Climate Resiliency FACT SHEET Extension UtahStateUniversity

Cap-and-Trade Carbon Pricing in Utah: Challenges and Potential Impact

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Poor air quality and climate warming are concerns for Utahns. Cap-and-trade carbon pricing is one tool that could help address both issues.

Burning fossil fuels emits both harmful air pollutants and carbon-based greenhouse gases, contributing to two major concerns for Utahns: poor air quality and warming due to climate change. To address these issues, there is a need to reduce Utah's emissions through programs that increase clean energy capacity and carbon capture efforts. Reducing emissions requires approaches that target different sectors of the economy. One potentially effective approach is carbon pricing. Carbon pricing puts a price on carbon emissions to account for the impact of the emissions. By making it more expensive to emit, carbon pricing can incentivize companies to emit less.

Cap-and-trade programs are a market-based form of carbon pricing that allows companies to trade with each other using carbon credits. Carbon credits function as permission slips to emit a certain amount of carbon. The "cap" establishes the number of carbon credits an industry or region has available for trading. Companies are incentivized to emit less because they can sell their excess carbon credits to other companies. Several cap-and-trade programs exist in the United States, and these programs are effectively reducing carbon emissions while creating net economic benefits for their regions. A cap-and-trade program could help Utah reduce carbon emissions in the state while also improving air quality.

What Is Carbon Pricing?

Carbon emissions come at a cost, whether through the impacts of climate change like heatwaves and droughts or the health problems caused by the other pollutants emitted with carbon (Jay et al., 2023). However, the companies that benefit from the economic activities that generate carbon emissions generally do not have to pay for the damage to property, loss of crops, medical bills, higher insurance premiums, higher utility bills, or other costs that carbon emissions cause (Marino et al., 2023). To ensure that companies include their emissions in their production costs, governments can implement carbon pricing policies that assign a price to emitted carbon either through a tax or through the trading of carbon credits on the market (World Bank Group [WBG], 2024).

Putting a price on carbon can reduce harmful emissions. If companies must pay for the carbon they emit, they are likely to be motivated to adjust their production strategies to lower their carbon emissions, and these adjustments would likely also reduce their emission of other harmful air pollutants (Figure 1). Some companies already use their own internal carbon pricing strategies (Bartlet et al., 2021), but without a standard system of carbon pricing, companies may value carbon differently and/or exclude important factors in their assessments. Moreover, if companies price carbon too low, they have little to no financial incentive to lower emissions to meet goals. If they price carbon too high, this could restrict production or otherwise hurt their business and the broader economy (Guo & Gong, 2023). A standardized system for carbon pricing allows governments to meet emissions goals while minimizing economic harm.

Carbon pricing differs from other emissions-reduction policies because it gives companies the freedom to choose the best path to lower their emissions instead of mandating the adoption of a specific strategy. Strategies for reducing carbon emissions can include investing in new technologies, increasing energy efficiency, or using different energy sources for production (Rodriguez et al., 2023; Sesana & Dell'Oro, 2024). Although carbon pricing imposes a new cost on companies, companies maintain the freedom to decide which strategies they adopt to adjust for these costs.

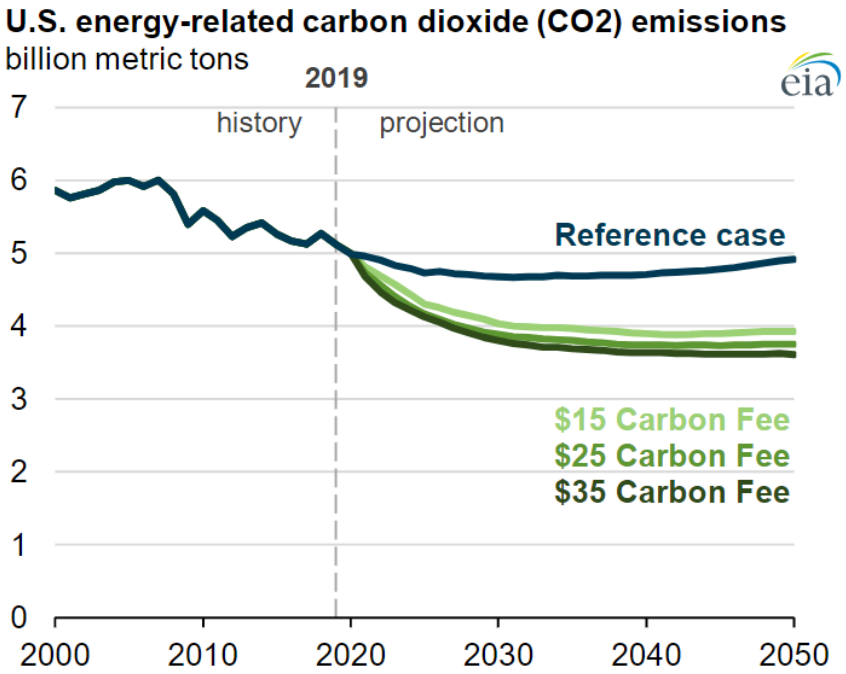

Figure 1. *Projected Effects of a Fee on Carbon Emissions in the United States*
Note. By 2050, a carbon fee could reduce annual emissions from the energy sector by one billion metric tons of carbon dioxide compared to no carbon fee.

Source: U.S. Energy Information Administration, 2020.

Importance of Predictably Increasing the Price of Carbon

Often, carbon pricing policies gradually increase the cost of emitting by following a carbon pricing timeline to meet the region's emissions goals (Organisation for Economic Cooperation and Development [OECD] and WBG, 2015). Gradually increasing the price of carbon has several advantages. Initially, a low carbon price gives companies time and access to more financial resources as they choose and implement ways to emit less carbon. Meanwhile, the knowledge that the price will increase motivates action. Increasing the price of carbon also makes sense when the impact of emissions is considered. Because carbon remains in the atmosphere for centuries (Buis, 2019), the emissions themselves are additive, but due to the global warming and climate change they cause, the costs of their impacts are expected to increase at a much faster rate (Jay et al., 2023). Therefore, if part of the rationale for putting a price on carbon is to account for the impact of emissions, the cost of emitting carbon should increase with its impact.

Emissions From an Industrial Plant

While gradually increasing the price of carbon can make it more financially possible for companies to promptly implement changes that reduce emissions, the duration of the carbon pricing policy can shape a company's approach to decarbonization (OECD and WBG, 2015). Short-term carbon pricing policies often drive companies to choose temporary decarbonization strategies such as carbon capture, buying carbon offsets, and burning methane that would otherwise be released as a highly potent greenhouse gas (Pan & Sun, 2023; Fisher, 2023). However, these efforts do little to reduce the emissions from the company's regular activities.

In contrast, long-term carbon pricing policies can lead to infrastructure investments that do more to reduce total emissions in the long run. Long-term emissions-reduction strategies include researching and using more sustainable production materials, increasing energy efficiency, and building renewable energy infrastructure (Sesana & Dell'Oro, 2024; Pan & Sun, 2023). If a company knows the price of carbon emissions will gradually increase over the next 50 years, they may choose to forgo short-term decarbonization strategies and pay the low price for emissions now while investing in infrastructure that would more significantly reduce their carbon emissions in the long term. Such an approach could be more cost-effective overall because it would save the company money when the cost of emitting is higher.

Both short- and long-term strategies are helpful in reducing carbon emissions globally, but carbon pricing policies with longer timeframes will generally have greater capacity to induce change. However, it is important that long-term pricing strategies, once implemented, remain stable and

continuously in place so companies can have confidence in the need to adjust their business strategies.

Changes in the Fossil Fuel Industry Under Carbon Pricing

Carbon pricing allows for companies to shift their production strategies gradually, but industries that rely on the use of fossil fuels will still see their businesses impacted. As the cost of carbon increases, the demand for energy generated from fossil fuels will decrease, and the cost of extracting and refining fossil fuels will increase; together, these pressures could result in the closure of fossil-fuel-based companies. Knowing this, companies in the fossil fuel industry can strategize to transform their business models to be viable in a new economic landscape where carbon emissions are included in operational costs. For example, Occidental Petroleum has built carbon capture plants to offset its emissions so it can sell these carbon offsets to other companies that require them. By investing in this infrastructure, the company is positioned to expand its carbon capture efforts if there is more demand for these offsets (Domonoske, 2023; Occidental Petroleum, n.d.). Thus, although carbon pricing may change the fossil fuel industry, it could also motivate new and desirable innovations (Figure 2).

Figure 2. *Petra Nova Is a Coal-Fired Power Plant With Carbon Capture and Storage (CCS) Near Houston, Texas*

Source: U.S. Energy Information Administration, 2017.

Some companies, however, will not be able to shift their production and may face closures. In such cases, government policies can ease the transition away from fossil fuels through the strategic investment of revenue generated from carbon pricing (Tomer et al., 2021; Azevedo et al., 2023). These policies can include job training initiatives for cleaner energy production and programs that incentivize new industries to join the economy, bringing new jobs to the region. Through these policies, governments can minimize economic harm and create net benefits for their residents.

What Is Cap-and-Trade Carbon Pricing?

Globally, governments use two main carbon pricing strategies: carbon taxes and cap-and-trade programs (WBG, 2024). A carbon tax sets a limit for carbon emissions, and companies are taxed for the amount of carbon they emit over that limit. A cap-and-trade program operates similarly where the government sets a limit (the "cap") on how much carbon an industry or region can emit and then gives companies carbon allowances equal to this limit in the form of carbon credits (Center for Climate and Energy Solutions, 2024). These allowances mean that companies can emit up to the number of credits they have. Companies that emit above or below their allowed amount can buy or sell credits to other companies (the "trade"). Thus, under a cap-and-trade system, clear incentive exists to minimize emissions because companies can profit by selling credits rather than simply being taxed for emitting over the limit.

Cap = *How much carbon an industry or region is allowed to emit; this is represented by the total carbon credits available.*

Trade = *If companies emit below their allowed amount, they can sell their excess carbon credits to other companies.*

Through the buying and selling of carbon credits, the price of carbon is determined by the market, but the government can still influence the price. If the government raises the carbon cap by providing more carbon credits, the price of these credits decreases because more companies can trade their excess credits; conversely, if the government lowers the carbon cap, carbon credits become more expensive because more companies need them for themselves (Center for Climate and Energy Solutions, 2024).

Cap-and-Trade in the U.S.

In the U.S., three major cap-and-trade programs are in operation: the Regional Greenhouse Gas Initiative (RGGI) in the northeast U.S. and separate programs in California and Washington (Center for Climate and Energy Solutions, 2023). The RGGI has operated since 2009 and includes 11 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. The RGGI only applies to power plants within these states and issues carbon credits through auctions (RGGI, 2024). To further benefit regional sustainability goals, the revenue from these auctions funds programs that improve energy efficiency, create renewable energy infrastructure, assist lower-income households in paying electricity bills, and provide education and job training (Figure 3; RGGI, 2023). From 2009 to 2018, the RGGI produced $4.7 billion in net economic benefits (Hibbard et al., 2018). By 2016–2018, members of the RGGI had collectively reduced their carbon emissions from power plants by 48% compared to the 2006–2008 baseline (Center for Climate and Energy Solutions, n.d.).

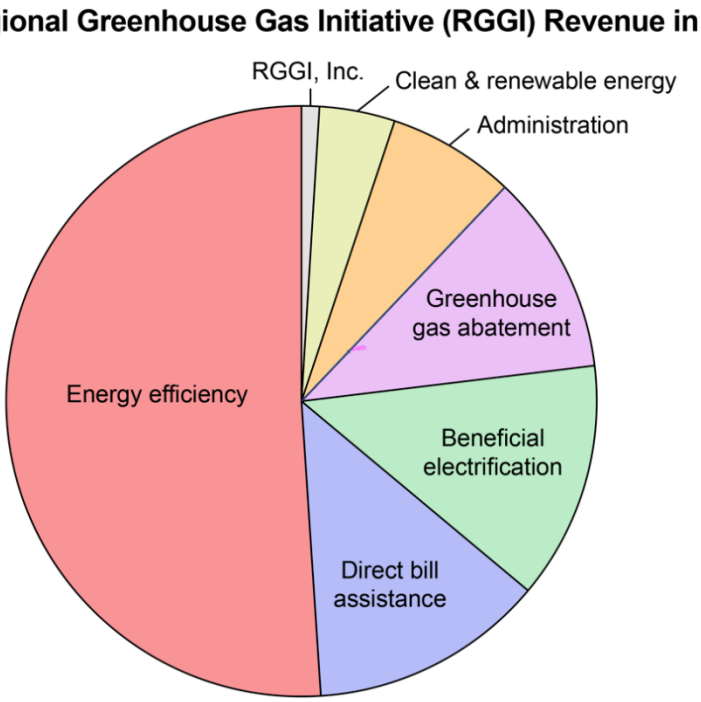

Figure 3. *Regional Greenhouse Gas Initiative (RGGI) Revenue Use in 2021, by Category*
Note. Most of the programs funded by RGGI revenue focused on increasing energy efficiency.

Data source: RGGI, 2023.

While the RGGI aims to reduce emissions from power plants, California's cap-and-trade system applies to all businesses that emit over 25,000 metric tons of carbon per year (Air Resources Board, 2015). Since the implementation of this program in 2012, California has seen a 14% reduction in overall greenhouse gas emissions. Although not all of this can be attributed to the cap-and-trade program, California's Legislative Analyst's Office reports that the cap-and-trade program "reduces emissions more cost-effectively than most other state-funded programs" (Legislative Analyst's Office, 2023). For example, under California's cap-and-trade program, the cost of preventing carbon emissions is about $30 per ton, while the state's zero-emission vehicle replacement program spends about $193 per ton of carbon emissions prevented (Legislative Analyst's Office, 2023). The revenue generated from auctioning carbon credits in California is used to fund projects that will decrease emissions, such as creating a high-speed rail system across the state and making public transportation more efficient (Figure 4). Another portion of these funds is used to create more affordable housing to help low-income communities (Legislative Analyst's Office, 2023).

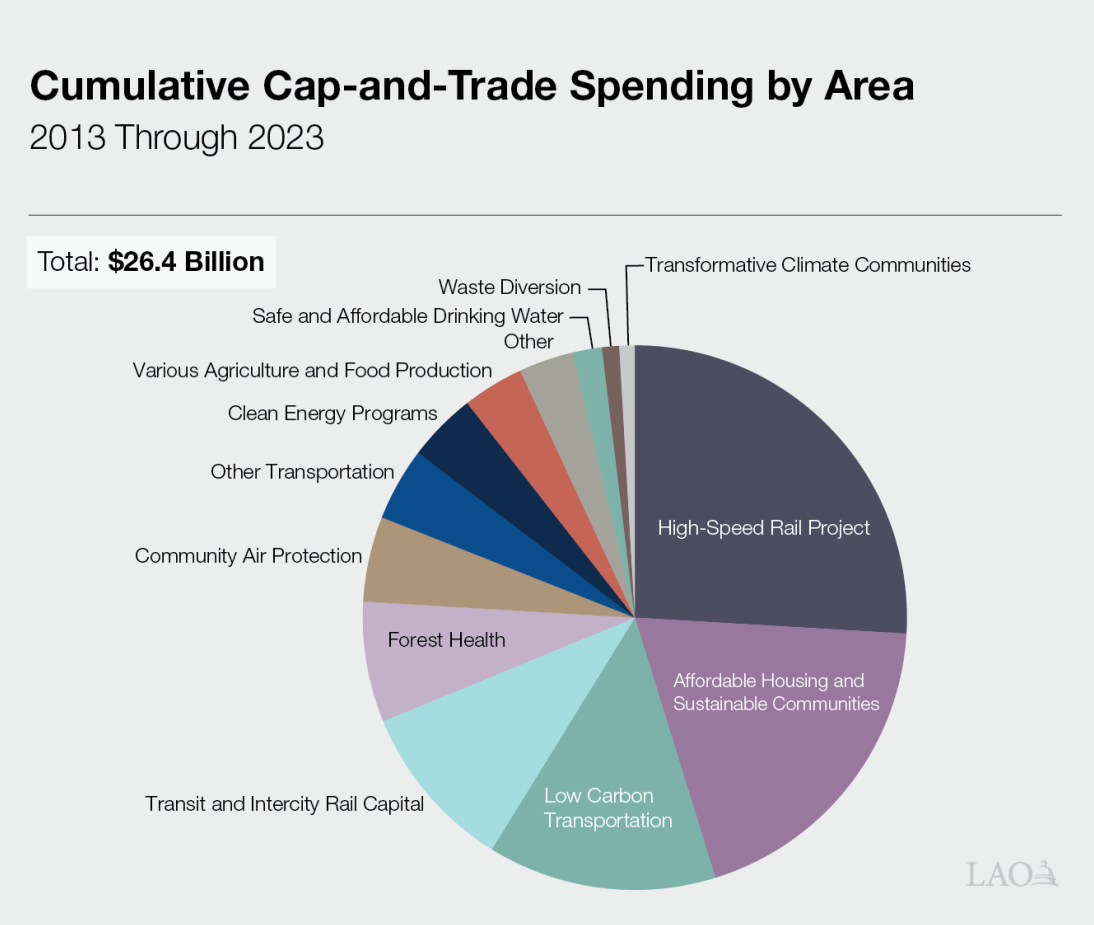

Figure 4. *California Cap-and-Trade Revenue Use: 2013–2023*
Note. Most revenue was invested in programs that reduce transportation emissions and create more affordable housing.

Source: Legislative Analyst's Office, 2023.

Consumer Prices Under Cap-and-Trade

Despite the benefits, there are several challenges to implementing cap-and-trade programs. When energy companies face higher production costs, these costs can be passed down to consumers. And even if higher-income households consume more energy, lower-income households may be more affected by price increases because energy costs take up a larger portion of their budget. These costs, however, can be mitigated by other government programs, resulting in a net benefit to households (Rogulj et al., 2023; Winter et al., 2023). Programs that offer tax rebates, eliminate grocery sales tax, and provide bill assistance create direct benefits for lower-income households. Other programs that fund efforts to increase energy efficiency and build renewable energy infrastructure could also benefit consumers by decreasing their electricity bills (Hibbard et al., 2018). For example, consumers would have lower energy bills if power plants used more renewable energy because the power plants would generate fewer carbon emissions and, therefore, not need as many carbon credits.

Barriers to Effective Cap-and-Trade Programs

Effective cap-and-trade programs depend on accurate emissions measurements so the government can determine if companies have obtained the required number of carbon credits (WBG, 2022). Typically, a government body performs regular inspections to ensure that companies accurately report their emissions, and companies are required to adopt accurate measurement tools. Power plants, however, are already required to report their carbon emissions as directed by the U.S. Environmental Protection Agency, so this inspection infrastructure already exists (Continuous emission monitoring, 1993).

Another potential issue with cap-and-trade is if the system fails to set an appropriate price for carbon credits. If too many credits exist, emitting carbon becomes too cheap (Guo & Gong, 2023). Conversely, if too few credits exist, production can become too expensive, and rather than investing in gradual decarbonization, energy companies may react with rapid price increases that hurt the economy. To combat this, programs often have a predetermined reserve of carbon credits they can introduce to the market if carbon reduction costs are greater than expected (Jordan & Moore, 2023; Schmalensee & Stavins, 2017). Like many other financial systems, flexibility in cap-and-trade programs allows for governments to respond appropriately to the market to ensure they remain on track for their emissions goals while minimizing economic harm.

However, even if the government provides the optimal number of carbon credits, cap-and-trade programs may be more likely to succeed if implemented at a large enough geographic scale (Schmalensee & Stavins, 2019). For example, cap-and-trade programs implemented at the county or city level might fail because companies could easily relocate to avoid having to participate. In contrast, regional and state programs have generally succeeded at retaining companies (Center for Climate and Energy Solutions, 2023).

Cap-and-Trade and Utah

While cap-and-trade systems are effective tools for combating climate change and would be similarly valuable in Utah, a cap-and-trade system would also help address Utah's air quality issues. A 2023 poll found that 87% of Utahns are either very concerned or somewhat concerned about poor air quality in the state, and 71% believe policymakers are not doing enough to address the issue (Schad et al., 2023). Although a cap-and-trade system would not address all aspects of air pollution in Utah, actions that reduce emissions also improve air quality (Utah Division of Air Quality, 2023).

Currently, Utah's plan to reduce the emission of both greenhouse gases and air pollutants includes improving energy efficiency, decreasing Utah's dependence on coal, and decreasing the use of gas-powered cars (Utah Department of Environmental Quality, 2024). By targeting the energy and transportation sectors, a cap-and-trade system could help Utah reach its 2050 emissions goal, as outlined by the Utah Roadmap Project, while still giving companies the freedom to choose how they decarbonize (Figure 5; Kem C. Gardner Policy Institute, 2020). Additionally, a cap-and-trade policy could generate revenue to fund other initiatives that are important to Utahns.

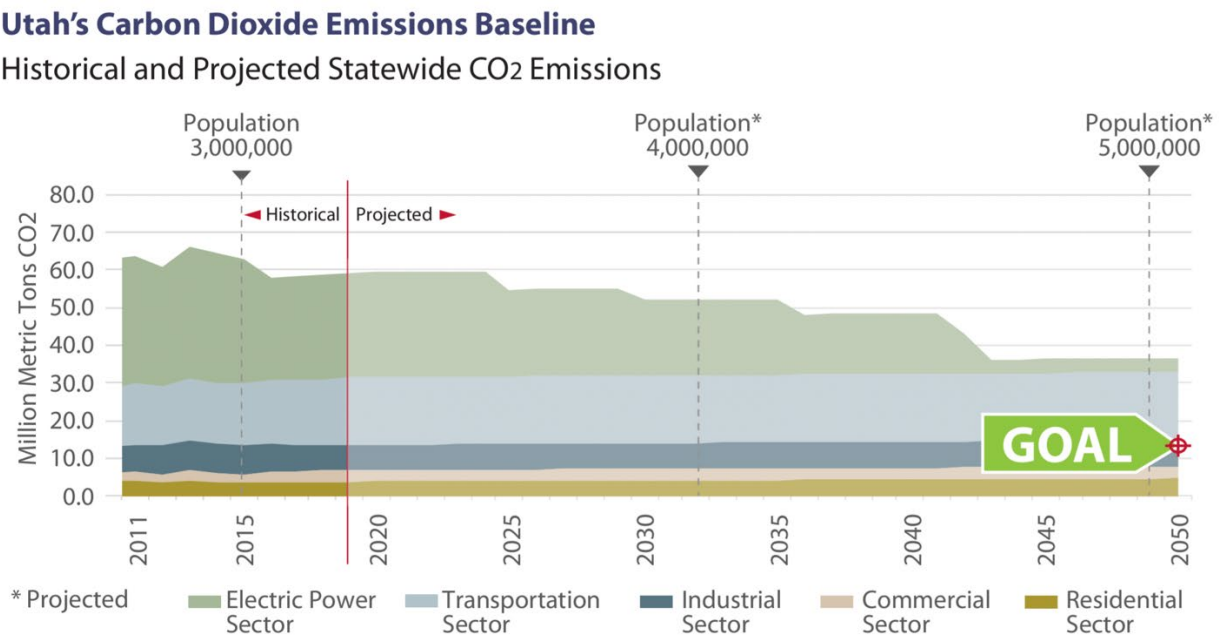

Figure 5. *Utah's Carbon Emissions Projections by Sector*
Note. Utah's current carbon emissions trajectory will not meet the 2050 emissions goal defined by the Utah Roadmap Project. Emissions baselines account for the potential closures of the Bonanza (2030), Huntington (2036), and Hunter (2042) power plants.

Source: Kem C. Gardner Policy Institute, 2020. Data sources: U.S. Energy Information Administration based on the combustion of fossil fuel (historical) and Kem C. Gardner Policy Institute (projected).

Moving Forward With Cap-and-Trade

To assist in the creation of cap-and-trade policies, several organizations like the World Bank's Partnership for Market Readiness, the International Carbon Action Partnership, the European Commission, and others have published studies and guides for governments looking to create cap-and-trade programs in their regions. These guides can help governments assess whether cap-and-trade is a viable strategy for their emissions goals, in addition to providing lessons learned from other governments and their programs. These resources can be found on the World Bank Group's Carbon Pricing Dashboard under the heading "How to do carbon pricing right."

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