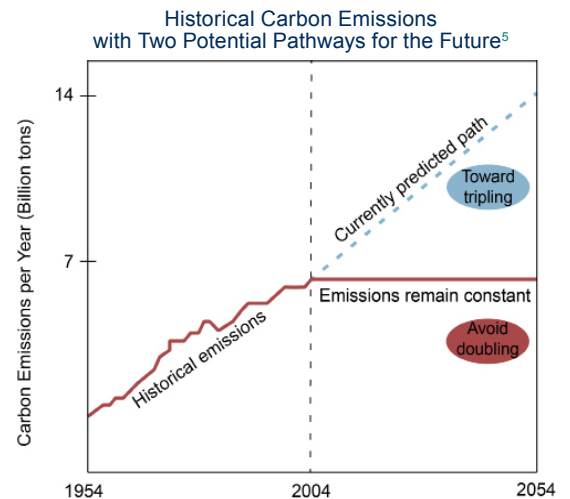


# Climate Change: Policy and Mitigation

## The Challenge

Climate change is a global problem that will require global cooperation to address. The objective of the United Nations Framework Convention on Climate Change (UNFCCC), which virtually all nations, including the U.S., have ratified, is to stabilize greenhouse gas (GHG) concentrations at a level that will not cause “dangerous anthropogenic (human-induced) interference with the climate system.”<sup>1</sup> Due to the persistence of the increased concentrations of GHGs, significant emissions reductions must be achieved in coming decades to meet the UNFCCC objective. Unrestricted growth in global emissions is projected to lead to a 5% increase in CO<sub>2</sub> concentration levels from 2011 to 2030 and between a 74-202% increase by 2100.<sup>2</sup> Stabilizing CO<sub>2</sub> at 450 parts per million (ppm) in the atmosphere by the year 2100 (which will likely keep temperature change below 2°C relative to pre-industrial levels) will require lowering global CO<sub>2</sub> emissions in 2050 by 40-70% compared to 2010, and will require emissions levels near zero GtCO<sub>2</sub>e in 2100.<sup>2</sup> Stabilization at 500 ppm, almost double the pre-industrial concentration, could be achieved by holding GHG emissions constant for 50 years and then reducing emissions by two-thirds over the following 50 years.<sup>3</sup> In 2014, U.S. GHG emissions were 6.9 GtCO<sub>2</sub>e.<sup>4</sup>



## General Policies

### Market-Based Instruments

- Market-based approaches include carbon taxes, subsidies, cap-and-trade programs, and emissions standards.<sup>6</sup>
- In a tradable carbon permit system, permits equal to an allowed level of emissions are distributed to each party. Parties with emissions below their allowance are able to sell their excess permits to other parties that have exceeded their emissions allowance.<sup>6</sup>
- Market-based instruments are recognized for their potential to cost-effectively reduce emissions by allowing for flexibility and ingenuity in the private sector.<sup>6</sup>

### Regulatory Instruments

- Regulatory approaches include non-tradable permits, technology and performance standards, product bans, and government investment.<sup>6</sup>
- In 2007, the U.S. Supreme Court ruled that the Environmental Protection Agency (EPA) can regulate CO<sub>2</sub> emissions from mobile sources under the Clean Air Act.<sup>7</sup> In 2012, after several appeals, the U.S. Court of Appeals upheld the original ruling.<sup>8</sup>
- In the U.S., Corporate Average Fuel Economy (CAFE) standards for vehicles, administered by the National Highway Traffic Safety Administration (NHTSA), are intended to decrease carbon emissions by reducing gasoline consumption.<sup>6</sup> In 2012, the EPA and the NHTSA finalized CAFE and EPA GHG emission standards requiring new vehicles to meet an average emissions level of 163 grams of CO<sub>2</sub> per mile, or 54.5 miles per gallon, by model year 2025.<sup>9</sup>

### Voluntary Agreements

- Voluntary agreements take many forms, but, in general, are an agreement between a government agency and one or more private parties to “achieve environmental objectives or to improve environmental performance beyond compliance.”<sup>2</sup>
- The EPA partners with the public and private sectors to oversee a variety of voluntary initiatives, including GHG emissions reductions, clean energy, and climate change adaptation.<sup>10</sup>

## The Kyoto Protocol

The Kyoto Protocol came into force on February 16, 2005. The Protocol established mandatory, enforceable targets for GHG emissions. Initial emissions reductions for participating countries ranged from -8% to +10% of 1990 levels, while the overall reduction goal was 5% below the 1990 level from 2008 to 2012.<sup>11</sup> When the first commitment period ended in 2012, the Protocol was amended for a second commitment period; the new overall reduction goal would be 18% below 1990 levels by 2020.<sup>12</sup>

- The Protocol is based on three GHG emission reduction mechanisms: Joint Implementation (JI), Clean Development Mechanism (CDM), and International Emissions Trading.<sup>12</sup>

## The Paris Agreement

In December of 2015, all Parties of the UNFCCC reached a climate change mitigation and adaptation agreement, called The Paris Agreement, in order to keep global temperatures below a 2°C increase above pre-industrial temperatures. The agreement will be enforced 30 days after 55 countries ratify the agreement. The 55 countries must account for at least 55% of the global emissions.<sup>13</sup>

- As of May 20, 2016, The Paris Agreement had 177 signatories of which 17 parties have ratified the agreement accounting for 0.04% of global emissions.<sup>14</sup>

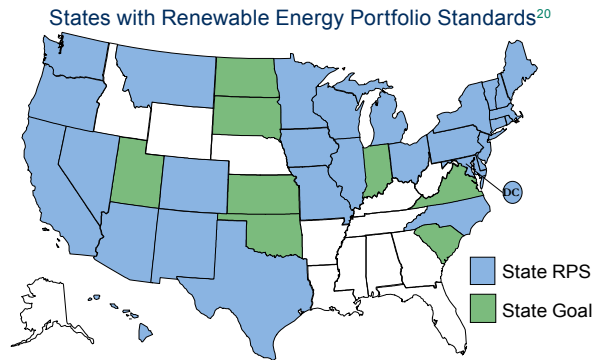
# Government Action in the U.S.

## Federal Policy

- According to the U.S. Senate, "...Congress should enact a comprehensive and effective national program of mandatory, market-based limits and incentives on emissions of greenhouse gases that slow, stop, and reverse the growth of such emissions at a rate and in a manner that will not significantly harm the United States economy and will encourage comparable action by other nations..."<sup>15</sup>
- In 2015, the Clean Power Plan was proposed that sets a national limit for CO<sub>2</sub> emissions from power plants. On February 9, 2016, the plan was stayed by the Supreme Court due to several lawsuits against it.<sup>16</sup>
- Due to the Consolidated Appropriations Act of 2008, large emitters of GHGs in the U.S. must report emissions to the EPA.<sup>17</sup>

## State Policy

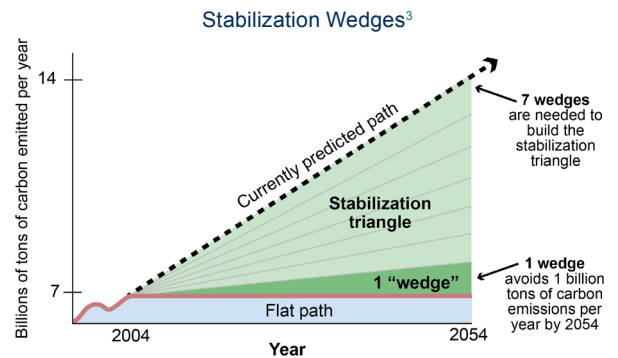
- Climate change action plans have been enacted by 34 states and D.C.<sup>18</sup>
- Twenty states and D.C. have greenhouse gas emission reduction targets. For example, California has established targets to reduce emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050.<sup>19</sup>
- Twenty-nine states, D.C., and two U.S. territories have Renewable Portfolio Standards, which specify that a certain percentage of electricity be generated from renewable sources by a certain date.<sup>20</sup>



## Mitigation Strategies

Stabilizing atmosphere CO<sub>2</sub> concentrations cannot be accomplished without significant changes in energy production and use. Effective mitigation cannot be achieved without individual agencies working collectively towards reduction goals.<sup>2</sup> Stabilization wedges are one method of illustrating GHG reduction strategies; each wedge represents 1 billion tons of carbon avoided per year over 50 years.<sup>3</sup>

- **Energy Savings:** Many energy efficiency efforts require an initial capital investment, but the payback period is often only a few years. In 2009, the Washington Suburban Sanitary Commission entered a 10-year agreement to purchase 28% of their electricity from a local wind energy provider, saving \$1.2 million over the first four years.<sup>21</sup>
- **Fuel Switching:** Switching power plants and vehicles to less carbon-intensive fuels can achieve emission reductions in the short-term. For instance, switching from an average coal plant to a natural gas combined cycle (NGCC) plant can reduce CO<sub>2</sub> emissions by approximately 50%.<sup>2</sup>
- **Capturing and Storing Emissions:** CO<sub>2</sub> can be captured from large point sources during both pre- and post-combustion of fossil fuels. Once CO<sub>2</sub> is separated, it can be stored underground.<sup>22</sup> Alternatively through climate intervention strategies, existing CO<sub>2</sub> can be removed from the atmosphere through various Carbon Dioxide Removal (CDR) technologies and methodologies such as direct air capture and sequestration, bioenergy with carbon capture and sequestration, land management strategies, as well as many other methods.<sup>23</sup>



## Individual Action

- In the U.S., residential homes and personal vehicles are responsible for 32% of total GHG emissions.<sup>4</sup> There are many actions that individuals can take to reduce their daily GHG emissions; many involve energy conservation and can also save money.
- Choose a fuel-efficient vehicle and keep your car well maintained, including properly inflated tires.<sup>24</sup>
- Decrease the amount you drive by using public transportation, walking, riding a bike, telecommuting, or living closer to your work. Leaving your car at home for two days a week can prevent 4,000 lbs of CO<sub>2</sub> emissions per year.<sup>24</sup>
- Curb aggressive driving habits. During highway driving, aggressive acceleration lowers your gas mileage by 33% over smooth acceleration.<sup>25</sup>
- Ask your energy supplier about options for purchasing energy from renewable sources.
- When purchasing appliances, look for the Energy Star label and choose the most energy efficient model.
- Energy Star qualified light bulbs use 70-90% less energy than a typical incandescent bulb and last 10-25 times longer.<sup>26</sup> Turn off lights and appliances when they are not in use.
- Space heating is the largest user of household energy (42%).<sup>27</sup> Ensure that your home is properly sealed by reducing air leaks, installing the recommended level of insulation, and choosing Energy Star qualified windows.

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