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COMPETITIVENESS BRIEF

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FLAWS IN ECONOMIC MODELING SHOULD BE CORRECTED BEFORE LEGISLATURE APPROVES CAP-AND-TRADE

THE BOTTOM LINE

The Legislature should decline to approve the WCI cap-and-trade plan until WCI provides a credible estimate of the efficacy and economic impact of its proposal.

The Western Climate Initiative (WCI) wants us to believe that it will cost us nothing to totally transform the way we use energy. In announcing its plan for a cap-and-trade system to reduce greenhouse gas emissions in 11 states and provinces, WCI released the results of an economic modeling exercise intended to allay fears that its plan would result in economic disruption (WCI 2008). But burrowing a little deeper into this analysis reveals that the WCI's conclusions about the cost of its proposed cap-and-trade system are wildly optimistic and are not justified by the incomplete modeling work.

Under a cap-and-trade regime, the government sets a limit on the total amount of carbon that may be emitted during a particular period (the *cap*) and distributes allowances (rights to emit one metric ton of CO_2) equal to that total amount. Regulated entities, which might be either suppliers of fuel or emitters of carbon, must hold allowances equal to the amount of their emissions. After the allowances are initially distributed, regulated entities are free to buy and sell the allowances (the *trade*). The price of carbon is set by supply and demand in the allowance market.

The WCI, however, does not stop there. Integral to its cap-and-trade proposal is a set of "complementary policies" that aim to reduce greenhouse gas emissions in more conventional ways. These are:

- Clean car standards equivalent to those that have been enacted in California (and which Washington state has adopted also);
- Unspecified programs that reduce total vehicle miles traveled by 2 percent from the baseline projection for 2020;
- Unspecified aggressive energy efficiency programs that achieve 1 percent reductions in the annual rates of electricity and natural gas demand growth.

In theory, by allowing energy producers and consumers flexibility in responding to carbon caps, the cap-and-trade system avoids heavy-handed, prescriptive regulatory action that, in all likelihood, would not support the most efficient carbon reduction technologies or the optimal timing of their implementation. But the *cap* part of cap-and-trade does mandate reduced carbon emissions, and achieving those reductions will impose costs on businesses and consumers: new power plants, vehicles, furnaces and lighting are not free.

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To figure out whether the benefits of energy savings outweigh the costs, WCI commissioned modeling work from Systematic Solutions, Inc, which uses a proprietary model called ENERGY 2020 to simulate demand and supply in various fuel markets based upon detailed state-by-state forecasts of population and gross domestic product by industry. The modeling process plugs the caps in the cap-and-trade plan, along with the projected results of the complementary policies, into the model to see what happens to energy consumption. Then, applying prices to the projected saved energy, the analysis concludes that the program will not just be free, but will actually provide a net savings of billions of dollars in the process.

That last part is tough to believe. Beyond the basic intuitive sense that retooling an entire economy is very expensive, WCI's modeling has several clear problems.

Can cap-and-trade stand alone?

The first problem is that we never really see the impact of the cap-and-trade program itself, but only when it is lumped together with the complementary policies. Mixing cap-and-trade with traditional energy savings policies is mixing apples and kumquats.

A cap-and-trade regime is intended to operate at a macro level, influencing the behavior of businesses so that, over time, they create new efficiencies in the way they use energy. Rather than dictating how and when businesses might retool in response to the caps placed on them, governments simply set the program in place, sit back and watch the results. In contrast, the complementary policies that WCI places alongside cap-and-trade are more traditionally programmatic and regulatory.

The WCI proposal, then, marries the macro/results approach of cap-and-trade to a micro/command-and-control approach of the complementary policies. And it is clear from some of the modeling results that half of the anticipated greenhouse gas reductions are actually attributable to the complementary policies, and not to the cap-and-trade system itself. But aside from the California clean car standards, we do not know what those complementary policies actually are, and we cannot gauge the likelihood that they will achieve their posited contribution to CO_2 emissions reduction.

It is the cap that is the ultimate guarantor that the WCI emissions reduction target will be met. The primary WCI simulation of cap-and-trade with the complementary policies predicts that the price of a one metric ton CO_2 allowance would be $24 (2007$) in 2020. In light of the results of other efforts to model cap-and-trade systems, this allowance price looks low. The year 2020 nationwide CO_2 emission limit proposed by the Lieberman-Warner bill (which would have established a nationwide cap-and-trade system) is comparable to the regional limit proposed by WCI for 2020. Modeling results for Lieberman-Warner surveyed by the Pew Center on Global Climate Change predicted allowance prices as high as $61 (2007$) per metric ton in 2020. The average allowance price across the eight models Pew examined was $43 (2007$, Pew 2008).

The complementary policies are at least part of the reason that WCI modelers find such a low allowance price. To the extent that the complementary

Significant Costs for Business

Forecasts of emissions prepared for the state indicate that baseline 2020 greenhouse gas emissions (the level of emissions forecast absent the cap-and-trade system) would total 121.9 million metric tons, of which 113.4 million metric tons would be subject to the WCI cap (CCS 2007). At the WCI predicted price of $24 per ton (which we believe understates the 2020 allowance price) allowances sufficient to cover the baseline emissions would cost state residents and businesses $2.7 billion.

Of this $707 million would be borne by the industrial sector; $295 million, by the commercial sector, $354 million, by the residential sector; and $1.4 billion, by the transportation sector (this includes personal automobiles). The cost of gasoline would rise by $698 million; the cost of diesel fuel, by $288 million.

The burden on manufacturing businesses would be significant. Emissions data from the Boeing Company indicate that at $24 per metric ton the annual cost would be $8.4 million. Emissions data from the Northwest Pulp and Paper Association indicate the annual cost to a large pulp and paper mill would be $1.8 million, while the cost to a medium sized mill would be $980,000.

policies are not as successful as the WCI modelers assume, the price of an allowance will be higher. A simulation of cap-and-trade without the complementary policies would give an indication of how much the higher allowance price might go. Such a simulation would also allow us to compare ENERGY 2020 results with simulations of pure cap-and-trade policies done with other models.

WCI modelers have indicated that they are unwilling to conduct (or at least to release) a simulation without the complementary policies. This is unfortunate, because it gives the impression that they are trying to hide something.

Many allowances will not be auctioned

Under the WCI design recommendations, each partner state or province must auction off at least 10 percent of its allowance allocation and is free to distribute the remaining 90 percent of allowances as it sees fit. It is likely that many of these allowances will be distributed free of charge based on historical fuel-use patterns. This is appropriate, as it will ease the transition to a low carbon economy.

WCI modelers assume, however, that all of the allowances will be auctioned off, and this assumption matters for their results. By assuming that all allowances will be sold at auction, the WCI modeling tends to overestimate the rates of regulated gas and electric utilities at any given allowance price and therefore underestimate the ultimate price of allowances.

Complementary policies will cost real money

A glaring and inexplicable omission from the analysis is the cost of the complementary policies. While ENERGY 2020 accounts for costs that will arise under cap-and-trade (i.e. new power generation systems) it does not offset all the costs of the complementary policies, especially those that would bring about the reduction in VMT. Just because the energy savings programs have not been defined does not mean they are free!

In fact, some of the energy savings measures that might be promoted under the complementary policies never recoup their capital cost. For example, the federal Energy Star program says that “Replacing [home] windows is rarely cost-effective based solely on energy-savings.”

Using public transit to achieve reductions in vehicle miles traveled results in higher cost trips. Transit can save energy, but these savings are more than offset by labor and administrative costs. According to the National Transit Database, the operating cost of bus transit per passenger mile is $0.75 in King County, $0.89 in Spokane County, $0.92 in Clark County and $1.31 in Pierce County. This compares with the current IRS mileage rate of $0.58 per mile for driving a car. If just half of WCI’s anticipated 2 percent reduction in VMT is shifted to transit, Washington taxpayers would need to provide about $750 million per year in new transit operating subsidies (in 2009 dollars) by 2020. And this does not include capital costs and does not adjust for the high marginal cost of acquiring new transit riders.

Finally, we need to consider the non-pecuniary costs of saving energy. People and businesses can always turn down thermostats, turn off lights or take fewer trips. But just because these actions do not have a quantifiable penalty does not mean they are costless. Heat, light and easy mobility are integral parts of our contemporary standard of living, and reductions in them cannot be ignored.

State and province level results have not been released

As implemented for WCI, ENERGY 2020 models each partner state and province separately. To date, however, WCI modelers have chosen only to release aggregate results only and not results for the individual partners.

The initial round of modeling has included the eight partners who are members of the Western Electricity Coordinating Council (British Columbia, Washington, Oregon, California, Arizona, New Mexico, Utah, and Montana). In upcoming months WCI modelers intend to extend the analysis to include the remaining partners, Manitoba, Ontario, and Quebec.

Modeling stops short

WCI's modeling work does not provide enough information about the economic impacts that its cap-and-trade plan might have. ENERGY 2020 is an energy model, not a macroeconomic model, so it never quite gets to the larger impacts. Simply identifying energy savings does not forecast how a cap-and-trade system will affect the overall level of economic activity in the region.

Energy pervades the entire economy, so changes in patterns of energy use will ripple across all sectors, creating highly complex interactions throughout the U.S. and Canada as industries shift in response to carbon pricing. The WCI modeling is simply too static to anticipate these shifts and thereby show long term impacts on employment and incomes.

Systematic Solutions claims that ENERGY 2020 can integrate with macroeconomic models. Apparently, however, WCI did not feel it was important to take that next step for the region as a whole. Given that the 11 states and provinces represent about $4 trillion of annual economic activity, however, it seems as though it would have been worthwhile to do a more complete economic analysis.

Some individual states (Washington included) are planning to do macro modeling using the ENERGY 2020 outputs as inputs. But this piecemeal, backend approach will not pick-up the full range of dynamic feedbacks.

It would also be helpful to know just what is inside the black box of ENERGY 2020. Proprietary models such as this are built on a series of assumptions and relationships the public is not allowed to see, let alone comment on. Mistakes or biases in assumptions can produce very misleading results.

A very good way to provide a look inside the black box would be to conduct and make public a sensitivity analysis of the ENERGY 2020 model. (While WCI modelers have provided a limited sensitivity analysis of the cap-and-trade system, they have not provided such an analysis of the ENERGY 2020 model itself.) Sensitivity analysis, which is perhaps the most basic tool of model evaluation, "is usually performed as a series of tests in which the modeler sets different parameter values to see how a change in the parameter causes a change in the dynamic behavior "of the model (Breierova and Choudhari). Energy prices are key parameters that should be included in the sensitivity analysis.

Not the first time

This is not the first spurious attempt to sell a greenhouse gas reduction program based on a free ride. A 2006 paper published by the AEI-Brookings Joint Center for Regulatory Studies examined three studies that similarly claimed that it would be possible for California to meet its 2020

PEER REVIEW OF AB 32 ECONOMIC ANALYSIS

The California Air Resources Board (CARB) prepared an economic analysis of its plan to implement California's landmark greenhouse gas reduction bill, AB32 (CARB 2008). Much like the economic analysis prepared by the WCI of its design recommendations for a regional cap-and-trade system, the CARB economic analysis assumed that a number of the regulations to be imposed would be costless to Californians. The CARB economic analysis was put through an independent peer review process, under which the analysis was reviewed by panel of six economists, all nationally recognized experts in environmental economics. Five of the six expressed strong reservations to the CARB claim that California's 2020 emissions targets could be met with no net cost. Following are excerpts from three of the critiques.

Mathew Kahn of U.C.L.A:

> While I support the Governor's broad AB32 goals, I am troubled by the economic modeling analysis . . . These economic models predict that this regulation will offer us a "win-win" of much lower greenhouse gas emissions and increased economic growth. . . [T]here are too many uncertainties and open microeconomic questions for me to believe this. The net dollar cost of each of these regulations is likely to be much larger than what is reported. (Kahn 2008)

Robert Stavins, of Harvard University:

> I have come to the inescapable conclusion that the economic analysis is terribly deficient in critical ways and should not be used by the State government or the public for the purpose of assessing the likely costs of CARB's plans. . . .
>
> CARB's economic analysis systematically under-estimates costs. . . .
>
> But there should be no mistake about it—meaningful action to address global climate change will be costly. This is a key 'inconvenient truth' that must be recognized when policymakers construct and evaluate proposals, because a policy's specific design will greatly affect its ability to achieve its environmental goals, its costs, and the distribution of those costs. (Stavins 2008)

Janet Peace and Liwayway Adkins, of the Pew Center on Global Climate Change:

> Because the overall results are highly counter-intuitive and contrary to a wide body of theoretical and empirical work, the current analysis should have done more to explain and justify these results. In particular, it appears that the results are being driven by the net cost (in many cases, net savings) calculations of specific regulatory measures that are inputs to the models, as well as the limited set of policy simulations conducted. Furthermore, the report in many places claims that results are conservative but does not provide comparisons for this assertion. As such, the analysis gives the appearance of justifying the chosen package of regulatory measures rather than evaluating it. (Peace and Adkins 2008)

carbon reduction targets with no net cost to state residents. These studies were found to have omitted important components of the costs of emission reduction efforts and to have overestimated the energy efficiency improvements that those efforts would yield. The paper concluded that "just a few of the flaws we identified lead to underestimation of annual costs on the order of billions of dollars" (Stavins, Jaffe and Schatzki 2007).

In August 2008, the California Air Resources Board (CARB) released a staff economic analysis of its plan for meeting the state's 2020 carbon reduction goals. The CARB study also claimed that these goals could be met at no cost to state residents. This study was put through an independent peer review process, by a panel of six economists who are nationally recognized experts on the economics of climate change. Five of the six expressed strong skepticism that the goals could be met with no net cost. (See box at left.)

The Pew Center on Global Climate Change reviewed eight modeling exercises designed to project the impacts of the federal Lieberman-Warner Climate Security Act, the carbon reduction goals of which are similar to those anticipated by the WCI. All eight of the models used to analyze Lieberman-Warner found that it would reduce GDP growth, indicating net costs to the economy (Pew 2008).

WCI: FINISH YOUR HOMEWORK

Energy is at the heart of nearly all business and individual activities, and it is clear that over time we will all need to change how we use energy. But to suggest, as the WCI analysis does, that this transformation will be cost-free is ridiculous. There will be substantial costs involved in moving business, homes and transportation networks toward reduced energy use.

The question is, what energy saving and carbon reduction mechanisms are the most fair, efficient and transparent? By assuming zero cost (or even cost savings) for a cap-and-trade regime, WCI neatly sidesteps this question. And if Legislators are led to believe that reducing greenhouse gasses will be cost-free, they are less likely to scrutinize the mechanisms de-

signed to achieve those reductions. Legislators would be wise not to fall into this trap.

WCI needs to go back into its black box and produce a more credible model of its cap-and-trade proposal that policy makers can use to judge its merits. Specifically, WCI and its consultants need to:

- Conduct a detailed sensitivity analysis of the ENERGY 2020 model;
- Conduct simulations that test the energy savings from the cap-and-trade program alone, without the complementary policies;
- Conduct simulations where not all allowances are auctioned;
- Define the complementary policies in detail and factor the public and private costs of implementing them into their modeling;
- Report their results for each individual state and province, not just for the WCI region as a whole;
- Feed the results of the ENERGY 2020 modeling (with the public and private costs of the complementary programs fully measured) into a suitable macro-economic model to see how projected changes in energy use will affect the overall economy, not just of Washington, but of all states and provinces over time.

The Washington Legislature is being asked to get the state on board the WCI's cap-and-trade system, based on a poor piece of analytic work that falsely shows it to be a no-brainer. The Legislature should decline to entertain such an idea until WCI finishes its homework and comes back with a credible estimate of the efficacy and economic impact of its cap-and-trade proposal.

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