Addressing Climate Change Legislation:

A Review of the Policy Alternatives & The Potential Impact on Energy-Intensive Industries

The Electricity Consumers Resource Council (ELCON) is the national association representing large industrial consumers of electricity. ELCON members are multi-state and multi-national corporations from all segments of the manufacturing community and have facilities in every region of the U.S. The common denominator of ELCON's members is that each company uses very large amounts of electricity in its industrial operations.

As an association, ELCON has no position on whether to pass legislation addressing climate change by limiting the emission of greenhouse gases (GHGs). Different ELCON members have differing views, and many are seeking to achieve their individual objectives through coalitions or other groups of likeminded companies and organizations.

However, debate on the climate change issue has now changed complexion. The conventional wisdom of the past year, that a legislative cap-and-trade approach, such as that contained in H.R. 2454 as passed by the House in 2009, was the "only" way to achieve greenhouse gas reductions no longer seems quite so certain. However, the issue of imposing federal mandates that directly or indirectly increase the cost of manufacturing in the United States remains crucial to ELCON members and other manufacturers as they develop operational and production plans for the next decade and beyond.

ELCON members believe that mandated reductions in greenhouse gas emissions, however implemented, will affect their manufacturing operations in two ways. ELCON members are among the largest purchasers of electricity in the country, and electric utilities are among the largest emitters of GHGs. If utilities' costs increase as they reduce their emissions (by fuel switching or other means), power costs will increase for manufacturers. In addition, many ELCON members emit GHGs as part of their manufacturing processes. As the amount of greenhouse gas emissions is reduced, the cost to manufacturers will increase at their domestic facilities.

ELCON acknowledges that it is very difficult to estimate either the total costs or benefits of the various proposals to reduce greenhouse gas emissions. However, the costs to large and small consumers appear to us to be very substantial. Further, of the studies so far conducted, none has even attempted to monetize the benefits. To avoid

the possibility of significant job losses and increased world-wide emissions due to "leakage" (i.e., moving jobs off-shore to locations with less greenhouse gas regulation), Congress should ensure adequate protection for domestic, energy-intensive manufacturing entities. It seems unwise to put domestic manufacturers and their generally well paid employees at risk.

RECOMMENDATION

ELCON urges Congress to ensure that America's manufacturing base and its employees do not suffer unduly from the adverse impacts of legislation that directly or indirectly imposes new GHG related costs. Legislative alternatives that consider allocations that decrease on a fixed schedule, exclude manufacturers from offsets or dividends, foreclose access to allocations by excluding industrials from caps, or prescribe specific energy applications (e.g., a Renewable Energy Standard and/or an Energy Efficiency Resource Standard) all represent a similar threat to manufacturing. Each of these alternatives in one way or another will increase costs domestically and threaten employees' livelihoods by creating competitive imbalances favoring manufacturers in less regulated regions of the world, thus putting domestic manufacturing at a cost disadvantage.

SUMMARY

- Any mandatory policy intended to decrease greenhouse gas emissions will by necessity increase the cost of generating electricity. That in turn will increase the operating costs of domestic manufacturers. Generally speaking, the greater the decrease in emissions, the greater the costs borne by large and small electricity consumers. [see pages 3-5]
- Large industrial companies with manufacturing facilities throughout the world determine investment plans, sites and production levels based on a variety of factors such as labor, transportation, and energy, to name a few. Increased costs in one locale relative to another may well result in reduced investment, lower production and concomitant job losses at the higher cost location. Given the competitive world-wide markets for many basic manufactured products, even relatively small changes in operating costs can result in changes to where production takes place. [see pages 5-7]
- While studies vary wildly on the economic impact of mandated greenhouse gas emission reductions, every GHG study analyzed by the Congressional Research Service (CRS) projects that mitigation costs will rise, gross domestic product will fall and industrial shipments will decline –- substantially in many cases. Annual GDP declines could be on the order of 1% (or more) which, according to the U.S. Treasury, makes them equal in scale to the impact of all existing environmental regulations. A considerable amount of low-carbon generation will have to be built, and the technology for much of that generation is not yet developed or

available. If a cap-and-trade regime is implemented, and all of the allowances are auctioned, federal revenue is estimated to increase by $858 billion between 2010 and 2019, giving an indication of the value of the mitigation policy and thus the potential impact on consumer costs. [see pages 7-15]

- Even if the economic impacts of the emission reductions were rather minimal on average, the distribution of the impacts will be uneven in several ways. The proposed programs will cause significant shifts in the composition of employment between industries, between geographic areas and between levels of income. The proposed programs thus create substantial winners and losers. America's manufacturing base would clearly be a loser. In fact, the Congressional Budget Office states: "A cap-and-trade program for carbon dioxide emissions would reduce the number of jobs in industries that produce carbon-based energy, use energy intensively in their production processes, or produce products whose use involves energy consumption, because those industries would experience the greatest increases in costs and declines in sales." [see pages 15-16]
- It is very difficult to place a dollar value on the benefits of reducing greenhouse gas emissions. In fact, the CRS has stated that estimates of the social benefits of reducing carbon span three orders of magnitude. The best one can say is that the benefits may range from minimal to substantial. [see pages 16-17]

GHG MITIGATION PROPOSALS AND THEIR COST CONSEQUENCES

There are several approaches to mitigating greenhouse gases that are at least being considered for possible federal legislation:

1. Carbon tax
2. Cap-and-trade-type mechanisms (including cap-and-trade for utilities only and cap-and-dividend)
3. Cap-and-no-trade
4. Energy-only legislation (e.g., federal renewable energy standard and energy efficiency mandates)

EPA promulgation of command-and-control regulations via the Clean Air Act (CAA), a non-legislative option, is widely viewed as a default mechanism that is being triggered absent any new Congressional action.[1]

The cap portion of cap-and-trade systems limits greenhouse gas emissions, imposing lower emission levels – achieved by providing fewer allowances – over a period of time.

[1] Economists assert that either a carbon tax or a cap-and-trade scheme can produce the same results – if implemented correctly.

Such reductions create scarcity since emissions must be reduced somewhere. Scarcity increases costs. The greater the reduction in greenhouse gases required by the cap, the greater the scarcity and hence the greater the costs. As a recently released Treasury Department document stated, "stricter emissions constraints generate greater environmental benefits and *impose higher costs* [emphasis added]."

There must be cost increases for any cap-and-trade system to work. The only way that there could be no cost increases would be to have no scarcity. With no scarcity, there would be no reductions in greenhouse gases.[2]

The distribution of costs differs slightly depending on whether allowances are auctioned or freely allocated. If the allowances are auctioned, they have immediate and transparent value. All emitters must purchase allowances equal to their emissions and hence incur direct costs which in most cases they will try to pass through to their customers.

The situation is somewhat more complicated with allowances allocated at no cost. With free allocations, not all emitters will receive allowances adequate to cover all of their emissions. But allowances will be fungible and therefore represent a value to the holders who will determine whether to utilize the allowances to cover their own emissions or sell them at market value. Any emitter that emits more than the amount of held allowances must either (1) reduce its emissions to a level that equals the number of allowances it holds, (2) purchase allowances from an entity with excess allowances or (3) demonstrate a carbon offset elsewhere. In each instance, the emitter incurs increased costs.[3]

The need for political compromise in the legislative process will undoubtedly mean that, whichever program type is chosen (carbon tax, cap-and-trade, energy only, etc.), the result will not address GHG mitigation at the lowest possible cost. Therefore, no program type will have a guaranteed cost advantage when compared to other program types. For example, the cap-and-trade scheme proposed in H.R. 2454 in essence

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[2] It may be argued that there are other means to reduce CO_2 and other greenhouse gases that would not increase costs. Examples may include the implementation of renewables (e.g., wind) or the use of new sources of gas (such as shale gas) and new technologies such as carbon sequestration or reduced demand, e.g., through greater industrial efficiency or more efficient appliances in homes and businesses However, if such alternative sources of energy are truly economic, they should be implemented now without any governmental mandates such as renewable portfolio standards or other incentives. If they produce "enough" CO_2 reductions, then the cap-and-trade system would be unnecessary.

[3] Obviously, if one emitter has been given free allocations adequate to cover its entire emissions, that emitter will not incur increased costs. However, in such a situation other emitters, by definition, will incur increased costs as long as the cap is set at a level that will result in a reduction of CO_2. Additionally, a manufacturer may reduce its emissions by reducing production at that site, perhaps moving production offshore. Further, the current legislative proposals allocate free allocations to groups and organizations who are not emitters – which is equivalent to auctioning them from the emitter's standpoint, provided that all non-emitting entities sell their allowances.

prohibits least-cost compliance by mandating the deployment of renewable resources and energy efficiency measures even if other technologies have lower costs. The "market-based" efficiency advantages often touted by advocates of cap-and-trade will then never be realized. In addition, the results of the economic analysis of any bill are driven more by assumptions outside the legislation (e.g., cost and availability of carbon storage and sequestration technologies) and much less by the programmatic provisions in a proposed bill. Thus economic studies of one program type (e.g., cap-and-trade) are reasonable proxies for any program type.

The bottom line is very clear. Emitters, including generators of electricity and many industrial facilities, and energy consumers, will incur increased costs if a cap-and-trade system or any other greenhouse gas emissions reduction system succeeds in reducing greenhouse gas emissions.

COST INCREASES AND INDUSTRIAL PRODUCTION

Most large industrial electricity consumers that sell their products in global markets can manufacture the commodity in various locations in the U.S. or in foreign countries. The process by which companies determine where and how a particular product is manufactured includes balancing a myriad of factors including raw material, labor, energy, transportation, taxes and other factors. Increases in operating costs in one location may result in reduced investment, decreased production or even closure of a facility.[4]

Electricity is a critical input to most basic manufacturing processes. However, each manufacturing plant or facility is unique. Many cost hundreds of millions of dollars to build. They were built at different times using different technologies and processes. They have been renovated and updated individually over time. Cost increases impact each plant or facility, and even each product, differently.

Since most basic manufacturers operate in very competitive world-wide markets, they are required to be especially sensitive to all costs and have little ability to pass on increased costs. Thus, what might appear to be a very small increase in costs can result in substantial reduction in investment or production at a particular location.

During the ongoing debate on reducing greenhouse gases, it is generally recognized that domestic "energy-intensive sectors"[5] could well be disadvantaged if the U.S. imposes more stringent reductions in GHGs than do other nations, particularly less developed nations. The industries most commonly cited are steel, aluminum, paper, chemicals, and cement, though other industries, including refineries and air separation companies, note that they too are energy intensive and will bear increased production

[4] Of course, the overall production of the product may be reduced by an increase in costs due to the elasticity of demand for the final product.

[5] Treasury memorandums, op. cit., page 2, as well as the industries specifically identified in H.R, 2454.

costs if cap-and-trade legislation is enacted. In many energy intensive industries, commodity products can be (and, in fact, are now) produced throughout the world, and then shipped to the United States to be converted into finished products.

The discussion below focuses on the manufacturing processes of the five energy intensive industries most commonly identified. ELCON emphasizes that the economic impacts of the legislation is not limited to these five industries. Our descriptions in this paper are limited to these five industries for brevity and because they clearly show that the production of many commodity products can be undertaken virtually anywhere in the world.

As examples:

- Iron ore is mined (in descending order of importance) from China, Brazil, Australia, India and Russia. It is processed into iron, and then into unfinished steel products such as billets or slabs. These billets or slabs can be made anywhere in the world and shipped to markets for final processing into finished steel products.
- The production of aluminum involves processing bauxite ore to make aluminum ingots. Australia and Guinea have the largest reserves of bauxite, with Brazil, China, India, Jamaica and Vietnam following in significance. Aluminum ingots are made in many different countries and shipped to markets for final processing. Electricity represents well over 30% of the total costs of producing aluminum.
- Paper manufacturing involves the separation of cellulose fibers (or pulp) from impurities. The pulp is then "cooked" by boiling at high pressures and temperatures. Rolls of paper are made in many different countries and shipped to markets for final production. The process is very energy intensive requiring tremendous amounts of energy for heating and drying.
- Cement making begins with combining and crushing calcium compounds, silica, alumina and iron oxide and then heating those ingredients to over 2700 degrees to form the raw material "clinker" which is then ground into cement.
- There are over 70,000 different chemical products, with most sold as inputs to other industries (or to the chemical industry itself). The chemical reaction and refining processes (including air separation) used often require elevated temperatures and pressures. Chemicals are manufactured around the world and most often are transported in bulk to the industrial or agriculture user.

In the five industrial processes mentioned above, as well as others, electricity cost is a very significant and critical input. Any increases in the cost of electricity will have an impact on production. The greater the increase, the greater the impact. Some of the basic steps in the production process already are conducted in locations throughout the world. As electricity prices rise in the U.S. relative to other locations, and as the cost of

allowances for emitting GHGs at industrial facilities also increases, manufacturing companies will find it economically necessary to change current production locations and produce more overseas – resulting in job losses and production declines in the U.S.

Most large industrial electricity consumers are very capital intensive. Domestic production will decline as a consequence of inadequate protections in climate change legislation. These declines may lead to plant closings and write offs, thus weakening the financial condition of energy intensive industries. As a result, domestic industry will be less able to fund investments in replacement facilities. Many of the global competitors for large industrials are located in emerging and developing regions of the world. In all likelihood, companies in developing countries will increase their manufacturing as production falls in the U.S. However, unless the emissions requirements in developing countries are as stringent as those in the U.S., an unlikely assumption, emissions will increase worldwide.[6]

Legislation should include provisions to avoid carbon leakage through allowance allocation and other transitional compensation for energy-intensive industries.

THE IMPACT OF CLIMATE CHANGE LEGISLATION ON ENERGY-INTENSIVE INDUSTRIES AND OTHER CONSUMERS

Any cap-and-trade mechanism that mandates a reduction of greenhouse gases from electricity generation will increase the cost of power for consumers. Increased costs will impact the production decisions of energy-intensive manufacturers. Thus, the question for U.S. policy makers should be: Are the cost increases to be incurred by domestic manufacturers (and ultimately their consumers) more than offset by the benefits of the greenhouse gas reductions?

Several studies of the cost increases expected by H.R. 2454 have been conducted,[7] and although most of the studies use the same or very similar econometric models, they have arrived at widely varying conclusions. A few of the studies receiving most public attention are briefly mentioned below.

The Environmental Protection Agency's (EPA) analysis of the House-passed bill estimates that H.R. 2454 would cost the average household an additional $80 to $111 per year, which translates to about 22¢ to 30¢ per day.[8]

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[6] In fact the recent Copenhagen Accord prescribed emission reductions based on 2005 emission levels for developed countries but merely reductions as a percentage of economic growth for developing countries.

[7] H.R. 2454 is the "American Clean Energy and Security Act of 2009 (ACES)." H.R. 2454 was passed by the U.S. House of Representatives on June 26, 2009.

[8] EPA Analysis of the American Clean Energy and Security Act of 2009: H.R. 2454 in the 111th Congress, June 23, 2009. The EPA has more recently issued a report titled: "Economic Impacts of S. 1733: The Clean Energy Jobs and American Power Act of 2009," October 23, 2009. In this report, the EPA states that:

The Congressional Budget Office estimated net annual household costs at $175 per year[9] and the Energy Information Administration puts the costs at $83 per year.[10] Chairmen Henry Waxman and Ed Markey presented the costs as equivalent to only a "postage stamp a day," coining a phrase that backers of climates change legislation in and outside of Congress used to demonstrate the program's relative affordability.[11]

However, the respected consulting company CRA International conducted a study for the National Black Chamber of Commerce and concluded that, by 2050, H.R. 2454 would: [12]

- Reduce U.S. employment by 3.6 million – net of substantial gains in "green jobs"
- Increase electricity rates by 48% (5.8 ¢/kWh)
- Reduce household purchasing power by $1,070
- Reduce gross domestic product (GDP) by 1.5% ($630 billion) relative to the baseline
- Create substantial uncertainty, inevitably depress total employment from baseline levels, create very substantial wealth transfers abroad, and require very substantial costs of a duplicate regulatory system.

And the National Association of Manufacturers and the American Council for Capital Formation (NAM/ACCF) released a study of the impacts of H.R. 2454 using the same model as the U.S. Energy Information Administration, but with different assumptions. The NAM/ACCF study concludes that by 2030 H.R. 2454 would result in : [13]

- A reduction in annual GDP of 1.8% (or $419 billion) under the low cost scenario and by 2.4% (or $571 billion) under the high cost scenario.

"EPA's assessment of the two bills indicates that the full suite of EPA models would likely show that the impacts of S. 1733 would be similar to those estimated for H.R. 2454."

[9] The CBO analysis critically assumed that all allowance value flows back to households. While that may technically be true in that ultimately higher employment for some people and higher shareholder value returns for some industries will be generated, it is incorrect to imply that this result is likely to be a typical household's impact.

[10] The Estimated Costs to Households from the Cap-and-Trade Provisions of H.R. 2454, Congressional Budget Office, June 19, 2009.

[11] "Senate Staff Consult EPA To Keep Cost Estimates Down In Climate Bill," CarbonControlNews.com, September 10, 2009.

[12] Impact on the Economy of the American Clean Energy and Security Act of 2009 (H.R.2454), a study conducted for the National Black Chamber of Commerce by CRA International, August 2009.

[13] "Analysis of The Waxman-Markey Bill 'The American Clean Energy and Security Act of 2009' (HR 2454) Using The National Energy Modeling System (NEMS-ACCF-NAM2)," A Report by the American Council for Capital Formation and the National Association of Manufacturers with analysis conducted by Science Applications International Corporation (SAIC), August 12, 2009.

- A decline in industrial production beginning in 2012 and reaching losses of between 5.3% and 6.5% by 2030.

To try to bring some sense to the battle of the studies, the Congressional Research Service (CRS) conducted a detailed comparison of the seven studies that have received the most attention.[14] CRS recognized that the assumptions used as inputs for each study can result in significant differences in outcome. However comparing the results of the various studies is valuable and it may be able to assist policymakers in designing a greenhouse gas reduction strategy. CRS concludes:

- If enacted, the ultimate cost of H.R. 2454 would be determined by the response of the economy to the technological challenges presented by the bill.
- The allocation of allowance value under H.R. 2454 will determine who ultimately bears the cost of the programs.
- The cases generally indicate that the availability of offsets (particularly international offsets) is potentially the key factor in determining the cost of H.R. 2454.
- The interplay between nuclear power, renewables, natural gas, and coal-fired capacity with carbon capture and storage technology among the cases emphasizes the need for low-carbon sources of electric generating capacity in the mid-to-long term. A considerable amount of low-carbon generation will have to be built under H.R. 2454 in order to meet the emission reduction requirement.
- Attempts to estimate household effects (or other fine-grained analyses) are fraught with numerous difficulties that reflect more on the philosophies and assumptions of the cases reviewed than on any credible future effect.

THE IMPORTANCE OF ASSUMPTIONS IN UNDERSTANDING THE DIFFERENCES IN COST ESTIMATES

The CRS study does an excellent job of pointing out the importance of assumptions in each of the various cost estimates.[15] In summarizing the general approach of the ACCF/NAM and the EIA's "high technology" sensitivity case, CRS stated: [16]

[14] Parker, Larry and Yacobucci, Brent D., "Climate Change: Costs and Benefits of the Cap-and-Trade Provisions of H.R. 2454," Congressional Research Service, September 14, 2009 (herein, The CRS Study). The studies analyzed by the CRS were conducted by: the Environmental Protection Agency, Energy Information Administration, CRA International for the National Black Chamber of Commerce, the Heritage Foundation, the Congressional Budget Office, the American Council for Capital Formation and the National Association of Manufacturers, and the Massachusetts Institute of Technology.

[15] See specifically pages 25–28, The CRS Study.

> In its sensitivity case, EIA mimics H.R. 2454's various technology and efficiency provisions by employing its High Technology baseline that has more aggressive technology development assumptions than its reference case, and also includes banking, and phased-in offsets. In contrast, ACCF/NAM is not confident that new technology, new energy sources, and market mechanisms (e.g., carbon offsets, banking) will be sufficiently available to achieve H.R. 2454's emission targets. Accordingly, ACCF/NAM's High Cost case assumptions differ substantially from EIA's High Technology sensitivity analysis by discouraging banking, restricting the availability of offsets to half that allowed in H.R. 2454, and significantly restricting availability of various low-and non-carbon technologies beyond what is embedded in the NEMS base case.

These differences are highlighted in the following table from the CRS study:[17]

The assumptions specified in each study result in very significant differences that would have critical differences in projected costs. For example, the EIA/NEMS/BASIC analysis results in projections of new generating capacity in 2030 that differ significantly from comparable projections from the NBCC/CRA/LOW analysis. [18] Specifically:

Table 4. General Perspective of ACCF/NAM-High Cost and EIA-High Technology Assumptions

	EIA High Technology	ACCF/NAM-High
Technology	Assumes no constraints on technology availability beyond those embedded in the NEMS model	Assumes significant constraints on further low- and non-carbon technology availability beyond that embedded in NEMS
Economic	Assumes aggressive technology development, efficient decision-making via banking, and phasing in of offsets to the levels allowed in H.R. 2454 (2 billion metric tons)	Assumes short-term decision-making with a 10% discount rate; total offsets allowed limited to 1 billion metric tons annually (50 million from international sources)
Ecological	Assumes decisions made in favor of technology and efficiency because of H.R. 2454's incentives, regulations, and price signal	Assumes none—total GHG emissions are not presented

Source: Energy Information Administration (EIA),*Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009* (August 4, 2009); Science Applications International Corporation, *Analysis of The Waxman-Markey Bill " The American Clean Energy and Security Act of 2009" (H.R. 2454) Using the National Energy Modeling System (NEMS/ACCF-NAM 2)*, a report by the American Council for Capital Formation and the National Association of Manufacturers (2009).

[16] The CRS Study, page 26.

[17] Table 4 from the CRS Study, page 27.

[18] The CRS Study, Table 9, page 54.

Projections of Construction of Generating Capacity in 2030	EIA/NEMS/BASIC	NBCC/CRA/LOW
Nuclear Power	100 GW	42 GW
Renewable Power	120 GW	76 GW
Natural Gas-Fired	40 GW	59 GW
Coal with CCS	68 GW	3 GW

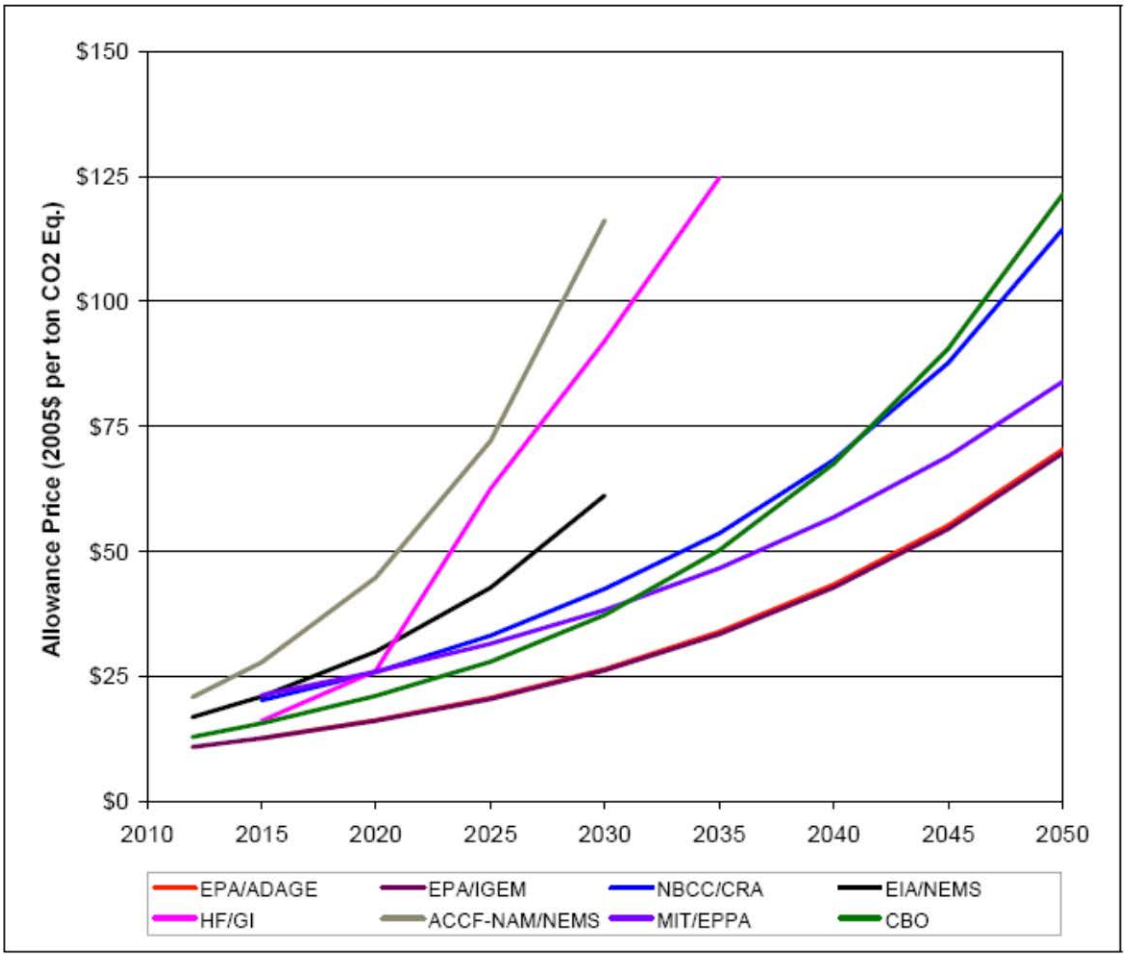
Such differences are very important to understanding the final cost estimates. A considerable amount of low-carbon generation will have to be built to meet the GHG reduction requirements in H.R. 2454. It is debatable whether the amounts of new generating capacity of the types included in the chart above can actually be constructed by 2030 – especially when recognizing, for example, that EIA/NEMS/BASIC in essence calls for doubling within the next two decades the total amount of nuclear capacity currently in existence. And further, EIA/NEMS/BASIC projects 68 GW of new coal generation with CCS by 2030, while that technology has not yet been demonstrated viable, much less economic.

OBSERVATIONS FROM THE STUDIES

While recognizing the difficulties of the task, the CRS study still gives an important perspective to the debate over the various cost estimates. For example, CRS compared the projected prices of carbon allowances under H.R. 2454 (see chart on page 12) and found that in spite of the substantial differences, all seven studies showed significant increases in the projected allowance price per ton of CO_2 equivalent, with several showing prices exceeding $100 per ton and one study finding that the $100 per ton threshold would be reached before 2030. [19]

[19] The CRS Study, Figure 12, page 41.

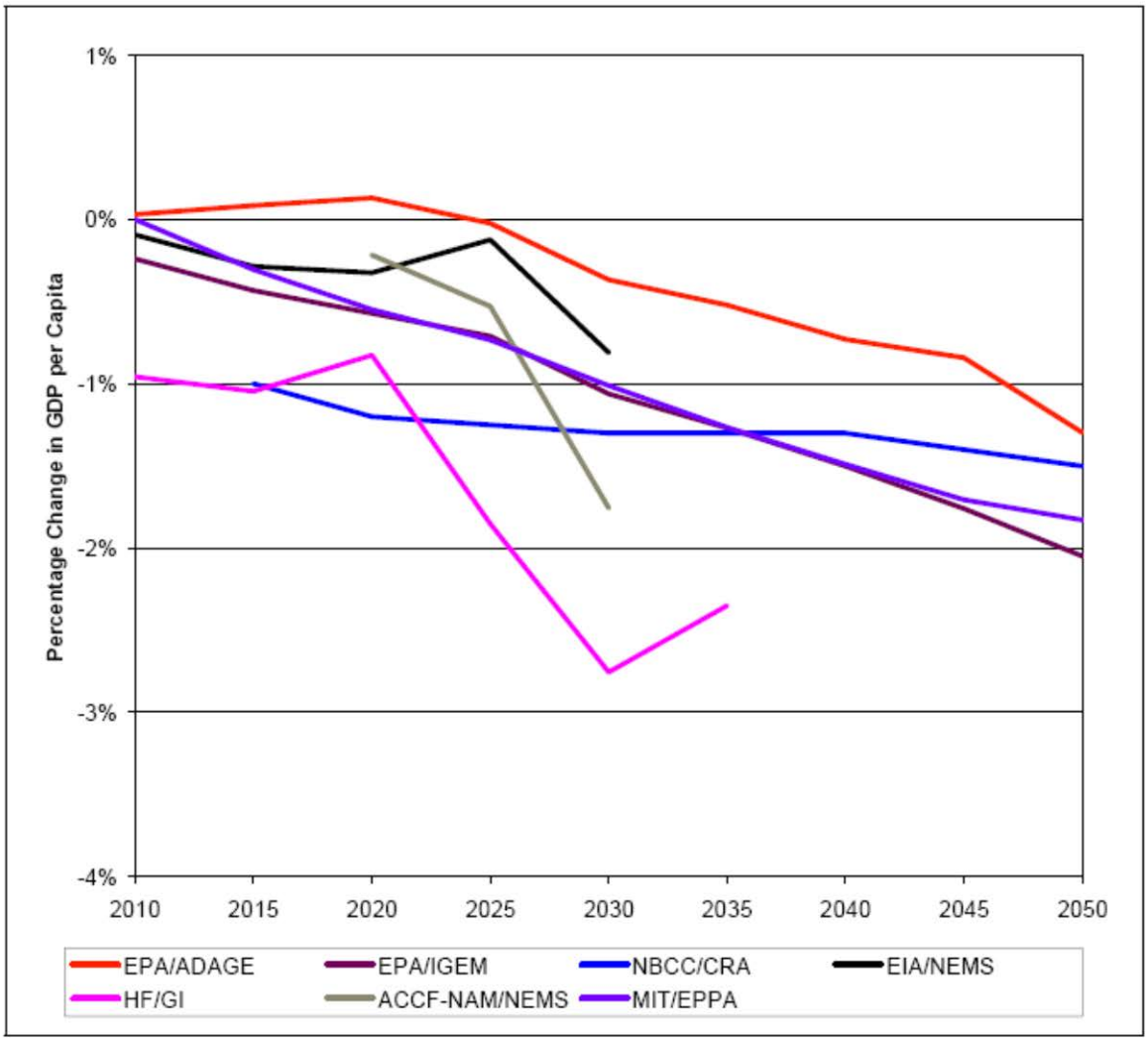
Figure 12. Projected Allowance Prices Under H.R. 2454



Sources: EPA/ADAGE and EPA/IGEM: "Data Annex" available on the EPA website at http://www.epa.gov/climatechange/economics/economicanalyses.html MIT/EPPA: Sergey Paltsev, et al., "Appendix C" of Paltsev et al., *The Cost of Climate Policy in the United States*, MIT Joint Program on the Science and Policy of Global Change (2009). EIA/NEMS: EIA, *Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009*, (August 2009). ACCF-NAM/NEMS: SAIC, *Analysis of The Waxman-Markey Bill "The American Clean Energy and Security Act of 2009" (H.R. 2454) Using The National Energy Modeling System (NEMS)*, report by the ACCF and NAM (2009). NBCC/CRA: CRA International, *Impact on the Economy of the American Clean Energy and Security Act of 2009 (H.R. 2454)* (May 2009). CBO: CBO, *CBO Cost Estimate: H.R. 2454 American Clean Energy and Security Act of 2009 As ordered reported by the House Committee on Energy and Commerce*, (June 5, 2009). HF/GI: The Heritage Center for Data Analysis, *The Economic Consequences of Waxman-Markey: An Analysis of the American Clean Energy and Security Act of 2009* (August 5, 2009).

Note: Estimates converted to 2005$ using GDP implicit price deflator.

Figure 9. Percentage Change in GDP per Capita Under H.R. 2454 Relative to the Reference Case



Note: Reductions are relative to each model's reference case baseline.

Sources: CRS Analysis of data from each model. EPA/ADAGE and EPA/IGEM: "Data Annex" available on the EPA website at http://www.epa.gov/climatechange/economics/economicanalyses.html. MIT/EPPA: Sergey Paltsev, et al., "Appendix C" of Paltsev et al., *The Cost of Climate Policy in the United States*, MIT Joint Program on the Science and Policy of Global Change (2009). EIA/NEMS: EIA, *Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009,* (August 2009). ACCF-NAM/NEMS: SAIC, *Analysis of The Waxman-Markey Bill "The American Clean Energy and Security Act of 2009" (H.R. 2454) Using The National Energy Modeling System (NEMS)*, report by the ACCF and NAM (2009). NBCC/CRA: CRA International, *Impact on the Economy of the American Clean Energy and Security Act of 2009 (H.R. 2454)* (May 2009). HF/GI: The Heritage Center for Data Analysis, *The Economic Consequences of Waxman-Markey: An Analysis of the American Clean Energy and Security Act of 2009* (August 5, 2009).

Further, the Congressional Budget Office (CBO) estimated that, if all of the allocations were auctioned, federal revenue would increase by $858 billion between 2010 and 2019 giving an indication of the significant value of the allowances and thus the potential impacts on total costs.[20]

Which of the many diverse studies is correct? Obviously, it is difficult to definitively determine. However, in 2008 Steven Hayward, a scholar with the American Enterprise Institute, wrote an op-ed for the ***Wall Street Journal*** which, if correct, puts climate control costs into a historical perspective.[21] Specifically, Mr. Hayward states:

- DOE reports that in 2006 the U.S. emitted 5.8 billion metric tons (bmt) of CO2 or just under 20 tons per capita
- An 80% reduction from 1990 levels [roughly equal to the mandate of HR 2454] means the US cannot emit more than roughly 1 bmt of CO2 in 2050
- The last time the US emitted 1 bmt was around 1910 when the population was 92 million
- By 2050, the Census Bureau projects population to be 420 million -- Thus, per capita emissions must be reduced to 2.5 tons per capita
- France and Switzerland (with electricity from nuclear and hydro respectively) emit about 6.5 tons per capita today
- The average US residence uses about 10,500 kWh and emits 11.4 tons of CO2 per year; this must fall to 2,500 kWh and 1.5 tons to meet the 2050 goal

While studies vary wildly on the economic impact of mandated greenhouse gas emission reductions, every GHG study analyzed by the Congressional Research Service (CRS) projects that mitigation costs will rise, gross domestic product will fall, and industrial shipments will decline – substantially in many cases. Annual GDP declines could be on the order of 1% (or more) which, according to the U.S. Treasury, makes them equal in scale to the impact of all existing environmental regulations.

A considerable amount of low-carbon generation will have to be built, and the technology for much of that generation is not yet developed or available. If a cap-and-trade regime is implemented, and all of the allowances are auctioned, federal revenue is estimated to increase by $858 billion between 2010 and 2019, giving an indication of the value of the mitigation policy and thus the potential impact on consumer costs. Meeting the 2050 emission reduction requirements of H.R. 2454 would require ***total*** greenhouse gas emissions reduced to levels comparable to those last experienced in 1910, but today's population is more than four times the population in 1910. The

[20] "CBO: Waxman-Market may raise $858 billion," ***Electric Power Daily***, June 9, 2010.

[21] "The Real Cost of Tackling Climate Change," ***The Wall Street Journal***, April 28, 2008, page A 19.

average U.S. household would have to reduce its electricity consumption to less than one-fourth of today's consumption.

Given such indicators, we find it difficult to see how the U.S. can meet the 2050 emission reduction goals of H.R. 2454 without costs rising more, perhaps very significantly more, than the price of a postage stamp per day. To minimize the risk of underestimating the cost burden that will be placed on energy intensive industrial users, legislation should minimize the cost of climate policy through market mechanisms and cost containment provisions such as the banking and borrowing of offsets as well as provide research and development funding to accelerate the development and deployment of new and low emissions technologies.

THE IMPACTS ARE NOT EVENLY DISTRIBUTED

Even if the economic impacts of the emission reductions were rather minimal *on average*, which we believe is not the case, the distribution of the impacts will be uneven in several ways. Thus, the program will create winners and losers. As examples:

- *Shifts in production and employment:* The CBO projected a relatively small impact on overall employment. While this projection may be questioned, there is no question that the legislation will create a very substantial shift in the composition of employment between industries with manufacturers losing jobs. Specifically, CBO states:

  > A cap-and-trade program for carbon dioxide emissions would reduce the number of jobs in industries that produce carbon-based energy, use energy intensively in their production processes, or produce products whose use involves energy consumption, because those industries would experience the greatest increases in costs and declines in sales. [22]

  While such a shift in employment from certain sectors to others is not new, there are questions regarding whether the employment gains in other sectors (i.e., low-carbon industries) would be sufficient to offset the losses in carbon-based industries. ELCON is not suggesting that the program is either fair or unfair, we are simply pointing out that it would create winners and losers in various industrial sectors.

- *Geographical shifts:* H.R. 2454 allocates 30% of the free allowances to electric utilities based half on emissions and half on the electricity sales of the utilities. This rewards utilities that have large amounts of low- or zero-carbon generation (natural gas, hydro, nuclear, etc.) at the expense of primarily coal-based utilities. Since the coal-based utilities are located in the Midwest and Southeast, this allocation scheme would benefit utilities on the coasts at the expense of those

[22] The Economic Effects of Legislation to Reduce Greenhouse-Gas Emissions, Congressional Budget Office, September 2009, page 15.

inland. ELCON is again not suggesting that the allocation scheme is either fair or unfair, we are simply pointing out that it would create geographical winners and losers.

- *Shifts between income categories:* Most estimates of the net costs to households under H.R. 2454 do not reveal the wide range of effects that the program would have on households in different income brackets. However, the differences may be substantial. As an example, the CBO estimates that "…households in the lowest quintile would see an average *net benefit* of about $40, while households in the highest income quintile would see a *net cost* of approximately $245…"[23] This redistribution of income is due primarily to the fact that significant assistance is planned for low income individuals with few benefits planned for other income groups. Again, ELCON is not suggesting that the allocation scheme is either fair or unfair, we are simply pointing out that it would create income transfers between income categories.

BENEFITS

Obviously, estimating future costs is very difficult. However, trying to put a monetary value on the expected benefits of H.R. 2454 is even more difficult. CRS states that: "None of the cases examined here attempt to quantify or monetize the benefits of reducing greenhouse gases."[24] CRS states that monetizing the benefits from reducing traditional air pollutants has been attempted for decades, to no avail. Since climate change is a global problem, it is very difficult to monetize benefits from reducing greenhouse gases. "Indeed, some consider the effort impossible, bordering on the unethical." [25]

CRS presents several pages of analysis regarding attempts to monetize the benefits of reducing greenhouse gas – focusing primarily on studies from the UK and MIT. CRS concludes: "…attempts to monetize climate-related benefits currently reflect much about the philosophies and assumptions of the people doing the estimating." [26] Due to the difficulties in trying to estimate benefits, CRS observes that: "…estimates of the social costs of carbon span three orders of magnitude." [27]

ELCON believes that the costs of substantial reductions in greenhouse gases are not insignificant, and, at the same time, we certainly agree that it is very difficult to place a dollar value on the benefits of reducing greenhouse gas emissions. However we do not accept the simple assertions of those who suggest that these substantial costs are more

[23] CBO, June 19, 2009, op.cit., page 9, emphasis in the original.

[24] The CRS Study, page 86.

[25] Ibid.

[26] Ibid., page 90.

[27] Ibid., page 93.

than offset by the benefits – when we really cannot quantify, even within three orders of magnitude, the value of the benefits.[28] Enacting legislation that has a possibility of costing the economy trillions of dollars, with the associated devastating job losses, absent any real idea of the value of the benefits, does not seem to be good public policy.

Additionally, it is very important to recognize that any "benefits" derived from a greenhouse gas emissions reductions program that apply only to the U.S. and other developed nations will have minimal impacts on world-wide climate at best. Climatologists estimate that the U.S. meeting the reductions mandated by H.R. 2454 will lower global temperatures by no more than 0.2 of a degree at the end of the century unless developing countries also impose GHG-reducing requirements similar to those in the U.S. Thus, unless the developing countries adopt plans similar to the U.S., the U.S. will incur very substantial monetary and employment costs, while the world's greenhouse gas emissions will fall by insignificant amounts.

CONCLUSIONS

Manufacturers face considerable uncertainty when viewing future electricity markets. The magnitude of the electricity cost increases due to greenhouse gas controls depends on variables such as the: auction or allocation of allowances, form of any allocation, availability of offsets, inclusion of biomass, the available supplies of natural gas, involvement of either new or existing hydro and nuclear facilities, treatment of "leakage," amount of energy efficiency and renewables required and availability of new technologies, not to mention the general level of the economy. However, it seems certain that any mandates requiring meaningful reductions in greenhouse gas emissions will result in substantial increases in electricity prices.

Electricity price increases have very significant impacts on basic industry. Substantial portions of industry production may be lost to offshore competitors with lower electricity prices and lower (or no) similar energy and environmental policies, resulting in very significant losses of manufacturing jobs in the U.S and possibly higher global greenhouse gas emissions. The loss of our industrial base will be harmful regardless of whether new green jobs offset this loss.

ELCON urges Congress to ensure that energy intensive industrial consumers and their employees do not suffer unduly from the adverse impacts of legislation. Such legislation could well create competitive imbalances favoring manufacturers in less regulated regions of the world. To avoid the possibility of unnecessary job losses and increased overall emissions due to leakage, Congress should ensure adequate protection for manufacturing entities as long as the climate legislation induced

[28] CRS specifically states: "Because of these differences in perspective and techniques, estimates of the social costs of carbon span three orders of magnitude," Ibid., page 93.

competitive imbalance endures. [29] Without such critical protections, large portions of major domestic industrial production will be put at an international competitive disadvantage, risking unnecessary job losses and resulting in increased greenhouse gas emissions world-wide.

[29] Critical elements of this protection include (but may not be limited to):

- Provisions to avoid carbon leakage through allowance allocation and other transitional compensation for energy-intensive industry, including:
  - Allocation of allowance value to cover the direct and indirect emissions; and
  - Assurance that adequate allowances are provided for all eligible energy intensive industries for as long as the climate legislation induced competitive imbalance endures.
- The minimization of the cost of climate policy through market mechanisms and other cost containment provisions such as banking, borrowing and offsets, and
- The funding of market incentives to accelerate the development and deployment of new and low emissions fuels, technologies and processes.