Climate Resiliency FACT SHEET Extension UtahStateUniversity

Could a Carbon Tax Improve Utah's Air Quality and Mitigate Climate Change?

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Urban areas in Utah have suffered from poor air quality since Euro-American settlement in 1847. Because today's harmful air pollutants and carbon dioxide—the most significant driver of contemporary climate change—are often emitted together, a carbon tax could improve air quality while also mitigating climate change. Here, we explore how Sweden has successfully implemented a carbon tax and consider the viability of a similar approach for Utah. While a carbon tax would pressure Utah's transportation and energy sectors to reduce reliance on fossil fuels, revenue from the tax could finance renewable energy infrastructure to support companies transitioning away from fossil fuels while simultaneously improving Utah's air quality.

Air Pollution and Carbon Emissions in Utah

Utah residents regularly experience poor air quality (Maffly, 2020). Since the EPA established national ambient air quality standards in 1971, Utah has struggled to meet them (Mitchell & Zajchowski, 2022; Utah Division of Air Quality, 2023). Poor air quality is especially prominent in densely populated valleys in northern Utah, including Cache, Salt Lake, and Utah Valley (American Lung Association, 2023). Air pollutants, including nitrogen oxides, ammonia, ozone, and volatile organic compounds (VOCs), are emitted in these valleys and react to form small particulate matter (e.g., $PM_{2.5}$) that is detrimental to human health (Caiazzo et al., 2013; Malek et al., 2006). The common bowl shape of Utah's valleys traps pollutants, which are unable to disperse beyond the valley walls due to stagnant air (Utah Division of Air Quality, 2021).

Pollutants that cause poor air quality are often emitted along with carbon dioxide. For example, in 2021, Utah's transportation sector was responsible for 39% of nitrogen oxide, 8% of primary $PM_{2.5}$, and 2% of VOC pollution statewide, as well as 29% of carbon dioxide emissions; Utah's energy, industrial, and commercial sectors were responsible for 37% of nitrogen oxide, 10% of primary $PM_{2.5}$, and 8% of VOC pollution statewide, as well as 64% of carbon dioxide emissions (U.S. Energy Information Administration [EIA], 2023; Utah Division of Air Quality, 2021). While nitrogen oxides, primary $PM_{2.5}$, and VOCs harm human health, carbon dioxide is a powerful greenhouse gas and the primary driver of human-caused global warming since 1990 (Lindsey, 2022). Because the release of multiple air pollutants is tied to carbon dioxide emissions, some policies that reduce carbon dioxide emissions could also improve air quality. For example, one way Utah could improve air quality––and mitigate climate change—would be to apply a carbon pricing policy such as a carbon tax.

What Is a Carbon Tax?

A carbon tax places a price on every ton of carbon emitted, which incentivizes companies to use energy sources that emit less carbon (Center for Climate and Energy Solutions, n.d.). The tax more strongly affects the industries that emit the most carbon, such as those in the transportation and energy sectors (Macaluso et al., 2018). While a carbon tax pressures these industries to emit less carbon, companies and customers remain free to choose the most economical ways to respond to that pressure (Sterner, 2020). This freedom

benefits companies because businesses can tailor the changes they make to fit their different production needs and circumstances.

Revenue generated by a carbon tax can fund other initiatives. The revenue can be fed back into the economy to reduce the costs of alternative energy options, such as solar, wind, or hydropower, which do not release carbon into the atmosphere during energy production. Alternatively, or in addition, tax revenue can be returned to residents via rebates or reductions in sales or income tax to compensate for any increases in transportation and energy costs that are passed on to consumers.

Utah's transportation and energy sectors release most of the state's air pollution and carbon emissions.

Because Utah's transportation and energy sectors are responsible for the majority of air pollutants as well as more than three-fourths of statewide carbon emissions (EIA, 2023; Utah Division of Air Quality, 2021), a carbon tax could benefit Utahns by (1) protecting the health of Utah residents, (2) lowering the cost of administration because just one substance (carbon) is targeted rather than numerous air pollutants, and (3) reducing emissions of carbon-based greenhouse gases that drive global warming and climate change (National Aeronautics and Space Administration [NASA], 2024). Clean the Darn Air, a grassroots group in Utah, supports ongoing efforts to introduce a carbon tax policy, but the state does not currently have one (Clean the Darn Air, 2023). To contextualize how a carbon tax may be a viable solution to improve air quality in Utah, we explore the factors that enabled Sweden, in 1991, to implement one of the most effective, long-standing carbon tax policies in the world (Figure 1).

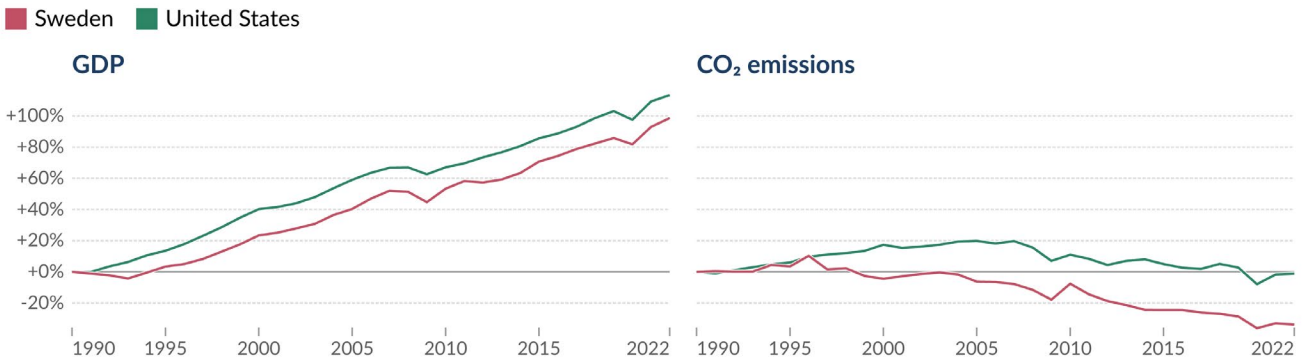

Figure 1. *Comparing Gross Domestic Product (GDP) and CO_2 Emissions of Sweden and the United States*

Notes. Since implementing a carbon tax in 1991, Sweden's GDP has increased by 99%, and carbon dioxide emissions have decreased by 34%. Meanwhile, in the United States, which does not have a carbon tax, GDP has increased by 113%, and carbon dioxide emissions have decreased by 1%.

Source: Our World in Data (2023), with data sourced from Global Carbon Budget (2023)

What Can Utah Learn From Sweden's Carbon Tax Policy?

Since implementing a carbon tax more than three decades ago, Sweden's GDP has nearly doubled, while the country's greenhouse gas emissions have decreased by one-third (Figure 1; Government Offices of Sweden, 2024). By drawing on effective features of the Swedish carbon tax, Utah may be able to create a carbon tax plan that is both practical and politically viable.

We identified five factors that have contributed to the success and longevity of Sweden's approach (Sterner, 2020). Sweden:

1. Built on collective motivation around a shared environmental goal.
2. Implemented change as a small part of a major—and popular—tax reform.
3. Provided initial protections for vulnerable sectors, with gradual implementation and industry-specific tax rates.

4. Has reinvested revenue in ways that benefit the country.
5. Implemented a stable and long-term plan.

Below, we discuss these factors and compare the situation in Sweden to circumstances in Utah.

1. Building on collective motivation around a shared environmental goal.

Sweden – Eliminating reliance on fossil fuels and achieving net-zero carbon emissions has long been a Swedish national goal across the political spectrum. For example, in 2017, Sweden formalized an objective to decarbonize by 2045 with widespread consensus (Sterner, 2020; United Nations Climate Change, 2017). This target date represented a middle ground between conservatives who wanted to decarbonize by 2050 or 2060 and environmentalists who preferred a 2040 deadline (Sterner, 2020). Unity around the need to reduce carbon emissions is partly the result of Sweden not having its own fossil fuel resources. Since fossil fuels are imported, the idea of taxing them is more palatable than taxing forest products and hydropower, Sweden's domestic—and renewable—resources (Sterner, 2020).

Utah – Consensus in Utah around the need for good air quality parallels the consensus in Sweden around the need to decarbonize. Air quality issues in Utah have motivated government intervention since the Salt Lake City Air Ordinance in 1891, five years before Utah became a state (Mitchell & Zajchowski, 2022). Efforts to improve air quality have continued steadily; thus, motivation could exist to use a carbon tax to reduce emissions of harmful air pollutants (Utah Division of Air Quality, 2023; Clean the Darn Air, 2023).

Utah residents regularly experience poor air quality, especially in valleys.

2. Implementing change as part of a major—and popular—tax reform.

Sweden – Sweden implemented its carbon tax during a major tax overhaul in the early 1990s, which, over 30 years, has lowered the overall tax burden for residents by 10% of the GDP (Sterner, 2020). This tax reform coincided with a desire for lower taxes, especially on income, and an interest in mitigating climate change. Once implemented, the tax reform reduced direct taxation on residents' income from a high of 80% to 30%–52%. The reform compensated for some revenue loss by increasing indirect taxation, i.e., taxing businesses that might raise prices, lower wages, or reduce profits to recover the money to pay the tax (Jonsson et al., 2020; Henrekson & Stenkula, 2015). Including a carbon tax as part of the indirect tax program allowed the government to pressure companies to lower carbon emissions while maintaining revenue.

Utah – The historical context of taxation in Utah is different from Sweden. Federal income tax in the U.S. is comparatively low, ranging from 10%–37%, and, in Utah, state income tax is also low at 4.65% (Internal Revenue Service, n.d.; Utah Income Taxes, n.d.). Thus, implementing a carbon tax in Utah would likely *not* coincide with a noticeable and popular reduction in income taxes. However, Utah does have several taxes on fossil fuels in place, such as the Environmental Assurance Fee, the Oil and Gas Conservation Fee, and the Oil and Gas Severance Tax (Utah State Tax Commission, 2024). The Environmental Assurance Fee is a $0.0065 tax on every gallon of motor fuel purchased. The Oil and Gas Conservation Fee is paid by owners of oil and gas wells, and the Oil and Gas Severance Tax is an additional tax well owners pay based on the value of what they extract (Utah State Tax Commission, 2024). Implementing a carbon tax could simplify multiple taxes to a general tax on carbon emissions, potentially reducing administrative costs and/or overall tax burden.

3. Protecting vulnerable sectors through gradual implementation and lower tax rates.

Sweden – When Sweden implemented its policy in 1991, it taxed carbon dioxide emissions at approximately $26 USD per ton (Jonsson et al., 2020). This rate has slowly increased over 33 years and is currently at $130 USD per ton (Government Offices of Sweden, 2024). The gradually increasing tax rate allowed businesses and residents to adapt over time, making the policy more feasible both practically and politically. And, because the carbon tax was effective and emissions decreased over time, the increasing tax rate helped maintain steady revenue.

One risk of any carbon tax is the loss of jobs in fossil-fuel-based sectors. Manufacturing and engineering companies make up most of Sweden's industry and had greater reliance on imported fossil fuels than other sectors. There was concern these companies might move their operations outside the country to avoid the tax. Thus, these industries were initially only required to pay 25% of the tax compared with other sectors (Sterner, 2020). Other exemptions, such as for fuel *not* used for motors or heating and fuel used for commercial maritime or aviation purposes, meant that the carbon tax initially applied to just 40% of Sweden's greenhouse gas emissions (Jonsson et al., 2020); however, even taxing a portion of overall emissions had a significant impact. In recent years, Sweden has been phasing out these exemptions (Jonsson et al., 2020).

Utah – Utah's current reliance on fossil fuels in the transportation and energy sectors suggests that Utah policymakers may want, or need, to incorporate compromises into a potential carbon tax. Accommodations could include a low initial tax rate and/or a lower tax rate for companies that require more time and resources to transition to clean energy sources. Such accommodations may be essential in Utah because companies could find it easier to move operations out of state than out of country.

Currently, Utah's transportation sector largely relies on fossil fuels; thus, a potential carbon tax may need to incorporate compromises.

4. Reinvesting revenue.

Sweden – Strategic reinvesting of tax revenue can be critical to the success of a carbon tax program because companies could choose to lower wages or raise prices to pay for the tax without reducing their carbon emissions (Jonsson et al., 2020). However, if tax revenue is used to fund renewable or energy-efficient infrastructure and to support residents who may be financially impacted by lower wages or higher prices, emissions reductions can be achieved while the financial burden on individuals is mitigated.

In 2021, Sweden's carbon tax generated about $2 billion USD, making up 1.4% of the country's total annual tax revenue (SCB Statistical Database, n.d.). While some countries (e.g., Canada) earmark carbon tax revenue for refunds to individuals, Sweden rolls it into its general government budget (Jonsson et al., 2020). This works well because the income distribution among Swedish residents is relatively even, and the government is generally trusted to manage key social programs, such as job retraining and home energy efficiency improvements (Sterner, 2020).

Utah – If Utah implements a carbon tax, harm to workers in carbon-based industries and low-income households will need to be minimized for the program to succeed. Options for achieving this include: (1) funding job retraining programs for employees in the fossil fuel industry, (2) putting tax revenue toward subsidies and/or research that will yield cheaper clean energy, (3) funding public transportation or other infrastructure projects, (4) providing tax rebates for low-income households, and (5) subsidizing housing costs or other rising expenses that pose financial challenges to Utahns (Beiser-McGrath et al., 2019). Using tax revenue to address issues that are important to constituents will help a carbon tax policy garner public support.

5. Implementing a stable, long-term plan.

Sweden – Sweden's carbon tax policy has been in place for 33 years, making it one of the longest-running carbon tax policies in the world, second only to Finland's, which was implemented in 1990 (Jonsson et al., 2020). The program's longevity has been key to its success because it allows industries and individuals to anticipate a future where carbon is still taxed (Government Offices of Sweden, 2024). This incentivizes investment in cleaner technology because it will continue to be economical in the future. The results of this long-term support are clear. The heating sector no longer uses oil, resulting in decreased tax revenue but also less need for further infrastructure changes (Sterner, 2020). For the transportation sector, Sweden's carbon tax functions like the fuel taxes of other countries. Compared with fuel taxes in the U.S., the carbon tax on fuel in Sweden is more than twice as high, and consumption per person is less than half (Sterner, 2020).

Utah – A long-term, multi-decadal carbon tax policy that increases at a steady rate is widely acknowledged as the most effective, least expensive way to incentivize industries to invest in cleaner energy (Sterner, 2020; Jonsson et al., 2020). Although an incremental approach would result in gradual, rather than immediate, improvements to air quality, this type of carbon tax structure could help Utah maintain economic stability while moving toward systems that reduce harmful pollution in the long term. Utah policymakers could also tailor their plan to decrease emissions in the industries that cause the most air pollution, stemming those sources of pollution quickly while building in the necessary measures (e.g., tax incentives) to support the affected industries and their workers.

Conclusion

Utah's air quality issues are directly tied to carbon emissions because the transportation and energy sectors emit most of the state's air pollutants and carbon dioxide (EIA, 2023; Utah Division of Air Quality, 2021). Applying a carbon tax in Utah could improve people's health by reducing multiple harmful air pollutants while also mitigating climate change by reducing Utah's contribution to carbon-based greenhouse gas emissions.

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