COMMON SENSE INSTITUTE

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COSTS OF COLORADO'S ENVIRONMENTAL AND EMISSION REDUCTION TARGETS OVER 15 YEARS

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ABOUT COMMON SENSE INSTITUTE

Common Sense Institute is a non-partisan research organization dedicated to the protection and promotion of Colorado's economy. CSI is at the forefront of important discussions concerning the future of free enterprise and aims to have an impact on the issues that matter most to Coloradans. CSI's mission is to examine the fiscal impacts of policies, initiatives, and proposed laws so that Coloradans are educated and informed about issues impacting their lives. CSI employs rigorous research techniques and dynamic modeling to evaluate the potential impact of these measures on the economy and individual opportunity.

TEAMS & FELLOWS STATEMENT

CSI is committed to independent, in-depth research that examines the impacts of policies, initiatives, and proposed laws so that Coloradans are educated and informed on issues impacting their lives. CSI's commitment to institutional independence is rooted in the individual independence of our researchers, economists, and fellows. At the core of CSI's mission is a belief in the power of the free enterprise system. Our work explores ideas that protect and promote jobs and the economy, and the CSI team and fellows take part in this pursuit with academic freedom. Our team's work is informed by data-driven research and evidence. The views and opinions of fellows do not reflect the institutional views of CSI. CSI operates independently of any political party and does not take advocacy positions.

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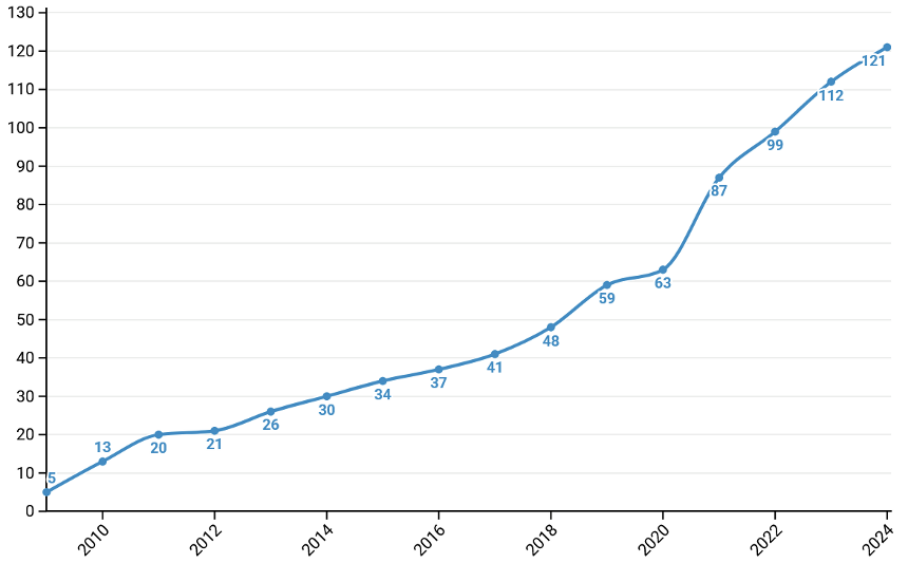
INTRODUCTION

The signing of HB19-1261 committed Colorado to some of the country's most ambitious emissions goals: reducing statewide greenhouse-gas emissions by 26% in 2025, 50% in 2030, and 100% in 2050 relative to the level in 2005. Since then, the state government has enacted 73 new bills and regulations—an unprecedented deluge—in the pursuit of those ambitions. All of this has come at a cost to Colorado's private sector, which has endured higher prices, reduced output, and administrative strictures for the sake of mitigating its contribution to global climate change. As the state government lacks a unified means of recording that cost, CSI aims to estimate it in this report through observed price, production, tax, and consumption changes.

HB19-1261, however, was hardly the state's first venture. Environmental policy has been a contested topic at the Capitol for decades, during which time many consequential actions were proposed, passed, and defeated; the scope of this study, therefore, includes a full 10 years of impact before 2019—bringing the total number of policies to 121—for the sake of both exhaustiveness and comparison to the present.

Total Number of New Environmental Policies since 2009



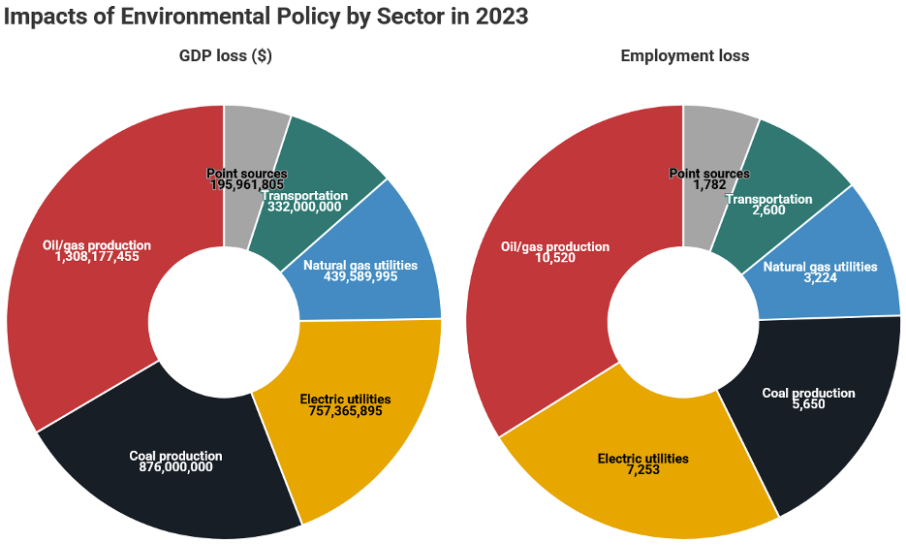
FINDINGS

CSI estimates that, as of 2023, state and local environmental policy has cost Colorado $18.3 billion of GDP, $13.8 billion of personal income, and $32 billion of output over 15 years. In 2023, it cost the state roughly 1% of its GDP and employment—an amount larger than the state's whole agricultural sector—and $131.7 million in tax revenue from personal income alone. In return, the state is on track to fall just short of its goal to reduce total emissions to a level 26% below what it was in 2005 with even more expensive action on the horizon.

Economic Impact of Environmental Policy since 2009					
	2009–2020	2021	2022	2023	Total
Employment	-2,253 per year	-44,127	-33,220	-30,986	-30,986[1]
GDP	-$5,147,926,353	-$5,453,899,211	-$3,914,421,872	-$3,761,095,150	-$18,277,342,586
Personal income	-$2,873,734,842	-$4,349,714,797	-$3,301,585,408	-$3,239,850,733	-$13,764,885,780
Output (goods and services)	-$8,751,686,160	-$10,082,192,800	-$6,795,484,000	-$6,449,084,820	-$32,078,447,780

Every sector except coal production has faced the vast majority of its total impact since 2019, when Colorado's emissions-reduction goals were established. In 2023, the coal and oil and gas production sectors endured policy's biggest cost burdens.

Below are detailed findings corresponding to each of the six sectors represented in the charts above. More information on how these figures were generated can be found in each major section of this report.



[1] Unlike GDP, personal income, and output, employment is already a cumulative measure in each year

Key Findings by Sector: Electric Utilities

- From 2009 through 2023, the annual price of electricity was an average of $.0016/kWh lower due to policy differences between Colorado and its neighboring states.
  - > This generated a total real savings for residential, commercial, and industrial consumers of $2 billion and increased consumption by 1,280 million kWh.
  - > If consumers would have used the same amount of electricity in the absence of policy, these lower prices saved the average residential consumer $22.95 per year, the average commercial consumer $128.96 per year, and the average industrial consumer $1,578.71 per year.
- Beginning in 2023, Colorado's policy no longer resulted in customer savings relative to neighboring states; instead, Colorado's average electricity price per kWh was half a cent higher in 2023 due to those same policy differences.
- Since 2021, policy has caused households, businesses, and industrial operations to spend $791 million more and consume 617 million kWh less.
- According to an earlier CSI study, the biggest impacts of Colorado's electricity policy have yet to impact consumers. The electric capacity and generation changes required of utilities to meet HB19-1261's and its successors' standards will cause consumer electricity prices to rise through the next decades at unprecedented speeds.

Economic Impacts of Electricity Policy				
	2009–2020	2021	2022	2023
Employment	3,788 per year	-2,193	-5,343	-7,253
GDP	$4,109,307,661	-$142,667,424	-$509,512,984	-$757,365,895
Personal Income	$3,113,302,495	-$66,676,336	-$358,283,520	-$569,433,139
Output	$7,225,395,460	-$239,696,640	-$852,190,560	-$1,258,974,100

Key Findings by Sector: Natural Gas Utilities

- CSI estimates that the price of consumer natural gas per Mcf was $0.59 higher in 2023 than it would have been in the absence of new policy. On average over the previous 15 years, the consumer price of natural gas was $0.46 per Mcf higher.
  - This caused residential, commercial, and industrial consumers to consume 26,700 Mcf less. 73% of that lost consumption has been realized since 2019 due to the rapid increase in prices since then.
  - If consumers would have used the same amount of natural gas in the absence of policy, this cost the average residential consumer $23.83 per year, the average commercial consumer $479.39 per year, and the average industrial consumer $3,866.56 per year.
- Some of the costs of electricity policy may have been passed on to natural gas consumers since most Coloradans receive their electric and natural gas services from the same providers.

Economic Impacts of Natural Gas Policy				
	2009–2020	2021	2022	2023
Employment	-1,447 per year	-4,267	-4,192	-3,224
GDP	-$1,640,234,014	-$481,502,556	-$524,353,168	-$439,589,995
Personal Income	-$1,207,833,224	-$375,054,390	-$398,590,416	-$329,424,130
Output	-$2,865,081,620	-$816,466,680	-$876,772,980	-$729,336,720

Key Findings by Sector: Coal Production

- Unlike the other sectors studied in this report, coal mining has experienced a decline that began well before HB19-1261 became law.
- Of the 19 states with proven coal reserves in both 2012 and 2022, Colorado's has been extracted at the third-slowest rate.
  - Since 2011, the extracted share of the state's known recoverable coal reserve has declined in all but three years from 12% to 4.6%.
- The average sale price of coal extracted in Colorado has been rising steadily at a long-term rate that outpaces inflation.
- Had Colorado mines maintained their 2005–2008 average rates of production, even considering the accelerated depletion of their reserves under that condition, the state would have produced a total of 95.5 million short tons more, worth a total of $5.2 billion, through 2023.

Economic Impacts of Lost Coal Production				
	2009–2020	2021	2022	2023
Employment	-4,594 per year	-5,727	-6,313	-5,650
GDP	-$7,617,000,000	-$893,000,000	-$979,000,000	-$876,000,000
Personal Income	-$4,786,000,000	-$570,000,000	-$606,000,000	-$560,000,000
Output	-$13,112,000,000	-$1,543,000,000	-$1,702,000,000	-$1,524,000,000

Key Findings by Sector: Oil and Gas Extraction

- Despite high proven reserves, Colorado fell off the national pace of oil/gas production in 2021 when many of the most restrictive drilling regulations came into force.
- Between 2019 and 2023, Colorado's crude oil and natural gas production fell by 13.3% and 8.3%, respectively.
  - Over the same period, New Mexico's oil production rose by 97.7% and its natural gas withdrawals grew by 75.2%. Texas' production also increased.
- Had policy not reduced the state's rate of production after 2020, Colorado would have produced 16.6 million barrels more of oil and marginally more natural gas worth a combined value of $1.3 billion.
- Because it will take several more years to fully realize the effect of the recent permitting decline on production, this value will be only a fraction of the eventual impact.

Economic Impacts of Lost Oil and Gas Production				
	2021	2022	2023	2023
Employment	-30,784	-13,605	-10,520	-5,650
GDP	-$3,816,353,592	-$1,597,793,144	-$1,308,177,455	-$876,000,000
Personal Income	-$3,254,638,651	-$1,504,790,784	-$1,270,635,930	-$560,000,000
Output	-$7,280,785,440	-$2,843,366,580	-$2,283,518,540	-$1,524,000,000

Key Findings by Sector: Transportation

- SB19-077 allows utilities to recover their costs of building charging stations through rate increases, which effectively recruits electricity customers to subsidize electric vehicle adoption.
- Regulation 20 forces manufacturers to sell minimum quantities, increasing over time, of zero-emissions vehicles in Colorado, but prices of new vehicles appear not to have responded yet.
  - As of 2024, consumer demand for electric vehicles in Colorado (25.3% of new purchases) is higher than Regulation 20's floor (19.5%).
  - If its quotas rise rapidly enough over the coming years to exceed demand for electric vehicles, we can expect Regulation 20 to raise car prices and price some manufacturers out of the state.
- SB21-260, the only environmental policy that has cost the transportation sector substantially to date, creates new fees and raises existing fees worth $200 million in FY24 and an annual average of $380 million over its first 10 years.

Economic Impacts of SB21-260		
	2022	2023
Employment	-1,835	-2,600
GDP	-$96,000,000	-$184,000,000
Personal income	-$313,000,000	-$388,000,000
Output	-$177,000,000	-$332,000,000

Key Findings by Sector: Buildings and Other Stationary Sources

- The most influential environmental policies that affect stationary sources fall into two categories: laws that charge owners for pollution directly and laws that change local building codes.
  - The first group has imposed a net cost of $16.1 million through 2023 via fees and tax rebates.
  - The second group has cost owners and tenants of residential buildings a total of $104.4 million through 2023 by regulating new construction.
- New energy efficiency codes force building owners to purchase expensive equipment in the short run but will save them money in the long run through reduced energy usage. As a result, the total cost of Colorado's building code policies will shrink over time if standards remain the same.
- Together, the eight policies analyzed in this section of the report have reduced employment by almost 1,800 and cost Colorado $524 million of GDP since 2021.

Economic Impacts of Policy Affecting Stationary Sources				
	2018–2020	2021	2022	2023
Employment	~0	-1,156	-1,932	-1,782
GDP	~$0	-$120,375,639	-$207,762,576	-$195,961,805
Personal income	$6,795,887	-$83,345,420	-$120,920,688	-$122,357,534
Output	~$0	-$202,244,040	-$344,153,880	-$321,255,460

POLICY IMPACTS ON UTILITIES

The actions of Colorado's public utilities, including their infrastructure investments and rate increases, are fully regulated by the state government; this leaves consumer prices especially vulnerable to state policy changes. Below are the bills and regulations enacted since 2009 that affect the operations of the state's utilities and, therefore, the prices that individuals and businesses pay. The two subsections after this table estimate the aggregate costs and savings of these policies within the electricity and natural-gas sectors.

New Bills and Regulations since 2009: Utilities			
2009	SB09-039	Conserve Energy Tiered Rates Incentive	Authorizes cooperative electric associations to approve revenue-neutral, reasonable rates, charges, services, classifications, and facilities that establish a graduated rate for increased energy consumption, for energy conservation and energy efficiency purposes, by residential customers
2009	SB09-051	Renewable Energy Financing Act	Amends the "Colorado Clean Energy Finance Program Act"
2009	HB09-1126	Encourage Solar Thermal Installations	Allows local governments to provide the same incentives for solar thermal installations as may now be provided for solar electric installations
2010	SB10-174	Promote Geothermal Energy Development	Municipalities and counties may designate the use of geothermal resources for the commercial production of electricity as an activity of state interest
2010	HB10-1349	Re-energize CO Renewable Elec For Parks	The act directs the governor's energy office or its designee to create an inventory and map of lands under the control of the division of parks and outdoor recreation in the department of natural resources that have potential to support the development of renewable resource generation projects
2010	SB10-177	Promote Biomass Energy Development	Biomass energy facilities will be valued for the purpose of property taxation in the same manner in which wind or solar energy facilities are valued
2010	SB10-180	Colo Smart Grid Task Force	Creates an 11-member Colorado smart grid task force to gather information and report to the governor, general assembly, and Colorado public utilities commission on issues related to the implementation of a smart energy grid in Colorado

2010	HB10-1001	Renewable Energy Stds Solar Certif	Boosts these RPS percentages to achieve 30% renewable generation by 2020 and requires a portion of the RPS to be met through a subset of renewable generation, "distributed generation"
2010	HB10-1342	Community Solar Gardens Util Elec Std	Directs the PUC to adopt new rules under which standard rebates can apply to solar generation facilities that are beneficially owned by 10 or more customers at a shared location
2010	HB10-1365	Incent Util Convert Coal to Natural Gas	All rate-regulated utilities that own or operate coal-fired electric generating units must submit to the public utilities commission an emission reduction plan for emissions from those units covering the lesser of 900 megawatts or 50% of the utility's coal-fired electric generating units in Colorado
2019	SB19-077	Electric Motor Vehicles Public Utility Services	Authorizes electric public utilities to provide charging ports as regulated services and allows cost recovery
2011	HB11-1083	Hydroelectricity & Pumped Hydro	The act adds hydroelectricity and pumped hydroelectricity to the list of technologies that the public utilities commission may give the fullest possible consideration when considering generation acquisitions for electric utilities
2011	HB11-1262	Elec Util PUC Transparency in Bidding	The act directs the public utilities commission to adopt rules requiring investor-owned electric utilities to provide the owners of electric generating facilities with access to any modeling inputs and assumptions used by the utilities in bidding for acquisitions that directly relate to the owners' facilities
2011	SB11-45	Streamline Elec Powerline Siting	The act creates a task force on statewide transmission siting and permitting, consisting of 17 members representing the various stakeholders, including utilities, local governments, regulators, and consumers
2011	SB11-87	Medical Exemption Tiered Rate Plan	The act authorizes the public utilities commission to adopt rules creating an exemption from tiered electricity rate plans based on a customer's medical condition
2013	SB13-252	Renewable Energy Standard Retail Wholesale Methane	The bill would make a variety of changes to the state's renewable energy standard, including: expanding the definition of eligible energy resources that may be used to comply with the standard to include coal mine methane and synthetic gas produced by pyrolysis of municipal solid waste; increasing from 10 to 25 percent the share of retail electricity sales that must be achieved from eligible energy resources by cooperative electric associations serving more than 100,000 meters, beginning in the year 2020; and, for cooperative electric associations serving fewer than 100,000 meters, adding a distributed generation requirement of 1 percent of total electricity sales
2013	SB13-282	Tiered Electric Rate Medical Exemption	The act requires the public utilities commission to adopt rules by January 31, 2014, to exempt customers with certain medical conditions from tiered electricity rates
2015	HB15-1372	Raise the Public Utility Fee Cap	The act increases the cap on the fees that the department of revenue may charge public utilities to defray the administrative expenses of the public utilities commission and the office of consumer counsel from 0.2% to 0.25% of the public utility's gross intrastate utility operating revenues for the preceding calendar year
2015	SB15-46	Renewable Energy Std Adjust REAs Distributed Gen	The act allows cooperative electric associations to subtract industrial retail sales from total retail sales in calculating their minimum retail distributed generation requirements and use purchases from community solar gardens to meet the retail distributed generation component of the renewable energy standard
2017	HB17-1116	Continue Low-income Household Energy Assistance	The act extends the conditional funding through the state fiscal year commencing July 1, 2023

2017	HB17-1227	Electric Demand-side Management Program Extension	The act...requires the [public utilities] commission to set goals of at least 5% peak demand reduction and 5% energy savings by 2028 for demand-side management programs implemented during 2019 through 2028 when compared to 2018 numbers
2017	SB17-105	Consumer Right to Know Electric Utility Charges	The act requires an investor-owned electric utility to file with the public utilities commission for the commission's review a comprehensive billing format that the utility has developed for its monthly billing of customers
2018	HB18-1270	Public Utilities Commission Evaluation of Energy Storage Systems	The act directs the public utilities commission to adopt rules, by February 1, 2019, establishing mechanisms for the procurement of energy storage systems by investor-owned electric utilities, based on an analysis of costs and benefits as well as factors such as grid reliability and a reduction in the need for additional peak generation capacity
2018	HB18-1271	Public Utilities Commission Electric Utilities Economic Development Rates	The act allows the public utilities commission (commission) to approve, and electric utilities to charge, economic development rates, which are lower rates for commercial and industrial users who locate or expand their operations in Colorado so as to increase the demand by at least 3 megawatts
2019	HB19-1003	Community Solar Gardens Modernization Act	Amends the current statute authorizing the creation of community solar gardens
2019	SB19-236	Sunset Public Utilities Commission	Implements the recommendations of the department of regulatory agencies' 2018 sunset review and report on the public utilities commission
2021	HB21-1052	Define Pumped Hydroelectricity as Renewable Energy	Removes the existing restriction on pumped hydroelectric facilities as a source of recycled energy
2021	HB21-1105	Low-income Utility Payment Assistance Contributions	Authorizes the department of human services to make fuel assistance payments to supplemental nutrition assistance program recipients to maximize their federal heating and cooling standard utility allowance
2021	HB21-1238	Public Utilities Commission Modernize Gas Utility Demand-side Management Standards	Updates the methods used to determine the cost-effectiveness of demand-side management programs of public utilities selling natural gas at retail, including requiring that the calculation of future benefits reflects the avoided costs to ratepayers resulting from reduced consumption of natural gas
2021	HB21-1269	Public Utilities Commission Study of Community Choice Energy	Declares that "community choice energy" has the potential to enable communities to meet their renewable energy goals and to reduce their electricity rates by allowing wholesale competition and local control over the energy supplier and energy mix without changing the local utility's current status as sole supplier of electric transmission, distribution, billing, and customer service functions
2021	HB21-1324	Promote Innovative and Clean Energy Technologies	Replaces the integrated gasification combined cycle program, which was repealed in 2019, with a mechanism by which an investor-owned utility seeking to implement an innovative energy technology project may apply to the public utilities commission to acquire resources that demonstrate the use of innovative, zero-emission technologies for energy generation and storage
2021	SB21-020	Energy Equipment and Facility Property Tax Valuation	Clarifies that clean energy resources and energy storage systems used to store electricity are assessed for valuation for the purpose of property taxation in a similar manner to renewable energy facility property used to generate and deliver electricity

2021	SB21-072	Public Utilities Commission Modernize Electric Transmission Infrastructure	Authorizes the public utilities commission to approve utilities' applications to build new transmission facilities if the PUC, consistent with its authority, finds that the new facilities would assist the utilities in meeting the state's clean energy goals established in 2019
2021	SB21-103	Sunset Office of Consumer Counsel	Authorizes the Office of Consumer Counsel to operate for another seven years and expands its power
2021	SB21-246	Electric Utility Promote Beneficial Electrification	Directs the public utilities commission to establish energy savings targets and approve plans under which investor-owned electric utilities will promote the use of energy-efficient electric equipment in place of less efficient fossil-fuel-based systems
2021	SB21-261	Public Utilities Commission Encourage Renewable Energy Generation	Removes most of the existing limitations on the size of distributed generation facilities to qualify for renewable energy credits
2021	SB21-264	Adopt Programs Reduce Greenhouse Gas Emissions Utilities	Requires the AQCC to initiate a rule-making proceeding by September 1, 2022, to establish protocols for recovered methane that utilities must use in forecasting their emission reductions
2021	SB21-272	Measures to Modernize the Public Utilities Commission	Roughly doubles the maximum fee rates chargeable to utilities for upkeep of the fixed utility fund
2021	SB21-293	Property Tax Classification and Assessment Rates	The assessment rate for agricultural property and renewable energy production property is temporarily reduced from 29% to 26.4% for the next 2 property tax years
2022	HB22-1013	Microgrids for Community Resilience Grant Program	A cooperative electric association or a municipally owned utility may apply for a grant award to finance the purchase of microgrid resources in eligible rural communities within the utility's service territory that are at significant risk of experiencing severe weather or natural disaster events and in which one or more community anchor institutions, which institutions are important community, educational, health care, or other institutions, are located
2022	HB22-1249	Electric Grid Resilience and Reliability Roadmap	Requires the Colorado energy office, in collaboration with the department of local affairs and the Colorado resiliency office, to develop a grid resilience and reliability roadmap for improving the resilience and reliability of electric grids in the state, which roadmap must include guidance on how microgrids may be used to harden the grid, improve grid resilience and reliability, deliver electricity where extending distribution infrastructure may not be practicable, and operate autonomously and independent of the grid, when necessary
2022	HB22-1381	Colorado Energy Office Geothermal Energy Grant Program	Creates the geothermal energy grant program in the Colorado energy office within the office of the governor

2022	SB22-051	Policies to Reduce Emissions from Built Environment	For income tax years beginning on or after January 1, 2023, but before January 1, 2025, any purchaser of an air-source heat pump system, ground-source heat pump system, water-source heat pump system, or variable refrigerant flow heat pump system or a heat pump water heater that installs a residential or commercial heat pump system or a residential or commercial heat pump water heater into real property in the state is allowed an income tax credit in an amount equal to 10% of the purchase price of the heat pump system or heat pump water heater
2022	SB22-118	Encourage Geothermal Energy Use	Modifies some statutory provisions that apply to solar energy so that they also apply to geothermal energy
2022	SB22-193	Air Quality Improvement Investments	Creates the industrial and manufacturing operations clean air grant program through which the Colorado energy office awards grant money to private entities, local governments, tribal governments, and public-private partnerships for voluntary projects to reduce air pollutants from industrial and manufacturing operations
2023	HB23-1039	Electric Resource Adequacy Reporting	On or before April 1, 2024, and on or before April 1 of each year thereafter, an entity with an obligation to provide retail or wholesale electricity services in the state must file with the entity responsible for approving the resource plans or rates of the load-serving entity an annual report detailing the adequacy of its electric resources
2023	HB23-1252	Thermal Energy	Authorizes the Colorado energy office to award grants for retrofitting existing buildings for installation of geothermal systems for heating and cooling under the single-structure geothermal grant that the office administers, and for generating geothermal energy through direct air capture technology under the geothermal electricity generation grant that the office administers
2023	HB23-1281	Advance the Use of Clean Hydrogen	For income tax years commencing on or after January 1, 2024, but before January 1, 2033, section 3 creates a state income tax credit in specified amounts per kilogram of clean hydrogen used for hard to decarbonize end uses, for operating a heavy-duty vehicle, or for aviation, etc.
2023	SB23-198	Clean Energy Plans	Requires that any clean energy plan submitted to the division on or after January 1, 2024, achieve at least a 46% reduction in greenhouse gas emissions caused by the entity's Colorado electricity sales by 2027 relative to 2005 levels if the achievement of the 46% reduction in greenhouse gas emissions will maintain reliability and result in an incremental average annual cost of no more than 2.5% of the entity's system costs, etc.
2023	SB23-291	Utility Regulation	Requires the commission to establish rules to limit the amount of rate case expenses that an investor-owned electric or gas utility may recover from the utility's customers
2024	HB24-1370	Reduce Cost of Use of Natural Gas	Requires the Colorado energy office to issue a request for information by December 1, 2024, to solicit interest from local governments that are served by a dual-fuel utility in becoming a gas planning pilot community
2024	SB24-150	Processing of Municipal Solid Waste	Units that combust municipal solid waste that are in existence in the state on or before July 1, 2024, are eligible, pursuant to section 2 of the act, for a state incentive to conduct technological upgrades
2024	SB24-207	Access to Distributed Generation	On or after January 1, 2026, but before February 1, 2026, an investor-owned electric utility with more than 500,000 customers must make at least 50 megawatts of inclusive community solar capacity available, and a utility with 500,000 or fewer customers must make at least 3.5 megawatts of inclusive community solar available

The U.S. Energy Information Administration (EIA) publishes annual residential, commercial, industrial, and average fuel price data for each of the 50 states.[i ii] Because of the overwhelming difficulty of accounting individually the costs of each of the above actions since 2009, this report's approach to estimating the cumulative cost of utility policy in Colorado is to compare changes in Colorado's electricity and natural gas prices (starting in 2009 and against their 2005–2008 averages) to those in other states over time. To represent a baseline against which Colorado could be reasonably compared, CSI chose the seven states that border Colorado (Arizona, Kansas, Nebraska, New Mexico, Oklahoma, Utah, and Wyoming) because they collectively approximate Colorado's geographic, topographic, and demographic characteristics, exhibit a wide range of underlying energy prices, and include among them some of the country's most relaxed regulatory environments. This subjects the resulting cost estimates to the assumption that Colorado's utility prices ought to behave roughly the same as neighboring states' in the absence of policy interference. Because averaging seven states' price changes does not produce a baseline that's fully independent of state and local policy in those states, though, this method is likely to have understated Colorado's costs slightly.

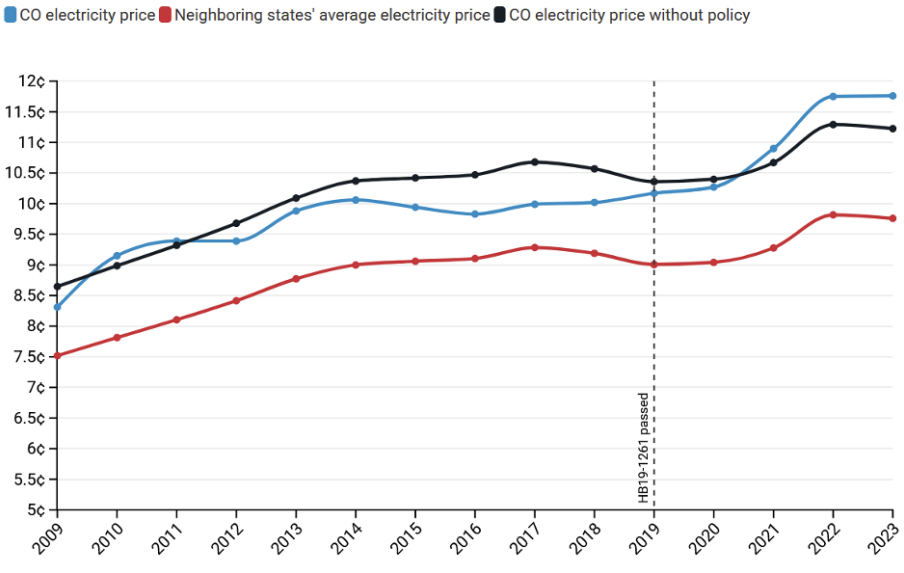
CSI transcribed the longitudinal price differences uncovered by this process into the REMI PI+ economic model along with consumption change estimates that they helped to generate. Those estimates are based on consumption data from the EIA, year-by-year price differences as described above, and third-party estimates of fuel-price elasticities of demand (-.1 for electricity and -.11 for natural gas). [iii iv v] The PI+ model's outputs are the estimates of economic impact presented in the key findings and later in this section.

Electricity

For consumers, there may be some advantage to living in a state with regulated utilities: so far in the 21st century, there appears to have been a relationship between deregulation and higher rate increases.[vi] If so, it's because regulating bodies, like Colorado's Public Utilities Commission, can force providers to keep their prices lower than a market would otherwise bear. When policy increases the underlying cost of providing power, however, price increases are unavoidable; this is the phenomenon that Coloradans are currently experiencing and why their electricity bills are rising faster than most other Americans'.

Across most of the recent past, Colorado's rates have held steadier than those in

Impact of State Policy on Electricity Prices (¢/kWh)



Source: EIA, CSI calculations

neighboring states, something to which the actions of the state's utility companies and regulators may have contributed. That pattern broke around 2021, however, just as the policies proceeding from HB19-1261 began to come into force and influence utilities' power plans. CSI estimates, based on price changes in surrounding states that lack such policies, that Colorado's average electricity price is now half a cent higher because of this.

From 2009 through 2023, policy differences in Colorado appear to have held the annual price of electricity an average of $.0016/kWh lower. At the levels of consumption in each of those years, adjusted by a price-elasticity factor, this generated a total real savings for residential, commercial, and industrial consumers of $2 billion and increased consumption by 1,280 million kWh. According to CSI's simulation in the REMI Tax-PI model, that savings generated $2.7 billion of GDP and $2.1 billion of personal income in Colorado. Over just the final three years of that period, however, policy caused consumers to spend $791 million more and consume 617 million kWh less, which cost the state more than 7,000 jobs and $1.4 billion of GDP. According to a separate CSI study, and based on the state government's own numbers, the electric capacity and generation changes required of utilities to meet HB19-1261's and its successors' standards will cause consumer electricity prices to rise through the next decades at unprecedented speeds.[vii] Phasing out fossil fuels may also degrade the grid's reliability, as has happened elsewhere.

Economic Impacts of Electricity Policy				
	2009–2020	2021	2022	2023
Employment	3,788 per year	-2,193	-5,343	-7,253
GDP	$4,109,307,661	-$142,667,424	-$509,512,984	-$757,365,895
Personal income	$3,113,302,495	-$66,676,336	-$358,283,520	-$569,433,139
Output	$7,225,395,460	-$239,696,640	-$852,190,560	-$1,258,974,100

Natural Gas

Most of the noteworthy policies that target natural gas usage in Colorado are both new and strictly prospective—local bans on new gas hookups and energy standards for new buildings, for example. Natural gas, as a practical and relatively clean substitute for coal, benefitted from widespread acceptance among policymakers until fervor about renewable power and electric heating came to dominate the discourse. Despite this, consumer prices of natural gas in Colorado broke dramatically from the underlying commodity price (represented in the graph below by the spot price at Henry Hub) in 2009, suggesting the sudden influence of something other than previously normal market behavior. Since the same phenomenon occurred in every other U.S. state, however, it's highly likely that market factors outside of Colorado, rather than state or local policy, were responsible for it.

Natural gas remains cheaper than average in Colorado, but the gap has narrowed. There hasn't been much new natural gas policy over the last decades, but policies imposed on the electric sector may be partially

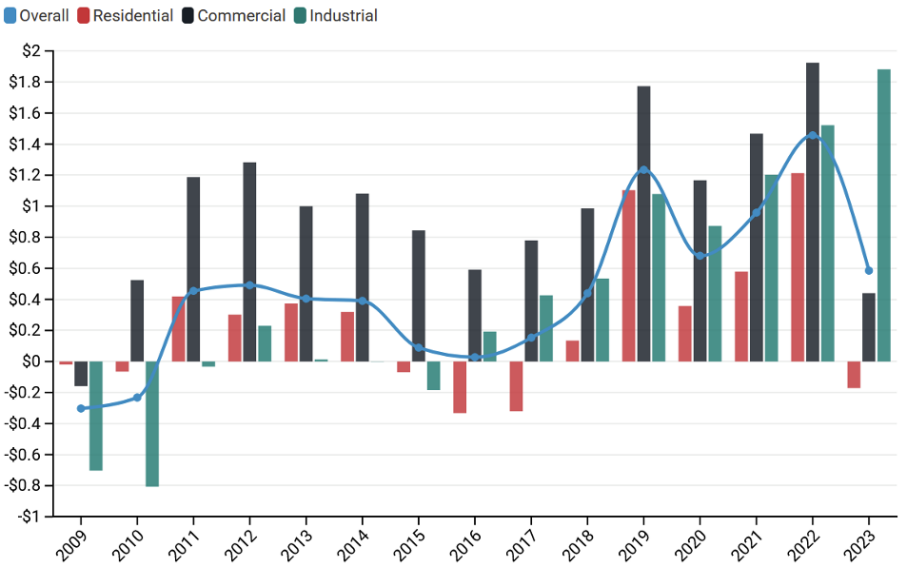
responsible: utilities that transmit both electricity and natural gas can make up for electricity cost hikes by raising natural gas rates. These, in whatever combination, have pushed the price per Mcf higher, especially in recent years, to one in 2023 that CSI estimates was $0.59 higher than it would have been otherwise.

CSI estimates that, between 2009 and 2023, policy caused the average annual consumer price of natural gas to be $0.46 per Mcf higher than it would otherwise have been. This caused residential, commercial, and industrial consumers to consume 26,700 Mcf less and reduced economic output across the state by a total of $5.3 billion, according to a REMI simulation. 73% of the lost consumption and 75% of the lost output has been realized since 2019.

Natural Gas Prices ($/Mcf)

Source: EIA

Colorado Natural Gas Price Differences Due to State Policy ($/Mcf)



Source: EIA, CSI calculations

Economic Impacts of Natural Gas Utility Policy				
	2009–2020	2021	2022	2023
Employment	-1,447 per year	-4,267	-4,192	-3,224
GDP	-$1,640,234,014	-$481,502,556	-$524,353,168	-$439,589,995
Personal income	-$1,207,833,224	-$375,054,390	-$398,590,416	-$329,424,130
Output	-$2,865,081,620	-$816,466,680	-$876,772,980	-$729,336,720

ENERGY PRODUCTION

Although the state has, arguably, devoted more attention to utilities of late, fossil-fuel producers have been targeted by some of Colorado's most aggressive environmental policies, especially in the wake of HB19-1261. Political opposition to coal-fired power (both within Colorado and across the country) has kept the state's coal extraction in prolonged decline since 2012 and the oil and gas industry, which was on the rise until recently, is faltering under the weight of sweeping new permitting, setback, and emissions rules.

New Bills and Regulations since 2009: Energy Production			
2011	Rule 205a	Hydraulic Fracturing Disclosure Rulemaking	Requires comprehensive public disclosure of the chemicals used in hydraulic fracturing treatments
2013	300, 600, and 800 Series Regulations	Setback Rulemaking	Creates a uniform 500-foot statewide setback applicable in both rural and urban areas and a 1,000-foot setback from high occupancy buildings such as schools, nursing homes and hospitals
2013	Amendments to Rule 906	Spills and Releases Rulemaking	Tightened spill reporting requirements to broaden the definition of what needs to be reported and requires that spills are reported within 24 hours to landowners and local governments
2013	SB13-202	Limit Use of Gov Land for Automotive Serv Stations	The act requires the Colorado oil and gas conservation commission, by July 1, 2014, to use a risk-based strategy for inspecting oil and gas locations that targets the operational phases that are most likely to experience spills, excess emissions, and other types of violations and that prioritizes more in-depth inspections
2014	HB14-1077	Raise Cap Oil Gas Conservation & Env Response Fund	The act increases the statutory cap on the 2-year average of the unobligated portion of the oil and gas conservation and environmental response fund from $4 million to $6 million
2014	HB14-1356	Strengthen Penalty Authority Oil & Gas Commn	Increases the maximum daily penalty for a violation of the "Oil and Gas Conservation Act" from $1,000 to $15,000, subject to a penalty schedule promulgated by the oil and gas conservation commission that considers aggravating and mitigating circumstances, etc.

2014		Air Emissions from Oil and Gas	New AQCC rules targeting air emissions from the oil and natural gas industry
2015	**600 Series Regulations**	Flood Lessons Learned Rulemaking	Requires remote shut-in capabilities and secondary containment areas around tanks
2016	**SB16-92**	State Authority under Federal Oil Pollution Act	The act adds the federal "Oil Pollution Act of 1990" as a source of natural resource damages and as authority for response actions that the department and attorney general may conduct and expend money on
2016		Governor's Oil and Gas Task Force Rulemaking	The Task Force was comprised of 21 members representing local government, civic organizations, environmental interests, agriculture, and affected industries. They put forward 9 recommendations that empowered local governments in the permitting process and allowed for site specific mitigation as a condition of permit approval.
2018	**300, 500, and 600 Series Regulations**	School Setback Rulemaking	The definition of a school facility was greatly expanded and broadens the 1,000-foot boundary to include not just the school building, but also surrounding facilities, such as playgrounds, athletic fields, fences, and other outdoor areas
2018	**300, 600, 900, and 1100 Series Regulations**	Flowline Rulemaking	Dozens of new rules pertaining to flowlines and other types of piping systems, along with other regulations increasing transparency in safety and gas leak reporting
2018		Mill Levy Rulemaking	Raises the statewide property tax mill levy on oil and gas operations from .7 to 1.1
2019	**SB19-181**	Protect Public Welfare Oil and Gas Operations	Modifies the oil and gas statutes and clarifies, reinforces, or establishes various aspects of local governments' regulatory authority over the surface impacts of oil and gas development
2020	**Mission Change 200/300/400/500/600/800/900/1200**		Colorado Oil and Gas Conservation Commission implementation of SB19-181, as directed by the bill
2020		Methane rules	New rules that tighten restrictions on oil and gas operations' methane emissions
2022	**HB22-1348**	Oversight of Chemicals Used in Oil & Gas	Establishes a regulatory scheme that requires disclosure of certain chemical information for products used in downhole oil and gas operations
2023	**HB23-1242**	Water Conservation in Oil and Gas Operations	Requires the commission to adopt rules, on or before December 31, 2024, requiring a statewide reduction in usage of fresh water and a corresponding increase in usage of recycled or reused water in oil and gas operations
2023	**Regulation 3**	Stationary Source Permitting and Air Pollutant Emission Notice Requirements	New permitting costs associated with EPA control rules
2023	**Regulation 7**	Control of Emissions from Oil and Gas Emissions Operations	Owners or operators of storage tanks with uncontrolled actual emissions of volatile organic compounds equal to or greater than four tons per year based on a rolling twelve-month total must collect and control emissions from each storage tank by routing emissions to and operating air pollution control equipment that achieves a VOC control efficiency of 95%, etc.

2024	**HB24-1346**	Energy & Carbon Management Regulation	The act expands the authority of the energy and carbon management commission to include the regulation of activities performed for the purpose of engaging in the injection and underground sequestration of injection carbon dioxide in pore space
2024	**SB24-230**	Oil & Gas Production Fees	The act requires the clean transit enterprise to impose a production fee for clean transit to be paid quarterly by every producer of oil and gas in the state
2023	**SB23-285**	Energy and Carbon Management Regulation in Colorado	Changes the name of the oil and gas conservation commission to the energy and carbon management commission and expands the commission's regulatory authority to include the authority to regulate a broader scope of energy and carbon management areas beyond oil and gas, etc.

Accordingly, Colorado has lost a substantial amount of economic output from these industries. CSI estimates that, without the restraining effects of state policy, Colorado could have extracted up to 3.5% more oil and 0.3% more natural gas since 2021 and 34.4% more coal since 2009. At the relevant prices of these three commodities, this lost production is worth $6.5 billion in 2023 dollars.

	Lost Production	Average Unit Price ($ 2023)	Total Value
Coal	95,477,568 tn	$54.34	$5,188,052,690
Crude Oil	16,650,000 bbl	$79.76	$1,328,053,286
Natural Gas	13,924 Mcf	$6.27	$87,297
		Total:	**$6,516,193,273**

Rather than comparisons between Colorado and other states, these estimates are based on price, production, and reserves data (all of which are collected by the EIA).[viii ix x xi xii xiii] State and local policy is presumed to have reduced the output of energy producers during a year if Colorado's extraction of a resource fell below a minimum share, based on a long-run average, of its known reserves in that year (notwithstanding temporary shocks). Colorado's coal production has been declining along these lines since the beginning of the study period, even though the sale price of Colorado coal has kept up with inflation, whereas oil/gas extraction began to falter much more recently; this matches, roughly, the patterns of state policy over that time. To account for some of the degree to which national policy, for which state and local governments in Colorado are not responsible, has influenced Colorado's coal production, this method considers "recoverable coal at producing mines" instead of "estimated recoverable reserves." The former includes only reserves accessible at active coal mines and appears a fairer measure given the growing difficulty of opening and operating new mines under national law.

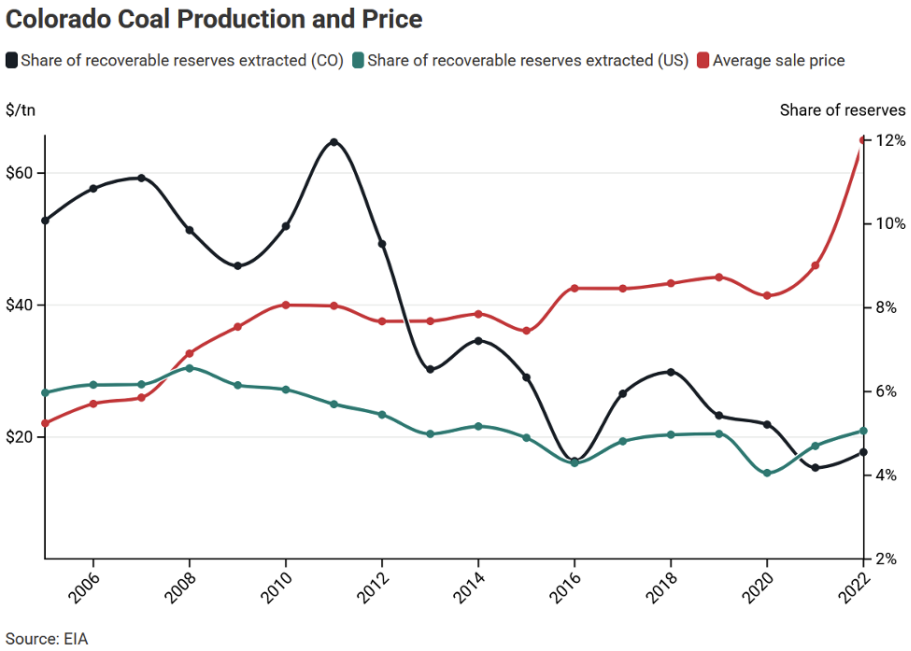
Coal

Colorado, under pressure from the national government, other states, and its own policymakers, is in the process of legislating coal out of existence within the state. Under current policy, the state's last coal-fired power plants will be shut down in or before 2031 and the demand for Colorado coal will diminish even further.[xiv]

As expected, the reason for Colorado's shrinking coal production is not the depletion of its mineral reserves. Since 2011, the extracted share of the state's known recoverable coal reserve has declined in all but three years from 12% to 4.6%. Other states' shares have fallen too, but mostly at much slower rates: of the 19 states with proven reserves in both 2012 and 2022, Colorado's has been extracted at the third-slowest rate. Meanwhile, the average sale price of coal extracted in Colorado has been rising steadily at a long-term rate that outpaces inflation.

Recoverable Coal Reserves at Producing Mines (Million Short Tons, 2012–2022)			
	2012	2022	Change
Pennsylvania	554	1,016	83.4%
West Virginia	1,842	1,809	-1.8%
Colorado	**300**	**281**	**-6.3%**
Illinois	2,215	1,846	-16.7%
Alaska	56	45	-19.6%
Utah	199	140	-29.6%
Alabama	265	186	-29.8%
Mississippi	162	102	-37.0%
Wyoming	6,932	4,161	-40.0%
North Dakota	1,128	599	-46.9%
Virginia	283	150	-47.0%
Indiana	600	285	-52.5%
Montana	960	401	-58.2%
Texas	751	275	-63.4%
Kentucky	1,263	350	-72.3%
Maryland	34	9	-73.5%
Ohio	235	35	-85.1%
Louisiana	115	12	-89.6%
New Mexico	497	36	-92.8%

Whether or not it's ultimately wise to transition away from coal, the decision sacrificed a substantial source of economic output for the state. Had Colorado mines maintained their 2005–2008 average rates of production, even considering the accelerated depletion of their reserves under that condition, the state would have produced a total of 95.5 million short tons more, worth a total of $5.2 billion, through 2023. Through direct, indirect, induced, and dynamic effects, that lost production cost the state almost 5,000 jobs per year and a total of $10.4 billion in GDP.



Source: EIA

Economic Impacts of Lost Coal Production				
	2009–2020	2021	2022	2023
Employment	-4,594 per year	-5,727	-6,313	-5,650
GDP	-$7,617,000,000	-$893,000,000	-$979,000,000	-$876,000,000
Personal income	-$4,786,000,000	-$570,000,000	-$606,000,000	-$560,000,000
Output	-$13,112,000,000	-$1,543,000,000	-$1,702,000,000	-$1,524,000,000

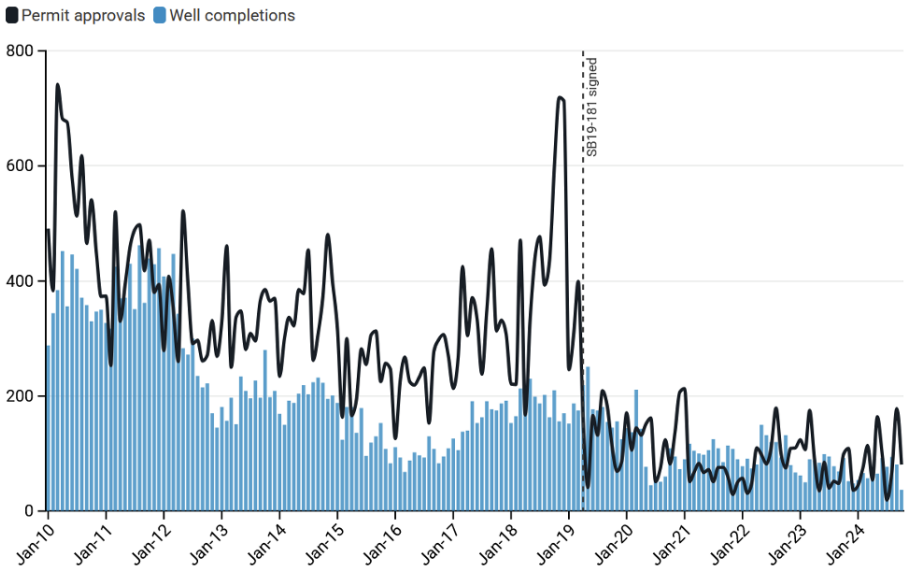
Oil and Gas

Colorado's oil and gas industry flourished much more recently than its coal sector, but the impacts of state policies, particularly those passed since 2019, have caused a notable drop in production. SB19-181, which imposed a diverse set of restrictions on well permitting, siting, and maintenance, new drilling setback rules that are the most aggressive in the country, and numerous lesser regulations have combined to drastically reduce the numbers of drilling permits and well completions in the state. Less than a year ago, a legislative attempt to ban drilling outright narrowly failed.[xv] These efforts have already manifested as a reduction in output that, given the lagged relationship between well starts and production, is set to grow much larger in coming years.

Oil and gas production is highly volatile over time due to global factors, but Colorado fell off the national pace in 2021, despite high proven reserves, when many of the most onerous drilling regulations came into force. The productive decline is most evident in Weld County, one of the most urban of the producing counties, most likely because of how much of its territory was rendered inaccessible to drilling by new setback rules.[xvi] Because Colorado's oil-and-gas operations are cleaner than the national and global averages, these policies may have actually caused a slight rise in global emissions.[xvii]

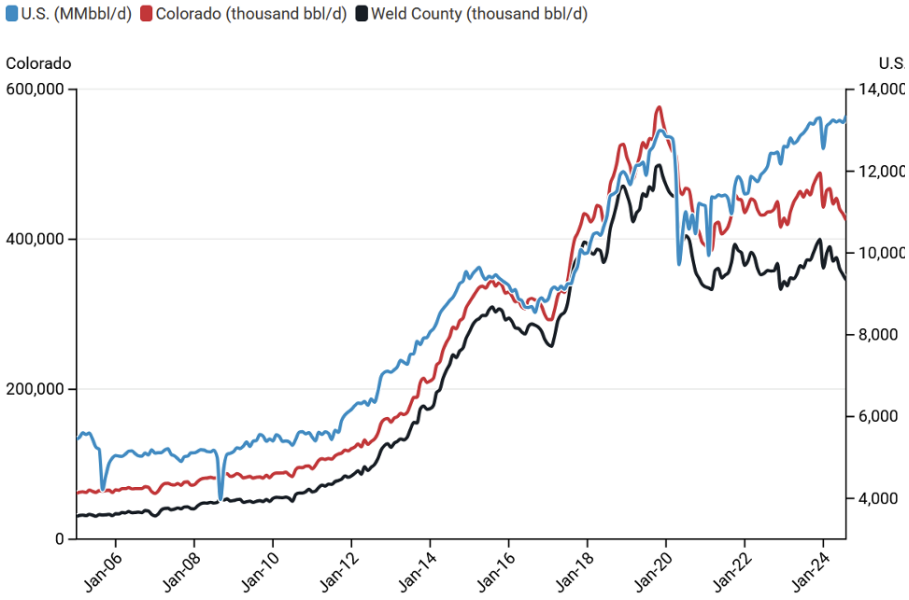
Between 2019 and 2023, Colorado's crude oil and natural gas production fell by 13.3% and 8.3%, respectively. Unlike our declining coal production, this phenomenon cannot be linked to an obvious national trend; over the same period, New Mexico's oil production rose by 97.7% and its natural gas withdrawals grew by 75.2%. Texas, likewise, added 7.9% more oil and 18.4% more gas, even despite its long history of high production. If Colorado had continued to extract the same share of its reserves since 2021 as it had in the years prior, it would have produced 16.6 million barrels more of oil and marginally more natural gas worth a combined value of $1.3 billion. Because it will take several more years to fully realize the effect of the recent permitting decline on production, this value will be only a fraction of the eventual impact.

Drilling Permits Approved and Well Completions in Colorado



Source: Enervus

U.S. and Colorado Crude Oil Production



Oil and gas extraction enables economic activity beyond just drilling operations, especially in rural areas where some towns are entirely sustained by local production. It also, crucially, attracts workers from outside Colorado and generates billions of dollars in tax revenue. Accordingly, the loss of $1.3 billion of output inflicts an even larger economic loss, in total, across the state. In 2023 alone, Colorado lost more than 10,000 jobs and $1.3 billion of GDP, according to a REMI simulation.

Economic Impacts of Lost Oil and Gas Production			
	2021	2022	2023
Employment	-30,784	-13,605	-10,520
GDP	-$3,816,353,592	-$1,597,793,144	-$1,308,177,455
Personal income	-$3,254,638,651	-$1,504,790,784	-$1,270,635,930
Output	-$7,280,785,440	-$2,843,366,580	-$2,283,518,540

TRANSPORTATION

The transportation sector is an important part of Colorado's environmental goals, but the state government's strategy for it is mostly incipient. As both versions of the GHG Roadmap prescribe, the main objective of transportation policy is universal adoption of electric vehicles;[xviii] because the electrical grid is yet inadequate for that, the most intense vehicle regulations will not materialize before the state's utilities are prepared for them. Though this approach will eventually raise the prices of vehicles and transportation fuels, the impact realized so far is small. Policies have been enacted over the last several years, though, that set future cost increases into motion.

New Bills and Regulations since 2009: Transportation			
2009	**SB09-003**	Motor Vehicle Emissions Programs	As of January 1, 2010, moves Weld and Larimer counties from the basic emissions program area of the automobile inspection and readjustment program to the enhanced emissions program area
2012	**SB12-034**	Repeal Rapid Screen for High-emitting Vehicles	The act repeals the rapid screen program for identifying high-emitting motor vehicles
2014	**SB14-125**	Transportation Network Companies Regulation	The act authorizes the public utilities commission to regulate transportation network companies
2018		Colorado Electric Vehicle Plan	Establishes Colorado's goal of incentivizing the purchase of 940,000 electric vehicles by 2030
2019	**HB19-1159**	Modify Innovative Motor Vehicle Income Tax Credits	Modifies the amounts of and extends the number of available years of the existing income tax credits for the purchase or lease of an electric motor vehicle, a plug-in hybrid electric motor vehicle, and an original equipment manufacturer electric truck and plug-in hybrid electric truck
2019	**HB19-1198**	Electric Vehicle Grant Fund	Allows the electric vehicle grant fund to administer grants for the installation of electric-vehicle charging stations
2019	**SB19-239**	Address Impacts of Transportation Changes	Requires the department of transportation to convene and engage in robust consultation with a stakeholder group comprised of representatives of specified industries, workers, governmental entities, planning organizations, and interest groups that will potentially be affected by the adoption of new and emerging transportation technologies and business models

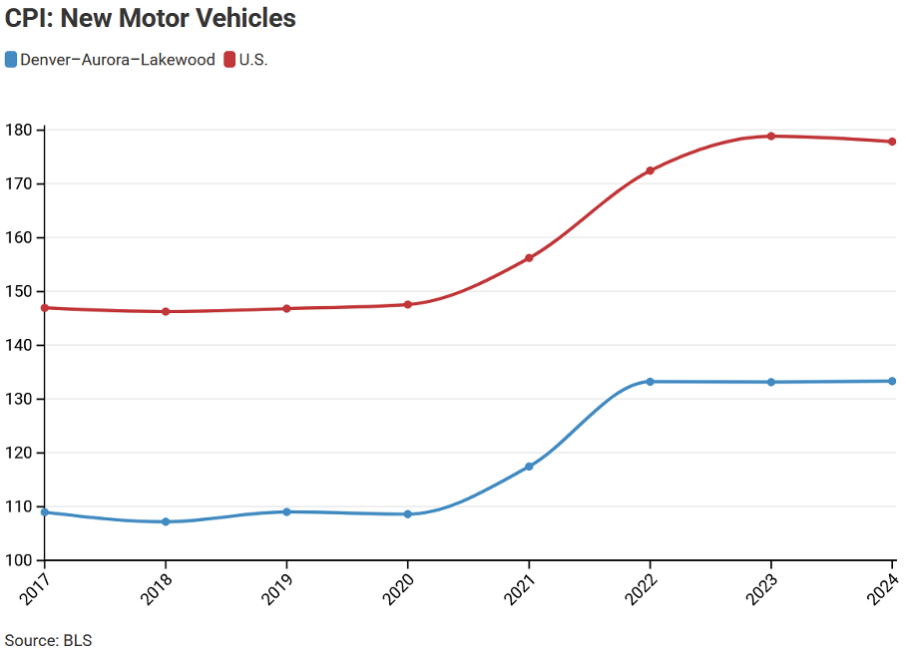
2021	**Regulation 11**	Motor Vehicle Emissions Inspection Program	Implements new vehicle-emissions inspection rules and expands the enhanced emissions program to northern Colorado
2021	**Regulation 20**	Colorado Low Emission Automobile Regulation	Imposes low- and zero-emission vehicle quotas on manufacturers delivering vehicles for sale in Colorado based on existing California standards
2021	**SB21-260**	Sustainability of The Transportation System	Creates new sources of dedicated funding and new state enterprises to enable the planning, funding, development, construction, maintenance, and supervision of a sustainable transportation system by preserving, improving, and expanding existing transportation infrastructure, developing the modern infrastructure needed to support the widespread adoption of electric motor vehicles, and mitigating adverse environmental and health impacts of transportation system use
2022	**SB22-180**	Programs to Reduce Ozone through Increased Transit	Provides grants to the regional transportation district and transit associations in order to provide free transit services for at least 30 days during ozone season
2023	**HB23-1233**	Electric Vehicle Charging and Parking Requirements	Requires the state electrical board to adopt rules requiring compliance, starting March 1, 2024, with the provisions of the model electric ready and solar ready code that require multifamily buildings to comply with the electric vehicle power transfer infrastructure requirements
2021	**HB21-1303**	Global Warming Potential for Public Project Materials	The office of the state architect and the department of transportation are each required to establish policies regarding the global warming potential for specific categories of eligible materials used to construct certain public projects
2019	**SB19-077**	Electric Motor Vehicles Public Utility Services	Authorizes electric public utilities to provide charging ports as regulated services and allows cost recovery

Of the bills in the list above, four stand out as especially important: the Electric Vehicle Plan, SB19-077, Regulation 20, and SB21-260. SB21-260's costs, which come from a host of new fees and fee increases, are straightforward and are enumerated in the table below. Although some of the fees do not explicitly serve the state's environmental policy interests, they all, according to the official summary, contribute to "a sustainable transportation system by preserving, improving, and expanding existing transportation infrastructure, developing the modern infrastructure needed to support the widespread adoption of electric motor vehicles, and mitigating adverse environmental and health impacts of transportation system" [sic].[xix] These cost Coloradans a combined $200 million in FY24 and many of them are scheduled to grow in the future; over the first ten years after the bill's enactment, the fees will cost an annual average of $380 million.[xx]

New Fee Revenue from SB21-260		
	FY23	FY24
Highway Users Tax Fund	$28,300,000	$97,300,000
Multimodal Options Fund	$6,800,000	$7,600,000
Electric Vehicle Grant Fund	$100,000	$200,000
Bridge and Tunnel Enterprise	$23,300,000	$33,400,000
Community Access Enterprise	$19,400,000	$21,700,000
Clean Fleet Enterprise	$17,300,000	$19,600,000
Clean Transit Enterprise	$8,400,000	$9,400,000
Air Pollution Enterprise	$9,200,000	$11,100,000
Total:	**$112,900,000**	**$200,400,000**

The other three policies serve the objective of increasing electric-vehicle usage in Colorado. The Electric Vehicle Plan, renewed twice since its inception in 2018, articulates specific goals—940,000 electric cars registered in Colorado by 2030 and ~100% market share for electric vehicles in 2050—and prescribes means of achieving them.[xxi] SB19-077 and Regulation 20 exemplify the Plan's two cardinal tactics: force utilities to build the requisite infrastructure and, eventually, ban sales of new gas-powered vehicles outright.

SB19-077, which allows utilities to recover their costs of building charging stations through rate increases, has already increased costs for consumers of electricity (see the previous sections of this report), but these costs are not borne by the transportation sector; effectively, it recruits utilities' customers to subsidize electric vehicle adoption. Regulation 20 forces manufacturers to sell minimum quantities, increasing over time, of zero–tailpipe-emissions



Source: BLS

vehicles in Colorado, but prices of new vehicles appear not to have responded yet (notwithstanding state EV subsidies, most of which have come from excess state revenue to date). In fact, Regulation 20's quotas are likely redundant at present—as of 2024, consumer demand for electric vehicles in Colorado (25.3% of new purchases) is higher than Regulation 20's floor (19.5%).[xxii] [xxiii] The price levels of new motor vehicles in Colorado and outside of Colorado, accordingly, have not diverged unfavorably since its implementation. The graph below shows that Colorado's prices, as reported by the Bureau of Labor Statistics, have grown slightly more slowly than the national average over the last seven years.[xxiv]

If the quotas rise rapidly enough over the coming years to exceed demand for electric vehicles, we can expect Regulation 20, and whatever policies accompany it through then, to raise car prices and price some manufacturers out of the state. Until then, this and other costs imposed upon Colorado's transportation sector remain mostly prospective. Only SB21-260's costs, to date, are substantial—according to a dynamic modeling scenario that treats its components as new production costs for transportation industries, new gas taxes, new taxes on vehicle purchases, new values of government output, and reduced transfer payments from the government to individuals (reflecting its effects on the TABOR spending limit), CSI finds that the bill cost the state 2,600 jobs and $280 million of GDP through 2023.

Economic Impacts of SB21-260		
	2022	2023
Employment	-1,835	-2,600
GDP	-$96,000,000	-$184,000,000
Personal income	-$313,000,000	-$388,000,000
Output	-$177,000,000	-$332,000,000

BUILDINGS AND OTHER STATIONARY SOURCES

The Colorado Legislature and state rulemakers have implemented 21 new policies since 2009 in an effort to reduce emissions from stationary sources of pollution (including factories, refineries, power plants, etc.). Most of these efforts either impose fees and penalties targeting industrial operations or take on energy-efficiency and electrification at residential and commercial buildings. This analysis shortlists eight of those policies that have had the most impact on this sector of the economy to date.

Bill Name	Bill Number	Year Passed	Estimated Cost through 2023[2]
Increase Fees Stationary Sources Air Pollutants	HB18-1400	2018	$16,271,167
Building Energy Codes	HB19-1260	2019	$104,382,517
Additional Resources to Protect Air Quality	SB20-204	2020	$6,200,000
Environmental Justice Disproportionate Impacted Community	HB21-1266	2021	$0
Energy Performance for Buildings	HB21-1286	2021	Not estimated
Building Greenhouse Gas Emissions	HB22-1362	2022	$8,477,956
Air Quality Improvement Investments	SB22-193	2022	$67,467,841 (existing funds)
Policies to Reduce Emissions from Built Environment	SB22-051	2022	-$6,400,000

These laws fall into two broad categories: laws that impose fees for pollution directly (HB18-1400, SB 20-204, HB21-1266, SB22-193 and SB22-051), and laws that change building codes (HB19-1260, HB21-1286, and HB22-1362), which either require local governments to adopt the most recent national energy code or establish state-level bodies to develop building codes designed to reduce carbon emissions. In total, the eight policies have reduced employment by almost 1,800 and cost Colorado $524 million of GDP since 2018.

[2] Based variously on fiscal notes and CSI analysis

Economic Impacts of Policy Affecting Stationary Sources				
	2018–2020	2021	2022	2023
Employment	~0	-1,156	-1,932	-1,782
GDP	~$0	-$120,375,639	-$207,762,576	-$195,961,805
Personal income	$6,795,887	-$83,345,420	-$120,920,688	-$122,357,534
Output	~$0	-$202,244,040	-$344,153,880	-$321,255,460

Fee-based Policies

HB18-1400: INCREASE FEE STATIONARY SOURCES AIR POLLUTANTS

HB18-1400 increased the statutory caps on fees for emissions from major point sources (from $22.90 to $28.63 per ton of regulated pollutants and from $152.90 to $191.13 per ton of hazardous pollutants) and set those caps to increase each year at the rate of growth of the Denver–Lakewood–Aurora consumer price index. A major point source is defined as a facility that emits 10 tons per year or more of hazardous air pollutants or 100 tons per year of any air pollutant.

Regulated emitters are required to file Air Pollutant Emission Notices (APEN) which report how much regulated and hazardous emissions they produce. Based on these, CSI estimates below the amount of additional fees paid to date since HB18-1400 passed. In each year so far, all the money collected by the bill's fee hikes has increased TABOR refunds by the same amount; the aggregate economic impact on the state through today, therefore, is about zero.

Additional APEN Fees Assessed after HB18-1400				
	Regulated Emissions	Hazardous Emissions	Processing Fees	Total
2018	$813,182	$196,636	$821,042	$1,830,860
2019	$1,192,099	$288,379	$1,204,131	$2,684,609
2020	$912,850	$220,826	$1,229,418	$2,363,094
2021	$1,296,247	$313,573	$1,309,330	$2,919,150
2022	$1,400,163	$338,711	$1,414,295	$3,153,168
2023	$1,474,371	$356,663	$1,489,252	$3,320,286
Total:	$7,088,911	$1,714,789	$7,467,467	$16,271,167

SB20-204: ADDITIONAL RESOURCES TO PROTECT AIR QUALITY

SB20-204 created the Air Quality Enterprise, which researches and monitors air quality issues in Colorado, and funds it through a new fee on the state's top 150 emitters of greenhouse gases. Fees collected in the program are subject to rising statutory limits. The enterprise's annual reports enable us to directly measure the impact of the legislation based on a total of $6.2 million collected through FY24.[xxv] The statutory limit in FY25, the current fiscal year, is $5 million.

Fees Collected through SB20-204		
Year	Statutory Limit	Amount Collected
FY23	$3,000,000	$2,700,000
FY24	$4,000,000	$3,500,000
Total:	**$7,000,000**	**$6,200,000**

HB21-1266: ENVIRONMENTAL JUSTICE DISPROPORTIONATE IMPACTED COMMUNITY

The focus of HB21-1266 was to create a task force to study "environmental justice" and provide recommendations to government on how to better incorporate such considerations into environmental policy. Essentially all topics in the task force's final recommendations fall outside the scope of this study. Elsewhere in the bill, however, is a requirement that point-source polluters who emit more than 25,000 tons of CO2-equivalent per year include GHG emissions in their APEN reports and pay a fee for those emissions.

The fee for GHG emissions is calculated by splitting the annual cost of administering the Air Quality Control Commission's (AQCC) programs related to controlling greenhouse gas emissions proportionally to how much each party emitted. Collection began in 2024 at a total cost of $6.54 million and will be adjusted in each subsequent year.[xxvi] Because this report's economic impact estimates run through 2023, this value is excluded from CSI's quantitative analysis.

This method of assigning emissions fees is unique in that the per-ton cost of emitting will fluctuate from year to year depending both on how much other parties emit (if one party increases their emissions, the share of the pollution decreases for all others and their obligation is reduced) and the cost of administering the AQCC's GHG programs. Currently, emissions are falling while AQCC's costs are rising; if this continues, polluters may be charged higher fees on lower emissions.

SB22-193: AIR QUALITY IMPROVEMENT INVESTMENTS

The Air Quality Improvement Investments Act takes a different approach than the previous bills. Rather than impose a fine for pollution, this bill provides grants for industrial and manufacturing property owners to install energy-efficient or low-emission equipment through the new Industrial and Manufacturing Operations Clean Air Grant Program. Eligible organizations include private entities, local and tribal

governments, and public-private partnerships. Activities that are eligible for grant money include projects for energy efficiency, renewable energy, electrification, transportation electrification, clean hydrogen production or use, carbon capture, direct air capture, methane capture, sustainable aviation fuel production, and industrial emissions reductions.

Because these grants come from existing state funds, rather than tax or fee increases, this analysis treats them as transfer payments to businesses rather than new costs. As the funds distributed by the grant program permanently raise the state government's spending obligation, however, they both crowd out other spending and, in the long run, encourage lawmakers to raise taxes to compensate.

Air Quality Improvement Investments Act Grants			
Purpose of Funds	**Source of Funds**	**Amount**	**Year Expires**
Clean Air Grant Program	General Fund	$25,000,000	2029
Cannabis Resource Optimization Fund	General Fund	$1,500,000	Once the funds are spent
Community Access to Electric Bicycles Cash Fund	General Fund	$12,000,000	2028
Electrifying School Buses Grant Program	General Fund	$65,000,000	2034
Eco Passes for State Employees	General Fund	$750,000	
Aerial Surveying of Pollution	General Fund	$7,000,000	2025
Total:		**$111,250,000**	
Total spent through FY24:		**$67,467,841**	

Each of the items in the table above is administered according to the same basic process: the state treasurer is directed to transfer the amount allotted in the statute to the respective funds, which can be used to provide grants for the respective purpose. Starting in 2025, all funds except for the Cannabis Resource Optimization Fund are required to report annually or biennially the progress of the respective grant program. Since reporting on the funds' activities to date is scarce, this analysis relies upon the original estimates from the bill's fiscal note: $67.5 million spent through FY24, including agency administrative costs.[xxvii]

SB22-051: POLICIES TO REDUCE EMISSIONS FROM BUILT ENVIRONMENT

This bill provides tax incentives for energy-efficiency measures and, like SB22-193, rewards building owners for equipment upgrades rather than punishing them for emitting. The bill offers several tax incentives for a variety of energy-efficiency and low-carbon energy systems.

For tax years 2023 and 2024, owners that install heat pumps are eligible for a 10% state income tax credit. The tax credit is available for both residential and commercial buildings and, crucially, can be transferred to the seller of the heat pump equipment, who can then compensate the home or building owner. This

feature is important for the tax credit to be effective because many building owners don't pay income taxes high enough to benefit from a 10% tax break on equipment that can cost nearly $1 million or more, depending on size.

Other tax incentives in the bill include an exemption from state sales and use taxes for heat pump and energy storage systems, beginning in January 2023, and eligible decarbonization building materials, starting in July 2024. The bill also allows cities and counties to exempt these items from local sales and use tax. In total, buildings claimed an estimated $2.1 million in FY23 and $4.3 million in FY24 of these tax incentives. Because there was excess state revenue in both of those years, the claims reduced the corresponding TABOR refunds by the same amounts.

SB22-1362: BUILDING GREENHOUSE GAS EMISSIONS

This piece of legislation establishes an energy code board that will develop codes specifically designed to make homes "solar-ready" and "electric-ready." It also includes requirements that counties and cities considering updates to their building codes between 2023 and 2026 adopt at least the 2021 energy codes and that jurisdictions considering changes after 2026 adopt the energy code board's finalized code. Because adoption of the 2021 energy code is already required by HB19-1260 (see section below), and the solar and electric building code only went into place in January 2025, this review focuses on the second portion of the bill: creation of the "building electrification for public buildings" and "high efficiency electric heating and appliances" grant programs. Both programs are funded by the new "clean air building investments fund."

To fund these new programs, SB22-1362 appropriates $20.85 million to issue grants under the two aforementioned programs. It also allocates $3.15 million to issue grants for compliance with and training on the 2021 International Energy Conservation Code (IECC) and to operate the energy code board. Both amounts come from the state's general fund and about $8.4 million of the total was projected to have been granted through FY24. The funds appropriated through this bill will ostensibly defray the cost of complying with a more stringent set of building codes. Government grants, however, either cut into other government programs or at some point result in higher taxes. Because it is not clear whether or how the state legislature will backfill this bill's grant obligations, this study treats the appropriations as public–private transfers and matching cuts in government spending.

Building and Energy Code Policies

The second category of policies analyzed here relate to changes to building codes that encourage more building efficiency and therefore lower emissions. Since 2018, the Colorado Legislature has passed multiple bills related to building and energy codes. Proponents of these policies argue that, over long enough periods of time, such building codes will reduce energy consumption to the point that energy cost savings outweigh the initial costs of compliance. A study of Regulation 28, one such regulation requiring lower building related emissions, released by the Colorado Air Pollution Control Division claims that implementing energy efficiency measures would result in about $5.1 billion in net savings from 2023 through 2030.[xxviii] Studies of other building codes also show net savings over time generated from requiring new buildings to be more efficient.

The two operative questions in evaluating updated building codes, however, are whether the energy savings come in a timeframe that is meaningful to the owner who must pay for the initial cost of compliance and what conditions might cause those savings to evaporate. Although such policies may eventually benefit society and the building owners themselves, the requirements potentially impose unrecoverable financial burdens for several years and benefit parties other than those that pay the costs. If a policy reduces energy consumption through efficiency or onsite emissions through electrification, building owners will bear the initial costs and tenants or renters will enjoy the direct benefit of lower energy bills. The building owner does have the option to recover costs through higher rents, but the owner's ability to ultimately recover these costs is dependent on how competitive the real estate market is.

A REVIEW OF THE PACIFIC NORTHWEST NATIONAL LABORATORY STUDY

To determine the economic impact of building codes in Colorado, this analysis focuses on the 2021 building energy code update. HB19-1260 requires county commissioners to adopt one of the three most recent building energy codes of the IECC. In 2025, these options would include the 2024, 2021 and 2018 building energy codes, making the 2021 code relevant for this discussion of the economic impact of carbon reducing policies. Additionally, the Pacific Northwest National Laboratory (PNNL), a US Department of Energy funded laboratory, published a study in 2021 that analyzes the marginal economic and emissions benefits of adopting the 2021 IECC over retaining the 2015 IECC in Colorado specifically.[xxix] Its methodology is both robust and well documented in publicly available formats, making it a helpful resource for the purposes of this research.

To determine the cost-effectiveness of the 2021 IECC, the PNNL relies on one primary metric: life-cycle cost (LLC). LCC is the most complete measure of how the code impacts the end consumer. It considers new housing price increases related to compliance, higher mortgage costs, the time discounted value of energy savings over a 30-year period, and the cost of replacing code-compliant equipment.[xxx]

Two other simpler metrics, consumer cash flow and the simple payback period complement the LCC measure but are not calculated to the same level of rigor. The consumer cash flow measures net annual energy savings without incorporating the initial capital costs, and the simple payback period is the number of years required for energy savings to equal the initial costs of compliance without including financing and replacement costs.

The results from the report are organized by climate zone because different climates have different energy use profiles and therefore have different energy savings and cost profiles. The LCC from the report are displayed in the table below, organized by Climate Zone. Climate 4B is the code for mixed, dry climates that are found in northern Texas and parts of New Mexico, Arizona, and southeastern Colorado. Climate 5B encompasses cool, dry climates and is the climate enjoyed by most of Colorado's population centers like Denver, Colorado Springs, Fort Collins and Grand Junction. As such, the state average for all the metrics discussed here tend to most closely reflect that of climate 5B. Climate 6B is a cold and dry climate present in the more mountainous regions of Colorado as well as most of Wyoming, Montana, Idaho and parts of northeastern Utah. Climate 7 is "very cold" and found in the counties of Colorado with the highest elevations. The only other parts of the country with this climate designation are the Tetons in Wyoming, southern Alaska, and the northern reaches of North Dakota, Minnesota, Michigan, and Maine.

Life-cycle Cost Analysis in Colorado by Climate Zone		
Climate Zone	**Example Location**	**LCC Savings[3]**
4B	Southeastern CO, Springfield	$1,796
5B	Denver, Grand Junction	$1,247
6B	Montrose County	$1,144
7	Ski Towns	$653
State Average	$1,233	

The state average of $1,233 comes to $41.10 per year in savings across a 30-year period. This estimate is calculated using a net-present-value formula, so the costs exceed the benefits in the initial years and rise higher than the average of $41.10 in later years. While technically positive, $41.10 is unlikely to meaningfully change the economic situation of those required to comply with the regulation and is close to zero.

Consumer cash flow tells a similar story. The state average cash flow is $22 per year according to the PNNL study. Average annual electricity spending in Colorado is about $1,700 per year and natural gas costs reach about $1,000. Compared to its total energy costs, $22 in added cash flow is negligible for the average Colorado household.

Consumer Cash Flow in Colorado by Climate Zone		
Climate Zone	**Example Location**	**Consumer Cash Flow per Year**
4B	Southeastern CO, Springfield	$50
5B	Denver, Grand Junction	$20
6B	Montrose County	$51
7	Ski Towns	$36
State Average	**Whole State**	**$22**

Simple payback period is measured by the number of years it takes for the initial cost of compliance to equate to the energy savings over time. There is no time-discounted component to this metric, nor does it include the effects of increased mortgage costs and inflation; as such, the Department of Energy reports it, but does not use it to determine the economic efficacy of building codes.

[3] Positive values in the LCC calculation indicate that the energy cost savings are larger than the costs of compliance.

Simple Payback Period in Colorado by Climate Zone		
Climate Zone	**Example Location**	**Payback Period (Years)**
4B	Southeastern CO, Springfield	14.1
5B	Denver, Grand Junction	17.5
6B	Montrose County	11.4
7	Ski Towns	16
State Average	**Whole State**	**17.3**

Whether a statewide average of 17.3 years is an acceptable timeline to recoup the costs of efficiency upgrades is up for debate. Investopedia reports that the average number of years a homeowner stays in a home is just over eight years. The median tenure is 13 years. This means that, on average, the first two owners of a compliant new build will be unable to recover the initial costs of compliance, pushing the savings experienced by the owner far into the future. For commercial buildings, the average tenure is five to 10 years, meaning that even more owners or their tenants will be at a net loss due to the requirements.[xxxi]

To determine the efficacy of updated building codes, CSI relies on the life-cycle cost metric reported by PNNL. As shown above, the average savings in Colorado is estimated to be $41.10 per year. Given an average home price of $543,106 statewide and $578,381 in the Denver metropolitan area, saving $41.10 per year is unlikely to be a major boost to the economy.[xxxii] Accordingly, the argument that updating energy codes achieves large reductions in the cost of living has little validity. It is also important to remember that any savings are only realized over a very long period during which energy prices are expected to increase steeply. The initial cost of compliance would be a net financial drag on every property for the first several years.

Still, at least in the long run, updating building codes is not a high-cost means of reducing carbon emissions, like so many others are. The same PNNL study estimates that, over 30 years, the 2021 IECC will prevent 20,301,000 metric tons of CO2 emissions, 1,072 tons of methane emissions (warming-equivalent to 30,016 metric tons of CO2), and 148 tons of N20 emissions (equivalent to 39,220 metric tons of CO2). In 2023, Colorado was responsible for 135,600,000 metric tons of greenhouse-gas emissions. If Colorado were to stay at the same level of carbon emissions for 30 years, updated buildings codes would reduce the state's emissions by about 0.5%. Because of other emissions-reduction policies and future updates to the building codes, the actual share of emissions reduced by new building codes will be substantially higher.

Based on this level of impact on emissions, CSI concludes that relying on building codes is neither an effective means of boosting the economy nor a way to reduce carbon emissions significantly. The long-run economic benefit is only slight and, for many years after initial compliance, homeowners and renters will endure higher home prices and higher mortgage costs. Only after 17–20 years is there a chance that the benefits of lower energy costs outweigh the costs for home and property owners. Given the average tenure of property owners, it is likely that the owner that pays for the costs may not recoup the costs

in that period, meaning that the requirement to comply with the regulations is a financial burden to the owner for the entire time it owns the property. The long horizon over which savings will materialize also adds risk to property ownership.

A NOTE ON VARIANCE AND UNCERTAINTY

The PNNL report is based on a model with inputs that include economic factors like energy prices, interest rates, and the cost of compliance equipment. While static in the model, none of these parameters remains constant over time, but shift with short term economic cycles and long-term economic trends. The PNNL study does not include measures of variance, or an indicator of how the results of the model might change if certain inputs were to change. Without this deeper level of analysis, it is difficult to understand if slightly lower interest rates would cause the savings to become significantly higher or if lower energy prices would cause the long-term savings to evaporate and turn into net costs.

AN ATTEMPT TO REPLICATE THE PNNL RESULTS

CSI attempted to replicate the results of the PNNL study for Colorado to determine the economic impact of the standards through 2024. PNNL includes a list of its inputs in the study,[xxxiii] and the Department of Energy has made the methodology and formulas that underpin the PNNL's cost savings model public.[xxxiv] These resources make an attempt to replicate the results possible. Because the Department described its methodology so thoroughly, CSI was able to replicate the analysis over different time periods, specifically the four years since the latest code was updated in 2021.

PNNL Cost of Building Codes Inputs and Assumptions	
Input	**Value**
Discount Rate	10%
Inflation Rate	1.4%
Mortgage Interest Rate	3%
Loan Term	30 years
Down-Payment Rate	12% of home price
Points and Loan Fees	1% of home price
Property Tax Rate	1.24%
Income Tax Rate	12%
Home Price Escalation Rate	1.4% (equal to inflation)
Fuel Price Escalation Rate	1.6%

The net cost is calculated by summing the costs and subtracting the benefits of the energy efficiency measures, which are all time-discounted over the scope of the model. Costs include the added cost of a home that complies with the code and the financing costs required to purchase that home, including increased interest paid and additional closing costs. Benefits include reduced energy consumption, tax deductions and the residual value of the efficiency measures.

Before focusing on the economic impact through 2024, CSI replicated the full 30-year period and found the results in the table below.

Comparison of 2021 IECC Building Code Economic Impact		
LCC by Climate Zone	PNNL Calculated	CSI Calculated
4B	$1,796	$196
5B	$1,247	-$1,232
6B	$1,144	$1,422
7	$653	$586

The CSI results closely mirror those of PNNL for climate zones 6B and 7 but are significantly different for Zones 5B and 4B. 5B stands out because its results are negative, meaning that, over a 30-year period, the cost of complying with the regulation is actually higher than the energy savings.[4]

After replicating the methodology used by the Department of Energy, we found the costs per unit for a four-year period listed in the table below:

Costs of 2021 Building Codes through 2024 per Unit by Climate Zone[5]				
	Climate Zone 4B	Climate Zone 5B	Climate Zone 6B	Climate Zone 7
Single Family Home	$844	$1,088	$328	$802
Apartment	$107	$212	$155	$629

Because the period analyzed here is only four years into investments that are expected to take several more years before seeing positive returns, it is not surprising that these codes result in higher costs for both housing types and all climate zones.

We matched these per-unit figures with data from the U.S. Department of Housing and Urban Development of residential units permitted from 2021 through 2023 (the latest year for which data are available) to find a total cost new building codes of approximately $104.4 million. Unlike most of the other costs described in this report, this one will decrease over time as the energy savings accumulate. So far, this has cost Colorado more than 970 jobs and $361 million of GDP.

[4] One possible cause of this difference could be the residual value calculation. Some pieces of equipment required to comply with the building codes increase the value of the house if not fully depreciated. CSI used an average 10-year life span for this equipment and used a single figure to represent its value. At the end of 30 years, the equipment was assumed fully depreciated and so the residual value was 0. It appears that PNNL applied this value on an itemized basis, so, at the end of the 30 years, it's possible some of the equipment had retained some of its value. This explanation, though, cannot account for the nearly identical results between the two studies in the other climate zones.

[5] These are calculated as an average of the costs for new homes built in 2021, 2022, 2023 and 2024

Economic Impacts of Residential Building Code Laws			
	2021	2022	2023
Direct cost	$48,693,742	$33,291,243	$22,397,532
Employment	-1,156	-1,151	-976
GDP	-$115,917,282	-$128,614,928	-$116,517,830
Personal income	-$83,345,420	-$98,527,968	-$94,121,180
Output	-$202,244,040	-$213,047,640	-$191,016,760

HB21-1286: ENERGY PERFORMANCE FOR BUILDINGS

Many of the same principles from the PNNL study are applicable to other bills that focus on updating building or energy codes. HB21-1286 directs the Air Quality Control Commission within the Colorado Energy Office to recommend and adopt building performance standards that increase efficiency and reduce carbon emissions. A study of the same caliber as the PNNL study is beyond the scope of this report, but the Colorado Department of Public Health and Environment has already conducted a study estimating the economic and carbon emission impacts of the proposed rules (Regulation 28).[xxxv] The study estimates a net savings of $4.6 billion for electricity consumption, $0.6 billion in natural gas costs and $1.2 billion for the social cost of carbon for a total of about $6.4 billion in savings by 2050. Colorado's GDP was $529.6 billion in 2023. If Colorado's GDP remains roughly equivalent until 2050, then combined GDP over the period will be roughly $15.9 trillion, meaning the savings will be equal to about 0.04% of GDP. It is unclear whether the cost-benefit analysis was conducted simply by subtracting costs from benefits or if its methodology mirrors PNNL's, which incorporates discount rates, inflation, and impacts on home prices, mortgage costs, replacement costs, and property taxes.

The appropriate conclusion is not necessarily that the savings are not worth the costs, but that the regulation should be considered with caution and not viewed as a way to boost the economy. The net savings are likely minimal at best, will only materialize after a long period of time, and are potentially negative if projections of energy prices, inflation, or interest rates are wrong.

CONCLUSION

The policies reviewed in this study collectively impose a cost on the Colorado economy; whether that cost is justified depends on both its effectiveness and greenhouse gases' potential impacts on society—both subjects of debate. This report does not seek to persuade the reader about the merit of Colorado's climate policy, but it can provide some context for how Colorado's approach stacks up to other programs in the United States by comparing the costs associated with the policies to carbon reductions Colorado has experienced during the same period.

Neither the state government nor this report records the emissions impacts of state policy, but they can be estimated at a high level. One approach assigns all carbon emissions below 2009 levels to Colorado's environmental policy efforts. CSI estimates that the direct costs of these policies (excluding the secondary impacts on GDP and employment) was $6.3 billion from HB19-1261's enactment through 2023 and that statewide carbon emissions has fallen by 96.9 MMT of CO2e since 2009. This method yields an average cost of carbon of $65 per ton.

The second approach acknowledges that the economy has been on a decarbonizing trajectory due to factors other than the policies analyzed here—between 2008 and 2019, Colorado's emissions fell by an annual average of 1.58 MMT.[xxxvi] These factors include nationwide reductions in solar and wind prices and increased energy-efficiency in automobiles. This comparison associates year-over-year reductions after 2019 greater than the 2008–2019 average with Colorado policy. Using this approach, CSI calculates policy's emissions impact between 2020 and 2023 to be 25.8 MMT of CO2e. At the same direct cost of $6.3 billion, CSI estimates the cost of emissions-reductions to have been $244 per ton in Colorado. These two crude estimates frame a wide range of the cost of Colorado policy since 2020.

Other states with strong decarbonization policies appear to be able to reduce emissions at costs below CSI's estimated range. The California Low Carbon Fuel Standard, which incentivizes transportation decarbonization, requires refiners to trade credits that each represent one ton of carbon abated. After peaking at just above $200 per ton in 2020, the average cost of these credits since January 2023 has been about $70.[xxxvii] The California cap-and-trade program has averaged a per-ton cost of about $35 since January 2023.[xxxviii] The price of credits in the Regional Greenhouse Gas Initiative, a cap-and-trade program in the northeastern United States, has averaged about $15 per ton since 2023. [xxxix]

Comparison of the Colorado policies included here and the programs of other states is crude, but paints a helpful picture. Even under the most generous attribution of carbon abatement to Colorado policy, its price per ton of carbon emissions is still higher than other policies throughout the United States that pursue the same ends. Under a more realistic approach that credits some emissions reduction to developments other than state and local policy, it is possible that carbon abatement through the policies enacted in Colorado has been upwards of 10 times more expensive. This should inform the consideration of future environmental policy if Colorado continues to pursue its emissions-reduction goals.

APPENDIX A: COMPLETE LIST OF ENVIRONMENTAL POLICIES SINCE 2009

Year	Number	Name	Description	Sector
2019	HB19-1261	Climate Action Plan to Reduce Pollution	Colorado shall have statewide goals to reduce 2025 greenhouse gas emissions by at least 26%, 2030 greenhouse gas emissions by at least 50%, and 2050 greenhouse gas emissions by at least 90% of the levels of statewide greenhouse gas emissions that existed in 2005	All
2023	SB23-016	Greenhouse Gas Emission Reduction Measures	Updates the statewide GHG emission reduction goals to add a 65% reduction goal for 2035, a 75% reduction goal for 2040, and a 90% reduction goal for 2045 when compared to 2005 GHG pollution levels, adds pollution fees, etc.	All
2021	HB21-1180	Measures to Increase Biomass Utilization	Requires the state forest service, at the discretion of the state forester, to implement a biomass utilization grant program by awarding up to $2.5 million in grants to demonstrate the utilization of biomass throughout the state for purposes such as wildfire prevention and mitigation, increased biomass energy generation, and agricultural biochar	Forestry, utilities, agriculture
2021	HB21-1009	Update Division Housing Function & Local Development	Expands the list of existing functions of the division of housing to include research and collaboration with other agencies on energy performance standards	Governments
2021	HB21-1253	Renewable and Clean Energy Project Grants	Transfers $5 million from the general fund to the local government severance tax fund for the purpose of funding grants to local governments for renewable and clean energy infrastructure implementation projects	Governments
2024	SB24-212	Local Govs Renewable Energy Projects	Requires the director of the energy and carbon management commission in the department of natural resources, at the request of a local government or tribal government, to provide technical support concerning renewable energy codes and projects	Governments
2024	SB24-214	Implement State Climate Goals	Creates the office of sustainability in the department of personnel, which is required to work with state agencies to implement environmentally sustainable practices	Governments
2011	Rule 205a	Hydraulic Fracturing Disclosure Rulemaking	Requires comprehensive public disclosure of the chemicals used in hydraulic fracturing treatments	Oil/gas

Year	Number	Name	Description	Sector
2013	300, 600, and 800 Series Regulations	Setback Rulemaking	Creates a uniform 500-foot statewide setback applicable in both rural and urban areas and a 1,000-foot setback from high occupancy buildings such as schools, nursing homes and hospitals	Oil/gas
2013	Amendments to Rule 906	Spills and Releases Rulemaking	Tightened spill reporting requirements to broaden the definition of what needs to be reported and requires that spills are reported within 24 hours to landowners and local governments	Oil/gas
2013	SB13-202	Limit Use of Gov Land for Automotive Serv Stations	The act requires the Colorado oil and gas conservation commission, by July 1, 2014, to use a risk-based strategy for inspecting oil and gas locations that targets the operational phases that are most likely to experience spills, excess emissions, and other types of violations and that prioritizes more in-depth inspections	Oil/gas
2014	HB14-1077	Raise Cap Oil Gas Conservation & Env Response Fund	The act increases the statutory cap on the 2-year average of the unobligated portion of the oil and gas conservation and environmental response fund from $4 million to $6 million	Oil/gas
2014	HB14-1356	Strengthen Penalty Authority Oil & Gas Commn	Increases the maximum daily penalty for a violation of the "Oil and Gas Conservation Act" from $1,000 to $15,000, subject to a penalty schedule promulgated by the oil and gas conservation commission that considers aggravating and mitigating circumstances, etc.	Oil/gas
2014		Air Emissions from Oil and Gas	New AQCC rules targeting air emissions from the oil and natural gas industry	Oil/gas
2015	600 Series Regulations	Flood Lessons Learned Rulemaking	Requires remote shut-in capabilities and secondary containment areas around tanks	Oil/gas
2016	SB16-92	State Authority under Federal Oil Pollution Act	The act adds the federal "Oil Pollution Act of 1990" as a source of natural resource damages and as authority for response actions that the department and attorney general may conduct and expend money on	Oil/gas
2016		Governor's Oil and Gas Task Force Rulemaking	The Task Force was comprised of 21 members representing local government, civic organizations, environmental interests, agriculture, and affected industries. They put forward 9 recommendations that empowered local governments in the permitting process and allowed for site specific mitigation as a condition of permit approval.	Oil/gas
2018	300, 500, and 600 Series Regulations	School Setback Rulemaking	The definition of a school facility was greatly expanded and broadens the 1,000-foot boundary to include not just the school building, but also surrounding facilities, such as playgrounds, athletic fields, fences, and other outdoor areas	Oil/gas
2018	300, 600, 900, and 1100 Series Regulations	Flowline Rulemaking	Dozens of new rules pertaining to flowlines and other types of piping systems, along with other regulations increasing transparency in safety and gas leak reporting	Oil/gas

Year	Number	Name	Description	Sector
2018		Mill Levy Rulemaking	Raises the statewide property tax mill levy on oil and gas operations from .7 to 1.1	Oil/gas
2019	SB19-181	Protect Public Welfare Oil and Gas Operations	Modifies the oil and gas statutes and clarifies, reinforces, or establishes various aspects of local governments' regulatory authority over the surface impacts of oil and gas development	Oil/gas
2020	Mission Change 200/300/400/500/600/800/900/1200		COGCC implementation of SB19-181, as directed by the bill	Oil/gas
2020		Methane rules	New rules that tighten restrictions on oil and gas operations' methane emissions	Oil/gas
2022	HB22-1348	Oversight of Chemicals Used in Oil & Gas	Establishes a regulatory scheme that requires disclosure of certain chemical information for products used in downhole oil and gas operations	Oil/gas
2023	HB23-1242	Water Conservation in Oil and Gas Operations	Requires the commission to adopt rules, on or before December 31, 2024, requiring a statewide reduction in usage of fresh water and a corresponding increase in usage of recycled or reused water in oil and gas operations	Oil/gas
2023	Regulation 3	Stationary Source Permitting and Air Pollutant Emission Notice Requirements	New permitting costs associated with EPA control rules	Oil/gas
2023	Regulation 7	Control of Emissions from Oil and Gas Emissions Operations	Owners or operators of storage tanks with uncontrolled actual emissions of VOCs equal to or greater than four tons per year based on a rolling twelve-month total must collect and control emissions from each storage tank by routing emissions to and operating air pollution control equipment that achieves a VOC control efficiency of 95%, etc.	Oil/gas
2024	HB24-1346	Energy & Carbon Management Regulation	The act expands the authority of the energy and carbon management commission to include the regulation of activities performed for the purpose of engaging in the injection and underground sequestration of injection carbon dioxide in pore space	Oil/gas
2024	SB24-230	Oil & Gas Production Fees	The act requires the clean transit enterprise to impose a production fee for clean transit to be paid quarterly by every producer of oil and gas in the state	Oil/gas
2023	SB23-285	Energy and Carbon Management Regulation in Colorado	Changes the name of the oil and gas conservation commission to the energy and carbon management commission and expands the commission's regulatory authority to include the authority to regulate a broader scope of energy and carbon management areas beyond oil and gas, etc.	Oil/gas, polluters
2009	HB09-1332	Repeal Air Pollution Rule Econ Analysis	Repeals a requirement for the department of public health and environment to conduct a cumulative economic analysis of the costs of all air pollution control measures every 5 years	Polluters

Year	Number	Name	Description	Sector
2010	HB10-1042	Air Quality Permitting Program	Instead of conducting a review by the air quality control commission for all permits that required 5 or more hours of professional staff time to process, the act requires the commission to report permit information on stationary industrial sources of pollution in its annual report to the public	Polluters
2011	HB11-1291	Approve Regional Haze Air Quality Plan	The act approves the regional haze SIP and postpones [its] automatic expiration	Polluters
2011	SB11-235	Third Party Air Quality Modelers	To reduce the current backlog of air quality permit applications, the act authorizes the division of administration in the department of public health and environment to give permit applicants the option to have the air quality modeling for their permit performed by nongovernmental air quality modeling engineers when the division expects that the backlog will prevent permits from being issued pursuant to statutory deadlines	Polluters
2015	HB15-1249	Recodify Water Pollution Control Fees	The act amends the statutory fee schedule that the department of public health and environment charges for the discharge of pollutants into state waters	Polluters
2016		SIP implementation	Strengthened rules to reduce ozone levels for the Denver Metropolitan and North Front Range nonattainment area	Polluters
2017	HB17-1285	Refinance Water Pollution Control Program	Current law finances the state's water quality program with a mix of general fund money and fees that are paid by sources that discharge pollutants into the state's waters. Section 2 of the act raises the fees and establishes goals for future adjustments of the ratio of revenue from fees and the general fund	Polluters
2018	HB18-1400	Increase Fees Stationary Sources Air Pollutants	The act increases the statutory caps on fees set by the air quality control commission by rule and assessed against stationary sources of air pollutants	Polluters
2019	HB19-1260	Building Energy Codes	supercedes 2007 energy code requirement which required new buildings to comply with IECC 2003 or 2006 energy code standards. HB19-1260 requires jurisdictions to adopt one of the three latest energy code standards if they make changes to their building code. This bill was superceded by HB22-1362	Polluters
2019	SB19-096	Collect Long-term Climate Change Data	Requires the air quality control commission in the department of public health and environment to collect greenhouse gas emissions data from greenhouse gas-emitting entities and report on the data, including a forecast of future emissions	Polluters
2020	Regulation 22	Colorado Greenhouse Gas Reporting and Emission Reduction Requirements	Requires many large sources of emissions to report their emissions to the state and sets future emissions-reduction targets for those sources	Polluters
2020	SB20-204	Additional Resources to Protect Air Quality	Creates a new 'Air Quality Enterprise' which collects data emissions, awards grants to study and mitigate emissions and collects an annual emission fee that is applicable to the top 150 point source emitters in Colorado. The max they can collect is outlined in statute	Polluters

Year	Number	Name	Description	Sector
2021	HB21-1189	Regulate Air Toxics	Expands the definition of "covered facility" under air quality laws	Polluters
2021	HB21-1266	Environmental Justice Disproportionate Impacted Community	Requires the AQCC to adopt rules, including permit processing fees, that apply to permits for sources of pollutants that cause or contribute to significant health or environmental impacts in areas with large proportions of minorities and/or low-income people	Polluters
2021	HB21-1286	Energy Performance for Buildings	Requires most large buildings in Colorado to achieve reductions in greenhouse gas emissions of 7% by 2026 compared to 2021 levels as reported in energy benchmarking data and by 20% by 2030 compared to 2021 levels	Polluters
2022	HB22-1244	Public Protections from Toxic Air Contaminants	Creates a new program to regulate a subset of air pollutants, referred to as "toxic air contaminants," which are defined as hazardous air pollutants, covered air toxics, and all other air pollutants that the air quality control commission designates as toxic air contaminants	Polluters
2022	HB22-1362	Building Greenhouse Gas Emissions	Requires jurisdictions that update their building codes between 2023 and 2026 to also adopt the 2021 IECC building energy code and the state's electric-ready and solar-ready codes. Jurisdictions that change building codes after 2026 are required to also adopt the state's low energy and carbon code	Polluters
2023	HB23-1210	Carbon Management	Requires the Colorado energy office, in collaboration with the office of economic development and the department of public health and environment, to contract with an organization for the development of a carbon management roadmap for the state	Polluters
2023	HB23-1294	Pollution Protection Measures	Creates the legislative interim committee on ozone air quality to study ozone air quality in the state, etc.	Polluters
2024	HB24-1338	Cumulative Impacts & Environmental Justice	Creates the office of environmental justice (office) in CDPHE and requires the office to oversee a process to develop at least 2 EECIAs for specific geographic locations in the state	Polluters
2024	SB24-229	Ozone Mitigation Measures	Requires the division of administration in the department of public health and environment to propose rules to the air quality control commission to reduce certain emissions of oxides of nitrogen (NOx) generated by upstream oil and gas operations in certain areas of the state by 50% by 2030 relative to 2017 NOx emission levels	Polluters
2009	SB09-003	Motor Vehicle Emissions Programs	As of January 1, 2010, moves Weld and Larimer counties from the basic emissions program area of the automobile inspection and readjustment program to the enhanced emissions program area	Transportation
2012	SB12-34	Repeal Rapid Screen for High-emitting Vehicles	The act repeals the rapid screen program for identifying high-emitting motor vehicles	Transportation
2014	SB14-125	Transportation Network Companies Regulation	The act authorizes the public utilities commission to regulate transportation network companies	Transportation

Year	Number	Name	Description	Sector
2018		Colorado Electric Vehicle Plan	Establishes Colorado's goal of incentivizing the purchase of 940,000 electric vehicles by 2030	Transportation
2019	HB19-1159	Modify Innovative Motor Vehicle Income Tax Credits	Modifies the amounts of and extends the number of available years of the existing income tax credits for the purchase or lease of an electric motor vehicle, a plug-in hybrid electric motor vehicle, and an original equipment manufacturer electric truck and plug-in hybrid electric truck	Transportation
2019	HB19-1198	Electric Vehicle Grant Fund	Allows the electric vehicle grant fund to administer grants for the installation of electric-vehicle charging stations	Transportation
2019	SB19-239	Address Impacts of Transportation Changes	Requires the department of transportation to convene and engage in robust consultation with a stakeholder group comprised of representatives of specified industries, workers, governmental entities, planning organizations, and interest groups that will potentially be affected by the adoption of new and emerging transportation technologies and business models	Transportation
2021	Regulation 11	Motor Vehicle Emissions Inspection Program	Implements new vehicle-emissions inspection rules and expands the enhanced emissions program to northern Colorado	Transportation
2021	Regulation 20	Colorado Low Emission Automobile Regulation	Imposes low- and zero-emission vehicle quotas on manufacturers delivering vehicles for sale in Colorado	Transportation
2021	SB21-260	Sustainability of The Transportation System	Creates new sources of dedicated funding and new state enterprises to enable the planning, funding, development, construction, maintenance, and supervision of a sustainable transportation system by preserving, improving, and expanding existing transportation infrastructure, developing the modern infrastructure needed to support the widespread adoption of electric motor vehicles, and mitigating adverse environmental and health impacts of transportation system use	Transportation
2022	SB22-180	Programs to Reduce Ozone through Increased Transit	Provides grants to the regional transportation district and transit associations in order to provide free transit services for at least 30 days during ozone season	Transportation
2023	HB23-1233	Electric Vehicle Charging and Parking Requirements	Requires the state electrical board to adopt rules requiring compliance, starting March 1, 2024, with the provisions of the model electric ready and solar ready code that require multifamily buildings to comply with the electric vehicle power transfer infrastructure requirements	Transportation
2021	HB21-1303	Global Warming Potential for Public Project Materials	The office of the state architect and the department of transportation are each required to establish policies regarding the global warming potential for specific categories of eligible materials used to construct certain public projects	Transportation, governments
2019	SB19-077	Electric Motor Vehicles Public Utility Services	Authorizes electric public utilities to provide charging ports as regulated services and allows cost recovery	Transportation, utilities

Year	Number	Name	Description	Sector
2009	SB09-039	Conserve Energy Tiered Rates Incentive	Authorizes cooperative electric associations to approve revenue-neutral, reasonable rates, charges, services, classifications, and facilities that establish a graduated rate for increased energy consumption, for energy conservation and energy efficiency purposes, by residential customers	Utilities
2009	SB09-051	Renewable Energy Financing Act	Amends the "Colorado Clean Energy Finance Program Act"	Utilities
2009	HB09-1126	Encourage Solar Thermal Installations	Allows local governments to provide the same incentives for solar thermal installations as may now be provided for solar electric installations	Utilities
2010	SB10-174	Promote Geothermal Energy Development	Municipalities and counties may designate the use of geothermal resources for the commercial production of electricity as an activity of state interest	Utilities
2010	HB10-1349	Re-energize CO Renewable Elec For Parks	The act directs the governor's energy office or its designee to create an inventory and map of lands under the control of the division of parks and outdoor recreation in the department of natural resources that have potential to support the development of renewable resource generation projects	Utilities
2010	SB10-177	Promote Biomass Energy Development	Biomass energy facilities will be valued for the purpose of property taxation in the same manner in which wind or solar energy facilities are valued	Utilities
2010	SB10-180	Colo Smart Grid Task Force	Creates an 11-member Colorado smart grid task force to gather information and report to the governor, general assembly, and Colorado public utilities commission on issues related to the implementation of a smart energy grid in Colorado	Utilities
2010	HB10-1001	Renewable Energy Stds Solar Certif	Boosts these RPS percentages to achieve 30% renewable generation by 2020 and requires a portion of the RPS to be met through a subset of renewable generation, "distributed generation"	Utilities
2010	HB10-1342	Community Solar Gardens Util Elec Std	Directs the PUC to adopt new rules under which standard rebates can apply to solar generation facilities that are beneficially owned by 10 or more customers at a shared location	Utilities
2010	HB10-1365	Incent Util Convert Coal to Natural Gas	All rate-regulated utilities that own or operate coal-fired electric generating units must submit to the public utilities commission an emission reduction plan for emissions from those units covering the lesser of 900 megawatts or 50% of the utility's coal-fired electric generating units in Colorado	Utilities
2011	HB11-1083	Hydroelectricity & Pumped Hydro	The act adds hydroelectricity and pumped hydroelectricity to the list of technologies that the public utilities commission may give the fullest possible consideration when considering generation acquisitions for electric utilities	Utilities
2011	HB11-1262	Elec Util PUC Transparency in Bidding	The act directs the public utilities commission to adopt rules requiring investor-owned electric utilities to provide the owners of electric generating facilities with access to any modeling inputs and assumptions used by the utilities in bidding for acquisitions that directly relate to the owners' facilities	Utilities

Year	Number	Name	Description	Sector
2011	SB11-45	Streamline Elec Powerline Siting	The act creates a task force on statewide transmission siting and permitting, consisting of 17 members representing the various stakeholders, including utilities, local governments, regulators, and consumers	Utilities
2011	SB11-87	Medical Exemption Tiered Rate Plan	The act authorizes the public utilities commission to adopt rules creating an exemption from tiered electricity rate plans based on a customer's medical condition	Utilities
2013	SB13-252	Renewable Energy Standard Retail Wholesale Methane	The bill would make a variety of changes to the state's renewable energy standard, including: expanding the definition of eligible energy resources that may be used to comply with the standard to include coal mine methane and synthetic gas produced by pyrolysis of municipal solid waste; increasing from 10 to 25 percent the share of retail electricity sales that must be achieved from eligible energy resources by cooperative electric associations serving more than 100,000 meters, beginning in the year 2020; and, for cooperative electric associations serving fewer than 100,000 meters, adding a distributed generation requirement of 1 percent of total electricity sales	Utilities
2013	SB13-282	Tiered Electric Rate Medical Exemption	The act requires the public utilities commission to adopt rules by January 31, 2014, to exempt customers with certain medical conditions from tiered electricity rates	Utilities
2015	HB15-1372	Raise the Public Utility Fee Cap	The act increases the cap on the fees that the department of revenue may charge public utilities to defray the administrative expenses of the public utilities commission and the office of consumer counsel from 0.2% to 0.25% of the public utility's gross intrastate utility operating revenues for the preceding calendar year	Utilities
2015	SB15-46	Renewable Energy Std Adjust REAs Distributed Gen	The act allows cooperative electric associations to subtract industrial retail sales from total retail sales in calculating their minimum retail distributed generation requirements and use purchases from community solar gardens to meet the retail distributed generation component of the renewable energy standard	Utilities
2017	HB17-1116	Continue Low-income Household Energy Assistance	The act extends the conditional funding through the state fiscal year commencing July 1, 2023	Utilities
2017	HB17-1227	Electric Demand-side Management Program Extension	The act...requires the commission to set goals of at least 5% peak demand reduction and 5% energy savings by 2028 for demand-side management programs implemented during 2019 through 2028 when compared to 2018 numbers	Utilities
2017	SB17-105	Consumer Right to Know Electric Utility Charges	The act requires an investor-owned electric utility to file with the public utilities commission for the commission's review a comprehensive billing format that the utility has developed for its monthly billing of customers	Utilities

Year	Number	Name	Description	Sector
2018	HB18-1270	Public Utilities Commission Evaluation of Energy Storage Systems	The act directs the public utilities commission to adopt rules, by February 1, 2019, establishing mechanisms for the procurement of energy storage systems by investor-owned electric utilities, based on an analysis of costs and benefits as well as factors such as grid reliability and a reduction in the need for additional peak generation capacity	Utilities
2018	HB18-1271	Public Utilities Commission Electric Utilities Economic Development Rates	The act allows the public utilities commission (commission) to approve, and electric utilities to charge, economic development rates, which are lower rates for commercial and industrial users who locate or expand their operations in Colorado so as to increase the demand by at least 3 megawatts	Utilities
2019	HB19-1003	Community Solar Gardens Modernization Act	Amends the current statute authorizing the creation of community solar gardens	Utilities
2019	SB19-236	Sunset Public Utilities Commission	Implements the recommendations of the department of regulatory agencies' 2018 sunset review and report on the public utilities commission	Utilities
2021	HB21-1052	Define Pumped Hydroelectricity as Renewable Energy	Removes the existing restriction on pumped hydroelectric facilities as a source of recycled energy	Utilities
2021	HB21-1105	Low-income Utility Payment Assistance Contributions	Authorizes the department of human services to make fuel assistance payments to supplemental nutrition assistance program recipients to maximize their federal heating and cooling standard utility allowance	Utilities
2021	HB21-1238	Public Utilities Commission Modernize Gas Utility Demand-side Management Standards	Updates the methods used to determine the cost-effectiveness of demand-side management programs of public utilities selling natural gas at retail, including requiring that the calculation of future benefits reflects the avoided costs to ratepayers resulting from reduced consumption of natural gas	Utilities
2021	HB21-1269	Public Utilities Commission Study of Community Choice Energy	Declares that "community choice energy" has the potential to enable communities to meet their renewable energy goals and to reduce their electricity rates by allowing wholesale competition and local control over the energy supplier and energy mix without changing the local utility's current status as sole supplier of electric transmission, distribution, billing, and customer service functions	Utilities
2021	HB21-1324	Promote Innovative and Clean Energy Technologies	Replaces the integrated gasification combined cycle program, which was repealed in 2019, with a mechanism by which an investor-owned utility seeking to implement an innovative energy technology project may apply to the public utilities commission to acquire resources that demonstrate the use of innovative, zero-emission technologies for energy generation and storage	Utilities

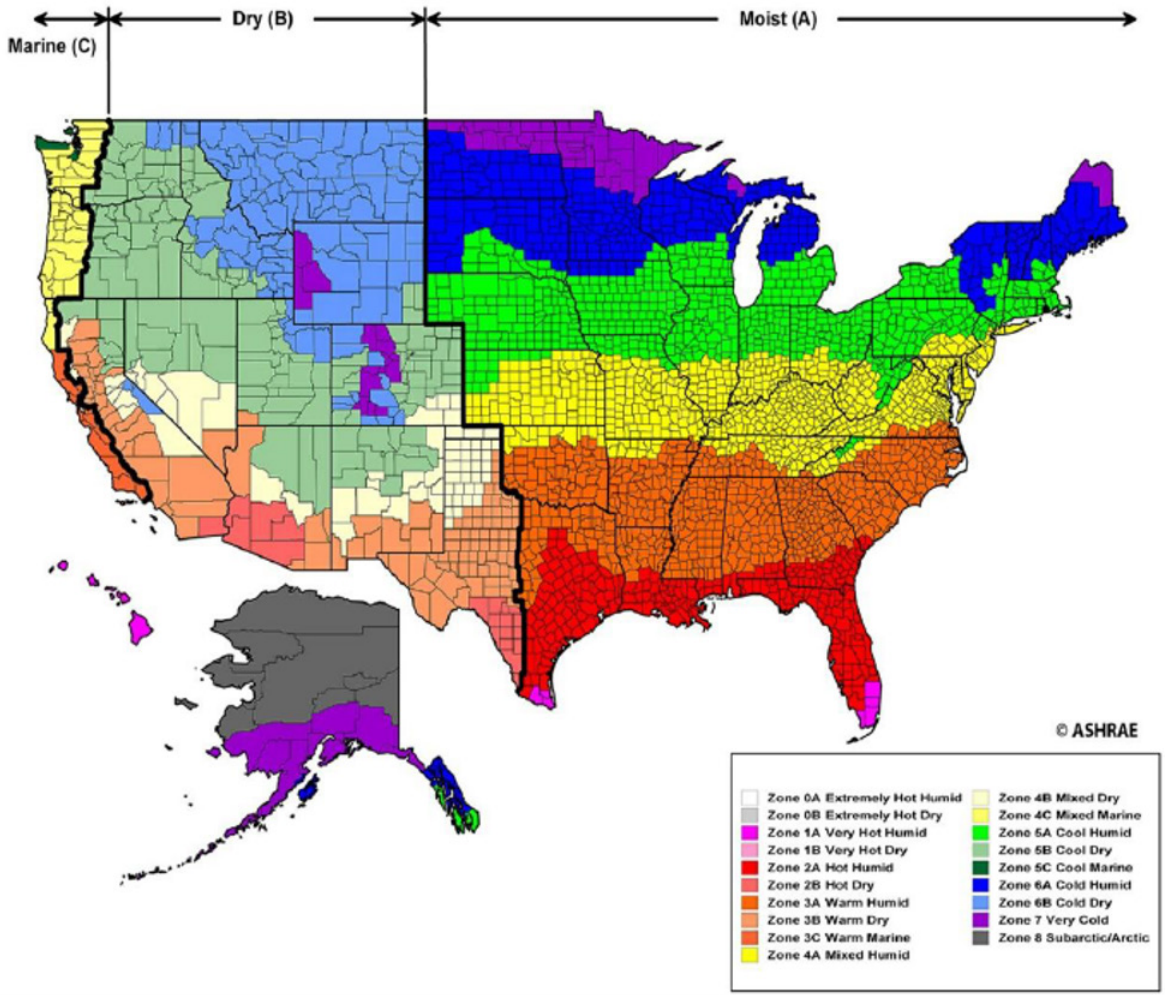
Year	Number	Name	Description	Sector
2021	SB21-020	Energy Equipment and Facility Property Tax Valuation	Clarifies that clean energy resources and energy storage systems used to store electricity are assessed for valuation for the purpose of property taxation in a similar manner to renewable energy facility property used to generate and deliver electricity	Utilities
2021	SB21-072	Public Utilities Commission Modernize Electric Transmission Infrastructure	Authorizes the public utilities commission to approve utilities' applications to build new transmission facilities if the PUC, consistent with its authority, finds that the new facilities would assist the utilities in meeting the state's clean energy goals established in 2019	Utilities
2021	SB21-103	Sunset Office of Consumer Counsel	Authorizes the Office of Consumer Counsel to operate for another seven years and expands its power	Utilities
2021	SB21-246	Electric Utility Promote Beneficial Electrification	Directs the public utilities commission to establish energy savings targets and approve plans under which investor-owned electric utilities will promote the use of energy-efficient electric equipment in place of less efficient fossil-fuel-based systems	Utilities
2021	SB21-261	Public Utilities Commission Encourage Renewable Energy Generation	Removes most of the existing limitations on the size of distributed generation facilities to qualify for renewable energy credits	Utilities
2021	SB21-264	Adopt Programs Reduce Greenhouse Gas Emissions Utilities	Requires the AQCC to initiate a rule-making proceeding by September 1, 2022, to establish protocols for recovered methane that utilities must use in forecasting their emission reductions	Utilities
2021	SB21-272	Measures to Modernize the Public Utilities Commission	Roughly doubles the maximum fee rates chargeable to utilities for upkeep of the fixed utility fund	Utilities
2021	SB21-293	Property Tax Classification and Assessment Rates	The assessment rate for agricultural property and renewable energy production property is temporarily reduced from 29% to 26.4% for the next 2 property tax years	Utilities
2022	HB22-1013	Microgrids for Community Resilience Grant Program	A cooperative electric association or a municipally owned utility may apply for a grant award to finance the purchase of microgrid resources in eligible rural communities within the utility's service territory that are at significant risk of experiencing severe weather or natural disaster events and in which one or more community anchor institutions, which institutions are important community, educational, health care, or other institutions, are located	Utilities

Year	Number	Name	Description	Sector
2022	HB22-1249	Electric Grid Resilience and Reliability Roadmap	Requires the Colorado energy office, in collaboration with the department of local affairs and the Colorado resiliency office, to develop a grid resilience and reliability roadmap for improving the resilience and reliability of electric grids in the state, which roadmap must include guidance on how microgrids may be used to harden the grid, improve grid resilience and reliability, deliver electricity where extending distribution infrastructure may not be practicable, and operate autonomously and independent of the grid, when necessary	Utilities
2022	HB22-1381	Colorado Energy Office Geothermal Energy Grant Program	Creates the geothermal energy grant program in the Colorado energy office within the office of the governor	Utilities
2022	SB22-051	Policies to Reduce Emissions from Built Environment	For income tax years beginning on or after January 1, 2023, but before January 1, 2025, any purchaser of an air-source heat pump system, ground-source heat pump system, water-source heat pump system, or variable refrigerant flow heat pump system or a heat pump water heater that installs a residential or commercial heat pump system or a residential or commercial heat pump water heater into real property in the state is allowed an income tax credit in an amount equal to 10% of the purchase price of the heat pump system or heat pump water heater	Utilities
2022	SB22-118	Encourage Geothermal Energy Use	Modifies some statutory provisions that apply to solar energy so that they also apply to geothermal energy	Utilities
2022	SB22-193	Air Quality Improvement Investments	Creates the industrial and manufacturing operations clean air grant program through which the Colorado energy office awards grant money to private entities, local governments, tribal governments, and public-private partnerships for voluntary projects to reduce air pollutants from industrial and manufacturing operations	Utilities
2023	HB23-1039	Electric Resource Adequacy Reporting	On or before April 1, 2024, and on or before April 1 of each year thereafter, an entity with an obligation to provide retail or wholesale electricity services in the state must file with the entity responsible for approving the resource plans or rates of the load-serving entity an annual report detailing the adequacy of its electric resources	Utilities
2023	HB23-1252	Thermal Energy	Authorizes the Colorado energy office to award grants for retrofitting existing buildings for installation of geothermal systems for heating and cooling under the single-structure geothermal grant that the office administers, and for generating geothermal energy through direct air capture technology under the geothermal electricity generation grant that the office administers	Utilities
2023	HB23-1281	Advance the Use of Clean Hydrogen	For income tax years commencing on or after January 1, 2024, but before January 1, 2033, section 3 creates a state income tax credit in specified amounts per kilogram of clean hydrogen used for hard to decarbonize end uses, for operating a heavy-duty vehicle, or for aviation, etc.	Utilities

Year	Number	Name	Description	Sector
2023	SB23-198	Clean Energy Plans	Requires that any clean energy plan submitted to the division on or after January 1, 2024, achieve at least a 46% reduction in greenhouse gas emissions caused by the entity's Colorado electricity sales by 2027 relative to 2005 levels if the achievement of the 46% reduction in greenhouse gas emissions will maintain reliability and result in an incremental average annual cost of no more than 2.5% of the entity's system costs, etc.	Utilities
2023	SB23-291	Utility Regulation	Requires the commission to establish rules to limit the amount of rate case expenses that an investor-owned electric or gas utility may recover from the utility's customers	Utilities
2024	HB24-1370	Reduce Cost of Use of Natural Gas	Requires the Colorado energy office to issue a request for information by December 1, 2024, to solicit interest from local governments that are served by a dual-fuel utility in becoming a gas planning pilot community	Utilities
2024	SB24-150	Processing of Municipal Solid Waste	Units that combust municipal solid waste that are in existence in the state on or before July 1, 2024, are eligible, pursuant to section 2 of the act, for a state incentive to conduct technological upgrades	Utilities
2024	SB24-207	Access to Distributed Generation	On or after January 1, 2026, but before February 1, 2026, an investor-owned electric utility with more than 500,000 customers must make at least 50 megawatts of inclusive community solar capacity available, and a utility with 500,000 or fewer customers must make at least 3.5 megawatts of inclusive community solar available	Utilities
2019	HB19-1314	Just Transition from Coal-based Electrical Energy Economy	Creates the just transition office in the division of employment and training in the department of labor and employment	Workforce
2021	HB21-1290	Additional Funding for Just Transition	Makes general fund transfers of $8,000,000 to the just transition cash fund and $7,000,000 to a newly created coal transition worker assistance program account in the fund	Workforce
2022	HB22-1193	Fund Just Transition Coal Workforce Programs	Directs the state treasurer to transfer $2 million from the coal transition workforce assistance program account to the just transition cash fund on March 7, 2022, and directs the general assembly to appropriate $150,000 from the fund to the department of higher education for allocation to the Colorado school of mines to expand the Carbon Ore, Rare Earth, and Critical Minerals Initiative for U.S. Basins in the Greater Green river and Wind river basins	Workforce
2022	HB22-1394	Fund Just Transition Community and Worker Supports	Transfers $15 million from the general fund, with $5 million allocated to the just transition cash fund and $10 million allocated to the coal transition workforce assistance program account, and directs the department of labor and employment, through the just transition office, to expend the money for specified coal community and worker supports	Workforce

APPENDIX B: UNITED STATES CLIMATE ZONES

The American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) is an international organization focused on improving the built environment. Its mission includes improving energy efficiency, indoor air quality, refrigeration and sustainability within the industry.[xl] To that end, ASHRAE developed a climate map to support building designers and architects in creating buildings that were most suitable for their climate. The map displayed below was referenced in the PNNL study of the impact of the 2021 IECC building codes in Colorado.



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