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RCI Technical Work Group Assessment of Cumulative Impacts

In addition to estimating the impacts of each individual policy option considered by the Policy Work Groups, we have estimated the *combined* impacts of all of the policies in each sector if all were implemented together. This involves eliminating any overlaps in coverage that would occur to avoid double-counting of impacts. We have also evaluated any overlaps between the RCI and ES sectors and between the RCI and AFW sectors to establish an assessment of the cumulative impacts of all policy options in these sectors.

The methodology applied to perform these assessments is as follows.

RCI

In order to assess the cumulative emissions reductions for the policies in the RCI sector, it is necessary to consider any overlaps among the policies that affect similar types of energy use. Specifically, some policies (such as RCI-2) 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.

To address this issue, we compared the target audience and measures of all RCI policies. We considered whether the sector addressed by the policy (residential, commercial, industrial, or government/institutional) was covered under the goals of other policies. We also asked whether the policy implements, or is likely to implement, specific measures within a sector that are called for under other policies also targeting that sector. We then compared the size of the impacts for policies targeting a specific measure and sector to determine which policy option would have the greater incremental impact.

Policies with No Overlaps: RCI-8

We are assuming that RCI-8 does not overlap with any other policy. This is due to the way that consumers are expected to respond to new rate structures by making behavioral changes, such as turning down their heat or making sure to run a full dishwasher at all times, rather than retrofitting their homes and/or upgrading appliances (measures which overlap with other energy efficiency policies). As RCI-8 does not overlap with any other policy, we kept 100% of the costs and benefits from this policy in the cumulative analysis.

Policies with Full Overlaps: RCI-3, RCI-7, RCI-11

RCI-3 involves the creation of revolving low-interest loan fund(s) for small-scale residential and commercial energy efficiency projects and implementation of individual measures that are usually included within more comprehensive energy efficiency programs such as RCI-2 and RCI-10. Since the loans will likely be used to replace a single piece of equipment rather than comprehensively retrofit a building and RCI-2 and RCI-10 treat the customer segments that RCI-3 would focus on, the impact of RCI-2 and RCI-10 would exceed the impact on the residential & commercial sectors from RCI-3. Therefore, we conclude that RCI-3 would have no incremental impact on electricity or gas use if implemented along with RCI-2 and RCI-10.

RCI-7 focuses on reducing energy use via upgrades to highly efficient appliances. The DSM program addressing the residential and commercial sectors in RCI-2 would include an appliance program, which would partially overlap with the residential and commercial sector results for RCI-7. Efforts to reduce energy use by government buildings and schools within RCI-4 would include upgrades to office equipment that would fully overlap with the government and school results for RCI-7. The Energy Efficiency Resource Standard in RCI-10 would likely drive appliance improvements within all sectors and would partially overlap with the residential and commercial sector results for RCI-7. If all three of these policies were implemented, they would likely completely subsume the benefits of RCI-7.

RCI-11 focuses on reducing energy use via upgrades to more efficient lighting. As with RCI-7, if RCI-2, RCI-4, and RCI-10 were all implemented, they would completely subsume the benefits of RCI-11. The DSM program addressing the residential and commercial sectors in RCI-2 would focus on lighting, which would partially overlap with the residential and commercial sector results for RCI-7. Efforts to reduce energy use by government buildings and schools within RCI-4 would definitely include lighting upgrades that would fully overlap with the government and school results for RCI-7. The Energy Efficiency Resource Standard in RCI-10 would drive lighting improvements within all sectors and would partially overlap with the residential and commercial sector results for RCI-7. Also, it is anticipated that the future code improvements analyzed in RCI-1 will begin to include lighting measures.

As RCI-3, RCI-7, and RCI-11 are fully subsumed by other policies, we kept 0% of the costs and benefits from this policy in the cumulative analysis.

Policies with Partial Overlaps: RCI-1, RCI-2, RCI-4 and RCI-10

The focus for RCI-2 is on creating a comprehensive DSM program with impacts across all sectors. The focus of RCI-10 is on developing an Energy Efficiency Resource Standard that will likely drive a comprehensive response across all sectors. By design, RCI-2 and RCI-10 are mutually exclusive from one another. However, due to the comprehensive nature of both of these policies, they each overlap with several other policies, including RCI-1 and RCI-4.

RCI-1 focuses on new construction within the residential and commercial sectors, and RCI-4 focuses on government and school buildings. To account for overlaps between RCI-1, RCI-4, RCI-2 and RCI-10, we isolated the greenhouse gas emissions reductions from RCI-2 and RCI-10 that correspond to 1) new construction within the residential and commercial sectors and 2) government and school buildings.

Cumulative greenhouse gas emissions reductions from RCI-4 were found to be greater than the government and schools portions of RCI-2 and RCI-10. The residential portion of RCI-1 is also more aggressive than residential new construction components of RCI-2 and RCI-10. As a result, 100% of the costs and benefits for RCI-4 and the residential portion of RCI-1 were included in the cumulative analysis. The costs and benefits for RCI-2 and RCI-10 that overlapped with RCI-4 and the residential portion of RCI-1 were removed from the cumulative analysis.

The cumulative greenhouse gas emissions reductions from the commercial portion of RCI-1 are lower than the commercial new construction component of RCI-2 and RCI-10. Therefore, we included 100% of the costs and benefits for the commercial new construction portion of RCI-2 and RCI-10 in the cumulative analysis. The costs and benefits for the commercial portion of RCI-1 were removed from the cumulative analysis.

The remaining components of the costs and benefits for RCI-2 and RCI-10 that did not overlap with any other policies (i.e., industrial) were kept in the cumulative analysis.

Cumulative Impacts Summary Table

A summary of the overlaps for each RCI policy is presented in the following table.

No.	Policy	Interaction	Notes
RCI-1	Improved Building and Trade Codes and Beyond-Code Building Design and Construction	Overlaps w/ residential and commercial new construction within RCI-2, RCI-10, and RCI-11	Partially Included; The residential component of this policy is more aggressive than the residential new construction components for RCI-2 and RCI-10 combined. However, the commercial component is less aggressive.
RCI-2	Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity and Natural Gas	Overlaps with: 1) Residential and commercial new construction within RCI-1 2) Govt and schools within RCI-4 3) RCI-11	Partially Included; Results for residential existing stock, commercial new construction, commercial existing stock and industrial are incremental to other policies
RCI-3	Low-cost loans for energy efficiency	Overlaps with RCI-2 and RCI-10	Not Included; Fully subsumed by these policies
RCI-4	Improved design, construction, appliances, and lighting in new and existing state and local government buildings, "Government Lead-by-example"	Overlaps with government and school efforts within RCI-2 and RCI-10	Fully Included; This policy is more aggressive than the government component of RCI-2 and RCI-10 combined.
RCI-7	More Stringent Appliance/ Equipment Efficiency Standards	Overlaps with parts of RCI-2, RCI-4 and RCI-10	Not Included: Fully subsumed by these policies
RCI-8	Rate structures and Technologies to Promote Reduced GHG Emissions (including inverted block rates)	No overlaps	Fully Included; This policy is assumed to primarily target behavioral changes, which are not targeted by any other policy
RCI-10	Energy Efficiency Resource Standard (EERS)	Overlaps with: 1) Residential and commercial new construction within RCI-1 2) Govt and schools within RCI-4 3) RCI-11	Partially Included; Results for residential existing stock, commercial new construction, commercial existing stock and industrial are incremental to other policies
RCI-11	Promotion and Incentives for Energy Efficient Lighting	Overlaps with parts of RCI-1, RCI-2, RCI-4 and RCI-10	Not Included: Fully subsumed by these policies

Combined 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 a Renewable Portfolio Standard (ES-7), which is designed to serve a certain percentage of electricity sales from renewable sources. Similarly, the reduction in demand would decrease the impact of repowering existing power plants (ES-8) or improving their efficiency (ES-10), as these plants would be producing less power.

With the ES policies in place, on average electricity that is avoided under RCI programs would have a lower impact on reducing emissions, as opposed to RCI measures being implemented on their own. Some ES policies promote low- or no-GHG emitting resources, reducing the GHG emissions per unit of electricity on average. These policies include ES-1 (promotion of renewable energy via zoning, siting, incentives and contracting), ES-2 (technology-focused initiatives for electricity supply, e.g. biomass co-firing and energy storage), ES-4 (CCSR incentives, requirements and/or enabling policies), and ES-5's distributed generation component.

The expanded use of combined heat and power under ES-5 is assumed not to overlap with any other options in its impact on residential and commercial energy or gas use.

The degree of overlap between ES-3 (GHG cap-and-trade), ES-9 (carbon tax), and RCI policies is dependent upon the policy design. Results for the analyses of these ES policies are forthcoming.

Combined RCI and AFW

Trees that are strategically placed can reduce building heating (by providing wind breaks during the winter) and cooling loads (by shading buildings during the summer). Energy that is avoided by urban tree planting in AFW-2 is expected to reduce baseline emissions by 9.8 MMTCO_{2e}. (Full achievement of the expected GHG benefits from urban forestry requires adherence to a plan consistent with the assumptions laid out in AFW-2.)

Tree planting is sometimes included as a measure in DSM programs, such as recommended under RCI-2 and RCI-10, and it could be a measure used to participate in advanced building codes or LEED (or similar program) under RCI-1 or RCI-4. More significantly, tree planting would reduce the operation of high-efficiency HVAC systems or HVAC system components to be installed under RCI-1, RCI-2, RCI-4, RCI-7, or RCI-10. The extent of the overlap between AFW-2 and RCI policies is to be determined.