Cap-and-Trade Health Impact Assessment Framework

This is a working DRAFT document; we look forward to stakeholder and expert input.

(1) Health Impact Assessment Scope

The HIA is not expected to provide exhaustive documentation of all potential health impacts of a cap-and-trade rule, nor quantify the majority of the potential impacts. Instead, the purpose of the HIA is to highlight aspects of a cap-and-trade program most likely to influence public health, and to quantify effects where feasible and appropriate. These impacts can occur via pathways or linkages between the cap-and-trade rule elements and potential health determinants and/or outcomes. The purpose of the HIA is to delineate these pathways to assess the potential impact of the cap-and-trade program on health, including local impacts and strategies to maximize criteria and toxic pollutant reductions as well as other public health benefits to the extent feasible.

(2) Potential Public Health Impacts of the Proposed Cap-and-Trade Regulation

HIA is a systematic process to evaluate the potential health impacts – both positive and negative – of public decisions[1]. To determine potential health impacts, staff conducted a literature review and consulted with experts to (a) list potential parameters that might change as a result of the proposed cap-and-trade rule and (b) list potential health impacts to evaluate.

(a) Changes to the following health determinants will be considered in the HIA:

- Air pollution emissions (criteria air pollutants and toxics)
- Consumer economic impacts
- Employment
- Land use/transportation (including noise and visual impact)
- Ecological impact(s) (i.e. water, soil, habitat, waste generation)
- Social factors (i.e. transparency, engagement)

Staff preliminary analysis suggests that the largest changes under the proposed cap-and-trade regulation will be changes in air pollution emissions and consumer economic impact.

[1] Bhatia R. A Guide for Health Impact Assessment: Working Draft provided for review and use by the California Department of Public Health (Sept. 2009)

(b) Potential health impacts to be considered in the HIA:
There are many health determinants and outcomes that could be evaluated; given time and resource constraints, those with sensitive, specific and direct links to the cap-and-trade program will be evaluated. Additionally, the HIA will try to evaluate a relatively equal number of health outcomes for each determinant.

Health Determinant	Potential Health Impact	Relationship to Cap-and-Trade	Plausible Explanation
Ai r Pollutant Emissions	Cardiovascular and respiratory hospitalizations	Change in /foregone air pollutant emissions	Air pollution exposure linked directly to stated potential health impact with a known concentration-response relationship and reasonable expected exposure change estimates
	All cause mortality		
	Cardiovascular mortality		
	Asthma and lower respiratory symptoms		
	Acute bronchitis		
	Work loss days		
	Minor restricted activity days		
Ecological Impacts (assuming urban forestry remains one a preferred offset option)	Diabetes	Location/type of offset projects (i.e. urban forestry)	Diabetes/obesity prevalence could change by 2020 due to increased walkability resulting from urban forestry offset projects
	Obesity	Location/type of offset projects (i.e. urban forestry)	
	Heat-related illness/death	Location/type of offset projects (i.e. urban forestry)	Heat-related illness/death could decrease (in community w/offset project) due to reduce heat island effect due to urban forestry projects
Consumer Economic Impact	% change in HH income	HH income will decrease due to increased energy, etc, costs.	Qualitative discussion about effects of income, particularly related to low SES
Employment	% change in employment	Employment effects likely to be observed in regulated industrial sectors, non-regulated sectors that generate offsets, and sectors that serve regulatory compliance needs.	Qualitative discussion about effects of employment, particularly related to low SES

		Note that effects on regulated industrial sectors may be mixed—job loss from downsizing operations and job growth from changes in infrastructure and operations.	
Land Use/Transportation	Traffic counts, availability of public transportation, green space, visual impact; noise	Need to further explore questions like will GHG regulations change where regulated GHG industries locate, or the spatial clustering of GHG emitting industries? Will impacts on transportation fuels affect development preferences substantially?	Qualitative discussion of health effects associated with the built environment
Social Impact	TBD	TBD	TBD

(3) Baselines for the Cap-and-Trade HIA

In order to evaluate potential cap-and-trade design alternatives, the first step is to define the policy baseline, i.e. the specific circumstance that serves as a comparison or control. The next step is to determine the health baseline (i.e. population characteristics and baseline health conditions) for all communities/counties in the HIA.

Policy baseline (Table 1): The proposed baseline is the cap-and-trade preliminary draft regulation (PDR) (released November 2009[2]). Additionally, staff will assume implementation of existing Federal and State programs that reduce criteria and toxic pollutants and other climate policies[3]. This includes the most recent California State Implementation Plan (SIP) and the Scoping Plan[4]. In the baseline, no additional program design elements are incorporated into the cap-and-trade program specifically to maximize co-benefits and none of the allowances or proceeds are invested in projects, programs or communities to decrease pollution from criteria air pollutants or toxics.

Table 1. Baseline Program Design Parameters for 2020

Type of Parameter	Assumptions	Source Recommending Baseline Parameter
Stringency of the Cap (Number of allowances)	365 $MMTCO_2e$	PDR[1]
Scope of the cap-and-trade program	California Program linked to the Western Climate Initiative (WCI)	PDR and AB 32 Scoping Plan
Percent of allowances auctioned	25% auction as a minimum in 2020 (75% Freely distributed)	WCI recommendation[2]
Covered entities/sectors	All sectors in PDR Section 95820 • Facilities that emit 25,000 $MTCO_2e$/year or more • Electricity deliverers • Transportation fuel delivers • Natural gas & natural gas liquid delivers	PDR

[2] Download a copy of the Cap and Trade Preliminary Draft Regulation at: http://www.arb.ca.gov/cc/capandtrade/meetings/121409/pdr.pdf

[3] In the baseline it is assumed that only greenhouse gas emission reductions that are additional to those achieved by the complementary policies are attributed to a cap-and-trade program.

[4] The Assembly Bill 32 Scoping Plan contains the main strategies California will use to reduce the greenhouse gases (GHG) that cause climate change. The scoping plan has a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 cost of implementation fee regulation to fund the program. The Scoping Plan was adopted by the Air Resources Board in 2008. More information is available at http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm .

Table 1. Baseline Program Design Parameters for 2020		
Type of Parameter	**Assumptions**	**Source Recommending Baseline Parameter**
Percent of offsets permitted	4% of entities surrender obligation, equivalent to 49% of reductions (allowances+offsets)	PDR
Allocation strategy for freely allocated allowances (for 25% auction case)	Output-based[5] allowance allocation to address leakage	EAAC Recommendation
Pollutants covered	CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3	PDR
Banking and retiring allowances permitted	Yes	PDR
Carbon price	\$20 – \$60/ton of CO_2e	EAAC Report
Amount of proceeds	\$7.3 - \$21.9 billion (i.e. 365 $MMTCO_2e$ times \$20 to \$60/ ton of CO_2e)	EAAC Report
Potential Types of Offset Projects	ARB Board approved voluntary offset protocol calculation methods (urban forestry, non-urban forestry, and methane digesters).	Staff estimate for the purpose of this exercise only

Health baseline (see document w/sample pathways analysis): Expected to contain information about race, ethnicity, socioeconomic status; hospital admissions for all respiratory disease and asthma; and heart disease and hypertension related mortality.

(4) Potential Alternative Design Choices & Revenue Considerations (Table 2)

Possible program design elements to consider are:

- Percent of allowances auctioned
- Allocation strategy for freely allocated allowances (~25% auction cases)
- Recipient of allowances
- Mechanism to distribute set-aside allowances
- Provisions to maximize co-benefits in the regulation

Though not part of the cap-and-trade regulation itself, the HIA will also consider different revenue distribution strategies. These might include:

- Recipient of proceeds (EAAC recommendations)

[5] Output-based allowance allocation is when allocation is determined by how much of a product an entity produces (e.g. a power plant that generates more megawatt-hours (MWh) would receive more allowances than one that generates less energy) rather than its GHG emission levels.

Generally, the EAAC recommended that a relatively small share of the total proceeds and revenue be directed to (1) minimize leakage, (2) low-income communities, and (3) environmental remediation. The remaining proceeds and revenue, expected to represent the bulk of the allowance value, should go towards all Californians (~75%) and financing private and public investment (~25%) (see table 2).

In early January, the 16-member Economic and Allocation Advisory Committee (EAAC) adopted their report of recommendations to California officials on a range of economic issues related to the possible design of a cap-and-trade system to reduce greenhouse gas emissions[6].

- Mechanism(s) to distribute proceeds

[6] This report can be downloaded at: http://www.climatechange.ca.gov/eaac/documents/eaac_reports/2010-01 10_EAAC_Allocation_Report_Draft.pdf

Table 2. Alternatives to the Baseline Program Design Parameters for 2020			
Type of Parameter	**Baseline Assumption**	**Alternative Assumption**	**Reason for including Alternative**
Percent of Allowances Auctioned	25% as a minimum in 2020	"Rely principally, and perhaps exclusively on auctioning." (100% auction) - EAAC Recommendation	• The percent of allowances auctioned (versus freely allocated) would affect the proceeds and could affect the carbon price.
Allocation strategy for freely allocated allowances (for 25% auction case)	Product output-based allowance allocation Output-based allowance allocation is when allocation is determined by how much of a product an entity produces (e.g. a power plant that generates more megawatt-hours (MWh) would receive more allowances than one that generates less energy) rather than its GHG emission levels.	Co-pollutant emissions would be considered in addition to product output when determining allowance allocation	• The goal of this alternative is to incentivize entities with high product output to reduce their co-pollutant emissions relative to their competitors. • Decisions about allowance allocation would be based on co-pollutant emissions per unit of product output. Where facilities with lower co-pollutant emissions, relative to their unit of output, would be given more allowances than entities with the same output, but higher co-pollutant emissions.
Recipient of Allowances and Proceeds		**EAAC Recommendations** A relatively small share of the total proceeds and revenue should go towards • Minimizing leakage • Low-income communities (households with an income below 150% of the poverty line) • Environmental remediation (co-pollutant contingency fund) The remaining proceeds and revenue, which is expected to represent the bulk of the allowance	No recommendations pertaining to this topic were included in the PDR

Table 2. Alternatives to the Baseline Program Design Parameters for 2020			
Type of Parameter	**Baseline Assumption**	**Alternative Assumption**	**Reason for including Alternative**
		value should go towards • ~ 75% Californians (cap-and-dividend) • ~ 25% Financing private and public investment o low cost emissions reductions o job training o adaptation to climate impacts o improvements to disadvantaged communities (half committee recommended Community Benefits Fund) o job training o infrastructure improvements o beneficial local and state plans (e.g. improvements to land use) **Other recommendations?**	
Mechanism to distribute proceeds or set-aside allowances		**EAAC Recommendations** Low-income households – direct transfer of allowance value Californians – lump sum (cap-and-dividend) or individual income tax cuts	No recommendations pertaining to this topic were included in the PDR
Provisions to maximize co-benefits in the regulation		Trading restrictions (for allowances and offsets) • Determined by community and/or facility characteristics • See Boyce memo for examples of possible restrictions[7]	No recommendations pertaining to this topic were included in the PDR
Offset limit	4% of surrender obligation	No offsets	• The percent of offsets permitted could affect the carbon price (i.e. allowing more offsets increases the supply of compliance instruments available to

[7] This memo can be downloaded at: http://climatechange.ca.gov/eaac/documents/member_materials/Boyce_memo_on_investment_in_disadvantaged_communities.pdf

Table 2. Alternatives to the Baseline Program Design Parameters for 2020			
Type of Parameter	**Baseline Assumption**	**Alternative Assumption**	**Reason for including Alternative**
			entities which could decrease the carbon price). Changes in carbon price could affect consumer cost and/or household income. • The quantitative use limit on offsets could potentially affect the change in co-pollutant emissions

(5) Proposed Methodology

a) *Geographic and temporal boundaries*

The HIA will be limited to California communities and/or counties and will result in an estimation of the potential health impacts of the proposed cap-and-trade rule in 2020 (the end of the last proposed cap-and-trade compliance period). Likely two to five communities and/or counties will be included in the HIA. These geographic locations will be selected according to population health and socioeconomic characteristics as well as expected number of facilities subject to the proposed rule and health (Tables 3 and 4) and emissions data availability.

Table 3. California cities with 5 or more facilities subject to mandatory reporting

#	City
1	Antioch
2	Bakersfield
3	Fellows
4	Long Beach
5	Maricopa
6	Martinez
7	McKittrick
8	Pittsburg
9	San Diego
10	Wilmington
11	Yuba City

Table 4. California cities with Reported Total Emissions > 1,000,000 CO2e (metric tons)

#	City	#	City
1	Apple Valley	14	Moss Landing
2	Bakersfield	15	Pittsburg
3	Benicia	16	Redlands
4	El Segundo	17	Richmond
5	Escondido	18	San Jose
6	Fellows	19	Sun Valley
7	Herald	20	Sutter
8	Lebec	21	Torrance
9	Long Beach	22	Trona
10	Lucerne Valley	23	Tupman
11	Martinez	24	Victorville
12	McKittrick	25	Wilmington
13	Mojave		

b) *Impact analysis questions*

The goal of the HIA is to evaluate potential impacts of the proposed cap-and-trade rule most likely to significantly influence public health. To determine what public health impacts may occur, staff compiled a table of alternatives (Table 2) to the baseline program design parameters for 2020 most likely to influence the proposed cap-and-trade rule impact. Using this table, the HIA will address questions such as:

- What is the public health impact associated with free distribution or auction of allowances?
- What is the public health impact associated with forestry, urban forestry or agriculture offset projects?
- What provisions to maximize co-benefits should be incorporated into the rule?

- Though not part of the rule, what mechanisms to distribute proceeds would have the largest public health impact?

c) *Analysis*

The general analysis plan is to:

- Define several representative California communities/counties, according to location of covered entities and available health and exposure data
- Quantitatively and qualitatively describe the existing health conditions and population characteristics in each community/county
- Evaluate potential cap-and-trade policy design options in each community and to determine the direction, magnitude and associated certainty associated with potential health impacts and/or changes in health conditions (sample evaluation in appendix x)

The HIA will use qualitative and quantitative methods where feasible and appropriate. Preliminary analysis suggests that emissions and health data available for quantitative analysis is primarily available at the county level, indicating that community level analysis would largely be qualitative (though some quantitative analysis may be feasible at the zip code level).

d) *Data sources*

Data Type	Source	Years
Facility locations & GHG emissions	ARB mandatory reporting data	2008
PM, NOx, toxics emissions data	ARB	Through 2008
Mortality Data (zip code level)	CDPH	Through 2006
Hospital/ER admissions data (zip code level)	CDPH/OSHPD	2000-2006/2005-06
Heart disease & asthma (& diabetes) prevalence/symptoms	California Health Information Survey	2003/2005/2007
Population/sociodemographic data (census block/tract/zip code/community)	US Census/CDoF	Varies by location
Cancer	CDPH (Cancer Registry)	Latest available 2007
Birth Outcomes	CDPH (Birth Records)	Latest available 2008
Obesity prevalence	California Health Information Survey and/or Behavioral Risk Factor Surveillance System	~2003/2005/2007

(6) Priorities/Timelines

The timeline for the HIA completion is primarily driven by the cap-and-trade regulatory timeline. The draft HIA needs to be completed by **late February 2010** to provide timely input into the development of the cap-and-trade regulation. To facilitate this goal, staff is seeking input from the Public Health working group on priority objectives for the HIA.

[1] The cap-and-trade preliminary draft regulation of can be accessed at http://www.arb.ca.gov/cc/capandtrade/meetings/121409/pdr.pdf

[2] WCI Recommendations available at http://www.westernclimateinitiative.org/component/remository/general/design-recommendations/Design-Recommendations-for-the-WCI-Regional-Cap-and-Trade-Program/