

## The Social Cost of Carbon

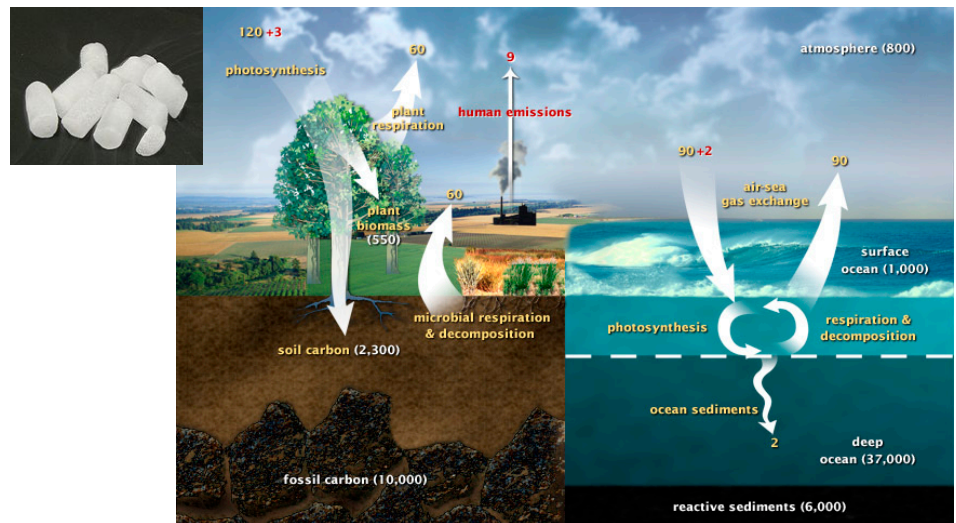
*Pseudoscience, deception, and a grab for power—all in one magic number*

By Marlo Lewis

**Summary:** *The Social Cost of Carbon is a number guesstimated by economists and then manipulated by bureaucrats and environmentalists to justify government activities ranging from the shutdown of coal-fired power plants to the regulation of microwave oven clocks. The problem is that it's a made-up number with no scientific validity, put out by flawed computer models using data from other flawed models and ignoring the huge cost of not using carbon-based energy.*

It's a number that underlies a wide range of government regulations. It's the foundation for taking away consumers' freedom of choice and for giving broad powers to politicians, judges, and bureaucrats. It has the potential to deprive the country of cheap and abundant energy and to do unimaginable harm to the U.S. economy. And when invoked to demand "action" on climate change, it's an utter con.

As a pretext for expanding political control of the economy and bilking the American people to the benefit of special interests, nothing beats the pseudoscience of the Social Cost of Carbon (SCC). Here's how it works: Government regulations are subject to cost-benefit analysis—that is, the executive branch of the federal government is required to establish that the benefits of a regulation will exceed the costs to society. That's a principle that, as Eric Posner of the University of Chicago Law School noted in *The New Republic*, was "brought to government by none other than Ronald Reagan, in Executive Order 12291 of 1981. Reagan was riding the wave of the deregulatory movement, which held that regulation of industry was excessive and stunted economic growth. His order stipulated that agencies should issue regulations only after finding that the benefits exceeded the costs." The principle became so well-established



**Carbon dioxide in solid form ("dry ice"), and an illustration of the carbon cycle (admittedly one that downplays the role of human-caused carbon emissions).**

that Democratic presidents Bill Clinton and Barack Obama renewed the order, with modifications.

But anyone familiar with the operation of bureaucracies should be able to spot the weak links in cost-benefit analysis of regulation: Who determines the cost? Who determines the benefit? Simply by changing one part of the formula or the other, you can justify anything.

### Carbon dioxide, in brief

Carbon dioxide (CO<sub>2</sub>) is the basic building block of planetary food chains. Plants use CO<sub>2</sub> to construct their tissues, all animals depend (directly or indirectly) on plants for food, and countless animal species depend on vegetation for critical habitat. A colorless, odorless gas, CO<sub>2</sub> is non-toxic to humans at more than 20 times current atmospheric concentrations. It is unlike any substance traditionally regulated as an "air pollutant." So why is CO<sub>2</sub> said to have a social "cost"? In addition to being a plant nutrient, CO<sub>2</sub>

is a "greenhouse" (heat-absorbing) gas. Like water vapor, the atmosphere's chief greenhouse gas, CO<sub>2</sub> helps keep the Earth habitably warm. But it is possible to have too much of a good thing. Many experts and legions of activists contend that CO<sub>2</sub> emissions from the combustion of coal, oil, and natural gas—fuels vital to manufacturing, transportation, and electricity generation—will cause dangerous global warming.

Since the mid-19th century, CO<sub>2</sub> concentrations have increased from 280 parts per million (ppm) to 396 ppm. During that period global temperatures increased

**February 2014**

The Social Cost of Carbon  
Page 1

The Drake Equation and the SCC  
Page 4

Green Notes  
Page 8

approximately 0.85°C. About half of that warming occurred between 1910 and 1940, before anthropogenic (human-caused) CO<sub>2</sub> emissions could have had much effect on planetary temperatures. Virtually all scientists agree that, other things being equal, a doubling of CO<sub>2</sub> concentrations above pre-industrial levels will warm the Earth by about 1°C. Most would also agree that a 1°C warming would likely have net benefits for human health and welfare. There is a reason, after all, that millions of retirees move from the cold north to the Sunbelt.

As discussed below, the theory that CO<sub>2</sub> emissions will cause dangerous warming is based on numerous speculative assumptions. Here's what we know for certain: The current warm period (roughly 1880 to the present) has been an era of unprecedented improvement in human health and welfare, natural variability remains the overwhelming cause of the strength and frequency of extreme weather events, and climate models increasingly project more warming than is actually observed. It's also a safe bet that future technologies for coping with drought, storms, and other adverse weather phenomena will surpass current technologies.

The Social Cost of Carbon is an estimate of how much climate change-related damage is supposedly done to society by an extra ton of CO<sub>2</sub> emissions. Because the SCC represents the supposed cost to society of carbon emissions, it's a critical factor in calculating the relative benefit-to-cost of any regulation that is supposed to affect these emissions. Raise the SCC estimate high enough and it can appear to justify almost any CO<sub>2</sub>-reduction measure, no matter how expensive.

---

**Editor:** Steven J. Allen

**Publisher:** Terrence Scanlon

**Address:** 1513 16th Street, NW  
Washington, DC 20036-1480

**Phone:** (202) 483-6900

**E-mail:** [sallen@CapitalResearch.org](mailto:sallen@CapitalResearch.org)

**Website:** [CapitalResearch.org](http://CapitalResearch.org)

**Green Watch** is published by Capital Research Center, a non-partisan education and research organization classified by the IRS as a 501(c)(3) public charity. Reprints are available for \$2.50 prepaid to Capital Research Center.

---

SCC analyses can make uneconomic “renewable” energy look like a bargain at any price, and make traditional carbon-based fuels look unaffordable no matter how cheap. The political function of SCC analysis is to legitimize a wide range of anti-CO<sub>2</sub> measures—cap-and-trade, carbon taxes, wind power mandates, “green jobs” subsidies, and other schemes to rig energy markets.

### Spot the externalities

All economic activities have “externalities”—costs or benefits not reflected in the prices people pay for the associated goods and services. Pollution is a common example of a “negative” (harmful) externality. Thus, it sounds plausible that CO<sub>2</sub> emissions have a social cost.

SCC analysts calculate carbon's social cost down to the penny, creating the impression that they are reporting an objective magnitude like the price of wheat futures at the end of a trading day. In fact, the social cost of carbon is an unknown quantity. For example, see if you can discern, from the following information, carbon's social cost via its supposed role in Global Warming:

- There has been no trend in the strength or frequency of land-falling hurricanes in the world's five main hurricane basins during the past 50-70 years.
- The U.S. is currently enjoying the longest period on record without a major (category 3-5) hurricane landfall.
- There has been no trend in the strength or frequency of tropical cyclones in the main Atlantic hurricane development region during the past 370 years.
- There has been no trend in U.S. hurricane-related damages since 1900, once economic losses are adjusted (“normalized”) for changes in population, wealth, and the consumer price index.
- There has been no trend in global normalized weather-related losses since 1960, and as a proportion of GDP, global weather-related losses since 1900 have been declining.
- There has been no trend since 1950 in the strength or frequency of tornadoes in the U.S.
- There has been no trend since 1900 in U.S. soil moisture as measured by the Palmer Drought Severity Index.

• There has been no trend in U.S. flood magnitudes over the past 85 years.

• Since the 1920s, global deaths and death rates related to extreme weather declined by 93% and 98%, respectively.

• Twenty-First Century sea-level rise due to ice loss on Greenland and West Antarctica is likely to be measured in inches, not feet or meters.

• The greater-than-present warmth of the Holocene Optimum (roughly 7000 to 3000 B.C.), Roman Warm Period (250 B.C. to A.D. 400), and Medieval Warm Period (A.D. 950 to 1250) contributed to improvements in human health and welfare. Warming has historically been *beneficial* to mankind.

• Historically, rising CO<sub>2</sub> emissions and concentrations are strongly correlated with improvements in per capita income, per capita food production, average lifespan, and public health.

A staple of global warming advocacy is the claim that climate change is “worse than we thought.” In reality, the 17-year pause in global warming, the growing divergence between climate model projections and observations (models on average overshoot the warming of the past 15 years by 300%), and more than a dozen recent papers on the critical issue of climate sensitivity (how much warming results from a doubling of CO<sub>2</sub> concentrations) all indicate that the state of the climate is *better* than they told us, even assuming that all such change is harmful.

Thus, if SCC analysis were an honest enterprise, the Obama administration's most recent SCC estimates (May 2013) would be lower than its initial (February 2010) estimates. Instead, the administration's 2013 SCC estimates for year 2020 (\$12, \$43, \$65, and \$129) were substantially higher than its 2010 SCC estimates for 2020 (\$6.80, \$26.30, \$41.70, and \$80.70).

The administration's revised SCC estimates are a product of political calculation, not science, argues Cato Institute climatologist Chip Knappenberger:

In this way, all qualifying rules and regulations, including the EPA's promised emissions limits on new and existing power plants, appear less costly—a critical asset, as costs are often the greatest barrier to approval.

Since the war on global warming is a high priority within the Obama administration, finding ways to make the social cost of carbon appear to be as high as possible is the ongoing objective.

Back in May [2013], the administration increased its previous estimate by more than 50%, from \$25 to \$40, which means that all proposed carbon dioxide emissions cuts are now some 50% more valuable.

### Putting out the trash

Just because a calculation is run through a computer doesn't mean that it makes any sense or has any relation to reality. Scientists call the processing of bad information to get bad results GIGO, "Garbage In, Garbage Out." This concept is so widely accepted that even Wikipedia notes—

**Garbage in, garbage out (GIGO)** in the field of computer science or information and communications technology refers to the fact that computers will unquestioningly process unintended, even nonsensical, input data ("garbage in") and produce undesired, often nonsensical, output ("garbage out").

The computer programs used to estimate carbon's social cost are called "integrated assessment models" because they integrate a model of how CO<sub>2</sub> emissions supposedly change the climate with a model of how climate change supposedly damages the economy.

That creates two opportunities for GIGO. *If either of the two models is flawed, the final model which combines them is flawed, perhaps useless.*

Finding the integrated assessment models (IAMs) "so deeply flawed as to be close to useless as tools for policy analysis," Robert Pindyck, a professor at MIT, cautions that "their use suggests a level of knowledge and precision that is simply illusory, and can be highly misleading." By tweaking the assumptions, modelers can get almost any estimate they want. Pindyck explains:

The modeler has a great deal of freedom in choosing functional forms, parameter values, and other inputs, and different choices can give wildly different estimates of the SCC and the optimal amount of abatement. You might think that some input choices are more rea-

sonable or defensible than others, but no, "reasonable" is very much in the eye of the beholder. Thus these models can be used to obtain almost any result one desires.

Is that the commentary of a hard-core "climate skeptic"? No. Pindyck believes CO<sub>2</sub> emissions "will eventually result in unwanted climate change." He even favors adoption of a carbon tax.

Two speculative inputs in particular determine IAM outputs, Pindyck notes, are *climate sensitivity*, which "translates increases in CO<sub>2</sub>e [carbon dioxide-equivalent] concentration to increases in temperature," and the *damage function*, which "translates higher temperatures into reductions in GDP and consumption."

The reader may be familiar with the Intergovernmental Panel on Climate Change, a body created by the United Nations to study the Global Warming issue (and, critics say, designed to promote alarm about manmade Global Warming regardless of what the evidence might show). The UN IPCC has long studied a key factor in Global Warming theory, how much carbon it takes to warm the atmosphere by a certain amount. This is usually calculated based on "doubling," a hypothetical 100% increase in atmospheric carbon.

The range of "likely" climate sensitivity estimates in the UN IPCC's first (1990) climate change assessment report was 1.5°C-4.5°C for a doubling of CO<sub>2</sub> concentrations. That's a wide range. Today, after more than two decades of research, the so-called likely range remains 1.5°C-4.5°C. Scientists have been unable to narrow the range, much less determine the actual value, Pindyck explains, because "the physical mechanisms that determine climate sensitivity involve crucial feedback loops, and the parameter values that determine the strength (and even the sign [i.e., positive or negative]) of those feedback loops are largely unknown, and for the foreseeable future may even be unknowable."

(A feedback loop is when Factor A causes Factor B, and Factor B in turn affects Factor A, back and forth in a cycle, or when 'A' causes 'B,' which causes 'C,' which causes 'A.' For example, imagine that rising temperatures cause water to evaporate, which creates clouds, which block sunlight, which cools things down. That is the sort of process

that can make it difficult to make predictions with computer models.)

As for the damage function component of SCC analysis, the part that assesses the harm supposedly caused by Global Warming, it is guesswork and yarn-spinning:

When assessing climate sensitivity, we at least have scientific results [e.g. temperature data] to rely on, and can argue coherently about the probability distribution that is most consistent with those results. When it comes to the damage function, however, we know almost nothing, so developers of IAMs can do little more than make up functional forms and corresponding parameter values. And that is pretty much what they have done.

None of the loss functions that modelers select are "based on any economic (or other) theory," Pindyck adds. "They are just *arbitrary functions*, made up to describe how GDP goes down when T [temperature] goes up."

Damage functions are speculative because no one knows how human adaptive capabilities will develop over time. Since technology is what enables humans to adapt to whatever climatic conditions they happen to live in, SCC analysts must make assumptions about technological change over the next 50-100 years and beyond. Good luck with that! (Imagine someone in 1914 predicting today's technology, from antibiotics and DNA testing to GPS, the Internet, and iPhones.)

In a study for the Reason Foundation, economist Indur Goklany finds that modelers often fail to account for reasonably anticipated changes in future adaptive capabilities, and thus "substantially overestimate future net damages from global warming." For example, an impact assessment used in the UK Government's *Stern Review of the Economics of Climate Change* assumed that farmers in 2025, 2050, and 2085 would adapt to climate change with 1990s technologies "rather than technologies available at the time for which impacts are estimated."

Of course, societies will adapt more easily to climate change if CO<sub>2</sub> emissions have benefits ("positive externalities") as well as costs. Carbon dioxide is the basic compound from which plants construct their tissues,



and literally thousands of laboratory and field experiments demonstrate that plants raised in CO<sub>2</sub>-enriched environments grow faster and larger, utilize water more efficiently, and are more resistant to drought, pests, pollution, and other stresses.

In a recent study based on a large database of such research, climate researcher Craig Idso estimates that rising CO<sub>2</sub> concentrations boosted global agricultural output by \$3.2 trillion during the past 50 years and will increase yields by another \$9.8 trillion between now and 2050. Incorporating “CO<sub>2</sub> fertilization” benefits of that magnitude in IAMs would significantly reduce most SCC estimates. (The IAMs, remember, are the computer models that combine speculation about both Global Warming’s effects and the degree to which carbon dioxide in the air causes Global Warming.)

Two of the three IAMs the Obama administration uses to estimate the SCC, the Dynamic Integrated Climate Economy (DICE) and Policy Analysis of the Greenhouse Effect (PAGE) models *have no CO<sub>2</sub> fertilization benefit*.

That omission alone renders those two models unfit to guide policymakers. As Idso concludes:

The very real positive externality of inadvertent atmospheric CO<sub>2</sub> enrichment must be considered in all studies examining the SCC; and its observationally-deduced effects must be given premier weighting over the speculative negative externalities presumed to occur in computer model projections of global warming. Until that time, little if any weight should be placed on current SCC calculations.

### Accounting gimmicks

The idea of a “discount rate” may sound complicated, but the concept is simple. Just as a bird in the hand is worth two in the bush, \$100 in your pocket today is worth more than a promise to pay you \$100 a year from today. Lottery winners usually take the immediate lump-sum payment, even though it is much less than the amount that would be paid over time. Since the beginning of civilization, much of the economic activity in the world is based on this concept, and any business person is familiar with the math, the “discount rate,” that’s used to determine the *present* value of *future* sums of money.

That principle applies to any future harm, such as harm caused by Global Warming. One of the easiest ways to get big, scary-sounding SCC estimates is to select low discount rates when making the calculations.

## Like the Social Cost of Carbon? You'll love the Drake Equation

by Steven J. Allen

The Social Cost of Carbon isn’t the only instance in which scientists concoct a phony formula designed to fool the public, and sometimes fool themselves.

Perhaps the most famous such formula is the Drake Equation, which is used to estimate the chance that we will contact aliens from outer space. (I’m simplifying things slightly.) Proposed by astronomer Frank Drake at a 1961 conference on SETI (the search for extra-terrestrial intelligence), the formula multiplies estimates of the number of stars, times the number of planets around the average star, times the portion of those planets that might support life, and so forth, to come up with an estimate of the number of civilizations with whom we might someday communicate.

One parallel to SCC is that the Drake Equation is self-serving to scientists and reflects their wishful thinking. Remember: The equation was created at a conference on the search for aliens, then used to justify public interest in and funding for the search for aliens.

Another parallel is that each part of the formula is highly speculative. A tiny change in each factor is enough to create a huge difference in the final result, and the estimated range for some factors is so large that no reasonable guess can be made.

Some scientists believe that earthlike conditions are common in the universe. Others (correctly, in my view) believe that the earth has many characteristics necessary for intelligent life, from its dense, gravity-producing core to its binary, regulatory relationship with the moon, that are very rare among

planets. But it’s the SETI-believers who dominate the public discussion and the popular imagination, because, well, the universe would be a lot cooler if everything were like *Star Trek*. So the Drake Equation is often presented as if it were proof of the likelihood of intelligent aliens.

The person who did the most to popularize the equation was present at that 1961 SETI conference. His name: Carl Sagan. Sagan, as noted in the December *Green Watch*, often used pseudoscience to push his opinions. Like many scientists who happen to be atheists or agnostics, he saw SETI as a counterweight to religion. Critics of the equation see SETI itself as a sort of religion, one that, like environmentalism and unlike many traditional religions, is socially acceptable in the academic world.

The late Michael Crichton, a physician and the creator of *Jurassic Park* and the TV show *ER*, said of the Drake Equation:

The problem, of course, is that none of the terms can be known, and most cannot even be estimated. The only way to work the equation is to fill in with guesses. . . . As a result, the Drake equation can have any value from “billions and billions” to zero. An expression that can mean anything, means nothing. Speaking precisely, the Drake equation is literally meaningless . . .

The Drake Equation is to astronomy what the Social Cost of Carbon is to public policy—nothing more than a magicians’ trick performed with math.

*Dr. Steven J. Allen (JD, PhD) is editor of Green Watch.*

Most of the damage from a ton of CO<sub>2</sub> emitted today is assumed to occur in future decades, even centuries from now. Modelers use discount rates to calculate the present value of future costs and benefits. As noted, discounting reflects the fact that people tend to attach less value to costs and benefits in the future, especially the remote future, than they do to costs and benefits in the present. The lower the selected discount rate, the larger the present value of future CO<sub>2</sub>-related damages, and the larger the estimated SCC.

In its guidance on regulatory analysis for the federal government, a document known as Circular A-4, the Office of Management and Budget (OMB) instructs agencies to use discount rates of both 7% (the “average before-tax rate of return to private capital” in the U.S. economy) and 3% (the average rate of return on long-term government bonds). But in both its 2010 and 2013 SCC analyses, the Obama administration used only discount rates of 2.5%, 3%, and 5%. The discrepancy may look like small potatoes, but through the miracle of compounding, small differences in the annual discount rate add up to big bottom-line differences.

For example, in the administration’s 2013 assessment, the SCC for 2010 is \$11 per ton at a 5% discount rate but \$52 per ton at a 2.5% discount rate. “In other words,” notes economist Robert Murphy of the Institute for Energy Research, “cutting the discount rate in half caused the reported SCC to more than quadruple.”

What would happen to the administration’s SCC estimates if the models were run with a 7% discount rate, in accordance with OMB best practices?

Heritage Foundation analysts Kevin Dayaratna and David Kreutzer found that the SCC estimates generated by one of the models “shift substantially”—that is, are much lower—when reasonable alternative inputs, such as a 7% discount rate, are substituted for just a few of the assumptions made by the modeler. Specifically:

- Using a 7% discount rate reduces the DICE model’s 2020 SCC estimate by more than 80%.
- Using the climate sensitivity range indicated by recent studies reduces the 2020 SCC estimate by 40%.
- If, in addition to those substitutions, projections of future damages are limited to an

almost plausible time span (through 2150 rather than all the way to 2300, as in the DICE model), the 2020 SCC estimate “falls by nearly 90%, from \$37.79 to \$4.03.”

Dayaratna and Kreutzer conclude that the DICE model is “loaded” and unfit to guide policy decisions:

Since moderate and defensible changes in assumptions lead to such large changes in the resulting estimates of the SCC, the entire process is susceptible to political gaming. This problem exacerbates the model’s more fundamental and more serious shortcomings in estimating damages in the first place. While running the DICE model (and similar integrated assessment models) may be a useful academic exercise in anticipation of solving these very serious problems, the results at this time are nowhere near reliable enough to justify trillions of dollars of government policies and burdensome regulations.

#### **Harm to the U.S.... or the world?**

Murphy of the Institute for Energy Research calls attention to another accounting trick that inflates SCC estimates. It, too, flouts OMB’s regulatory best practices. (A “best practice” is a method or technique that consistently shows superior results and that is used as a standard.) The administration’s February 2010 SCC assessment acknowledges that, “Under current OMB guidance contained in Circular A-4, analysis of economically significant proposed and final regulations from the domestic perspective is required, while analysis from the international perspective is optional.” Yet the May 2013 update reports only *global* SCC estimates. The effect is to make climate change appear to be a bigger problem for the U.S. than even the flawed underlying analysis indicates.

The global SCC incorporates SCC estimates for developing countries, which have fewer resources for adapting to climate change. According to the administration’s 2010 SCC report, “a range of values from 7% to 23% should be used to adjust the global SCC to calculate domestic effects.” Thus, when the administration estimates that the global SCC in 2010 is \$33 per ton, the corresponding domestic impact is only \$2-\$8 per ton. Not publishing the lower domestic impact helps the EPA pretend that its climate regulations pass a cost-benefit test. Murphy explains:

Suppose the EPA issues a new regulation that causes private industry to restrict carbon emissions, and that the compliance costs (in terms of forfeited economic output in the U.S. because of the new regulation) work out to \$25/ton. Using the [administration’s] recent headline SCC estimate of \$33/ton, this regulation would apparently pass a cost/benefit test, because the \$25 cost to American industry for every ton of restricted emissions would be counterbalanced by \$33 in avoided future climate change damage. However, Americans would still on net be hurt by the regulation, as they would only receive \$2 to \$8 of the stipulated benefits (i.e. avoiding the domestic social cost of carbon on each ton no longer emitted), while suffering the full \$25 in compliance costs.

Actually, all domestic carbon-reduction policies are bound to fail a cost-benefit test. Using the UN IPCC’s mid-range warming scenario, Cato’s Knappenberger calculates that the total U.S. contribution to the earth’s warming will be less than 0.02°C by 2100. An aggressive carbon tax might cut that contribution in half. But a 0.01°C reduction in warming—one-hundredth of a degree—would have no discernible impact on sea-level rise, weather patterns, or any other climate variable potentially affecting public health and welfare. In contrast, carbon taxes could significantly increase household and business energy costs, reducing GDP growth and per capita income. The policy’s very real costs would outweigh its hypothetical benefits.

**Editor’s note:** Incredibly, some environmentalists demand that the SCC calculation must include such fantastical speculative notions as the cost of future wars caused by shortages or by people moving from one region to another due to Global Warming. The inclusion of this factor in their version of the SCC is particularly amusing, given that a common trope in left-wing science fiction, known as the Genghis Gambit, is the idea that an existential threat—one like Global Warming—would cause the world’s nations to put aside their differences and unite in peace and brotherhood! Of course, a key difference between environmentalists and, say, *Star Trek* fans is that the latter insist on a certain degree of continuity in their science fiction stories.—*SJA*

## Repackaging uneconomic energy as a bargain at any price

A recent study by economists Laurie Johnson, Starla Yeh, and Chris Hope, *The Social Cost of Carbon: Implications for Modernizing Our Electricity System*, has the unintentional virtue of exposing what a menace SCC analysis has become.

Johnson, Yeh, and Hope (known collectively as JYH) compute carbon's social cost using discount rates even lower than the low-end of the Obama administration's range. The administration, using 5%, 3%, and 2.5% discount rates, produced year-2010 SCC estimates of \$11, \$33, and \$52 per ton. The JYH study, using discount rates of 2%, 1.5%, and 1%, produces SCC estimates of \$62, \$122, and \$266 per ton. JYH's lowest SCC estimate is higher than the administration's highest SCC estimate.

Those big numbers could leverage a lot of mischief if adopted by federal agencies, which is a distinct possibility. Johnson and Yeh are analysts with the Natural Resources Defense Council (NRDC), a key ally of the Obama administration's climate policies. [For more on the NRDC, see the August 2003 *Organization Trends* and various other CRC publications.] Chris Hope is the creator of the PAGE model, one of the three principal IAMs underpinning the administration's SCC estimates.

JYH translate their SCC estimates into cents-per-kilowatt estimates, and then "compare the total social cost (generation plus environmental costs) of building new generation from traditional fossil [i.e., carbon-based] fuels versus cleaner technologies." They also "examine the cost of replacing existing coal generation with cleaner options, ranging from conventional natural gas to solar photovoltaic." Their results are exactly what Global Warming campaigners want to hear:

1. In a full accounting that incorporates environmental damages, renewable energies are always more "efficient" than new coal generation, and usually more efficient than new gas generation.
2. If the SCC is \$266/ton or even \$122/ton, switching from coal to solar or installing carbon capture and sequestration (CCS) is more "efficient" than maintaining an existing coal power plant.

In the authors' words:

We find that for most SCC values, it is more economically efficient (from a social cost-benefit perspective) for the new generation to come from any of these cleaner sources rather than conventional coal, and in several instances, the cleanest sources are preferable to conventional natural gas. For existing generation, for five of the six SCC estimates we examined, replacing the average existing coal plant with conventional natural gas, natural gas with carbon capture and storage, or wind increases economic efficiency. At the two highest SCCs, solar photovoltaic and coal with carbon capture and storage are also more efficient than maintaining a typical coal plant.

An obvious objection is that the average cost of generating electric power from today's existing fleet of coal-fired power plants is 3.0 cents/kilowatt-hour, as JYH acknowledge. To all relevant economic actors—consumers, power producers, and shareholders—that is pretty darn efficient. At three cents, society is getting a whole lot of bang for very little electricity buck.

But, argue JYH, a \$266/ton SCC makes the "real" cost of electric power from existing coal plants ten times greater:

Specifically, at \$266/ton CO<sub>2</sub>, the average coal plant costs 34.5 cents/kWh (more than ten times its direct generation costs) versus 15.1 and 13.3 cents/kWh, respectively, for new coal with CCS and solar. At \$122/ton CO<sub>2</sub>, the average coal plant costs 18.7 cents/kWh versus 13.8 and 13.3 cents/kWh, respectively.

So here is the madness to their method. Having selected very low discount rates to produce very high SCC estimates, JYH compare their make-believe price of coal- or gas-fired electricity with the actual market price of wind- or solar-generated electricity. They then deduce that wind and solar are cheaper than new gas, and that replacing existing coal power plants with renewable energy will make the overall economy more efficient. That is loopy.

Any serious attempt to repower America with wind turbines and solar panels would cause electric rates to skyrocket. The premature retirement of the existing U.S. coal fleet, which supplies 40% of U.S. electric power, would destroy hundreds of billions

of dollars in shareholder value. In addition, regulating or taxing natural gas generation based on SCC estimates of \$122-266/ton would trigger massive capital flight from the gas industry.

And if SCC estimates demand corrective taxes for coal and gas, why not for oil, too? Such measures would snuff out the entire shale revolution—the most important source of new jobs, investment, tax revenue, and U.S. competitive advantage of the past 20 years.

Even if those "transitional" costs could somehow be avoided, wind and solar energy are simply too costly, intermittent, and unreliable—in a word, too inefficient—to power a modern economy. In 2012, wind and solar technologies provided 3.46% and 0.11% of U.S. electric generation, respectively. Wind and solar would not make even those meager contributions if not for mandatory production quotas in 29 states and other policies that subsidize their use.

Swapping out existing coal with solar and installing wind turbines instead of new gas would compel America to spend lots more for a more costly, smaller, and less reliable electricity supply. How can that possibly be *economically efficient*?

JYH try to finesse renewable electricity's well-known deficiencies: "An ideal comparison of costs would be one that adjusted for the intermittency of renewable sources, which is not captured in a levelized cost comparison. Adjusting for this factor is beyond the scope of this analysis, so the estimates here should be viewed as a first approximation."

In other words, JYH place "beyond the scope" of their analysis the very thing that: (1) makes kilowatts from wind and solar power less valuable than kilowatts from coal, gas, or nuclear energy; (2) renders wind and solar energy unfit to provide base load electricity (power you can depend on 24/7); and (3) disqualifies wind as a source of peaking power on summer days when the heat is intense precisely because the wind is *not* blowing.

In a study of three interconnection regions that account for more than half of U.S. installed wind capacity, economist Jonathan Lesser found that during 2009-2012, over 84% of the installed wind generation failed to produce electricity when demand



was greatest. During peak hours on high demand days, only 1.8% to 7.6% of wind infrastructure generated power in the Midwest (ISO) region, only 6.0% to 15.9% of installed wind generated power in the Texas (ERCOT) region, and only 8.2% to 14.6% of installed wind produced power in the East Coast (PJM) region.

An electric power station that fails to produce during a heat wave is like subway service that's available except during rush hour. Neither is of much value, regardless of how "competitive" the rates may seem to some SCC analysts.

As Lesser put it, forcing taxpayers and ratepayers to subsidize wind "is like asking someone to pay for a taxi that does not show up when it's raining." But armed with their SCC estimates, JYH can claim the no-show taxi is a bargain at any price!

Still, JYH are to be congratulated for clarifying the nature and purpose of SCC estimation. SCC analysts adjust computer model inputs to create the illusion that uneconomic energy is "more efficient" than economic energy. They do so for the purpose of advancing an agenda that could severely damage the economy.

### **Making carbon-based fuels look unaffordable**

The same assessment can also be stated this way: SCC analysis is a political strategy for making carbon energy, especially coal-based power, look unaffordable no matter how cheap.

The administration's SCC estimates for the year 2020 range from \$12/ton CO<sub>2</sub> at the low end to \$129/ton CO<sub>2</sub> at the high end.

What this means, according to electric power industry analyst Bob Kapplemann, is that the administration implicitly attributes over \$210 million a year in social costs to a mid-sized (600 megawatt) pulverized coal power plant and over \$74 million a year to a natural gas combined cycle power plant. In the case of the coal plant, the CO<sub>2</sub> portion of the social cost is 75% (with 25% attributed to particulate matter and other contaminants). In the case of the gas plant, CO<sub>2</sub> accounts for 97% of the social cost.

Given those damage estimates, "even radical reductions" in existing coal-fired generation can look economically justified.

For example, assume the administration's central SCC estimate of \$43/ton CO<sub>2</sub> in 2020, and wind and solar power become cheaper than new coal generation. Assume the administration's high SCC estimate of \$129/ton CO<sub>2</sub>, and renewable energy becomes cheaper than new gas. By fiddling with discount rates, climate sensitivity estimates, or damage functions, the EPA could easily raise SCC estimates to the point where the numbers appear to justify regulations forcing the premature shutdown of existing coal-fired generation and even gas-fired generation.

The economic effects of such bogus efficiency would likely be devastating. The Social Cost of Carbon has truly become a menace to society.

### **Inherently biased**

As noted, SCC estimates derive from speculations about climate sensitivity (how feedback mechanisms, positive or negative, will amplify or damp down the direct warming effect of rising CO<sub>2</sub> concentrations), climate impacts (how projected warming will affect weather patterns, ice-sheet dynamics, sea-level rise, and eco-system services), economic impacts (how projected changes in temperature, weather, and sea-levels will affect agriculture, forestry, tourism, and other climate-related activities), and technological change (how adaptive capacities will develop to limit climate change-related losses). Uncertainties accumulate through each stage of the analysis, as do opportunities to game the assumptions to arrive at predetermined conclusions.

But even if modelers used valid scientific, economic, and technological assumptions, appropriate discount rates, and domestic (as opposed to global) SCC estimates to calculate the costs and benefits of climate policies, the models they produce would still be one-sided and misleading because SCC analysis would still leave out the *social benefits* of affordable, reliable, carbon-based energy.

In a study for the Cato Institute, Indur Goklany shows that carbon-based fuels are the chief energy source of a "cycle of progress" in which economic growth, technological change, human capital formation, and freer trade co-evolve and mutually reinforce each other. The Earth today sustains some seven billion people who on average live longer, healthier, and more comfortably, with greater

mobility and more access to information, than the privileged elites of earlier times. Absent plentiful, affordable, reliable carbon energy, life for the vast majority would be nasty, poor, brutish, and short, and most of us would not even exist.

Since the cycle of progress is the very context of modern life, it is a collective good. And since the vast majority of the energy necessary for progress still comes from coal, oil, and gas, that cycle is, to no small degree, a positive "externality" of carbon-based fuels. The social benefits of carbon energy are absent from the SCC ledger.

Consequently, and more importantly, SCC analysis is blind to the social costs—the adverse effects on public health and welfare—that result from the economic losses that carbon mitigation schemes impose. The links between livelihoods, living standards, and life expectancy are more than etymological. Poverty and unemployment significantly increase the risk of sickness and death—a common-sense intuition confirmed by numerous academic studies.

Given the continuing importance of carbon-based fuels to human flourishing and the health risks of economic hardship, carbon mitigation schemes undoubtedly have social costs. Unless paired with a serious assessment of such costs, SCC analysis even at its theoretical best would still present only one side of the relevant risks and costs; it would still be partisan advocacy posing as science.

An old saying tells us that prediction is difficult, especially about the future. That's not always true. The odds are overwhelming that the Obama administration will never produce a report on the social cost of carbon regulation.

The public health and welfare risks of anthropogenic global warming are speculative but those of central planning and energy poverty are real and substantial. Rules, regulations, restrictions, and prohibitions based on GIGO Social Cost of Carbon estimates are likely to do much more harm than good.

*Marlo Lewis is a Senior Fellow at the Competitive Enterprise Institute.*

**GW**

# GreenNotes

Global Warming expert **John Beale**, a top official at the **Environmental Protection Agency**, had another job as a **CIA** agent. Actually, it turns out he was lying about the CIA. Now he's pled guilty to theft of government property and agreed to pay almost \$1.4 million in fines and restitution, and he's been sentenced to 32 months in prison. The **Wall Street Journal** commented on his relationship with **Gina McCarthy**, now the EPA administrator: "In 2009 Ms. McCarthy became the head of EPA's **Air and Radiation office**, where Beale was a senior adviser. In 2010 she [credited] him with developing EPA policies on climate change and air quality. In September 2011, Ms. McCarthy attended a retirement party for Beale and two other EPA colleagues aboard a yacht on the **Potomac River**. On March 29, 2012, Ms. McCarthy was informed via e-mail that although he had retired the previous year, Beale was still on the EPA payroll."

Yet it was "seven months after being told that the retired 'spy' was still getting paid" that McCarthy referred the matter to the EPA's general counsel. Two Inspector General reports concluded that EPA officials "enabled" Beale by failing to check out his stories, even when he took taxpayer-funded trips to London where he stayed at five-star hotels and rented limousines. Despite her (at least) seven-month delay in reporting Beale, Sen. **Barbara Boxer** (D-Calif.) praised McCarthy for "her actions [which] helped uncover his crimes."

Three years ago, **Christiana Figueres**, executive secretary of the **U.N. Framework Convention on Climate Change**, opened the international climate conference in **Cancun** with a prayer to **Ixchel**, the **Mayans'** jaguar goddess of midwifery and medicine. Figueres continues to express herself, telling **Bloomberg News** that **China** is "doing it right" on Global Warming because it's adopted strict codes for new buildings and transportation and brought solar panel prices down by 80% since 2008 (using subsidies).

China, she added, is able to implement policies efficiently because of its political system, in which the **National People's Congress** simply carries out the decisions of the **Communist Party**, while (as Figueres was paraphrased by Bloomberg) "The political divide in the **U.S. Congress** has slowed efforts to pass climate legislation and is 'very detrimental' to the fight against Global Warming."

How does the environment fare with the Far Left in charge? On December 6, the **Associated Press** reported that **Shanghai** ordered all schoolchildren indoors when pollution reduced visibility to a few dozen meters. The concentration of small particles in the air reached more than 24 times the level considered safe. On January 16 in **Beijing's Tiananmen Square**, where the sunrise was not otherwise visible, people could see it on a giant, panoramic LED display that was set up for a tourism commercial.

By the way, a recent study indicated China's "one child" policy led to 336 million abortions since 1971—more than the current population of the U.S. The brutal policy, which included infanticide and forced abortions, was adopted at the urging of environmentalists worried about the Population Bomb, a doomsday prediction that was later discredited.

Writing in **FrontPage** magazine, CRC's **Matthew Vadum** noted: "Although many Americans are convinced that global warming is real, they don't believe it is enough of a problem to justify spending cold, hard cash on a supposed solution, according to the **Pew Research Center for the People and the Press**. 'The American public routinely ranks dealing with global warming low on its list of priorities for the president and Congress.' In 2013 'it ranked at the bottom of the 21 [issues] tested.'"

Meanwhile, enough Americans are so well-informed on Global Warming that both the **Los Angeles Times** and **Reddit**, the online news aggregator, plan to censor them. The *Times* will no longer print letters from "deniers" and Reddit's science forum has banned comments from such people.

But lack of public support won't stop Sens. Barbara Boxer (D-Calif.) and **Sheldon Whitehouse** (D-R.I.). They've formed a **Climate Change Action Task Force**, reports the left-wing blog **Daily Kos**, to "bring more attention to the issue of climate change via hearings, legislative battles, internal briefings, among other means, and to build outside support (religious groups, businesses, etc.) in order to counteract the power of fossil fuel interests." Other members: **Blumenthal** and **Murphy** (Conn.), **Booker** and **Menendez** (N.J.), **Cantwell** (Wash.), **Cardin** (Md.), **Franken** and **Klobuchar** (Minn.), **Heinrich** and **Udall** (N.M.), **King** (Me.), **Markey** (Mass.), **Merkley** (Ore.), **Sanders** (Vt.), **Schatz** (Ha.), and **Shaheen** (N.H.).

Blumenthal and Markey must have a lot of time on their hands; they're also in a group of Senators attacking the **Golden Globe** awards for showing **Leonardo DiCaprio** and **Julia Louis-Dreyfus** smoking e-cigarettes during the recent broadcast (Louis-Dreyfus as part of a comedy bit).