

Reply to Questions for the Record
House Committee on Natural Resources,
Energy and Mineral Resources Subcommittee,
Oct 27th, 2021, oversight hearing titled
“*The Federal Coal Program: A Bad Deal for Taxpayers and a Threat to Climate.*”
Drew Shindell, Nicholas Professor of Earth Sciences, Duke University, Durham, NC

1. Dr. Shindell, would you be able to provide us the numbers for the real cost of renewables, including the current tax credits and how much they are?

The cost of electricity generation is calculated annually by the Energy Information Administration, a part of the US Department of Energy. Their 2021 report is available here: https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

Table 1a of that report provides the cost of electricity from renewables. Values for renewables include (in ¢ per kWh):

<i>Plant type</i>	<i>cost without tax credits</i>	<i>cost with tax credits</i>
Onshore wind	3.1	3.1
Offshore wind	11.5	11.5
Solar, standalone	3.1	2.9
Solar, hybrid	4.5	4.2
<i>For comparison (non-renewable)</i>		
Combined cycle	3.5	3.5
Combustion turbine	10.8	10.8

The table shows that the tax credits for solar power reduce costs by 0.2-0.3¢ per kWh and that either with or without those credits solar and wind are cheaper than electricity produced from fossil fuels, even though estimates such as these do not include the cost of environmental damages as described in my written testimony. Combined cycle generation uses gas, combustion turbines gas or coal.

2. Would you also be able to provide a breakdown on how you calculated the price of coal fired power and how you reached 40¢ per kWh?

I calculated environmental damages due to the air pollution and climate impacts of emissions from coal-fired power stations as causing 32¢ per kWh in damages. I added that to DoE values of current coal-fired power costing around 8-12¢ per kWh to get the total value of 40¢ per kWh (rounding to the nearest 10¢).

The damages are valuations of premature mortality and morbidity due to climate change and air pollution as well as climate-related damages other than health (e.g. sea-level rise, increases in severe storms and wildfires, labor losses due to extreme heat, etc.) and damages to crops resulting from both climate change and air pollution. However, the total damages are dominated by those associated with human health impacts, and those are in turn dominated by the effects of air pollution exposure. The impacts and their economic valuation are based upon observations of present-day pollution and heat exposure in the US and modeling of the portion of those that is attributable to coal, following peer-reviewed methods (Shindell, Climatic Change, 2015; using the US-specific methodology described in that study). Those methods are based upon well-established methods used the US EPA, the World Bank, the OECD and many others.

For the present calculations, the emissions associated with coal usage in the US for electricity generation have been updated to 2020 values from the US EPA's National Emissions Inventory (Mar 25, 2021 update of the NEI) and the exposure-response functions for the health impacts of air pollution have been updated to follow recent epidemiology that incorporates improved knowledge relative to older, more limited studies, as described in detail in our most recent paper (Shindell et al., Proceedings of the National Academy of Sciences of the United States, 2021). These lead to different values relative to damages attributable to coal-fired power presented in the 2015 paper. There have been reductions in emissions of air pollutants per unit of energy from coal relative to our 2015 analysis, but the improved epidemiology indicates that the health effects per unit of pollution exposure are much larger than those in the older study, so that in the end the 32¢ per kWh total environmental damages due to coal is slightly larger than the approximately 24¢ per kWh estimated in the 2015 study. As in the 2015 study, the value of the damages depends in part on the discount rate used to evaluate future impacts, with a range of roughly 20-45¢ per kWh over widely-used discount rate choices.