



California, Greenhouse Gases, and Climate Change

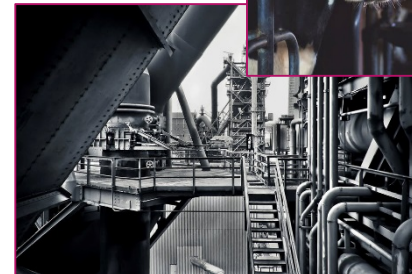
Air pollution and Greenhouse Gases

Major Greenhouse Gases

- Carbon Dioxide
- Methane
- Nitrous oxide
- High Global Warming Potential Gases

Air Pollutants

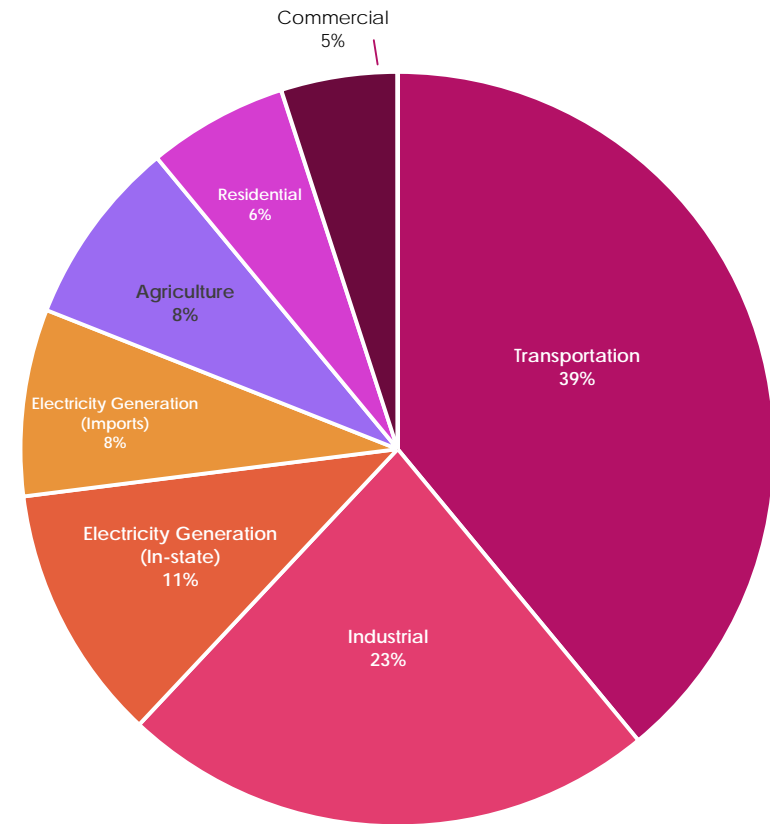
- Carbon monoxide*
- Ozone*
- Nitrogen dioxide*
- Sulfur dioxide*
- Particulate matter
- Sulfate
- Lead
- Hydrogen sulfide
- Vinyl chloride



Major GHG sources in California

► Largest Emitters

- Transportation
- Industrial
- Electricity Generation



CA's New Emission Goals

- ▶ AB 32 - California Global Warming Solutions Act of 2006- **requires by law a sharp reduction of greenhouse gas (GHG) emissions**
 - ▶ Target of reducing greenhouse gas emissions to 40 percent below 1990 levels by 2030
 - ▶ AB 398 – extended the cap and trade program to 2030
 - ▶ AB 617 – sets up a local governance program for air pollution from both mobile and stationary sources

Strategy for Lowering Emissions:

Cap and Trade

Putting a price on emissions

Step 1:

Emitters must purchase a permit or "Allowance" for every ton of CO₂ they emit

(Government allocates free allowances; any deficits must be bid or traded for during the auction)



Step 2:

California Air Resources Board (CARB) conducts an auction and sets a price per ton and allowance

Ex: Allowance
Cost: \$15 per ton



Step 3:

Emitters are able to purchase allowances from CARB or from other emitters that possess a surplus

Bid! – The Allowance Game



Set Up – Round 1

- ▶ Open Round 1 Envelope
- ▶ Each envelope includes:
 - ▶ 10 - Industry Information Sheets
 - ▶ 1 - Emissions and Expense Tracker
 - ▶ 1 – Bid Sheet

Industry Group X

GHG Emissions Level Very High

Example Industries: Avocado Transportation, Commercial Transport Vehicles

	Round	Amount
Estimated Emissions (metric tons CO₂e)	Round 1	900,000
	Round 2	900,000
Free Allowances (#)	Round 1	860,000
	Round 2	860,000
Operating Budget	Round 1	\$800,000
	Round 2	\$800,000
Allowances to Purchase (#)	Round 1	40,000
	Round 2	40,000

Bid Sheet

Table #: _____

Industry Group: _____

Round: _____

1 allowance permits you to emit 1 metric ton CO₂e

# of Allowances	\$ per Allowance
5,000	10 15 20 25 30
10,000	10 15 20 25 30
20,000	10 15 20 25 30
40,000	10 15 20 25 30
80,000	10 15 20 25 30
160,000	10 15 20 25 30

Industry Information Sheet

- ▶ Each table represents 1 of 3 different stakeholder groups
- ▶ Each info sheet includes:
 - ▶ Estimated Emissions Levels:
 - ▶ Industry Group X is Estimated to Emit 900,000 metric tons per round
 - ▶ Free allowances allocated per round
 - ▶ Industry Group X received 860,000 allowances per round
 - ▶ Operating Budget allocated per round
 - ▶ Industry Group X has \$800,000 to spend per round
 - ▶ Number of allowances needed to purchase at the auction
 - ▶ Industry Group X needs to purchase 40,000 allowances in each round

EXAMPLE

Industry Group X			Part 1
GHG Emissions Level		Very High	
Example Industries:		Avocado Transportation, Commercial Transport Vehicles	
	Round	Amount	
Estimated Emissions (metric tons CO ₂ e)	Round 1	900,000	
	Round 2	900,000	
Free Allowances (#)	Round 1	860,000	
	Round 2	860,000	
Operating Budget	Round 1	\$800,000	
	Round 2	\$800,000	
Allowances to Purchase (#)	Round 1	40,000	
	Round 2	40,000	

Emissions and Expense Tracker

- ▶ Using your Industry Information Sheet:

- ▶ Write in how many allowances your team is required to buy in Round 1
- ▶ Write in how much money you have to spend in Round 1

Do NOT fill in the rest of the form until the auction is complete and CARB provides the cost per allowance

EXAMPLE

Bidding

- ▶ Review the bidding rules located on the instruction sheet
- ▶ Please note that there can only be one bid placed at each price point – no more than one amount can be circled in each column and each row
- ▶ Bids that don't meet the CARB price per allowance at auction will not be allocated; you will need to make up any deficits in Round 2
- ▶ You CAN bid for more allowances than required as long as you have enough money to cover ALL bids placed

Bid Sheet						
Table #: 5						
Industry Group: X – Very High						
Round: 1						
1 allowance permits you to emit 1 metric ton CO ₂ e						
# of Allowances	\$ per Allowance					
5,000	10	15	20	25	30	
10,000	10	15	20	25	30	
20,000	10	15	20	25	30	
40,000	10	15	20	25	30	
80,000	10	15	20	25	30	
160,000	10	15	20	25	30	

EXAMPLE

Let's Play!

15:00

Emissions and Expense Tracker

- ▶ Now that Round 1 is complete, please finish filling in your Emissions and Expense Tracker

- ▶ Write in how many allowances your team purchased in the auction →
- ▶ Calculate if there is a deficit or surplus of allowances that you will need to purchase in Round 2 →
- ▶ Write in what the cost per allowances was as determined by CARB →
- ▶ Calculate how much money you need to pay CARB for your allowances purchased →
- ▶ Calculate if there are any funds remaining after you pay CARB →

EXAMPLE

Set Up – Round 2

- ▶ Open Round 2 Envelope
- ▶ Each envelope includes:
 - ▶ 1 – Bid Sheet

Bid Sheet						
Table #:						
Industry Group:						
Round:						
1 allowance permits you to emit 1 metric ton CO ₂ e						
# of Allowances	\$ per Allowance					
5,000	10	15	20	25	30	
10,000	10	15	20	25	30	
20,000	10	15	20	25	30	
40,000	10	15	20	25	30	
80,000	10	15	20	25	30	
160,000	10	15	20	25	30	

Emissions and Expense Tracker

- ▶ To prepare for Round 2, add or subtract any deficit or surplus of allowances from Round 1 to your allowances required in Round 2
 - ▶ Industry X needed to purchase 40,000 allowances but only won 20,000 in Round 1. They now need to purchase a total of 60,000 allowances in Round 2
- ▶ Add any remaining money to your Operating Budget for Round 2
 - ▶ Industry X had a budget of \$800,000 in Round 1, they only spent \$400,000 and now have \$1.2 million to spend in Round 2

EXAMPLE

Let's Play!

10:00

Stop

Team Report

TALK TO ME!



Part 2: Reinvestment of Funds

Lifetime GHG Emission Reductions
from Implemented Projects*



Anticipated GHG Benefits
Over Project-specific Timeframe

40%



100

Categories	Already Implemented (\$M)	Emissions Reduced (1,000 mtCO2)	% To Disadvantaged Communities			Existing Allocation	Additional
			Cost per ton	Examples of Policies			
Transportation	997.8	6570	Average: 1018.4, Min: 50, Max: 3613	47%	High speed rail, transit and intercity rail, Freight transport, low carbon fuels, car sharing and carpooling, Zero and near zero emissions vehicles	40%	
Sustainable Communities	74.8	598	Average: 94.5, Min: 55, Max: 134	63%	Affordable housing and sustainable communities, sustainable agricultural lands conservation, Technical assistance to disadvantaged communities, transformative climate communities	20%	
Clean Energy	74.5	773	Average: 202.8, Min: 0, Max: 542	47%	Community solar, single family photovoltaics, multifamily solar heating, woodsmoke reduction, biofuels, water energy grants	--	
Energy Efficiency	5.5	44	Average: 123, Min: 123, Max: 123	100%	Single family energy efficiency, large and small multifamily energy efficiency, state water energy efficiency	--	
Natural Resources	66.1	4845	Average: 55, Min: 6, Max: 117	66%	Mountain ecosystem restoration, Sacramento-San Joaquin Valley coastal restoration, forest and soil health, urban forestry, organics	--	
Waste	19	2346	Average: 9, Min: 5, Max: 15	47%	Food waste prevention and rescue, Recycling manufacturing grants, dairy digester research	--	
Other	--	--	--	--	Healthcare, education, climate change adaptation, ???	--	
TOTAL						60%	100%



Questions?