Appendix D
Methods for Quantification

This appendix describes in brief the methods used in quantifying the greenhouse gas (GHG) emission reductions and costs / cost savings associated with the policy recommendations, and provides examples of the distinction between "direct" and "indirect" costs. In addition, the combined impacts of all of the policy recommendations within and between each sector were estimated as if all of the recommendations were implemented together. This involved eliminating any overlaps in coverage of affected entities that would occur to avoid double-counting of impacts. These methods are based on those widely accepted among climate change mitigation policy analysts.

Methods for Quantifying Impacts of Policy Recommendations

- Focus of analysis: Net GHG reduction potential in physical units of million metric tons (MMt) of carbon dioxide equivalent (CO_2e) and net cost per metric ton reduced in units of dollars/MtCO_2e.
- Geographic inclusion: Measure GHG impacts of activities that occur within the state, regardless of the actual location of emissions reductions.
- Direct vs. Indirect Effects: Define "direct effects" as those borne by the entities implementing the policy recommendation. For example, direct costs are net of any benefits or savings to the entity. Define "indirect effects" as those borne by the entities other than those implementing the policy recommendation. Quantify these indirect effects on a case-by-case basis depending on magnitude, importance, need and availability of data. (See additional discussion and list of examples below.)
- Non-GHG (ancillary) impacts and costs: Include in qualitative terms where deemed important. Quantify on a case-by-case basis as needed depending on need and where data are readily available.
- Discounted and "Levelized" Costs: Discount a multi-year stream of net costs (total costs net of any savings) to arrive at the "net present value cost" of an policy. Discount costs in constant 2005 dollars using a 5% annual real discount rate for the period 2008 through 2020. Capital investments are represented in terms of levelized or amortized costs through 2020. Create a "levelized" cost per ton by dividing the "present value cost" by the cumulative reduction in tons of GHG emissions. This is a widely used method to estimate the "dollars per ton" cost of reducing GHG emission (all in CO_2 equivalence). A "levelized" cost is a "present value average" used in a variety of financial cost applications.
- Time period of analysis: Count the impacts of actions that occur during the project time period and, using levelized emissions reduction and cost analysis, report emissions reductions and costs for specific target years such as 2012 and 2020. Where additional GHG reductions or costs occur beyond the project period as a direct result of actions taken during the project period, show these for comparison and potential inclusion.

- Aggregation of impacts: Avoid simple double counting of GHG reduction potential and cost when adding emission reductions and costs associated with all of the policy recommendations. Note and or estimate interactive effects between policy recommendations using analytical methods where overlap is likely.
- Policy design specifications: Include timing, goal levels, implementing parties, and the type of implementation mechanism.
- Transparency: Include data sources, methods, key assumptions, and key uncertainties. Use data and comments provided by the Climate Action Panel (CAP) and Policy Work Groups (PWGs) to improve data sources, methods, and key assumptions using their expertise and knowledge to address specific issues in Colorado.

The approaches here do not necessarily take a "standard" benefit-cost perspective as used in regulatory policy impact analysis. For instance, there is no direct/indirect distinction under standard procedures; one takes the "societal perspective" and tallies everything, and quantifies where possible. Regarding GHG mitigation costs, often the best available data are focused at the level of implementation as opposed to the societal level. Regarding GHG benefits, market prices (monetized benefits) are normally taken as good proxies of societal costs and benefits in standard analysis unless there are market imperfections or subsidies that create distortionary effects. Because accurate information on the dollar value of GHG reduction benefits is typically not available, physical benefits are used instead, measured as $MMtCO_2e$.

The "direct cost" approach described here is useful in estimating the costs (and benefits) to the implementing entity (e.g., person, company, governmental body, etc.) "Indirect costs" (and benefits) are those experienced by other entities in society. In examining utility demand side management (DSM) programs for gas and electric utilities, analysts sometimes look at three perspectives: "participant", "non-participant", and "societal" (the latter being equivalent to "standard" benefit-cost perspective). Depending on program design, "direct cost" to a DSM participant can be high or low (if the latter, it may be attributable to a shifting of some costs to non-participants).

Note also that the "direct cost" approach does not necessarily account for market imperfections or subsidies. Typically, a state perspective on "direct costs" takes any federal government subsidies as a given. For example, substantial federal government subsidies exist for some alternative fuels. If the existing market price (with subsidy) of the alternative fuel is used in cost analysis, the option appears as relatively low cost. If the subsidy was included in the cost analysis (i.e., looking at societal costs in the standard benefit-cost perspective), then the alternative fuel would appear more costly.

Finally, some direct costs may look very large despite the attractiveness of the policy option for a variety of reasons, including co-benefits. For instance, in one state a bundle of Transit/Smart Growth/Vehicle Miles Traveled (VMT) Reductions was estimated to have a direct cost of $\$280/MtCO_2e$ – a comparatively high figure -- but stakeholders still endorsed the policy option for the multiple benefits it would generate. In this case stakeholders also believed that a large state investment cost would have been incurred anyway for conventional transportation investment, and that redirection of part of this existing stream of funds to smart growth alternatives made sense. As an alternative assumption, the cost of the existing stream of transportation funds could have been treated as sunk, and the true cost measured instead as the incremental level of smart growth redirected funding over and above the BAU funding stream.

For additional reference see the economic analysis guidelines developed by the Science Advisory Board of the US EPA available at: http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.

Examples of Direct/Indirect Net Costs and Benefits

Note: These examples are meant to be illustrative. They are not necessarily included in the specific policy recommendations in this report.

Residential, Commercial, and Industrial (RCI) Sectors

Direct Costs and/or Benefits

- Net capital costs (or incremental costs relative to standard practice) of improved buildings, appliances, equipment (cost of higher-efficiency refrigerator versus refrigerator of similar features that meets standards)
- Net operation and maintenance (O&M) costs (relative to standard practice) of improved buildings, appliances, equipment, including avoided/extra labor costs for maintenance (less changing of compact fluorescent light (CFL) or light-emitting diode (LED) bulbs in lamps relative to incandescent)
- Net fuel (gas, electricity, biomass, etc.) costs (typically as avoided costs from a TRC or societal perspective)
- Cost/value of net water use/savings
- Cost/value of net materials use/savings (for example, raw materials savings via recycling, or lower/higher cost of low-global warming potential (GWP) refrigerants)
- Direct improved productivity as a result of industrial measures (measured as change in cost per unit output, for example, for an energy/GHG-saving improvement that also speeds up a production line or results in higher product yield)

Indirect Costs and/or Benefits

- Re-spending effect on economy
- Net value of employment impacts
- Net value of health benefits/impacts
- Value of net environmental benefits/impacts (value of damage by air pollutants on structures, crops, etc.)
- Net embodied energy of materials used in buildings, appliances, equipment, relative to standard practice
- Improved productivity as a result of an improved working environment, such as improved office productivity through improved lighting (though the inclusion of this as indirect might be argued in some cases)

Energy Supply (ES) Sector

Direct Costs and/or Benefits

- Net capital costs (or incremental costs relative to reference case technologies) of renewables or other advanced technologies resulting from policies
- Net O&M costs (relative to reference case technologies) renewables or other advanced technologies resulting from policies
- Avoided or net fuel savings (gas, coal, biomass, etc.) of renewables or other advanced technologies relative to reference case technologies resulting from policies
- Total system costs (net capital + net O&M + avoided/net fuel savings + net imports/exports + net transmission and distribution (T&D) costs) relative to reference case total system costs

Indirect Costs and/or Benefits

- Re-spending effect on economy
- Higher cost of electricity reverberating through economy
- Energy security
- Net value of employment impacts
- Net value of health benefits/impacts
- Value of net environmental benefits/impacts (value of damage by air pollutants on structures, crops, etc.)

Agriculture, Forestry, and Waste Management (AFW) Sector

Direct Costs and/or Benefits

- Net capital costs (or incremental costs relative to standard practice) of facilities or equipment (e.g. manure digesters and associated infrastructure, generator; ethanol production facility)
- Net O&M costs (relative to standard practice) of equipment or facilities
- Net fuel (gas, electricity, biomass, etc.) costs or avoided costs
- Cost/value of net water use/savings

Indirect Costs and/or Benefits

- Net value of employment impacts
- Net value of human health benefits/impacts
- Net value of ecosystem health benefits/impacts (wildlife habitat; reduction in wildfire potential; etc.)
- Value of net environmental benefits/impacts (value of damage by air or water pollutants on structures, crops, etc.)

- Net embodied energy of water use in equipment or facilities relative to standard practice
- Reduced VMT and fuel consumption associated with land use conversions (e.g. as a result of forest/rangeland/cropland protection policies)

Transportation and Land Use (TLU) Sector

Direct Costs and/or Benefits

- Incremental cost of more efficient vehicles net of fuel savings.
- Incremental cost of implementing Smart Growth programs, net of saved infrastructure costs.
- Incremental cost of mass transit investment and operating expenses, net of any saved infrastructure costs (e.g., roads)
- Incremental cost of alternative fuel, net of any change in maintenance costs

Indirect Costs and/or Benefits

- Health benefits of reduced air and water pollution.
- Ecosystem benefits of reduced air and water pollution.
- Value of quality-of-life improvements.
- Value of improved road safety.
- Energy security
- Net value of employment impacts

Methods for Quantifying Cumulative Impacts of Overlapping Policy Recommendations

In addition to estimating the impacts of each individual policy recommendations, *combined* impacts of the policy recommendations in each sector were estimated assuming that all were implemented together. This involved eliminating any overlaps in coverage that would occur to avoid double-counting of impacts. Also, some of the policy recommendations in one sector overlapped with policy recommendations in another sector; therefore, these overlaps were identified and the impact analysis was adjusted to eliminate double counting of impacts associated with these inter-sector overlaps. The following identifies where these overlaps occurred and explains the methods used to adjust the impacts analysis to avoid double counting of impacts.

RCI Cumulative Impacts Analysis Methodology

In order to assess the cumulative emissions reductions for the policies in the RCI sectors, it is necessary to consider any overlaps among the policies that affect similar types of energy use. Specifically, some policies (such as RCI-1) are defined by their usage reduction goals, while others are defined by addressing a specific type of energy use. In these cases it is important to consider whether addressing the specific energy use would add to the overall reductions, or just be subsumed into the more general reduction goal.

In order to address this issue, two approaches were used to determining whether a policy recommendation would have an incremental impact over and above the more general DSM goals. First, it was asked whether the policy had a specific funding mechanism that would set it apart from other measures to reduce energy use. Then, it was asked whether the sector addressed by the measure was covered under a more general goal.

Impact of RCI-5

The issue is somewhat complicated by the presence of two independent overarching policies to address DSM: RCI-1, general economy-wide DSM defined by specific reduction targets, and RCI-5, which involves increasing block rates set to generate revenue to support DSM. As written, RCI-5 is more aggressive than RCI-1, so that total DSM activity would be defined by the funding available through this and other DSM policies.

Cumulative Impact of RCI-5

Policy	Interaction	Notes
RCI-1	Electricity component overlaps with RCI-5; gas component is incremental	Goals of RCI-1 would be more than met by RCI-5
RCI-2	Incremental	Has dedicated funding source (dedicated revolving fund)
RCI-3	Incremental	Building code requirement
RCI-4	Incremental	Has dedicated funding source (tax breaks on incremental cost)
RCI-5	Incremental	
RCI-6	Incremental	Has dedicated funding source (dedicated revolving fund)
RCI-7	Overlap	May be funded with RCI-5 funds
RCI-8	Not quantified	
RCI-9	Incremental	Not a DSM program
RCI-10	Incremental	Self-funded program, much of impact is on industrial sector & non-electric use.
RCI-11	Overlaps	Weaker version of RCI-5

Policies which affect natural gas demand

RCI-5 does not target natural gas use, so emissions associated with this energy source must be treated separately. In this case the demand reduction goal in RCI -1 exceeds the sum of all of the demand reductions that would be attained by the other measures considered, as demonstrated in the following table:

	RCI Policy Recommendation	GHG Reductions ($MMtCO_2e$)		
		2012	2020	Total 2007-2020
RCI-1 gas only	Expanded Demand Side Management	0.3	1.9	9.7
RCI-2 gas only	Energy Efficiency in Buildings Owned by State and Local Governments	0.0	0.1	0.6
RCI-4 gas only	Planning and Design	0.2	0.4	3.7
RCI-6 gas only	Retrofitting Existing Buildings for Energy Efficiency	0.1	0.3	1.7

Thus the cumulative gas savings depends on the specific policy design for RCI-1. If it is simply a goal for total demand reduction, the other policies affecting gas use would be subsumed into the overall goal and would have no incremental impact on emissions. On the other hand, RCI-1 could be specified to be incremental to the other policies and could have a dedicated funding stream that would be used on other measures such as rebates for energy efficient appliances, home energy audits, and other measures that would mitigate natural gas use.

Under either assumption, policy RCI-9, which is not oriented to DSM, would have an incremental effect on gas demand.

Interaction of RCI Policy Recommendations with Other Sectors

RCI and Energy Supply:

- The primary interaction between RCI and Energy Supply policies is that the RCI policies decrease overall electricity demand, thereby reducing the impact of RPS programs (ES-2), which are designed to serve a certain percentage of electricity sales from renewable sources. The combined impact of the RCI policies is a 20% reduction in overall electricity demand. This reduction in demand would also decrease the impact of improved efficiency for existing power plants as these plants would be producing less power. This reduction is accounted for in the ES sector adjustments

- The CHP component of RCI-9 is more aggressive than the ES-6 CHP policy. The GHG reductions and cost effectiveness calculations are therefore included in the RCI sector.

There are no significant overlaps between RCI and any of the other sectors.

Reductions from Recent Actions

Recent actions on the state level have, in some cases, already moved Colorado closer to the goals of the policies proposed through this process. In the RCI sectors, two developments have moved demand reduction efforts forward. These are Colorado State Legislature House Bill (HB) 07-1037, which sets DSM goals statewide, and an ongoing effort of Xcel energy to expand DSM as part of a settlement agreement. However, there is some overlap between these two, as Xcel's actions are more than sufficient to meet their requirements under HB 1037. The combined impact of these bills, taking the overlap into account, was included in revisions included in the final version of the Inventory and Forecast (see Chapter 2 and Appendix C). There is therefore no need to account for those recent actions in the RCI sector cumulative impacts analysis.

Overlap Adjustments to RCI Sector

Based on the assumptions above, the cumulative RCI totals, adjusting for overlaps, would be:

RCI SECTOR	2012 GHG Reductions ($MMtCO_2e$)	2020 GHG Reductions ($MMtCO_2e$)	2007-2020 GHG Reductions ($MMtCO_2e$)	2007–2020 Costs (Savings) (Net Present Value Million $)	2007-2020 Cost-Effectiveness ($/t$CO_2e$)
Totals of Individual Policies without Adjustments for Overlaps	7.1[1]	24.3[1]	149.2[1]	–$1,708[2]	Not Calculated
Totals Adjusted for Overlaps Among Policies	3.7[1]	15[1]	86[1]	–$153[2]	Not Calculated

[1]Totals from all 9 RCI recommendations with estimated GHG reductions.

[2]Totals from only those 7 RCI recommendations with estimated costs/cost savings.

ES Cumulative Impacts Analysis Methodology

The dominant policy recommendation for promoting renewable energy resource development is ES-2, mandated renewable portfolio standards (RPS). Because this is an aggressive target, it is reasonable to assume that if this policy is adopted, then any other renewable energy policy (e.g., ES-11, small hydro and other small renewables) would simply be a means of achieving these goals and would not actually add to the total amount of renewable energy generated in the state.

Additional benefits would come from the combined heat and power (CHP) component of ES-6 (but not from the DG component,) from efficiency improvements at existing fossil generators (ES-13) and from reduction of losses from oil and gas operations (ES-14). ES-15, emissions standards for new baseload generation, would have no incremental effect because no new baseload generation would be needed in the state during the study period. ES-13, a 2% improvement in existing generator efficiency, translates into a 2% reduction in CO_2 emissions from these plants, which would be an incremental effect in cumulative reductions.

Interaction of Energy Supply Policy Recommendations with Other Sectors

ES and RCI:

- As indicated in the RCI sector cumulative impact analysis, the primary interaction between ES and RCI policies is that the RCI policies decrease overall electricity demand, thereby reducing the impact of RPS programs (ES-2) which are designed to serve a certain percentage of electricity sales from renewable sources. The combined impact of the RCI policies is a 20% reduction in overall electricity demand. This reduction in demand would also decrease the impact of improved efficiency for existing power plants as these plants would be producing less power. The GHG reductions and cost effectiveness calculations are therefore included in the ES sector.

- The CHP component of ES-6 RCI-9 is less aggressive than the RCI-9 CHP policy. The GHG reductions and cost effectiveness calculations are therefore included in the RCI sector.

ES and AFW:

- In Colorado, policy AFW-10 is a landfill methane (CH_4) energy program which would count towards the RPS in ES-2. However, much of the benefit of the AFW initiative is the conversion of CH_4, a gas with a high global warming potential, to CO_2, which has a lower one. In the cumulative analysis report the impact of AFW-10 was reduced about 20% to account for this overlap. This overlap is accounted for in the AFW overlap analysis.

ES and TLU: There are no significant overlaps between ES and the TLU sectors.

Overlap Adjustments to ES Sector:
Based on the assumptions above, the cumulative ES total, adjusted for overlaps, would be:

ES SECTOR	2012 GHG Reductions ($MMtCO_2e$)	2020 GHG Reductions ($MMtCO_2e$)	2007-2020 GHG Reductions ($MMtCO_2e$)	2007–2020 Costs (Savings) (Net Present Value Million $)	2007-2020 Cost-Effectiveness ($\$/tCO_2e$)
Totals of Individual Policies without Adjustments for Overlaps	3.6[3]	12.7[3]	74.4[3]	$755[4]	Not Calculated
Totals Adjusted for Overlaps Among Policies	3[3]	9[3]	59[3]	$526[4]	Not Calculated

[3]Totals from all 6 ES recommendations with estimated GHG reductions.

[4]Totals from only those 5 ES recommendations with estimated costs/cost savings.

TLU Cumulative Impacts Analysis Methodology

CCS calculated the net cumulative impact of the eleven TLU policy recommendations in order to account for overlap and interaction among policies. The GHG reductions resulting from individual stand-alone policies are not necessarily additive. For example, a policy that reduces VMT will reduce the GHG benefits of a policy that improves vehicle fuel economy or reduces fuel carbon intensity.

A spreadsheet analysis was used to calculate net cumulative impacts. The first step in this analysis was to identify all the policies that affect VMT and determine the net VMT impact of this subset. Two of these policies reduce only urban light-duty vehicle (LDV) VMT, two reduce all statewide LDV VMT, and one reduces both urban and rural VMT but in different ways. The following table illustrates this distinction.

	Urban LDV VMT	Rural LDV VMT
TLU-1	Yes	Yes
TLU-3/7	Yes*	Yes*
TLU-8	Yes	Yes
TLU-9	Yes	No
TLU-10	Yes	No

* Urban and rural impacts are different

Based on input from the PWG, it was assumed that the VMT effects of these five policies are independent (additive). VMT reductions resulting from TLU-9 and TLU-10 were calculated using a model, producing a VMT reduction value. VMT reductions from TLU-1, the urban component of TLU-3/7, and TLU-8 were calculated as a percentage reduction from the VMT baseline used in the emission inventory and forecast. And the rural portion of TLU-3 was calculated using a spreadsheet analysis, producing a VMT reduction value. These results were summed to arrive at an adjusted statewide VMT (by vehicle class and urban/rural designation).

Then the other two policies with effects that would overlap with the LDV VMT reduction were identified: TLU-5 and TLU-6. Using adjusted VMT described above, the statewide fuel use and GHG emissions with the impacts of TLU-1, TLU-3/7, TLU-8, TLU-9, and TLU-10 were calculated. The resulting GHG emissions were reduced by the impacts of TLU-5 (10% reduction in LDV emissions in 2020) and the impacts of TLU-6 (15.5% reduction in LDV emissions in 2020).

TLU-4 affects only heavy-duty vehicles and therefore has no overlap with other policies. Therefore, the impacts of TLU-4 were applied directly to the baseline heavy-duty vehicle emissions.

The process described above results in baseline (business as usual) GHG emissions forecast and an adjusted GHG emissions forecast that reflects the mitigation strategies. Comparing the two, a percentage reduction in LDV and HDV emissions was calculated. Because it was developed using a different methodology, the baseline in this case is not identical to the reference case forecast developed by CCS as part of the statewide GHG inventory. Therefore, the percentage reduction (reflecting the cumulative net impact of all TLU strategies) was applied to the reference case forecast developed by CCS. The result is the net GHG emission reduction for the TLU policy recommendations.

The net cumulative GHG reduction from the TLU policy recommendations (7.84 MMtCO2e) is 9% lower than the sum of the individual policy impacts.

Interaction of TLU Policy Recommendations with Other Sectors
No significant interactions between the TLU sector and any of the other sectors were identified.

Overlap Adjustments to TLU Sector:
Based on the assumptions above, the cumulative TLU total, adjusted for overlaps, would be:

TLU SECTOR	2012 GHG Reductions ($MMtCO_2e$)	2020 GHG Reductions ($MMtCO_2e$)	2007-2020 GHG Reductions ($MMtCO_2e$)	2007–2020 Costs (Savings) (Net Present Value Million $)	2007-2020 Cost-Effectiveness ($\$/tCO_2e$)
Totals of Individual Policies without Adjustments for Overlaps	2.17[5]	8.58[5]	55.63[5]	–$3,185[6]	Not Calculated
Totals Adjusted for Overlaps Among Policies	2.14[5]	7.84[5]	46.7[5]	–$3,185[6]	Not Calculated

[5]Totals from all 8 TLU recommendations with estimated GHG reductions.

[6]Totals from only those 4 TLU recommendations with estimated costs/cost savings.

AFW Cumulative Impacts Analysis Methodology

AFW-1, 3, 4, & 5

These policy recommendations present the potential for interaction, should the CAP adopt each of these policy recommendations. AFW-4 & 5 quantify the reductions associated with increased in-state production of biofuels. Depending on the development of biofuel feedstocks in Colorado, these recommendations may necessitate an increase in agricultural output. This increase in output may have an impact on the GHG reduction potential of AFW 1 (which reduces the amount of land cultivated under conventional tillage and increases the efficiency of nitrogen fertilizer applications) and AFW 3 (which reduces the on-farm energy consumption in Colorado). However, these interactions were not considered in the cumulative quantification of the AFW policy recommendations, as such a task would require a significant number of assumptions and projections that may not be justifiable.

AFW 9 & 10

A PWG member raised the concern that the significant diversion of waste from landfills – as proposed by AFW-9 – would eventually lead to a decrease in the volume of waste in landfills in Colorado, and therefore a decrease in the quantity of CH_4 emitted. However, as waste that is deposited in landfills emits CH_4 over a long period of time, the impacts of the diversion proposed by AFW-9 on landfill CH_4 generation are not expected to be significant over the course of the policy period. Therefore, the interaction between the two policy recommendations is deemed to not be significant enough to warrant counting for overlap in the cumulative analysis.

Interaction of TLU Policy Recommendations with Other Sectors

AFW-2: Manure Management and Energy Utilization: all energy produced assumed to be used on-farm, so there should be no overlap with ES-1 & 2 renewables policies.

AFW-3: Reductions in On-Farm Energy Use: these are farm-specific energy reduction programs, so there is no significant overlap with RCI energy efficiency policies.

AFW-4 and AFW-5: Biodiesel and Ethanol Production Policy Recommendations: As described in Appendix H, the reductions as those felt to be incremental to the TLU-5 low-carbon fuel standard (LCFS) were quantified. These incremental reductions are based on two important assumptions: (1) for ethanol used to supply the LCFS within the policy period, the assumed source is starch-based ethanol (incremental reductions are associated with in-state production of cellulosic ethanol); and (2) for biodiesel used to supply the LCFS within the policy period, it is assumed that the predominant feedstock source is soybean oil (incremental reductions are based on producing feedstocks with higher GHG benefits). The methods used to quantify the impacts associated with the policies avoided overlap between the policies.

AFW-7 and AFW-8: Forest Health and Biomass Feedstocks for Energy Production: The biomass generated with this policy recommendation is assumed to be consumed within the RCI sector (e.g. residential or municipal biomass heating). There appears to be no overlap with the RCI policy recommendations.

AFW-10: Landfill Methane Reduction Programs: There are two components of the benefits calculation: (1) GHG reductions via control of CH_4 emissions from landfills; and (2) GHG reductions via utilization of the CH_4 collected to offset fossil fuel use. There is overlap between the second component and the ES-2 RPS policy recommendation, totaling about 1.0 $MMtCO_2e$. This is the only overlap between the AFW sector and other sectors, and is accounted for in the cumulative AFW analysis.

Overlap Adjustments to AFW Sector:
Based on the assumptions above, the cumulative AFW total, adjusted for overlaps, would be:

AFW SECTOR	2012 GHG Reductions ($MMtCO_2e$)	2020 GHG Reductions ($MMtCO_2e$)	2007-2020 GHG Reductions ($MMtCO_2e$)	2007–2020 Costs (Savings) (Net Present Value Million $)	2007-2020 Cost-Effectiveness ($/tCO_2e$)
Totals of Individual Policies without Adjustments for Overlaps	2.2	11.5	66	$252	Not Calculated
Totals Adjusted for Overlaps Among Policies	2.1	11.3	64.6	$252	Not Calculated