.

The emerging conversation has produced a legislative response that is both energetic and poorly calibrated. While the impulse for state action has grown increasingly urgent in some states, disagreement has also emerged over the form that action should take. This paper argues that a narrowly drawn state permitting statute serves every constituency better than a blanket prohibition.

The argument proceeds in five parts. Part I provides a brief overview of the relevant technologies, distinguishing weather modification from solar radiation management. Part II surveys the current policy landscape, including the federal governance gap and the recent surge of state ban legislation. Part III identifies concrete problems with blanket prohibitions. Part IV argues for a state role in supporting innovative research collaboratively – an interest a well-designed statute should further. Part V sets out the core features of the model permitting statute.



Part I: Understanding the Technologies

Legislators considering atmospheric-intervention bills confront a threshold problem: the bills themselves often mix activities that differ enormously in method, scale, risk, and scientific maturity. The central distinction lies between weather modification, which is a localized practice with decades of operational history, and solar radiation management, which is a set of largely experimental concepts aimed at altering global or regional climate patterns.

Weather Modification: Cloud Seeding

Cloud seeding typically involves the dispersal of silver iodide or other agents into clouds to enhance precipitation or suppress hail. Landowners and state governments have used this technique in the western United States for decades. As of 2024, nine states were spending or planning to spend a combined total of at least twenty million dollars on cloud-seeding programs to address precipitation shortfalls and reduce wildfire risks. These programs already fall under state permitting or licensing requirements and federal reporting obligations under the National Weather Modification Reporting Act of 1972.

Cloud seeding operates at relatively low altitudes, targets individual cloud systems, and produces localized effects such as additional rainfall in a targeted area or reduced hail damage to crops. The activity is short-term, geographically bounded, and supported by an established body of scientific evidence on its efficacy. Several western states regard cloud seeding as a routine water-management tool that they comfortably regulate in ways similar to other permitted activities that affect natural resources.

The existence of state cloud-seeding programs merits attention for two reasons. First, it demonstrates that states already know how to regulate targeted atmospheric interventions through familiar permit mechanisms. Second, it creates a practical pitfall for overbroad legislation because five states with proposed or enacted SRM bans - Idaho, Texas, Utah, Wyoming, and North Dakota - also have active cloud-seeding programs. A statute that criminalizes “weather modification” in broad terms may inadvertently jeopardize programs the legislature had already authorized and had no intention of curtailing.

Solar Radiation Management

Solar radiation management refers to deliberate efforts to reduce warming by reflecting a small fraction of incoming sunlight away from the Earth or by increasing the escape of heat to space. Most importantly, SRM is not a substitute for reducing greenhouse-gas emissions, it does not lower atmospheric concentrations of carbon dioxide, and it does not address ocean acidification. SRM, at best, offers a potential risk-management supplement rather than a replacement for decarbonization. For legislators who doubt the severity of near-term climate risk, SRM research still deserves support because these technologies are being explored globally and therefore raise independent concerns about atmospheric safety, weather disruption, and state sovereignty that can only be answered through controlled investigation. Shutting down inquiry in a given state does not end the issue, and public oversight would remain necessary. These technologies also

provide an “option value” by providing climate solutions that may be important should more worrying predictions actually materialize. For state lawmakers concerned about the likelihood that climate change effects will trigger tipping points in Earth systems (like the slow-down of major ocean currents) that would impose major social costs and environmental risks, SRM research can help these technologies mature and proceed with fully shared knowledge about their implementation and effects.

Several distinct approaches fall under the SRM umbrella, and the differences among them matter for legislative drafting. **Stratospheric aerosol injection** would introduce reflective particles into the stratosphere to increase the Earth’s albedo. The concept mimics the temporary cooling effect of large volcanic eruptions, such as the 1991 eruption of Mount Pinatubo, which reduced global temperatures by roughly 0.5°C for approximately two years. **Marine cloud brightening** would spray fine sea-salt particles into low-lying marine clouds to increase their reflectivity, producing more regional effects. **Cirrus cloud thinning** aims to reduce the heat-trapping effect of high-altitude ice clouds, but is the least studied of the three and has been investigated primarily through computer simulations.

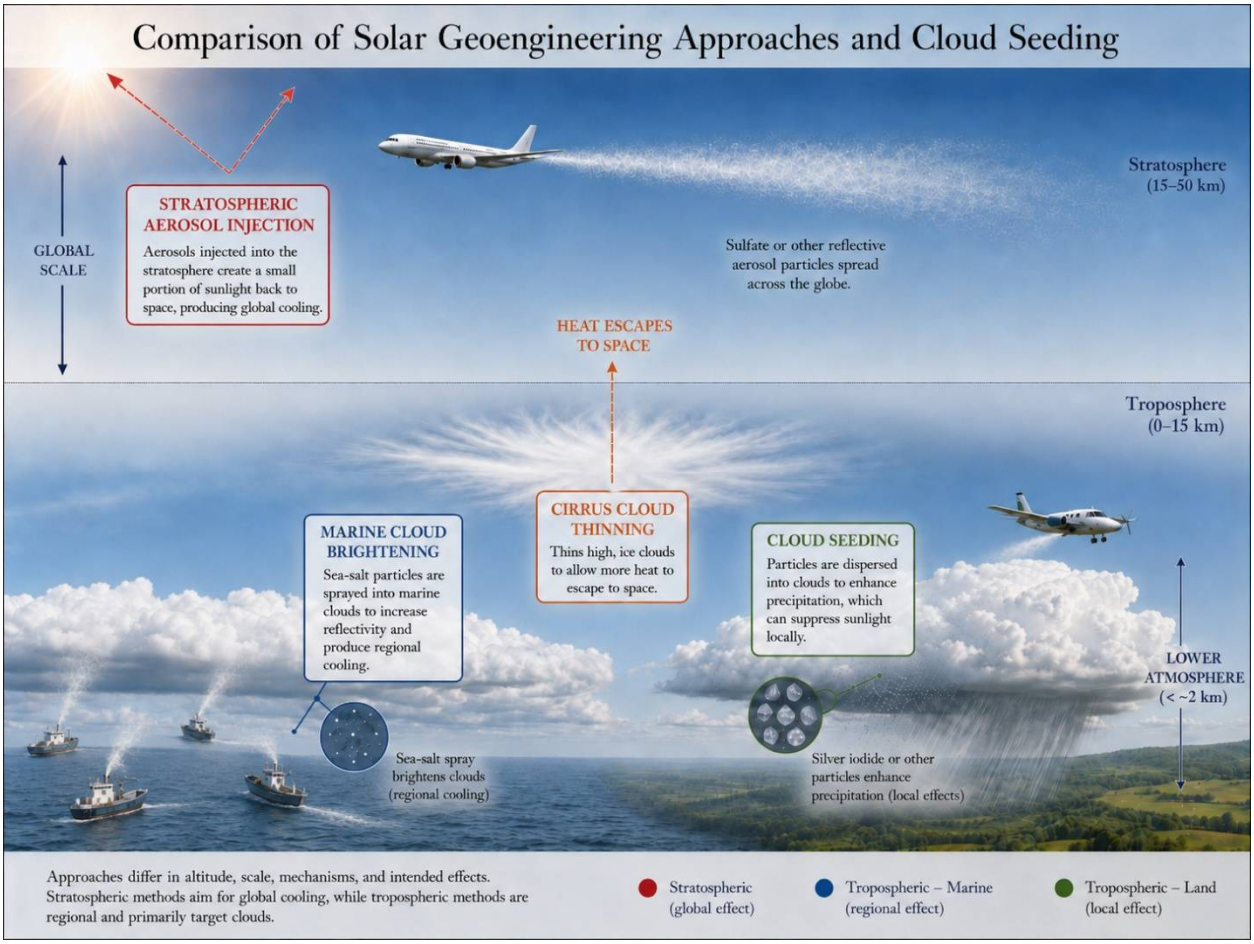


Figure 2. Comparison of Solar Geoengineering Approaches and Cloud Seeding

Source: Adapted from GAO-26-108013, Figure 1.

These approaches differ in altitude, scale (with some potential approaches affecting only regional weather), likely effects, and monitoring challenges. They also differ materially in the degrees of risk they present. A few pounds of particles released in a controlled experiment to inform models on stratospheric aerosol injection would pose no physical danger to anyone, but a large-scale atmospheric release of sulfur dioxide raises an entirely different scale of risk. Cloud-seeding, meanwhile, has been underway for years. Legislation that imposes a ban identically on these activities blurs fundamental and important differences.

Why the Distinction Matters for Legislation

Many of the ban bills introduced since 2023 fail to distinguish between weather modification and solar radiation management or between indoor research and outdoor atmospheric releases. As a result, these bills could theoretically reach a university researcher running a climate model, a graduate student analyzing cloud-brightening data in a laboratory, or a private company launching sulfur dioxide balloons into the stratosphere with the same criminal prohibition. If the law sweeps too broadly, it can chill benign research and invite vagueness challenges from parties who cannot determine whether their conduct is covered.

A computer simulation of stratospheric aerosol injection poses no physical risk, but a large-scale atmospheric release of sulfur dioxide is an entirely different matter. Legislation that treats both identically confuses fundamental and important differences.

Part II: The Current Policy Landscape

The Federal Governance - and Government Capacity - Gap

The federal government's authority over weather modification and SRM is surprisingly thin. The National Weather Modification Reporting Act of 1972 requires anyone conducting weather-modification (in practice, cloud-seeding) activities to file reports with the National Oceanic and Atmospheric Administration, but NOAA has no power to permit, condition, or prohibit any activity. Its role is limited to gathering information, and its performance of even those limited duties has drawn criticism.

A February 2026 Government Accountability Office report found that NOAA's weather-modification database was incomplete, inconsistent, and unreliable. GAO estimated that seventy-eight percent of initial reports contained at least one error, that the agency had no written guidance for reviewing submissions, and that its reporting forms were not designed to capture information about emerging solar geoengineering activities. GAO recommended that NOAA establish written guidance, improve its forms, and regularly inform operators and state agencies about its oversight role.

Beyond NOAA, no federal agency has clear regulatory jurisdiction over SRM research or deployment. EPA announced in July 2025 that it was reviewing its existing authorities and demanded information from at least one private startup that had conducted atmospheric sulfur

dioxide releases, but it has not promulgated any SRM-specific regulations. The White House Office of Science and Technology Policy issued a research governance framework in 2023 that articulated principles but created no enforceable obligations.

The absence of modernized governance also means that the federal government has less *capacity* dedicated to these important issues than it arguably should. Federal research institutions would ordinarily work with regulatory bodies to develop clearer understandings of opportunities for innovation and needs for oversight. Though some federal research is ongoing, this gap creates an opportunity for states to develop both governance and capacity to support, and shape, innovation while ensuring transparency and public protection.

The Congressional Research Service warned as early as 2013 that efforts at weather or climate modification, sometimes called geoengineering or climate intervention, could in principle create effects that cross state and regional boundaries and likely necessitate coordinated federal policy. That policy has not materialized. At the same time, the current wave of state legislation, along with rising concern over climate change and bipartisan interest in climate stabilization options, may unlock federal action. State legislation often informs federal action, and it can also intentionally seek to encourage federal approaches and respond to them. For example, while states could take initial action to govern research and actions in this arena, they can also include triggers in their statutes that would defer enforcement if the federal government later chose to take equivalent or more stringent actions.

The State Legislative Surge

This regulatory vacuum has attracted proposals for broad prohibitions. Florida repealed its prior weather-modification licensing structure in 2025 and replaced it with a sweeping prohibition that made certain geoengineering and weather-modification activities a third-degree felony with fines up to one hundred thousand dollars. Tennessee enacted a criminal ban the same year, and Louisiana quickly followed.

The political impetus behind many of these bills arises, at least in part, from the chemtrails conspiracy theory. While scientists, EPA, and NOAA have thoroughly repudiated this belief, anti-vaccination organizations have coordinated state-level ban efforts and connected COVID-era conspiracy frameworks to geoengineering fears. But while this conspiracy theory is incorrect, the broad public desire to understand changes in the atmosphere, and to ensure oversight of new technologies, is apt. The challenge for legislators is to respond to constituent concerns with policies that can actually develop more information for the public. They must also provide the transparent oversight that most members of the public expect, regardless of their view on chemtrails or on climate policy.

Legislators should take public concern about atmospheric intervention seriously. But they should calibrate any remedy they propose to the actual governance problem - a small but growing number of private actors exploring atmospheric interventions without clear legal authority - rather than a set of fears that the scientific community has thoroughly disproven.

Part III: Why Blanket Prohibitions Fail

Broad bans create four concrete problems that legislators should prevent regardless of their views on climate change.

Overreach

Most ban proposals collapse together activities that differ enormously in risk, scale, and purpose. Terms like “geoengineering,” “weather modification,” and “solar radiation management” can easily become overinclusive when legislatures write them into statutes without careful limiting definitions. The overbreadth problem has already surfaced: five of the states that have proposed or enacted weather-modification bans also have active cloud-seeding programs managed by their own agricultural and water agencies.

Under-Regulation

A law that simply says “no” actually produces less oversight than a law that offers carefully calibrated permission Once a state enacts a blanket prohibition, it loses the ability to distinguish between trivial and material atmospheric activity or to impose tailored conditions on sensitive experiments. It also can no longer demand monitoring, disclosure, and post-activity reporting from the actors whose work most warrants scrutiny. As a result, the state’s blanket ban would win a symbolic prohibition but forfeit the opportunity to develop practical tools to govern these activities.

Fiscal Waste

Florida’s 2025 law produced a cascade of compliance burdens. For example, all public airports were required to file monthly reports on aircraft that “might” have weather-modification equipment, the state created ReportFloridaSkies.com for citizens to report “suspicious atmospheric activity,” and the state Attorney General blamed Texas floods on cloud seeding - a claim debunked by meteorologists within hours. The law generated zero documented violations because the activity it banned had never occurred within the state. A Wyoming proposal, according to the legislature’s fiscal analysis, would have cost the state’s Department of Environmental Quality half a million dollars annually to “monitor airspace.”

Florida’s ban generated zero documented violations. The activity it prohibited had never occurred in the state. Its Department of Environmental Protection has never received a single application for weather modification in sixty-eight years.

Chilling Legitimate Research

While concepts for SRM have circulated for decades, the actual science of SRM’s physical impacts from deployment remains immature. Substantial uncertainty persists about the effectiveness, risks, and side effects of most proposed approaches. Some modeling studies suggest that stratospheric aerosol injection, if poorly calibrated, could reinforce rather than

mitigate climate change. Others have raised the prospect of “termination shock” from the rapid warming that would result from an abrupt halt to sustained aerosol injection. These uncertainties underscore precisely the need for credible and transparent research. A state that bans all SRM-related activity jeopardizes exactly the modeling, laboratory work, and small-scale field studies needed to resolve these uncertainties.

Part IV: Collaboration Enabled By Oversight

Because these issues are new, policy development and scientific research will likely move in tandem. State legislators can anticipate iterative rounds of policy work as science advances and as policy structures are proposed and tested. This process requires oversight – the public is very unlikely to accept this sort of staged policy process unless the state assures that it will oversee any substantial outdoor releases of reflective particles. But if the state has established that oversight – which the model statute described in the next part would allow – collaboration can move forward in synch.

Legislators could consider an array of complementary approaches to enable collaboration across states. These include memoranda of understanding that could align research efforts and information-sharing across state lines (especially important for a technology like this one that may have cross-border implications), Such MOUs could direct interested agencies to collaborate on shared priorities, to identify needs for research funding, and to inform each other of any oversight issues. Separately, legislators could support state university programs in these areas to build up state-based expertise, and they could solicit reports on likely risks from extreme weather to better understand how to assess and localize risks from new technologies as well as from the climate change challenges they would address.

A wealth of policy literature, including from Nobel Laureate in Economics Elinor Ostrom, suggests that these sorts of “first mover” collaborations can provide foundational structure for broad, even global, government designs. States that pair their oversight efforts with collaborative “clubs” on these issues may well find themselves in the lead worldwide on policy design. Moving rapidly to identify similarly situated governments can therefore put state legislators in position to ensure these emerging technologies develop in ways consistent with public priorities.

Part V: The Model Permitting Statute

A narrow permit-based statute offers a better legislative approach that would accomplish two goals simultaneously by prohibiting unpermitted private SRM activity while preserving a super–vised pathway for legitimate research. The model statute does not authorize global SRM deployment, endorse any particular technology, or displace climate-mitigation, adaptation, or carbon-removal policy. It instead imposes a simple permitting requirement that can be calibrated by state regulatory agencies to fit permit requirements to environmental impacts of substantial releases to the stratosphere, providing oversight even as science and policy develop.

Scope and Definitions

The statute regulates only intentional atmospheric activity, defined quantitatively by the relevant state agency as an amount of solar-radiation-altering material injected into the stratosphere, which is conducted within the state or launched from within the state, for the purpose of studying or altering radiative balance through solar reflection or related mechanisms. The specific quantitative threshold provides clarity and can be set by regulation with reference to either (i) the quantity and type of material that may have significant impacts (as advised by both the U.S. National Academies and the United Kingdom's Royal Society), or (ii) a reduction in radiative forcing caused by the release.[1] (The model leaves this threshold undefined as it is a proper topic of legislative discussion informed by scientific experts and agencies). It does not reach any activities below this threshold, including ordinary academic dialogue, climate modeling, indoor materials science, or environmental monitoring. Existing state weather-modification law remains in effect unless the legislature affirmatively integrates the two regimes. The key definitions rely on concrete conduct such as the intentional release or injection of specified substances into the stratosphere.

Tiered Regulatory Framework

The statute establishes a tiered approach that matches regulatory burden to actual risk. Indoor work, computer modeling, and component testing that does not involve an atmospheric release fall entirely outside the permit program. The full permit process is reserved for intentional atmospheric releases in the stratosphere that exceed a quantitative threshold defined with regard to substantial environmental impacts. This clear standard would enable compliance and not chill research. Outdoor releases below that threshold, as may occur in early stage research, may be subject to reporting under existing federal law, but are not regulated by the model bill as they do not implicate environmental concerns. The model bill prohibits unpermitted commercial activity and subjects it to potential civil enforcement.

Permit Criteria and Agency Authority

For activities that require a permit, the designated state agency (generally the environmental permitting agency) will evaluate a defined set of objective criteria that includes the amount and composition of material to be released, altitude and location, foreseeable environmental and public-health effects, monitoring and data-collection methods, emergency and termination procedures, and the applicant's financial and technical capacity. The model act concentrates permitting authority in a single lead agency to clarify lines of responsibility.

[1] For example, Parson and Keith have suggested a de minimis threshold defined by the product of area, duration, and size of the radiative forcing perturbation for global climate responses. Edward Parson and David Keith, *End the Deadlock on Governance of Geoengineering Research,* 339 SCIENCE 1278, 1279 (March 15, 2013).

Transparency and Public Accountability

The model statute emphasizes transparency. The responsible state agency will maintain a public docket of permit applications and decisions, require disclosure of funding sources and principal investigators, and publish post-activity reports. The agency will provide appropriate public notice and an opportunity for written comment. An open, publicly accessible permitting process will ensure that stratospheric releases cannot proceed in secret.

Enforcement

The statute authorizes civil enforcement against unpermitted activity, including injunctions, permit revocation, and meaningful monetary penalties. Civil enforcement offers a better first-line tool because it is more flexible than criminal law and better matches technical regulatory violations. The state legislature can establish criminal penalties for knowing, willful, or repeated violations if it believes such sanctions are necessary; sample provisions are included in the model statute for consideration.

A statute that can credibly promise both — prohibition of unauthorized activity and preservation of supervised research — is more durable than one that wins a headline by outlawing a category it has not taken the time to define with precision.

Conclusion

State legislatures have begun to rightly insist that atmospheric intervention, if it occurs within their borders, should not proceed in a legal vacuum. This bipartisan impulse to regulate is sound.

Broad prohibitions may satisfy an immediate political demand, but they also sacrifice oversight, blur important scientific distinctions, impose real fiscal costs, and risk disabling the research capacity that states may later need. The early experience of states with bans - compliance burdens aimed at activities that do not exist, enforcement mechanisms that generate no useful information, and definitions that inadvertently threaten programs the legislature intended to preserve - should give pause to any lawmaker considering the same path.

The better path would rely on a narrow permit-based statute that prohibits unpermitted private SRM activity, preserves room for legitimate research, demands transparency from applicants, and gives the state a practical means to prevent or condition the small subset of experiments that raise genuine public concern. This approach would protect state sovereignty over the atmosphere without sacrificing the state’s ability to learn what is happening in it.

Appendix: Model State SRM Legislation (for Texas)

* * * * * * * * *

By: _____

B. No. _____

A BILL TO BE ENTITLED
AN ACT

relating to the regulation of solar radiation management activities; authorizing permits for significant stratospheric releases; providing civil and criminal penalties; authorizing fees.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Title 5, Health and Safety Code, is amended by adding Chapter 399 to read as follows:

CHAPTER 399. SOLAR RADIATION MANAGEMENT

Sec. 399.001. DEFINITIONS. In this chapter:

(1) "Commission" means the Texas Commission on Environmental Quality.

(2) "Solar radiation management" means any intentional injection, release, or dispersion into the stratosphere above the state of Texas of material that may alter solar radiation reaching the surface of the planet over a level specified by the commission pursuant to Section 399.012(1) {Alternative language – specific [##] pounds, or average watts per square meter}. The term does not include:

(A) traditional agricultural practices;

(B) land or ocean surface albedo modification;

(C) urban heat island mitigation through conventional building materials;

(D) local weather modification activities authorized under Chapter 301, Agriculture Code; or

(E) emissions from aviation exhaust

Sec. 399.002. LEGISLATIVE FINDINGS AND PURPOSE. The legislature finds that:

(1) solar radiation management technologies represent emerging approaches to address risks, may have substantial benefits, and warrant transparent and accountable oversight;

(2) a comparative risk approach is appropriate as these technologies come with risks as well as benefits, but fundamentally are intended to manage risks of extreme weather;

(3) an oversight framework can also foster legitimate scientific research and economic activity in the state, but requires ensuring that any releases of potentially climate-altering materials in significant amounts are appropriately reviewed and permitted;

(4) federal oversight mechanisms remain incomplete, necessitating state-level regulation to protect state interests; and

(5) transparency and public participation in decision-making regarding solar radiation management technologies serve essential democratic and scientific purposes.

Sec. 399.003. PERMIT REQUIREMENTS.

(a) A person may not conduct any solar radiation management in this state without a permit issued by the commission under this chapter.

(b) In issuing a permit, the commission shall protect the public safety, environment, and economy of this state by evaluating the potential impacts of the proposed solar radiation management and implementing appropriate limitations in the permit.

Sec. 399.004. PERMIT PROCESS.

(a) An application for a permit under this chapter must include:

(1) a detailed description of the proposed activities;

(2) a review of potential environmental impacts;

(3) a risk assessment and mitigation plan;

(4) proof of liability insurance in an amount determined by commission rule;

(5) a public engagement plan;

(6) monitoring and reporting protocols; and

(7) any other information required by commission rule.

(b) The commission shall provide at least 60 days' public notice and hold at least one public hearing before issuing a permit under this chapter. A permit may only be issued if the commission determines that the application is complete, considers and responds to public comment, and determines that the public interest weighs in favor of issuing the permit and that the risks of the solar radiation management proposed for permit are substantially less than those of denying the permit, and the benefits substantially greater.

(c) A permit issued under this chapter must include conditions regarding:

(1) geographic and temporal limitations, including on the altitude and location of the release;

(2) the total amount and composition of materials that may be released;

(3) monitoring requirements;

(4) emergency termination procedures;

(5) bonding or financial assurance requirements;

(6) third-party oversight requirements; and

(7) any other conditions necessary to protect public health, safety, and the environment.

(d) Emergency actions by the commission or another state agency to respond to imminent threats to public health, welfare, or the environment are exempt from the permit requirements of this chapter even if they would otherwise constitute solar radiation management.

(e) Judicial review of a permit issued under this section shall be available for any affected person, after a contested case hearing, in the Fifteenth Court of Appeals.

Sec. 399.005. PROHIBITED ACTIVITIES. Notwithstanding any permit issued under this chapter, the following activities are prohibited:

(1) use of materials classified as hazardous air pollutants under federal law;

(2) activities causing measurable precipitation changes exceeding 10 percent in any county as determined by the commission;

(3) activities that result in transboundary material effects without the consent of an affected state; and

(4) activities conflicting with federal aviation or defense operations.

Sec. 399.006. REPORTING AND TRANSPARENCY.

(a) All activities permitted under this chapter shall be reported to the National Oceanic and Atmospheric Administration as required under federal law.

(b) The commission shall maintain a publicly accessible registry of all permit applications, issued permits, and activity reports submitted under this chapter.

(c) The commission shall submit an annual report to the legislature summarizing activities permitted under this chapter and their impacts.

Sec. 399.007. CRIMINAL PENALTIES.

(a) A person who conducts unauthorized solar radiation management deployment commits an offense.

(b) An offense under Subsection (a) is a state jail felony.

(c) If it is shown on the trial of an offense under this section that the defendant has previously been convicted of an offense under this section, the offense is a felony of the third degree.

Sec. 399.008. CIVIL AND ADMINISTRATIVE PENALTIES.

(a) The commission may assess an administrative penalty against a person who violates this chapter or a rule adopted or permit issued under this chapter.

(b) The penalty for a violation may be not more than $50,000 for each violation for each day that the violation continues.

(c) In determining the amount of an administrative penalty, the commission shall consider:

(1) the nature, circumstances, extent, and gravity of the violation;

(2) the history of previous violations;

(3) the amount necessary to deter future violations;

(4) efforts made to correct the violation; and

(5) any other factor the commission considers relevant.

(d) The commission may recover reasonable expenses incurred in obtaining injunctive relief or civil penalties under this section, including investigation costs, court costs, reasonable attorney's fees, witness fees, and deposition expenses.

Sec. 399.009. INJUNCTIVE RELIEF.

(a) The attorney general, at the request of the commission, may bring an action for injunctive relief to restrain a violation or threatened violation of this chapter or a rule adopted or permit issued under this chapter.

(b) An action for injunctive relief under this section may be brought in a district court in Travis County or in the county in which the violation occurred or is threatened.

Sec. 399.010. CITIZEN SUITS.

(a) An affected person may bring a civil action against:

(1) a person who is alleged to be in violation of this chapter or a rule adopted or permit issued under this chapter; or

(2) the commission if the commission fails to perform a nondiscretionary duty under this chapter.

(b) An action under Subsection (a)(1) may not be commenced:

(1) before the 61st day after the date the plaintiff gives written notice of the violation to the commission and to the alleged violator; or

(2) if the commission has undertaken substantial enforcement against the alleged violator or has notified the affected person that it intends to undertake that enforcement within 60 days.

(c) A court may award costs of litigation, including reasonable attorney and expert witness fees, to a prevailing or substantially prevailing party in an action under this section.

(d) If an affected person commences an action under Subsection (a)(1), the commission can intervene in that action as of right.

Sec. 399.011. FEES. The commission may impose fees for:

(1) permit applications;

(2) permit renewals and modifications;

(3) inspections and monitoring; and

(4) other regulatory activities under this chapter.

Sec. 399.012. RULES. The commission shall, within 18 months of enactment of this chapter, adopt rules necessary to implement this chapter, including rules including but not limited to:

(1) the amount of any injection, release, or dispersion of substances necessary to constitute "solar radiation management" under Section 399.001(4) as determined by the commission at a level requisite to protect public health and the environment;

(2) permit application procedures;

(3) insurance requirements;

(4) monitoring protocols;

(5) emergency response procedures;

(6) fee schedules; and

(7) procedures for administrative enforcement.

Sec. 399.013. GOVERNMENTAL COORDINATION. The commission shall:

(1) Coordinate and share information, as appropriate, with other states, and with relevant federal agencies with authority on these matters.

(2) Engage, as appropriate, in research on the topics covered by this statute.

(3) Report promptly to the Legislature as federal law on solar radiation management evolves, including with recommendations on any recommended modifications to the authorities in this statute warranted by changes in federal law.

SECTION 2. Nothing in Chapter 399, Health and Safety Code, as added by this Act:

(1) invalidates existing permits for activities not meeting the definition of solar radiation management;

(2) preempts a more stringent local regulation;

(3) affects emissions authorized under a state air quality permit; or

(4) limits traditional agricultural or silvicultural practices.

SECTION 3. (a) The change in law made by this Act applies only to an offense committed or other violation that occurs on or after the effective date of this Act.

(b) An offense committed or other violation that occurs before the effective date of this Act is governed by the law in effect on the date the offense was committed or the violation occurred, and the former law is continued in effect for that purpose.

SECTION 4. If any provision of this Act or its application to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of this Act that can be given effect without the invalid provision or application, and to this end the provisions of this Act are declared to be severable.

SECTION 5. (a) Except as provided by Subsection (b) of this section, this Act takes effect September 1, 2027.

(b) Section 399.012, Health and Safety Code, as added by this Act, takes effect immediately if this Act receives a vote of two-thirds of all the members elected to each house, as provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, Section 399.012, Health and Safety Code, as added by this Act, takes effect on the 91st day after the last day of the legislative session.