CENTER FOR ENERGY ECONOMICS
Bureau of Economic Geology, Jackson School of Geosciences
The University of Texas at Austin

Initial Report to Texas Comptroller of Public Accounts

The Proposed American Clean Energy and Security Act of 2009 and Related Energy/Environment Federal Legislation

Considerations for the Texas Economy

June 8, 2009[1]

[1] The first draft of this initial report was prepared June 2, 2009 following the first test run of modeling. This report was prepared by Dr. Michelle Michot Foss, Chief Energy Economist and Head and Dr. Gürcan Gülen, Senior Energy Economist, Center for Energy Economics, BEG-UT.

The Proposed American Clean Energy and Security Act of 2009 and Related Energy/Environment Federal Legislation:

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Background and Executive Summary

The Bureau of Economic Geology's (BEG's) Center for Energy Economics (CEE)[2] was asked to advise and assist the Texas Comptroller of Public Accounts (CPA) in its evaluation of potential State impacts associated with key Federal legislative and regulatory initiatives. Among these, of most importance for CPA is the proposed American Clean Energy and Security Act of 2009 (ACESA, HR 2454) and related policy and regulatory actions to address greenhouse gas (GHG) mitigation in the United States.

At more than 900 pages, ACESA is broad in scope and extensive in application, encompassing actions that would permeate throughout the US economy and society. However, ACESA is not the only item on the Congressional plate. Among other Federal initiatives that will affect Texas are oil and gas tax proposals and general energy provisions embedded in the Obama Administration budget blueprint (and in the previously enacted American Recovery and Reinvestment Tax Act of 2009, ARRA); other actions in Congress and among Federal regulatory agencies that target GHG emissions, proposals on commodity market oversight (how financial derivatives trading is conducted and overseen has substantial implications for both existing commodity markets as well as emerging markets like carbon) and on specific activities such as hydraulic fracturing (fracing) that are vital to oil and gas industry operations; and actions at the US Department of Interior (US DOI) related to oil and gas and other mineral leasing activities and costs in the US. As well, the Texas legislative session considered a number of energy related proposals. Several were passed, related to carbon capture and sequestration (CCS); alternative vehicle technologies; tax incentives for "clean coal", "clean energy" and renewable energy projects; and implementation of transmission projects for competitive renewable energy zones (CREZ), among others.

Of concern to CPA are forward revenues and associated employment, income, investment and gross state product measures as these developments unfold. ACESA and other policy/regulatory actions overlay a national/global economic recession that is historic in scale and scope and declines in commodity prices that have already affected the State's economy (albeit to a much smaller degree than other states and regions in the US).

CEE researchers are collaborating with CPA staff to track ACESA as it progresses through Congress (as of this writing, ACESA has been voted out of the full House

[2] For information on CEE's research, outreach and training programs and activities, see www.beg.utexas.edu/energyecon.

Committee on Energy and Commerce). CEE devised scenarios for CPA to test using the integrated national-regional modeling tool, Policy Insight, which CPA obtains from Regional Economic Modeling Inc. (REMI-PI) and uses for a variety of State revenue and economic planning and analysis requirements. Further work will be done by the CEE and CPA team to refine the model output as ACESA provisions are negotiated and should the bill become law. CEE is also assisting CPA in tracking other Federal energy, environment and economic developments, as noted above, to include production of a "map" of key Federal actions that should be assessed for potential State impacts.

To help devise recommended scenarios for CPA modeling, CEE researchers are relying on their ongoing research as well as information networks related to energy and climate economics. CEE has a number of projects and grants underway or under development that overlap with CPA's request for assistance. CEE and CPA are actively sharing resources and contacts and coordinating to review modeling inputs and outputs. As of this writing, reference and high case (higher cost) scenarios for the ACESA GHG cap and trade provisions have been compiled and initial model runs conducted for the national and regional (Texas) geographies and compared to the REMI-PI baseline. CEE also is benchmarking REMI-PI model outputs against peer studies and other targeted studies. Two key results have been obtained.

1. A national scenario of potential impacts associated with ACESA 2009 has been produced that is broadly consistent with scenarios produced by other groups and organizations that are being used as benchmarks. These include recent studies by Charles River Associates for the National Black Chamber of Commerce (which yielded specific inputs related to carbon prices and incorporates reasonable assumptions about energy technology and demand side adjustments); Heritage Foundation; US Energy Information Administration; and, for targeted aspects, Stanford Energy Modeling Forum and CEE-UT's own research, among others. In the CPA/CEE reference case, total employment nationwide declines 1.3 percent by 2030 (about 2.6 million jobs lost). Gross domestic product (GDP) declines by about 1.8 percent ($380 billion, in 2000 dollars) and real disposable income by about 2.5 percent ($395 billion, in 2000 dollars).
2. A regional (Texas) scenario that advances previous work by CPA (March 2009). Given the dominant presence of low labor-, high capital-intensive industries (petrochemical and non-energy manufacturing), potential impacts on employment are not as large for Texas as impacts on gross state product and real disposable personal income. Preliminary modeling results suggest that State revenue effects are potentially greater than "jobs" effects alone. In the reference case, by 2030 total employment declines by just over 1 percent (164,000 jobs lost). Gross state product (GSP) declines by almost 1.6 percent (almost $25 billion, in 2000 dollars) and real disposable income by roughly 2.3 percent (almost $30 billion, in 2000 dollars).

It is important to emphasize the following.

- These model results do not incorporate any assumptions of specific benefits associated with ACESA. For instance, CEE and CPA did not attempt to capture

job creation and output associated with growth in industries, such as those associated with renewable energy technologies.

- The carbon cost adjustments do reflect added expense to industrial, commercial and household customers as these kinds of shifts begin to occur with ACESA. With implementation of ACESA, a series of responses begin to filter throughout the US and Texas economies. First, and most directly, the imposition of emissions constraints and the prospect of ever increasing caps in the future – even with free allowances, offsets and other mitigation options – do affect the cost of energy supplies. In addition, our carbon price adjustments reflect the cost of mandates designed to push renewables further into the US energy mix (embedded in the CRA assumptions and results).
- Indeed, a key question for any economic analysis of ACESA or similar proposals is whether the economic costs associated with fundamental changes in the US energy supply portfolio can be balanced with sufficient economic growth from new businesses and jobs of comparable or greater wage and salary profiles to at least neutralize detrimental impacts.
- Moreover, going forward, a critical issue will be whether other nations adopt similar GHG mitigation strategies so that, along with mitigating allowances provided in ACESA, US export industries continue to be competitive and thrive.
- Finally, we have not attempted to estimate additional costs on businesses, individuals or the public sector of the myriad mandates and requirements incorporated in ACESA. In its June 5, 2009 scoring of ACESA, the Congressional Budget Office (CBO) stated that: "CBO estimates that the cost of mandates in the bill would well exceed the annual thresholds established in UMRA [Unfunded Mandates Reform Act] for intergovernmental and private-sector mandates (in 2009, $69 million and $139 million respectively, adjusted annually for inflation)".[3]

Details regarding assumptions, approach and preliminary results are provided in this report as well as recommendations for future analysis and strategies for Texas.

[3] See http://cbo.gov/ftpdocs/102xx/doc10262/hr2454.pdf.

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ACESA 2009 Key Points for Current Analysis

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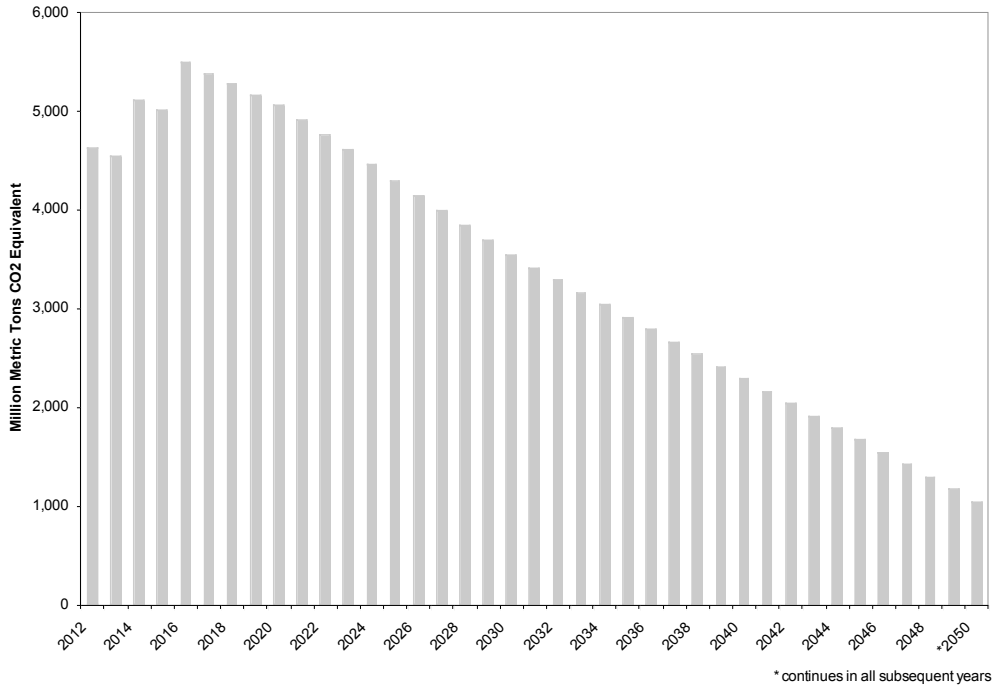
At more than 900 pages, ACESA is broad in scope and extensive in application, encompassing actions that would permeate throughout the US economy and society. However, ACESA is not the only item on the Congressional plate. Among other Federal initiatives that will affect Texas are oil and gas tax proposals and general energy provisions embedded in the Obama Administration budget blueprint (and in the previously enacted American Recovery and Reinvestment Tax Act of 2009, ARRA); other actions in Congress and among Federal regulatory agencies that target GHG emissions, proposals on commodity market oversight (how financial derivatives trading is conducted and overseen has substantial implications for both existing commodity markets as well as emerging markets like carbon) and on specific activities such as hydraulic fracturing (fracing) that are vital to oil and gas industry operations; and actions at the US Department of Interior (US DOI) related to oil and gas and other mineral leasing activities and costs in the US. As well, the Texas legislative session considered a number of energy related proposals. Several were passed, related to carbon capture and sequestration (CCS); alternative vehicle technologies; tax incentives for "clean coal", "clean energy" and renewable energy projects; and implementation of transmission projects for competitive renewable energy zones (CREZ), among others.

ACESA 2009 includes both direct energy titles for spurring development of clean energy (such as renewable energy standards and incentives for carbon capture and sequestration or CCS) and promoting energy efficiency as well as the major global warming title. The latter entails creation of emissions allowances (which can be bought, sold and traded with no restrictions), disposition of allowances, consumer and sensitive industry protections and adaptation provisions.[4]

[4] All documents related to ACESA 2009 can be accessed at http://energycommerce.house.gov/index.php?option=com_content&view=article&id=1633&catid=155&Itemid=55.

The chart below illustrates the annual caps on carbon dioxide (CO2) equivalent emissions that are central to ACESA.

Figure 1. Annual CO2 Equivalent Emissions Caps, ACESA 2009



CO2 equivalent tonnages are specified in ACESA as follows. The importance of equivalence is that ACESA will affect not only fossil fuel industries, but a variety of activities, including those by individuals, which produce emissions considered to be GHG. These emissions range from those associated with fossil fuel use (such as fugitive methane emissions from natural gas facilities) to coolants and other chemicals that permeate daily life. ACESA also provides for additional GHG to be included at the discretion of the US Environmental Protection Agency (US EPA).

Table 1. Conversions for CO2 Equivalence

Greenhouse gas (1 metric ton) carbon dioxide equivalent	
Carbon dioxide	1
Methane	25
Nitrous oxide	298
HFC-23 (hydrofluorocarbons, HFCx)	14,800
HFC-125	3,500
HFC-134a	1,430
HFC-143a	4,470

Greenhouse gas (1 metric ton) carbon dioxide equivalent	
HFC-152a	124
HFC-227ea	3,220
HFC-236fa	9,810
HFC-4310mee	1,640
CF4 (perfluorocarbons, CFx)	7,390
C2F6	12,200
C4F10	8,860
C6F14	9,300
SF6 (sulfur hexafluoride)	22,800
NF3 (nitrogen trifluoride)	17,200

The Obama Administration budget blueprint rests on the premise that 100 percent of all allowances would be auctioned. Importantly, ACESA, as voted out of committee on May 21, 2009, provides that only 15 percent of all allowances would be auctioned. Moreover, the distribution of allowances across various sectors, interests and programs is highly complex. The 15 percent of allowances to be auctioned for household income support do not phase out. A general overview of the complicated ACESA allowance scheme is shown below.

Table 2. ACESA 2009 GHG (Carbon Equivalent) Emissions Allowances

			PHASE OUT		
CATEGORY		**START**	**BEGIN**	**END**	
CONSUMER PROTECTION					
Purchased allowances	15.0%	2012			Targeted assistance for low and moderate income households. No phase out
Electricity sector, of which:	35.0%	2012	2026	2030	
• Regulated distribution companies	30.0%	2012	2026	2030	
• Merchant coal, long-term power purchase agreements	5.0%	2012	2026	2030	
Natural gas utilities	9.0%	2012	2026	2030	
Home heating oil and propane	2.0%	2012	2026	2030	Administered by states.

			PHASE OUT		
CATEGORY		**START**	**BEGIN**	**END**	
TRANSITION ASSISTANCE FOR INDUSTRY					
Energy intensive, trade exposed industries	15.0%	2014	2025		Phase out initiates in 2025. President has discretion to continue allowances.
Oil refiners	2.0%	2014		2026	
ENERGY EFFICIENCY AND CLEAN ENERGY TECHNOLOGY					
CCS, of which:	7.0%				Targeted assistance for electric utilities.
• First tranche	2.0%	2014		2017	
• Second tranche	5.0%	2018			No phase out.
Renewable energy, energy efficiency, of which:	29.0%				Targeted assistance for states.
• First tranche	10.0%	2012		2015	
• Second tranche	7.5%	2016		2017	
• Third tranche	6.5%	2018		2021	
• Fourth tranche	5.0%	2022			No phase out. Allowances granted 2022-2025 include some for future years.
Auto technology, of which:	4.0%				Targeted assistance for auto industry.
• First tranche	3.0%	2012		2017	
• Second tranche	1.0%	2018		2025	
R&D	1.0%	2012			Universities and other institutions. No phase out.
OTHER					
Tropical deforestation, of which:	10.0%				
• First tranche	5.0%	2012		2025	By 2020, expected to achieve additional emissions reductions of 10% of 2005 level
• Second tranche	3.0%	2026		2030	
• Third tranche	2.0%	2031			No phase out.
Domestic adaptation	14.0%				Half of allowances for wildlife and natural resource protection, half for domestic purposes including public health.

			PHASE OUT		
CATEGORY		**START**	**BEGIN**	**END**	
• First tranche	2.0%	2012		2021	
• Second tranche	4.0%	2022		2026	
• Third tranche	8.0%	2027			No phase out.
International adaptation, clean tech transfer, of which:	14.0%				Half of allowances for adaptation, half for clean tech transfer.
• First tranche	2.0%	2012		2021	
• Second tranche	4.0%	2022		2026	
• Third tranche	8.0%	2027			No phase out.
Worker assistance, job training	1.5%				
• First tranche	5.0%	2012		2021	
• Second tranche	1.5%	2022			No phase out.
UNALLOCATED ALLOWANCES					
Auctioned to maintain budget neutrality					

ACESA as it stands contains little in the way of detail in spite of the vast reach of programs, requirements and responsibilities, complicating the development of economic impact scenarios. However, a number of aspects of the proposed bill bear consequences for the nation and State of Texas.

- Central to the bill and of highest priority for CEE and CPA analysis are the creation and disposition of carbon allowances in the global warming title. While the majority of allowances are allocated freely until 2030, the balance (15 percent) must be purchased representing a cost that will affect both businesses and consumers. This portion of ACESA provides the most clarity for analysis.
- The global warming title also contains numerous regulatory, reporting and administrative requirements that will have broad impact across public and private activities. An example is creation of a GHG registry and GHG reporting for ACESA compliance. It is not possible to estimate the costs for businesses and individuals to comply with these rules.
- The climate change adaptation and clean energy transition titles contain a large assortment of new programs and institutions as well as expanded requirements for existing programs and institutions that reach across both public and private activities. It is not possible to estimate the cost or economic impacts of these sections.

- All provisions related to research and development or incentives for specific energy supply technologies and energy use must be funded. If funds are appropriated, at least some of this budget allocation would likely flow to programs and activities in Texas. Certain benefits could be created that should be considered. These include, for instance, subsidies (beyond carbon allowances) to stimulate investment in CCS by electric utilities, a major strategic interest in Texas.
- Federal funds must be appropriated and budget neutrality for ACESA is in no way assured. Given the large differences between ACESA provisions and the original Administration budget blueprint, Federal revenue shortfalls are likely to be substantial if ACESA becomes law in its current form. Already, a variety of research and analysis efforts are in place to assess the broader economic and financial implications of the Federal budget deficit outlook. Recent downward price movements for US Treasuries as well as interest rate spreads are indicative of growing negative opinions in financial markets and beyond regarding US budget imbalances and projected deficits related to US GDP. Because the sale of carbon allowances constituted a considerable portion of prospective Federal revenues to offset spending, ACESA has a particular role in Obama Administration budget plans. Potential impacts associated with persistent and very large Federal deficits range from higher costs of borrowing by businesses and consumers to Federal budget cuts and spending constraints that would eliminate and/or reduce some (or all) of the prospective benefits that might be associated with ACESA and other large legislative proposals.

While the purpose of our analysis is not to critique ACESA, it must be said that a variety of caveats, exceptions and opportunities exist to diminish impact of the proposed legislation on emissions reductions. Many opinions are that the banking/borrowing, strategic reserve, offsets and other sections of ACESA would result in a law that does not create binding emissions caps.[5] These same components of ACESA also make it unlikely that carbon prices would reach very high levels, at least for the foreseeable future (and based on prospective 2012 implementation), discouraging emissions reductions. The political negotiation required to produce ACESA – including the broad assortment of free allowances and considerable geographic disparities (states with large coal and coal-fired electric power generation and states with small manufacturing segments are disproportionally advantaged) – also makes it difficult to speculate on whether portions of the bill would be toughened at a later date if ACESA is enacted. As noted above, ACESA is, to a large extent, a spending bill. It is also substantial with respect to bureaucratic operations and costs and will thus impose additional costs on private businesses and individuals for compliance. ACESA exempts GHG from other major US EPA programs (criteria and hazardous pollutants, new source review) and thus essentially overrules the Supreme Court endangerment finding and US EPA's mandatory endangerment proceedings. Nevertheless, ACESA assigns

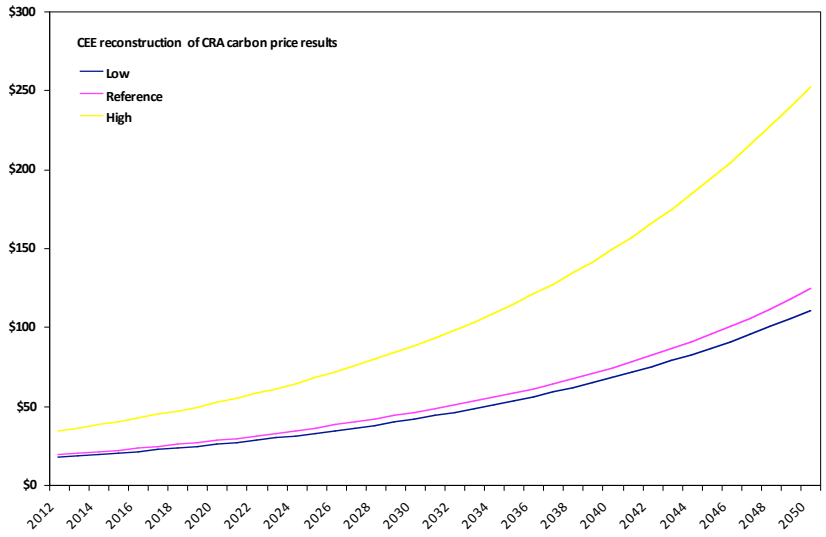
[5] CEE researchers reached this conclusion following an extensive review of ACESA, conversations with a variety of private and public sector sources and review of preliminary analyses and reports as well as research conducted on previous GHG mitigation legislation.

a broad array of new responsibilities and programs to a variety of regulatory bodies, essentially creating a shadow regulatory scheme that parallels the "cap and trade" regime.

Recommended Scenarios for Modeling Runs

Because of limited information and strongly convergent viewpoints with CEE's own analysis on the main effects associated with the ACESA global warming title, CEE reviewed and recommended use of projected carbon allowance prices from work performed and released by Charles River Associates (CRA) for the National Black Chamber of Commerce (NBCC).[6] A key output in the CRA report are projections of carbon prices necessary to reach the targeted emissions reductions framed in ACESA. The report incorporates reasonable assumptions regarding energy supply and demand responses and provides reference, low and high cases. These include reduced energy purchases by businesses and consumers and substitution; shifts in types of energy fuels consumed; introduction of new energy technologies and associated cost impacts; and changes in industry mix as well as influence of offsets and free allowances distributed according to ACESA provisions. The CRA model estimates CO2 prices for every five years starting in 2015; CEE extrapolated to have a complete series from 2012. The CEE reconstruction of the CRA carbon price results is shown below.

Figure 2. Carbon Price Assumptions for CPA Modeling (2008 $ per metric ton of CO2 equivalent)

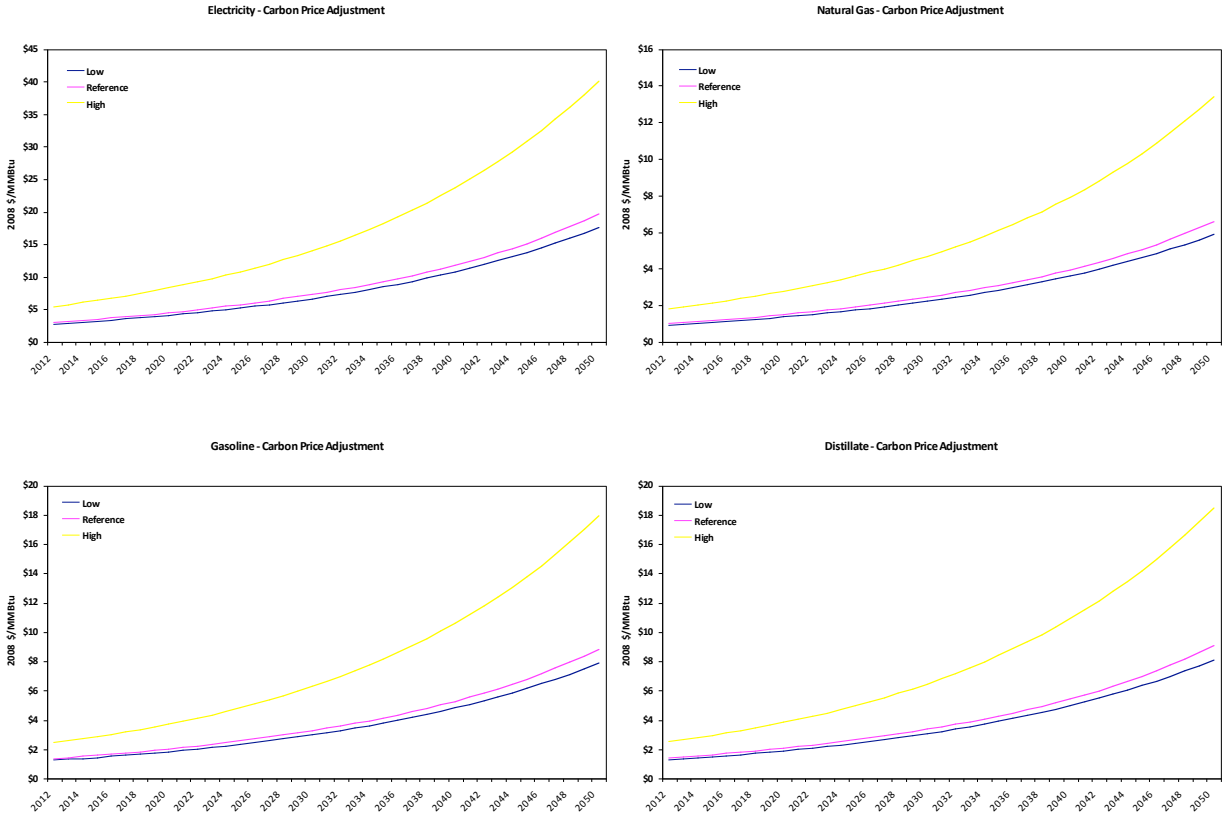


In order to introduce the CRA carbon price projections into the CPA REMI-PI model, CEE calculated fuel equivalent carbon price adjustments using US EIA emissions

[6] The CRA report can be obtained at this link. http://www.nationalbcc.org/index.php?option=com_content&view=article&id=750:nbcc-study-generates-concerns-about-waxmanmarkey-climate-change-bill-costs-are-high-but-benefits-are-uncertain&catid=1:latest-news&Itemid=7

factors for each fuel type. All fuel price adjustments are in 2008 dollars per million Btu ($/MMBtu). The charts below show the distribution of carbon price adjustments over time and for the three CRA scenarios (low, reference, high). For illustration, the average price for natural gas at Henry Hub is about $4.00/MMBtu (as of this writing). If the carbon price factor adjustment for 2015 were applied to today's prices, an expected natural gas price would be $5.17/MMBtu or roughly a $1 increase. The reference case natural gas carbon price adjustment in 2030 is about $2.50; this would increase by roughly two-thirds today's natural gas price and does not consider possible natural gas price increases into the future. The high case natural gas price adjustment in 2030 is $4.67, which would more than double today's price.

Figure 3. Carbon Price Adjustments for Key Fuel Types (2008 $/MMBtu)



These fuel price adjustments were applied to projected consumption of each fuel type using Global Insight's most recent US Energy Price Outlook (May 2009)[7], which approximates consumption levels in the REMI-PI model. CEE supplied the total projected fuel cost for the key REMI-PI commercial and industrial sectors and fuel types to CPA. With CPA staff, CEE also provided comparable scenarios for

[7] CEE is a member of the State Data Consortium and uses Global Insight commercial data and forecast products under that umbrella contract.

consumer fuel costs. For the national control run of REMI-PI, it is not possible to enter increased expenditures of the household sector by fuel type. Instead, a weighted average of percent increases for each fuel type is calculated and introduced as increase in consumer prices based on the share of energy in inflation indexes such as CPI and PCE. In a future regional (Texas) simulation, we should be able to introduce consumer expenditures by fuel type.

Preliminary Results

An initial run (conducted June 4, 2009) of CPA's REMI-PI model for the period 2012-2030 using the reference cases for fuel price adjustments above suggests that total employment losses in Texas could be around 130,000 annually between 2012 and 2020 with implementation of ACESA, with losses increasing further in later years as free allowance allocations phase out and industries and consumers face more rapidly increasing fuel costs. Industries that are more capital and energy intensive, rather than labor intensive, contribute relatively larger shares to the Texas economy than the national economy. As a result, employment losses are somewhat tempered in Texas relative to the national trend, especially in later years. But the decline in personal income associated with higher paying, albeit fewer, jobs is significant, as is the decline in production of and export of more GHG intensive products. The overall effect of establishing caps on emissions, even with free allowances, is to push costs up for affected industries (forcing technology responses or shut downs) and consumers (which decreases disposable income). Both of these impacts trigger employment losses.

The charts below illustrate the annual declines in employment, gross domestic and state product and real disposable income for the US and Texas (regional) reference cases. It is important to emphasize that these model results do not incorporate any assumptions of specific benefits associated with ACESA. For instance, CEE and CPA did not attempt to capture job creation and output associated with growth in industries, such as those associated with renewable energy technologies. The carbon cost adjustments do reflect added expense to industrial, commercial and household customers as these kinds of shifts begin to occur with ACESA. With implementation of ACESA, a series of responses begin to filter throughout the US and Texas economies. First, and most directly, the imposition of emissions constraints and the prospect of ever increasing caps in the future – even with free allowances, offsets and other mitigation options – do affect the cost of energy supplies. In addition, our carbon price adjustments reflect the cost of mandates designed to push renewables further into the US energy mix (embedded in the CRA assumptions and results). Indeed, a key question for any economic analysis of ACESA or similar proposals is whether the economic costs associated with fundamental changes in the US energy supply portfolio can be balanced with sufficient economic growth from new businesses and jobs of comparable or greater wage and salary profiles to at least neutralize detrimental impacts. Moreover, going forward, a critical issue will be whether other nations adopt similar GHG mitigation strategies so that, along with mitigating allowances provided in ACESA, US export industries continue to be competitive and thrive.

Figure 4. Projected Impacts for Texas from ACESA 2009 (Reference Case)

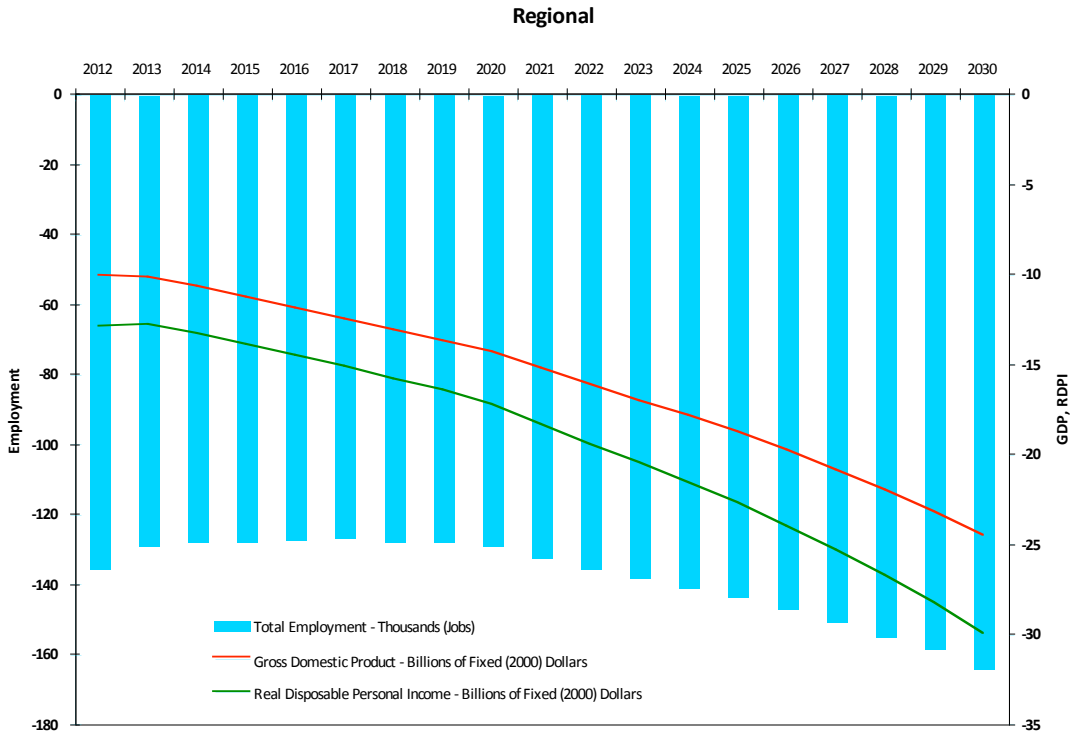
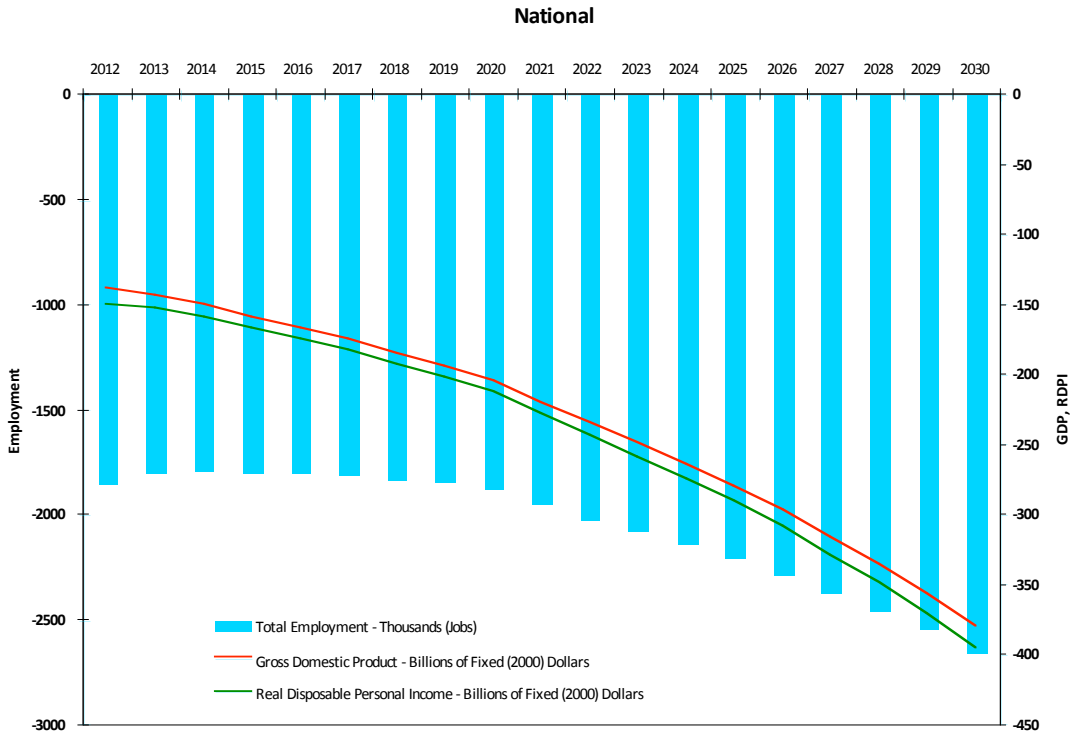


Figure 5. Projected Impacts for US from ACESA 2009 (Reference Case)



In the high carbon price case, job losses in Texas could exceed 270,000 by 2015 and 400,000 by 2030, with losses in gross state product and real disposable personal income near or above $30 billion a year initially, and $50-70 billion in later years. The table below provides more detail on percent changes for the reference and high cases for Texas and the US.

Table 3. Percent Changes, Reference and High Cases, Texas and US

Category	Texas				US			
	2012	2015	2020	2030	2012	2015	2020	2030
Reference Case:								
Total Employment	-.98	-.90	-.88	-1.09	-1.02	-.97	-.98	-1.31
Gross State/Domestic Product	-1.02	-1.04	-1.16	-1.59	-1.09	-1.13	-1.26	-1.81
Real Disposable Personal Income	-1.60	-1.56	-1.68	-2.32	-1.57	-1.59	-1.77	-2.54
High Case:								
Total Employment	-2.01	-1.91	-2.02	-2.78	-2.09	-2.07	-2.24	-3.27
Gross State/Domestic Product	-2.07	-2.16	-2.50	-3.68	-2.22	-2.35	-2.74	-4.17
Real Disposable Personal Income	-3.29	-3.28	-3.69	-5.42	-3.23	-3.34	-3.87	-5.91

Texas constitutes about eight percent of the United States economy. In April 2009 Texas employment was about 11.1 million while employment in the United States was about 140.6 million. The unemployment rate for Texas in April 2009 was 6.4 percent, while the unemployment rate for the US as a whole was 8.6 percent.[8] Texas real GSP in 2007 was about $903 billion and real disposable personal income about $674 billion. For the US, real GDP in 2007 was about $11.5 trillion and real disposable personal income about $8.6 trillion.

While the losses indicated in our model runs are significant, they are mostly in line with the findings of other studies. For example, the CRA study expects national job losses of, or greater than, 2.3 million throughout their study period. The CRA study also evaluates renewable energy mandates of ACESA. A recent Heritage Foundation study (May 18, 2009[9]) estimates close to 2 million job losses in the first year, followed by a recovery as the US economy improves and then accelerating losses in later years, exceeding two million jobs lost by 2030. Overall, CPA/CEE REMI-PI total employment losses follow a pattern somewhat similar to results of the Heritage study and fall in between the estimates of two studies.

[8] Texas Workforce Commission estimates, http://www.twc.state.tx.us/news/press/2009/052209epress.pdf.

[9] See http://www.heritage.org/Research/EnergyandEnvironment/wm2450.cfm.

CPA/CEE REMI-PI national GDP losses are quite consistent with CRA results of 1 percent to 1.3 percent decline until 2020 or so but are larger in later years. This could be a result of CRA study's efforts to incorporate alternative technologies and conservation explicitly. However, GDP losses in the Heritage Foundation study exceed CPA/CEE REMI-PI results except for few years around 2020; especially in later years, losses in the Heritage study become significantly larger than REMI-PI GDP losses as carbon prices steepen.

The Heritage Foundation analysis uses a carbon price that is close to our reference case, about $20/ton initially and rising with the rate of inflation in later years.

US EPA prepared an initial analysis of the draft HR 2454 in April 2009 and released an updated memo (May 17) as ACESA revisions emerged during bill mark up. Using two different modeling approaches, EPA produced carbon price ranges of $13-28 and $17-36 from 2015-2030. Both of these are considerably lower than the reference and high cases used by CPA/CEE and CRA and lower, at the outset, than Heritage Foundation. EPA's fuel cost impacts, as a consequence, are considerably less than CPA/CEE scenarios.

Table 4. Carbon Price Adjustments for Fuels, US EPA

	2015	2020	2025	2030
Electricity, $/kWh				
CPA/CEE	0.012	0.015	0.020	0.025
EPA	0.012	0.015	0.018	0.022
Natural Gas, $/MMBtu				
CPA/CEE	1.17	1.49	1.91	2.44
EPA	0.86	1.06	1.30	1.60
Petroleum Products, $/MMBtu				
CPA/CEE	1.56-1.61	1.99-2.05	2.56-2.63	3.27-3.36
EPA	0.95	1.12	1.38	1.82

The table below compares CPA/CEE results using REMI-PI with other, benchmark studies including US EPA's analysis of the Waxman-Markey draft. In its May 17 update memo, EPA suggested that given changes in ACESA from the initial Waxman-Markey draft, including expansion of free allowances and increased opportunities for offsets, carbon prices would be even lower and effects negligible.[10]

[10] All US EPA documents available at http://www.epa.gov/climatechange/economics/economicanalyses.html#wax.

Table 5. CPA/CEE Reference Case and Benchmark Studies, US Effects

		2012	2015	2020	2030
Change from reference case in jobs (millions)	CRA		-2.3	-2.7	-2.5
	CPA/CEE REMI-PI	-1.9	-1.8	-1.9	-2.7
	Heritage (approx.)	-1.9	-0.9	-0.05	-1.9
	US EPA	No employment effects reported.			
Change from reference case in GDP	CRA		-1.0%	-1.2%	-1.3%
	CPA/CEE REMI-PI ($ billions, constant $2000)	-1.1%	-1.1%	-1.3%	-1.8%
		-139	-159	-205	-380
	Heritage (approx. billions, constant $2009)	-200	-150	-125	-700
	US EPA (billions, constant $2005)	-41	-45	-65	-112

Inconsistencies are to be expected as all of these studies are using different models and different inputs. What is consistent in the CRA, Heritage and CPA/CEE initial runs, though, is the strong negative impact of additional costs associated with ACESA on employment and GDP, critical variables for the health of the US and Texas economies. A notable divergence is the US EPA results. Like CRA, EPA uses the US EIA Annual Energy Outlook as its basis (April 2009 update); Heritage Foundation uses Global Insight (November 2008 annual release). It should be noted that US EIA runs its National Energy Modeling System (NEMS) utilizing Global Insight's US macro outlooks. Presumably, based on these similarities, higher carbon cost assumptions would move EPA's analysis toward greater losses while lower carbon price impacts would reduce losses in CRA, Heritage and CPA/CEE results. However, a critical difference between EPA and other reviews is EPA's assumption that other nations will enact comparable GHG mitigation policies, so that US manufacturing exports increase substantially after 2020.

Other Issues for Consideration

As explained earlier, for this initial evaluation we focused only on direct CO2 cost impacts associated with ACESA. In further analysis, we may focus on potential losses in output for certain industries to better define the Texas situation. Also as mentioned previously, our current approach does not include any benefits associated with ACESA. Possible benefits would mainly extend from the potential for new industries and businesses to take hold as ACESA is implemented; these may offset some of the economic losses. The table below incorporates a number of recommendations and caveats for extending the current analysis, especially to track and monitor further developments as ACESA moves through the US House

and ultimately the Senate. Importantly, ACESA is not isolated from other Federal actions. Consequently, in keeping with previous discussions, the table below also includes a number of key Federal actions beyond ACESA that are of particular concern and should be considered by CPA, either for future modeling or to interpret and dissect potential implications for Texas.

Table 6. Recommended Issues for Consideration by CPA

Issue	Recommendations for CPA
ACESA 2009 and major provisions:	
Title III "cap and trade" – carbon equivalent allowances and projected prices	• Consider impacts on specific Texas industry segments (would increased exports of natural gas lessen impacts on petroleum refining?), including non-energy sectors (for CO2 equivalent reductions and effects). • Consider potential mitigating effects associated with lower comparative costs for some energy fuels in Texas relative to US as a whole. • Consider possible benefits associated with allowances designed to stimulate alternative energy technologies, research and development (R&D), etc.
Title VIII and IX regulatory mandates and requirements	• Consider costs to US and Texas businesses and industries associated with reporting and other administrative requirements. • Consider "drag" on US and Texas economies associated with increased Federal budget requirements for administrative costs.
Title I and II spending programs and regulatory provisions	• Consider benefits associated with investments in clean energy, CCS and other ACESA provisions. • Offsetting impact of administrative (regulatory and other) costs absorbed by businesses and industries associated with implementation of Title I and II provisions. • Impact of Federal budget requirements to fund and administer ACESA provisions.
ARRA 2009 and major provisions:	
Federal economic stimulus programs	• Benefits and costs (including administrative requirements and financial market responses to Federal budget deficits) of ARRA implementation. Potential to add to or detract from ACESA energy and climate provisions.
US Office of Management and Budget, proposed 2010 blueprint (passed by Congress, April 29, 2009; under appropriation and implementation by various Congressional committees	

Issue	Recommendations for CPA
and Federal departments)[11]	
Oil and gas taxes	• Impacts of potential reductions in oil and gas tax credits as well as increases in costs on US and Texas oil and gas extractive industries.
Consumer/customer tax increases	• Impact on US and Texas employment and income associated with increased taxes on energy fuels related proposals to compensate for revenue losses associated with ACESA free allowances.
Other energy and climate provisions.	• Costs and benefits associated with non-ACESA provisions for clean energy, "green" jobs, R&D, and other aspects of the President's budget blueprint. • Indirect effect (jobs, investment) associated with potential increases in Federal oil and gas royalties and changes in offshore leasing practices, as well as other changes in how the Federal mineral estate is managed.
Financial and commodity market regulation and oversight (House Committee on Agriculture; Commodities and Futures Trading Commission – CFTC; US Department of Treasury; Securities and Exchange Commission – SEC; Federal Energy Regulatory Commission – FERC):	
Proposals to increase oversight of financial derivatives and overall commodity market performance	• Impact of proposals to increase transparency of financial derivates trading on overall energy commodity prices and trading volumes, as well as on carbon prices and trading volumes, associated with increased regulatory and business costs on traders and other participants.
US EPA:	
Non-ACESA actions by EPA related to emissions reporting and mitigation	• Impact of increased costs, including Federal administrative costs, for EPA to implement additional GHG and non-GHG emissions reporting and mitigation requirements.
Safe drinking water and oil and gas drilling operations	• Impact of proposals to stiffen regulation of drilling fluids (components of materials used in fracing and other operations) on oil and gas industry costs and production, including activity in Texas. Emphasis on natural gas supply impacts to meet demand associated with economic recovery and growth as well as ACESA provisions.

[11] See http://www.whitehouse.gov/omb/budget/ for key components.

CEE is in the process of preparing a "map" of major ACESA provisions, including linkages across agencies and programs, and other major Federal policy/regulatory initiatives in order to inventory all potential actions and facilitate evaluation of possible interactions.