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IN FOCUS

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Mitigating Greenhouse Gas Emissions: Selected Policy Options

Congress may consider a range of policy options that could be used to limit or remove human-related greenhouse gas (GHG) emissions from the atmosphere, including carbon dioxide (CO_2), methane, nitrous oxides, and others. Efforts to reduce net GHG emissions—the sum of direct emission reductions/removals and permanent sequestration—are under way in other countries and in a number of U.S. states and localities. This In Focus identifies and briefly describes selected policy tools that could reduce net GHG emissions from one or more economic sectors, including electricity, transportation, industry, agriculture, and commercial and residential buildings. Some of the policies described below directly impact emissions—for example, through a price or regulation—whereas others address emission levels indirectly. The options below are not an exhaustive list of policy tools.

GHG Emissions (Carbon) Price

Governments may place a price on GHG emissions—often described as a carbon price—which typically involves either a carbon tax (emissions fee) or an emissions cap-and-trade system. Both approaches would place a price—directly or indirectly—on GHG emissions or their inputs, namely fossil fuels. A key difference between these approaches is that (in general) an emissions cap provides certainty about the ultimate emissions level, whereas taxes/fees provide certainty about the emission price level. A carbon price creates a financial incentive to reduce GHG emissions; promotes the displacement of higher carbon-intensive sources (e.g., fossil fuels) with lower carbon-intensive sources (e.g., renewables); spurs innovation in emission reduction technologies; and stimulates actions that may decrease emissions, such as efficiency improvements.

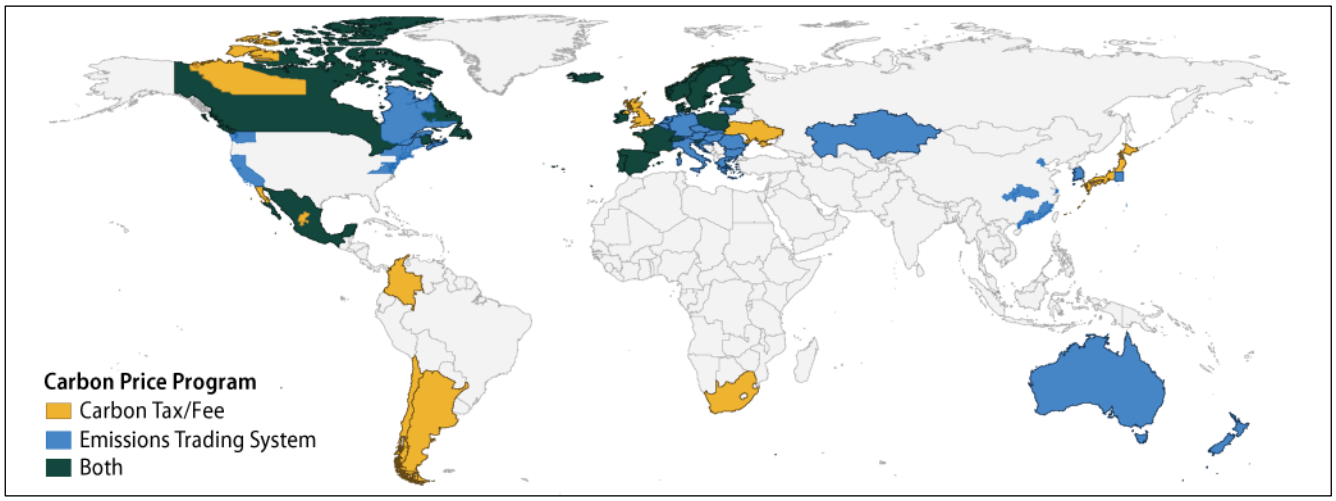
As illustrated in **Figure 1**, 32 countries and 27 subnational governments have carbon price programs in place. According to a 2020 World Bank report, a number of additional countries are considering carbon price programs.

Technology or Performance Standards

Policymakers may establish technology standards or performance requirements on a range of emission sources or their inputs, such as fuels. Examples of climate-related technology or performance standards include

- Corporate Average Fuel Economy (CAFE) and GHG emission standards for motor vehicles; renewable fuels standards or low carbon fuel standards;
- emission performance standards for electric power plants or oil and natural gas production facilities; and
- energy efficiency standards for consumer products and industrial equipment; and building codes or standards for building components, such as windows and insulation.

Figure 1. National and Subnational Carbon Pricing Programs

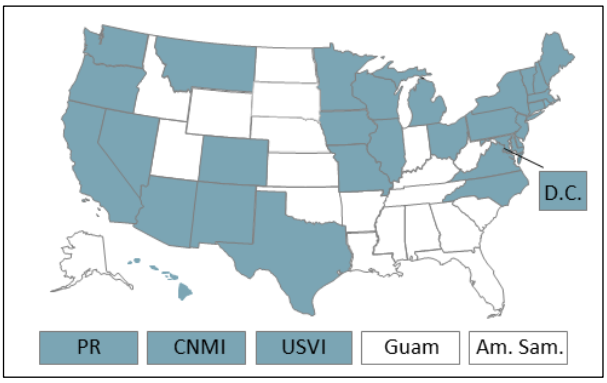


Source: CRS using data from World Bank, "Carbon Pricing Dashboard," as of November 1, 2020, https://carbonpricingdashboard.worldbank.org.

Electricity Portfolio Standards

Renewable portfolio standards and clean energy standards aim to change the technologies used to generate electricity. Portfolio standards establish a minimum amount of electricity generated by specified technologies, such as renewable energy, nuclear energy, or other eligible options. Portfolio standards apply across an electricity generating system, such as a utility—not to individual power plants. Thirty states, three U.S. territories, and the District of Columbia have mandatory portfolio standards (**Figure 2**).

Figure 2. States and U.S. Territories with Mandatory Electricity Portfolio Standards



Source: CRS, using data from Database of State Incentives for Renewables & Efficiency, September 2020, https://www.dsireusa.org.

Emission or Carbon Offsets

An emission (or carbon) offset is a measurable reduction, avoidance, or sequestration of GHG emissions from a source not covered by an emission reduction program. Offset projects often involve land-based activities, such as reforestation or specific agricultural practices. Many companies and some consumers purchase offsets voluntarily to reduce their net emissions. For example, the International Civil Aviation Organization established the Carbon Offsetting and Reduction Scheme for International Aviation to offset the projected annual increase in total CO_2 emissions from international civil aviation. Emission offsets have generated controversy and raised concerns, including the credibility of actual emission reductions and environmental justice issues more generally.

Public Investment in Research and Development

Technological advances in both energy services and industrial processes can help address a range of objectives, including climate change mitigation. In general, economists contend that the private sector limits investment in research and development (R&D), because companies cannot capture all the benefits of their investments. The federal government has played an important role in supporting R&D efforts that have led to scientific breakthroughs and new technologies across a range of sectors. Through this support, governments can play a role in shaping the direction and pace of technological developments.

Tax Policies

Tax credits or other types of tax incentives can encourage business investment in certain GHG-mitigating technologies, such as renewable energy generation or carbon capture and sequestration, accelerating their adoption. Likewise, governments use tax policies to encourage consumers to purchase certain products, such as electric vehicles, solar panels, or household energy efficiency improvements. Some taxes, such as the gasoline tax, may discourage the use of particular products that produce GHGs.

Government Procurement

Governments are a major purchaser of materials and goods (e.g., light bulbs, concrete, steel) and lessee of buildings. Policymakers can help drive technological advancement through procurement policies, which may include setting GHG or energy performance standards and/or guaranteeing purchase of that technology or material at a particular price, or by purchasing a less-emitting technology or material.

Policy Options to Increase Carbon Removal

Carbon removal includes a suite of activities that remove CO_2 from the atmosphere and store it underground, in living organisms, or in certain products. Carbon removal efforts often involve terrestrial carbon sequestration, in which naturally occurring processes (e.g., photosynthesis) store atmospheric carbon in forests, croplands, and other land types. Carbon removal also may involve emerging technologies such as direct air capture. Climate mitigation models generally project that some level of carbon removal activities will be necessary to achieve net zero emission goals. A range of policy tools could support carbon removal efforts, including direct funding, tax incentives, or public investment in R&D. Some carbon removal activities might qualify as emission offsets in a cap-and-trade system or voluntary program. Policymakers may support this inclusion by establishing programs to measure, monitor, and verify the carbon removal of particular activities. In addition, if policymakers establish a carbon tax or fee on emissions, they might consider allotting a portion of the new revenue stream to support carbon removal efforts.

Policy Considerations

If Members of Congress decide to establish federal programs or policies to mitigate GHG emissions, they may consider one or more of the above policy approaches. The options described above are not mutually exclusive and could be combined to address different sectors and GHG emissions sources, while supporting related objectives. When crafting a climate mitigation approach, Members may assess a range of potential concerns and how particular policies could be designed to address them. In particular, Members may consider policy design options that help alleviate some of the expected consequences of mitigation, which may include economy-wide impacts, disproportionate costs to lower-income households, job losses in certain industries, or impacts to carbon-intensive, trade-exposed industries. They also may consider the trade-off between estimated mitigation costs with the benefits of avoiding climate change, as well as "co-benefits," such as air pollution reductions, relative to the estimated costs to society of taking no action. In addition, Members may consider how policies would foster international cooperation or enhance competition.

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