

# The Cost of Reducing Greenhouse Gas Emissions

## Appendix Table

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This table summarizes the sources for the numerical values in Gillingham and Stock (*JEP*, 2018). This is a high-level overview, for details of specific calculations please contact the authors.

**Appendix Table: Sources for estimates in Table 2.**

<b>Policy</b>	<b>Reference</b>	<b>Estimate (\$2017/ton CO2)</b>	<b>Notes</b>
<b>A. Transportation</b>			
<b>Corn starch ethanol (U.S.)</b>			Policies to blend ethanol with gasoline
	Irwin, Good (2017)	-\$18	Below the E10 blend wall based on costs of non-ethanol oxygenates
	Authors' calculations	\$312	Subsidy value based on 2017 actual average RIN value and CARB (2017) average pathway emissions
<b>Biodiesel (U.S.)</b>			
	Used cooking oil	\$146	Subsidy value based on 2017 actual average RIN value and CARB average pathway emissions. Range excludes the biodiesel tax credit under the assumption that the tax credit does not raise the price of biodiesel but instead supplements the D4 RIN as a producer subsidy for biodiesel. In 2017, the tax credit was not in effect
	Tallow - au calculations	\$179	
	Soy oil - au calculations	\$251	contemporaneously so the entire subsidy value is attributed to the D4 RIN. The total subsidy value would be higher if LCFS credit prices were included as subsidies in addition to the D4 RIN value.
<b>Renewable Fuel Standard</b>			Policies requiring transportation fuels to contain a minimum amount of renewable fuels
	Sarica, Tyner (2013)	\$1.10 - \$15.70	
	Holland, Hughes, Knittel, Parker (2011)	\$72.70	
<b>Renewable Fuel Subsidies</b>			Policies to provide financial incentives for production of renewable transportation fuels
	Holland, Hughes, Knittel, Parker (2011)	\$103.30	
<b>Gasoline Tax</b>			Per gallon tax on gasoline
	Knittel, Sandler (2013)	\$18.20 - \$46.70	
<b>CAFE Standards</b>			Policies to set fuel efficiency and GHG emissions standards for certain vehicles
	Kok, Annema, van Wee (2011)	-\$107.40 to - \$155.40	
	Sarica, Tyner (2013)	\$224.80	
	Jacobsen (2013)	\$307.30	
<b>Low Carbon Fuel Standard</b>			Policies to limit the average emissions intensity of transportation fuels

	Holland, Hughes, Knittel, Parker (2011)	\$103.90	
	Holland, Knittel and Hughes (2009)	\$385 - \$2852	
<b>Cash for Clunkers</b>			Policy to provide financial incentives for consumers to trade in low efficiency vehicle and purchase new higher efficiency vehicle
	Knittel (2009)	\$270.80 - \$417	
<b>Dedicated Battery Electric Vehicle Subsidy</b>			Policy to provide financial incentives for consumers to purchase electric vehicles
	Archsmith, Kendall, Rapson (2015)	\$347.5 - \$637.30	
<b>B. Power Sector</b>			
<b>Wind Energy Subsidies</b>			Policies to provide financial incentives for wind energy projects
	Abrell, Kosch, Rausch (2017)	\$126.30 - \$264	
	Abrell, Kosch, Rausch (2017)	-\$5.60 to -\$8	
	Marcantonini, Ellerman (2013)	\$66.60	
	Frondel, Ritter, Schmidt, Vance (2010)	\$87.50	
	Metcalf (2009)	\$14.00	
	Callaway, Fowlie, McCormick (2015)	\$27 - \$93.7	
<b>Clean Power Plan</b>			National regulation to limit emissions from electricity generation in US
	Original EPA RIA (2015)	\$11	
<b>Concentrating Solar Power Expansion (China &amp; India)</b>			Policies to provide financial incentives for new concentrating solar power projects in India and China
	Ummel (2010)	\$101.20	
<b>Renewable Portfolio Standards</b>			State policies to mandate a certain percentage of renewables in overall energy mix
	Chen, Wiser, Mills, Bollinger (2009)	\$0 - \$241.10	
	Johnson (2014)	\$13 - \$189.20	
<b>Solar PV Subsidies</b>			Policies to provide financial incentives for solar PV energy projects
	Abrell, Kosch, Rausch (2017)	\$574 - \$1492.30	
	Abrell, Kosch, Rausch (2017)	\$1102 - \$2146.70	
	Hughes, Podolefsky (2015)	\$138.80 - \$209.30	

	Marcantonini, Ellerman (2013)	\$813.40	
	FrondeI, Ritter, Schmidt, Vance (2010)	\$1,159.60	
	Callaway, FowIie, McCormick (2015)	\$224.10 - \$763.90	
	Macintosh, Wilkinson (2011)	\$242.80 - \$287.70	
	Gillingham, Tsvetanov (2018)	\$376.90 - \$615	
<b>C. Energy Efficiency</b>			
<b>Energy Efficiency Programs (China)</b>			Potential for efficiency upgrades to urban production processes in different regions in China
	Wang, Bian, Cheng (2017)	\$297.70	
<b>Weatherization Assistance Program</b>			Policy to fund energy efficiency improvements and lower heating fuel usage in low-income households
	FowIie, Greenstone, Wolfram (2018)	\$346.20	
<b>Behavioral Energy Efficiency</b>			Program focusing on home energy reports
	Allcott, Mullainathan (2010)	-\$188.50	
<b>D. Land Use</b>			
<b>Reforestation</b>			Payments for ecosystem services to increase carbon sinks
	Jayachandran, de Laat, Lambin, and Stanton (2016)	\$0.60	
	Jack (2011)	\$9.70	
<b>Agricultural Emissions Policies</b>			Policies to limit GHG emissions from agricultural production
	De Cara, Jayet (2011)	\$49.80 - \$65.40	
<b>Soil Management</b>			Policies to limit GHG emissions through improved soil management techniques
	Beach, DeAngelo, Rose, Li, Salas, DelGrosso (2008)	\$56.90	
<b>Livestock Management Policies</b>			Policies to limit GHG emissions through improved livestock management techniques
	Beach, DeAngelo, Rose, Li, Salas, DelGrosso (2008)	\$71.20	
<b>E. Extraction and Other</b>			
<b>Methane Flaring Regulation</b>			State policy to limit methane flaring from natural gas production in North Dakota

<b>Reducing Federal Coal Leasing</b>	Lade, Rudik (2017)	\$20.40	Policies to reduce coal leasing on federal lands
	Gillingham, Stock (2016)	\$33 - \$68	
<b>National Clean Energy Standard</b>			National policies to mandate a certain percentage of "clean" energy in overall energy mix
	Sarica, Tyner (2013)	\$50.60 - \$112.40	

Notes: Source cost estimates were adjusted to 2017 dollars using the PCE price index.

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