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Cap & Trade Realities for CO_2 Emissions

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Background

The fear of climate change has led the United Nations and European Union to insist that the United States cut its carbon dioxide (CO_2) emissions by 80% so that worldwide emissions can be cut by around 50%, thereby limiting the level of CO_2 in the atmosphere to a level some scientists believe will keep climate change in check.

The recent United Nations Framework Convention on Climate Change (UNFCCC) meeting in Bali established a timetable for reaching a comprehensive agreement for establishing targets for cutting CO_2 emissions. There will be a series of meetings leading to a meeting in Copenhagen in 2009 where a final agreement is to be reached.

Thus far, developing countries such as China and India have indicated they will refuse to establish mandatory targets for cutting total CO_2 emissions; however, they have indicated they might agree to per capita targets for their countries. This appearance of an agreement could place the onus on the United States to establish a target for cutting total CO_2 emissions.

Congress is considering a cap & trade program for CO_2 emissions rather than carbon taxes for achieving the required 80% reduction. The Presidential candidates all endorse cap & trade approaches.

There has been little discussion about whether it is possible to significantly cut CO_2 emissions.

Senate bills S. 2144 and S. 731, which would require examining the feasibility of constructing and operating pipelines and CO_2 sequestration facilities, have languished in the Senate.

Discussion

Those promoting cap & trade legislation for regulating CO_2 emissions assume that proposed (theoretical) solutions are already established and ready for use, when, in fact, the technologies are unproven. Only nuclear power has been proven to work on a scale sufficient to replace coal-fired generation of electricity.

This is where we stand today with respect to cap & trade legislation. Congress is about to adopt legislation without knowing whether we can significantly cut CO_2 emissions.

There are several cap & trade Bills in Congress requiring up to an 80% reduction in CO_2 emissions by 2050. An 80% reduction would bring CO_2 emission levels down from 5905 million metric tons (MMT) in 2004 to 1,000 MMT in 2050. This lower level of CO_2 emissions approximates the level of U.S. CO_2 emissions in 1915-1920, when the U.S. population was 100 million, which is one-third of the current population.

If the U.S. built 400 nuclear power plants by 2050 and if Plug-in Hybrid Electric Vehicles (PHEVs) were developed so that 75% of our vehicles were PHEVs using electricity from nuclear power to recharge their batteries, it

might be possible to meet proposed cap & trade targets.

Currently, there are 104 nuclear power plants supplying about 20% of America's electricity. Building 400 new nuclear power plants would require a herculean effort and no opposition from the public.

At present there are no commercially built PHEVs. To meet the proposed targets, there would need to be around 243 million PHEVs on the road by 2050, after taking into consideration population growth between now and 2050.

Building 400 new nuclear power plants and getting this many PHEVs on the road by 2050 is a daunting task. The task is made virtually impossible when groups such as Greenpeace and the Natural Resource Defense Council mount campaigns against nuclear power.

People supporting Cap & Trade legislation for regulating CO_2 emissions claim there are "green" alternatives for generating electricity. A closer look at these purported alternatives shows that they do not have sufficient scale to generate the huge amounts of electricity needed to replace coal.

Wind power receives considerable media attention, but it lacks the necessary scale to generate more than a small percentage of our needs. Currently, wind produces less than 1% of the electricity generated in the United States.

While recent headlines have proclaimed that wind power could supply 20% of America's electricity by 2030, a closer look at the story behind the headlines is revealing.

It takes 2,000 wind turbines to replace one 1,000 MW nuclear (or similarly sized coal-fired) power plant. The largest number of wind turbines installed in any one year in the U.S. was 1,533, which is not even enough to displace one 1,000 MW power plant. In addition, wind isn't suitable for base load generation because it is intermittent and only works when the wind blows. Texas had a grid emergency earlier this year when the wind stopped blowing and a large amount of electricity was suddenly unavailable.

For wind power to provide 20% of America's electricity would require building around 200,000 wind turbines rated 1.6 MW, which is the average size of new units being built today. Manufacturing capacity is unavailable to produce 5,000 units annually, let alone 10,000 units every year until 2030. These turbines would largely be installed in remote areas so that 19,000 miles of new transmission lines will need to be built. This is equivalent to building six transmission lines from New York City to San Francisco. As for offshore wind power generation, Shell has just cancelled its participation in an offshore UK wind farm, saying off-shore wind is too expensive.

Realistically, wind isn't a viable option for replacing coal.

Solar power has similar problems. It can only generate electricity when the sun shines. It can be useful in the Southwest, but cannot be more than an expensive marginal player in the North. Currently, solar energy produces only 0.01% of the nation's electricity.

Iceland is the poster child for geothermal power generation. Iceland, however, has a population about the size of Toledo, Ohio. There are some places in the U.S. where geothermal can be developed, but it also lacks the scale to replace coal. Currently, geothermal accounts for less than 0.5% of the nation's electricity.

Hydro generates electricity without emitting CO_2, but the trend is to remove dams rather than building new ones. Over 200 dams have been removed since 1999 (not all generated electricity). Big power generation dams such as Hetch Hetchy, Glen Canyon and Matilija are being targeted for removal.

Other technologies, such as fuel cells and hydrogen, are unlikely to be available

within any foreseeable time frame. Fuel cells cost several times more than a gasoline engine. Hydrogen can't be easily stored in an automobile and making hydrogen available at service stations is a challenge. Without high temperature nuclear reactors producing hydrogen, production of hydrogen probably uses more energy than will be saved.

The fact of the matter is alternative energy sources are unable to replace coal. So, is it possible to continue to use coal or do we shut down half our supply of electricity?

Carbon Capture and Sequestration (CCS) is on the lips of all those promoting cap & trade regulations, but CCS has yet to be proven viable on a large commercial scale.

While it's possible to build new coal-fired power plants capable of capturing CO_2, capturing CO_2 from existing plants is another matter. And then sequestering huge amounts of CO_2 in geologic formations hundreds or thousands of miles away from the power plant is questionable.

We know it's possible to build IGCC (Integrated Gasification Combined Cycle) coal-fired plants capable of capturing CO_2. Two IGCC plants have been built in the United States, but neither of these plants include carbon capture.

Half of our electricity is generated by existing coal-fired power plants, so capturing CO_2 at existing plants is essential if there is to be any possibility of significantly cutting CO_2 emissions.

Unfortunately, carbon capture at existing coal-fired power plants is still experimental so not a single existing coal-fired power plant has yet been retrofitted to capture CO_2. In addition, current experimental processes require de-rating existing coal-fired power plants so an additional power plant must be built to replace the electricity lost when three coal-fired power plants are retrofitted to capture CO_2 emissions.

Capturing CO_2 is futile unless there is a way to dispose of it other than in the atmosphere. Sequestration is being touted as the answer to this problem, but large scale sequestration is unproven. Proponents of sequestration point to the Sleipner field in Norway's North Sea, where one million metric tons of CO_2 annually are injected into a salt water aquifer 2600 feet underground.

We would need to inject 2,000 times this much liquid CO_2 year after year, and no one knows whether this is feasible.

In addition, no one has determined whether CO_2 could leak back into the atmosphere or, worse, leak into adjoining geologic structures and contaminate drinking water or do other damage.

No one has addressed the legal issues. Who is liable if CO_2 leaks into adjoining geologic structures? Who is liable if the CO_2 leaks back into the atmosphere? Who owns the geologic structures in which the CO_2 is to be injected?

There is also the small matter of building thousands of miles of pipelines to transport the liquefied CO_2 from power plants to locations where it might be safely sequestered. To put this into perspective, the U.S. uses about 21 million barrels of oil daily. The pipelines required for carrying the liquid CO_2 will need to accommodate at least 30 million barrels of liquid CO_2 daily. Many of these pipelines will have to be built in thickly populated areas.

Conservation is supposed to cut our usage of electricity, but at best, it might be possible with conservation to cut CO_2 emissions by around 5%, a fraction of what cap & trade legislation will mandate. (PHEVs that can get 100 mpg are a breakthrough technology requiring less gasoline without curtailing mileage, rather than a method of conservation which infers sacrificing or driving less. Without nuclear power specifically associated with the charging of batteries, reductions in CO_2 emissions with PHEVs will be minimal.)

Rather than being an incentive for developing new technologies, cap & trade regulations will stifle the economy and could cause irreparable harm to America.

What would happen to the markets where billions of dollars in CO_2 credits are being traded when it becomes apparent that CO_2 emissions can't be significantly cut? Think ENRON on a massive scale.

Cap & trade legislation for CO_2 emissions will be the largest hidden tax increase ever passed by Congress. All of the costs will eventually be borne by the taxpayer. This alone will have a negative effect on the economy.

The proponents of cap & trade say the legislation is needed so as to stimulate technological development. Cap & trade could easily have a negative rather than a positive effect on technological development. The need to meet CO_2 targets will result in the installation of existing technologies where they are available. But no amount of money spent on carbon credits and cap & trade will cut CO_2 emissions if it's not possible to sequester CO_2. And no amount of money spent on carbon credits with cap & trade will cut CO_2 emissions from gasoline if PHEVs do not work.

Without sequestration, or lithium-ion batteries or methods for capturing CO_2 in existing coal-fired power plants, the currently proposed solutions will not be able to cut CO_2 emissions.

Without sequestration or carbon capture in existing coal-fired plants, coal-fired plants will not be built, old plants will be shut down and shortages of electricity will develop. Without workable lithium-ion batteries, gasoline rationing would be necessary.

What are needed are breakthrough technologies that change the name of the game. Breakthrough technologies are developed in laboratories and research facilities. Money spent to buy carbon credits won't be available for fundamental research.

Besides, the market is working just fine. The idea that capital won't be available without cap & trade is absurd. The lithium-ion battery that may make PHEVs possible is being developed without any cap & trade legislation. The capital for A123Systems, for example, came from GE and other investors. The same was true for ethanol where much of the capital came from Silicon Valley. (Of course, ethanol is a good example of unintended consequences with higher food prices.) Any scientist/entrepreneur who can demonstrate how to make an affordable, refrigerator-sized appliance that could store a few days' supply of electricity for a home could get funding in an instant without cap & trade legislation.

Conclusion

It is only necessary to look to Europe to see that cap & trade doesn't work as intended. The European Union (EU) still hasn't been able to cut its emissions of CO_2. In fact, Europe's emissions have recently increased. Electric bills went up dramatically as utilities used the emission credits as a reason for increasing the price of electricity.

What has been discussed above is merely the tip of the iceberg when it comes to cap & trade regulations. What about the politics, where lobbyists influence which industry gets gored and which gets a free ride? What about the higher costs for every consumer, rich and poor? What about the effects of having less electricity, more blackouts? What are the prospects for gasoline rationing? How will regulating CO_2 emissions affect every American?

No one has the answer to these questions.

Clearly, we do not yet have the necessary proven technologies or technologies having sufficient scale to dramatically cut CO_2 emissions. Forging ahead without the needed technologies will cause severe

economic harm by cutting our supply of electricity and reducing America's standard of living.

The next President has an obligation to determine whether the needed technologies are available before signing cap & trade legislation.

Cap & trade legislation can hurt America. Until we can prove that the proposed solutions (e.g., CCS and PHEVs) actually work, we are creating a poorer America with shortages, loss of jobs and higher costs for every American.

This article is adapted from the book "Carbon Folly" which is available from Amazon.com and other book sellers. Statements are supported by references noted in "Carbon Folly." Additional information is available at ***www.carbonfolly.com****.*

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