A Modest Proposal: After Cap and Trade

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Addressing the environmental problems created by the world's dependence on fossil fuels, and the ensuing global climate change, will help ensure security and economic stability for future generations. Unfortunately, current proposals to address climate change through economy-wide cap and trade are unworkable both politically and economically. An alternative approach, more modest in scope, that can be enacted quickly and improved upon over time, is urgently needed.

Economy-wide cap and trade proposals start from the worthy goal of limiting the total amount of greenhouse gas emissions that may be legally released into the atmosphere. The limit creates a market price for emissions, reflecting the stringency of the cap. However, the simplicity of "cap and trade in theory" is quickly lost as the challenges of implementing "cap and trade in practice" become apparent. There are three interrelated problems with economy-wide cap and trade proposals:

1. First, pricing greenhouse gas emissions will increase the costs of goods and services. But the cost impacts will not be manifested in equal proportions across different regions of the country or industries. The prospect of purposefully raising energy costs in some areas more than others creates a substantial political challenge to economy-wide cap and trade right from the start.
2. Second, to alleviate the disproportionate regional and industry-specific cost impacts of cap and trade, transition strategies must be developed

which will add to the complexity of the original policy. Economy-wide cap and trade proposals variously include provisions for freely allocating certain emissions permits to some industries, auctioning other sets of permits, allowing some types of emissions reductions to offset other sources of emissions, and setting artificial price ceilings and floors on the cost of emissions. These transition strategies will undermine the public's trust in the regime as the inevitable horse-trading ensues around who gets free permits and who doesn't, what kinds of offsets "count", etc. In short, to mitigate all of the unintended consequences and collateral damage of putting a single price on greenhouse gas emissions, cap and trade proposals have come to mirror the U.S. tax code in complexity, looking more like a delicately balanced Rube Goldberg machine than the elegant solution to climate change that was promised.

3. Third and finally, price-based, market mechanisms are not always the most cost-effective emissions reduction approach. This fact has often been overlooked in the push to develop cap and trade. Fundamental economic theory tells us that in industries with efficient, well-developed markets, putting a price on emissions will create a powerful market signal, generating emissions savings. However, the flip-side of this economic reality is that in industries that are *not* characterized by efficient, well-developed markets, a price signal on emissions will *not* be the most effective or least-cost way to reduce emissions. In the building-sector for example, and to some degree in the transportation sector, businesses and individuals already have an economic incentive to choose the more energy efficient option, yet they often do not. Finding innovative ways to overcome the non-economic barriers to energy efficiency will represent a significant source of low-cost emissions savings.

[1] The views expressed in this paper do not necessarily represent the views of the authors' companies or clients.

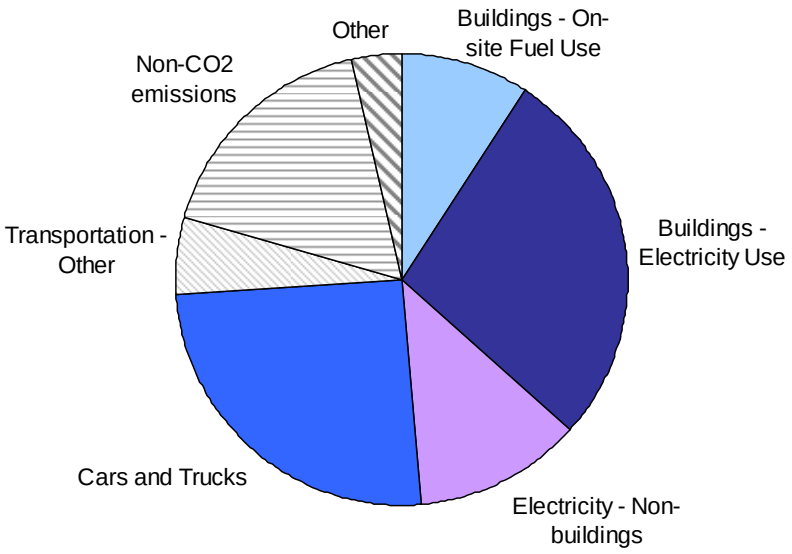
After more than a decade of watching some of the best minds in industry, environmental groups and Washington try to negotiate past these challenges to economy-wide cap and trade, the U.S. appears no closer to passing comprehensive climate legislation than when the Kyoto Protocol was adopted in 1997. An alternative, more certain and low cost approach is needed so that our economy can begin to turn the corner on reducing harmful pollutants from fossil fuels, including greenhouse gas emissions, as soon as possible.

A Low-Cost, Industry-Specific Climate Policy Proposal

This alternative proposal is focused on identifying the lowest-cost, most readily achievable emissions reductions from the energy sector. The proposal is based on the simple idea that policies that reflect regional and industry diversity, and which create investment certainty will be the most effective way to achieve broad-based support for emission reductions goals.

We explicitly do not present a comprehensive solution, but focus on the three largest sources of emissions in the U.S.: the electricity, vehicle, and building industries. Figure 1 below shows that in 2007, these three sectors (the blue and purple wedges) represented nearly three-quarters of all greenhouse emissions in the U.S.

Figure 1. Sources of emissions in the U.S.[2]



This proposal comprises four policy recommendations:

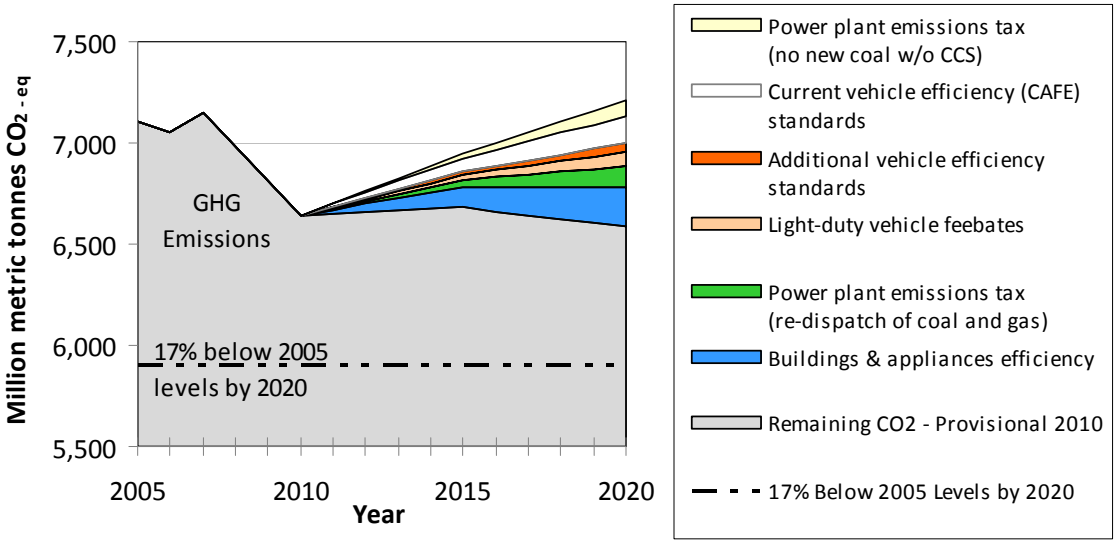
1. A regionally differentiated tax on power plant emissions
2. A revenue neutral incentive (i.e."feebate") for new vehicle purchases and minimum vehicle emission performance standards
3. Incentives for electricity energy efficiency in the form of inclining block electricity rates
4. Minimum building codes and appliances standards for energy efficiency

These policies would cost almost nothing, and using conservative assumptions, they would stabilize greenhouse gas emissions in the U.S. through 2020, reducing emissions at least half way to the administration's goal of a 17% reduction below 2005 levels by 2020 (Figure 2). These policies alone are not aggressive enough to put the U.S. emissions trajectory

[2] Based on data from the DOE, EIA, State Energy Data 2005: Feb. 2008; *and* EPA, U.S. 2009 Greenhouse Gas Inventory Report: Inventory of U.S. Greenhouse Gas Emissions Sources and Sinks: 1990 – 2007.

on a sustainable path, but they represent the minimum "common sense" policies that should be included as part of any climate policy. Deeper emissions reductions could be achieved by developing additional policies for other sectors of the economy or by increasing the intensity of these policy efforts.

Figure 2. Greenhouse gas emissions reductions, relative to historic emissions and Energy Information Agency's baseline forecast (2005 – 2020)



Four Low-Cost Climate and Energy Policies

(1) A regionally differentiated tax on power plant emissions would be effective at reducing emissions and low-cost for consumers and industry.

The power plant sector meets all of the industry characteristics that make it a good candidate for an emissions tax: (1) investors in new power plants expect their return on investment to occur over a long period (10 years or more), and so will factor in an emissions price into their long-term investment decisions; (2) power plant owners and operators represent sophisticated "profit maximizing" businesses, so will respond predictably to price signals; (3) power plant owners and operators have access to many technology solutions and design options for power plants, making it possible for them to respond to emission price signals through their investment

choices; and (4) perhaps most importantly, the electricity sector has relatively powerful state regulators that can mitigate the cost impacts of an emissions tax through the electricity rate design process, making an emissions tax in the electricity sector politically feasible to implement.

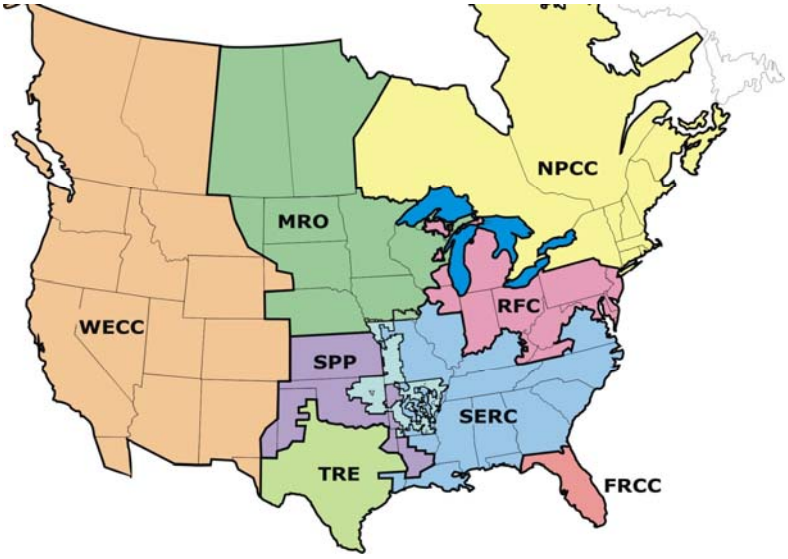
A power plant emissions tax would reduce emissions in two ways: first, by changing investment decisions for new power plants, and second, by changing power plant operations (in some regions). To achieve the first, an emissions tax of only $10/tonne CO_2 in the electricity sector can make the cost of generation from a new natural gas power plant cheaper than a new coal plant. This modest emissions tax would go far towards ensuring that the power plant industry has the stable and credible price signal that it needs to initiate new investments in lower-emissions power plants.

In contrast to new investment decisions, the emissions tax level required to change the *operations* of *existing* power plants varies greatly by region. Our analysis shows that in some parts of the country, particularly the Midwest, an emissions tax on electricity generation would increase the cost of electricity, but would do little to change existing power plant operations. This is because there is relatively little operational flexibility in the existing power plant fleet in the Midwest. In contrast, in the West, a power plant emissions tax of $60/tonne of CO_2 could significantly reduce emissions among existing power plants, while causing only a 2% increase in electricity prices, assuming the tax revenues are used to offset rate impacts. This is because the fleet of power plants in the West has greater operational flexibility, and with the right price signal, could partially change the dispatch order between coal and natural gas.

In summary, a single national emissions price is likely to be too high in some regions and too low in others, creating regional cost disparities that are politically unpopular. Regionally-based emissions prices present an attractive alternative. Power plant emissions tax regions could be based on NERC (North American Electric Reliability Corporation) regions, which currently

broadly reflect electrical grid operational boundaries, thereby simplifying implementation of the emissions fee policy (See Figure 3).[3]

Figure 3. North American Electric Reliability Corporation (NERC) Map



Source: NERC website: http://www.nerc.com/page.php?cid=1|9|119 (Alaska and Hawaii not shown).

Since there are relatively few power trades across regional NERC boundaries, this reduces the potential for emissions "leakage" or other price distortions. The same cannot be said of state boundaries, which do not reflect the underlying structure and operation of the electrical grid. Ideally, the Canadian electricity sector would also enact the same emissions tax program, perhaps along provincial boundaries, to further reduce leakage issues.

Under this regional power plant emissions tax proposal, the revenue raised from the emissions fee would stay within each NERC region, to be used by the state Public Utility Commissions or other appropriate state or regional entities to offset electricity rate impacts, to fund conservation,

[3] NERC is charged with overseeing the reliability of the bulk electric transmission system. It consists of eight regions on the continental U.S. The Alaskan and Hawaiian electric are administered separately.

renewable energy or other local priorities. The emissions fee could be administered either by the EPA, or by strengthened regional entities such as NERC.

A regionally-differentiated emissions tax of $10 - $60/tonne of CO_2 (whereby the emissions fee revenue is used to reduce electricity rates), would only increase consumers' electricity rates by 2% on average, but would generate significant emissions savings (~100 million metric tonnes of savings in 2020). The appropriate regional entities could also use the emissions revenue to fund cost effective investments in energy efficiency, which could reduce customers' bills and potentially eliminate the impact of the rate increase caused by the emissions tax.

Table 1 shows the NERC regions in the US, and the proposed tax levels in each region that would produce no more than a 2% average rate impact. The small cost increase is due to the fact that the revenues from the emissions tax are assumed be used to offset electric rate impacts. Even with this recycling of revenues, however, the displacement of lower operating cost coal plants with higher operating cost gas plants will increase total costs and rates by only a modest amount.

Table 1. NERC regions and CO_2 prices which would result in regional rate impact of less than 2% if all tax revenues are used for rate reductions

Region	NERC region	CO2 fee ($/tonne CO2)
Alaska	ASCC	$10
Florida	FRCC	$60
Hawaii	HICC	$10
Midwest	MRO	$10
Northeast	NPCC	$60
PJM	RFC	$10
South	SERC	$40
Southwest	SPP	$40
Texas	TRE	$60
West	WECC	$60

The "round-tripping" of emissions tax revenues on a regional basis should be contingent upon each region's successful implementation of other complementary, low-cost emissions savings measures, namely building

standards and electricity rates that encourage energy efficiency. For example, if a state or Public Utility Commission does not improve building efficiency standards or implement inclining block rates within a specified timeframe, some portion of that region's emissions tax revenue would be withheld.

Nationally, an emissions tax ranging from $10 to $60/tonne CO_2 would generate about $80 billion in revenue in the first year that the fee is fully implemented. A portion of this revenue could be used to reduce each region's electricity rates, and a portion of the revenue could be used as a financial incentive, contingent upon the adoption and implementation of building efficiency standards and/or inclining block residential electricity rates (discussed below).

Conservative estimates show that this relatively small tax will likely stop the construction of all new coal plants without carbon capture and storage (CCS), and displace existing coal plant emissions (primarily with increased use of gas), leading to a reduction in CO_2 of 130 million tonnes of CO_2 in 2020.

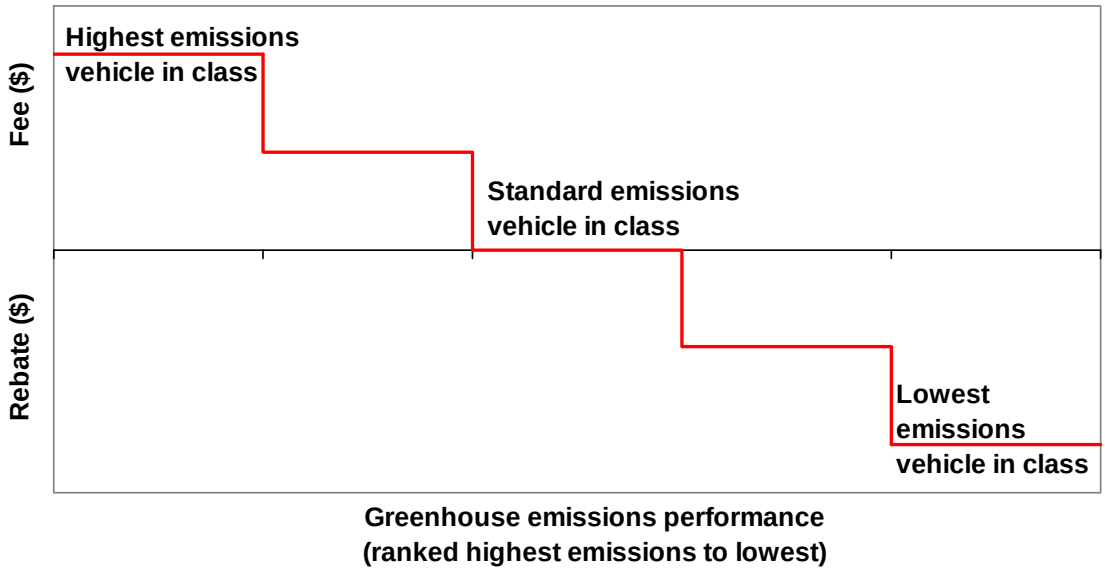
(2) A revenue neutral incentive (i.e."feebate") for new vehicle purchases would overcome the upfront cost barrier to consumers' investment decisions; vehicle emission performance standards would ensure a minimum standard of vehicle efficiency.

The transportation sector is not an ideal candidate for an emissions fee. This is because other, non-economic factors tend to be more important to consumers than fuel-efficiency, and because consumers tend to pay more attention to the sticker price of a car than its long-term operating costs. In addition, putting an emissions fee on gasoline is a regressive policy; it will tend to hurt the poor, and people in rural areas, more than the rich and people in urban areas.

For these reasons, an incentive (i.e. a "feebate"), which affects the upfront cost of new cars, and strengthened vehicle emissions performance

standards, are the best two strategies to reduce emissions from cars and trucks. The "feebate" policy would provide an up-front incentive to purchase a low-emissions vehicle, and would levy a fee on the purchase of higher-emissions vehicles. The policy would be revenue neutral, such that the revenue from the fee will be used to fund incentives for low-emissions vehicles. Figure 4 below illustrates conceptually how a feebate could be structured.

Figure 4. The rebate and fee structure under a "feebate" policy for vehicles



The feebate policy could easily be administered by the EPA, and should be supplemented by continued emphasis on strong vehicle emissions performance standards in the U.S., above and beyond current Corporate Average Fuel Economy (CAFE) standards.

A conservative estimate shows that these combined transportation sector policies could reduce emissions by around 70 million tonnes of CO_2 by 2020.

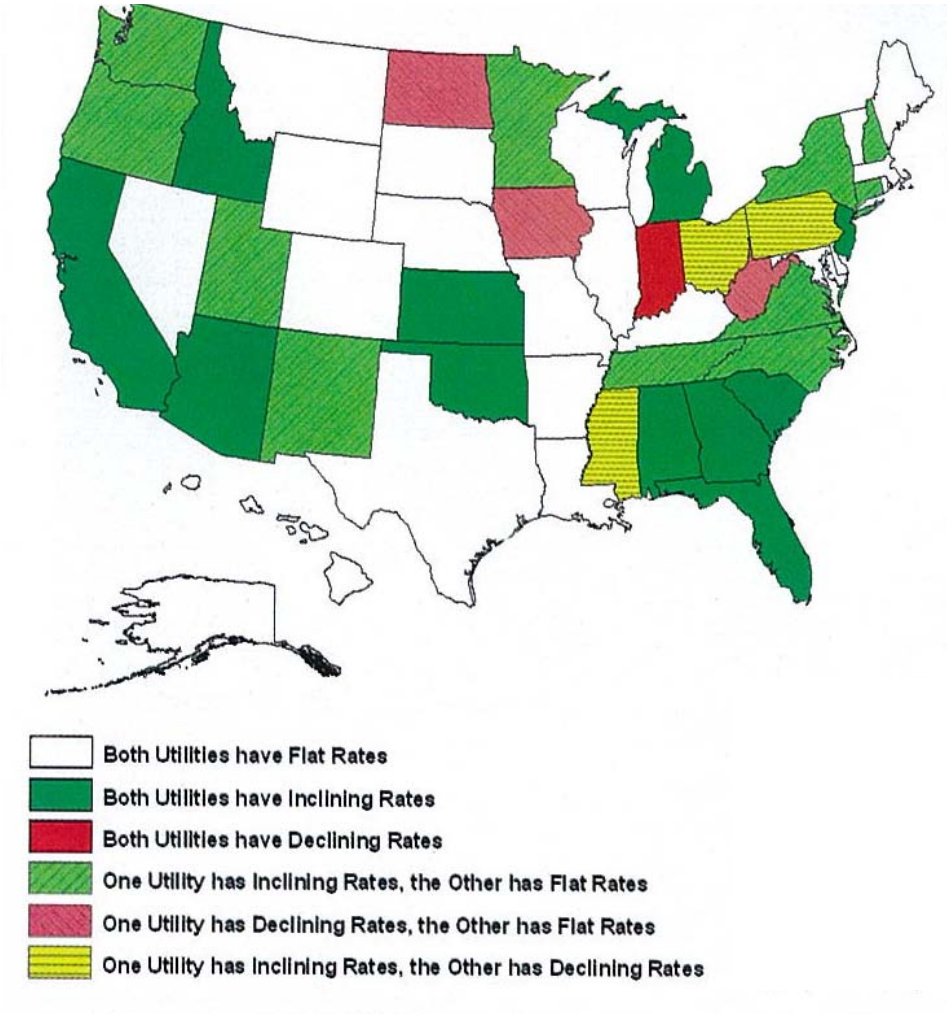
(3) Incentives for electricity energy efficiency in the form of inclining block electricity rates represent a zero-cost way to encourage efficiency in residential homes.

Another revenue neutral incentive to reduce emissions in the electricity sector, which could be designed and implemented at the regional level, is an "inclining block" residential electricity rate. Inclining block electricity rates are designed so that the homes with the highest electricity consumption pay a higher electricity rate than homes that use less electricity. An inclining block rate structure creates an incentive to invest in energy efficiency and comes at no net cost to consumers or society. Paradoxically, in many parts of the country the reverse is true – people pay a lower electricity rate as they consume more electricity.

State Public Utility Commissions can easily alter electricity rate structures to encourage energy efficiency and conservation. While electricity rate design falls within the provenance of state Utility Commissions, the federal government can induce states to adopt inclining block rate structures by withholding a portion of the regional revenues collected by a power plant emissions tax (discussed in Proposal #1) until a jurisdiction is in compliance with the rate design policy. Figure 5 below shows which states currently implement inclining block rates in summer months. The survey includes the two largest utilities in each state and shows that a substantial number of utilities still have rates that are either flat or decline with increased energy usage. Declining block rates are an unnecessary and easy to eliminate barrier to additional cost-effective investments in energy efficiency in the residential sector.[4]

[4] Electric rate designs that serve commercial and industrial customers are even more likely to have declining blocks than residential rates.

Figure 5. U.S. Map of Summer Residential Rate Structures[5]



We estimate that this single change alone could create a powerful incentive for customers to make cost effective investments in efficiency saving, which will reduce their cost of electricity and save between 4 and 8 million tonnes of CO_2 in the first year the rate is implemented, at no cost.

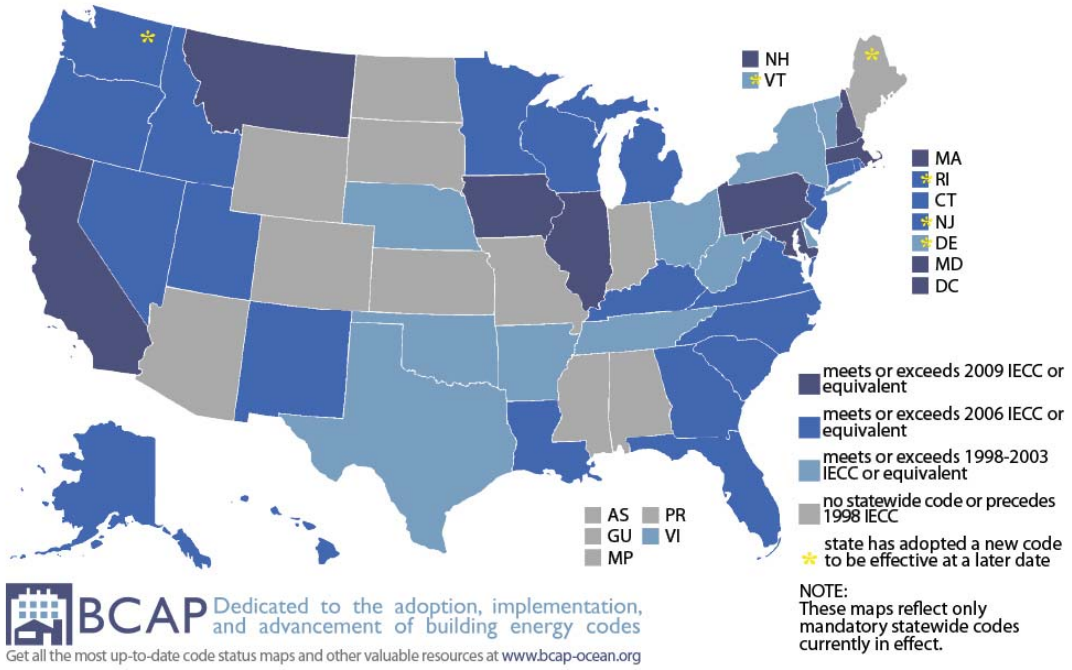
(4) Minimum building codes and appliance standards are needed to ensure that the U.S. takes advantage of negative and low-cost emissions savings opportunities in the building sector.

[5] Orans, Ren, et al, "Inclining for the Climate: GHG Reduction via Residential Ratemaking," *Public Utilities Fortnightly*, Vol. 147, No. 5, May 2009, pg. 40-45.

The building industry faces numerous market failures, making it a poor candidate for a carbon price policy. Many energy efficiency measures are already cost-effective, even without the addition of a carbon fee, but many consumers still do not choose the cost-saving efficiency measure. Part of the problem is a lack of information. Owners and occupants of buildings often do not have access to transparent, easy-to-understand information about their energy consumption choices, or how to cost-effectively reduce their buildings' energy use. Other market failures which are likely to prevent price signals from generating significant, low-cost savings in the building sector include "split incentives" between landlords and tenants, (whereby neither party sees the full benefit of an investment in energy efficiency), and the perceived "hassle factor" of implementing energy efficiency.

For these reasons, building codes and appliance standards are one of the most cost-effective ways to reduce GHG emissions in the building sector. However, national building and appliance standards face significant opposition in some jurisdictions. Figure 6 below shows the current status of residential building codes in the U.S. by state.

Figure 6. Residential State Energy Code Status as of April 2010[6]



Federal legislation could create significant incentives for states to adopt acceptable minimum building code standards by including a provision to withhold a portion of the proposed power plant emissions tax revenue (discussed in Proposal #1) until the appropriate energy code has been adopted and implemented.

In addition, since building codes are ultimately implemented and enforced at the state and local level, they must have local buy-in and support to be successful. One innovative, low-cost approach to encourage building efficiency to be sustained and increased over time is to require transparency and disclosure surrounding buildings' energy performance. Building's historic and/or projected energy use data, which is readily available, should be provided to market participants at the point of sale of a building, allowing this information to be incorporated into the market valuation of the building. Experience has shown that when data are available, the market will use it, creating demand for more efficient buildings with lower energy bills.

[6] Online Code and Advisory Network: http://bcap-ocean.org/

Legislation which requires building owners to disclose the actual or projected energy consumption data for their building any time there is a change in ownership, refinancing or where there are substantial building improvements, would encourage more cost effective investments in building efficiency.

The building sector is one of the single largest emitters of CO_2 in the U.S. Improving building energy codes and retrofitting existing buildings to meet code can cost effectively reduce U.S. emissions by approximately 200 million tonnes of CO_2 by 2020.

Conclusion

These four policy recommendations could be implemented individually, or as part of a broader policy package. These four policies are recommended as a minimum set to include in any future energy policy regime because they can all be implemented in the near term, each will achieve significant emissions savings and are extremely low-cost or revenue neutral.

However, to truly transform the U.S. economy and achieve deep emissions reductions over the long-term, the U.S. must also support innovative low-carbon technology development for emerging technologies such as high-performance buildings, carbon capture and storage (CCS), solar thermal power, nuclear waste treatment and disposal, and low-cost energy storage, to name only a few. Strategic investments in the future of low-carbon technologies are needed. What is not needed, is a U.S. climate policy based on a series of subsides and handouts to nuclear, oil and gas and other special interest industries. Nor does an effective climate policy need to dramatically increase energy costs to consumers – there is a better way forward. Achieving the lower-cost, “low-hanging fruit” emission reduction policies discussed in this paper should be a first priority for a U.S. energy strategy.