



**Public Workshop**

**Greenhouse Gas Cap-and-Trade  
Regulation Status Update**

May 17, 2010

California Air Resources Board

# Agenda

- Cap-and-trade Regulation Status Update
  - Initiating a new series of program design workshops
- Allocation of Allowances
  - Current staff thinking on allocation
  - Identifying and addressing leakage risk
  - Developing emissions benchmarks by industrial activity

# Principles for Program Design

- Create a gradual transition to a low carbon economy
  - Protect California consumers
  - Keep California industry competitive
  - Reward those who have invested in energy efficiency and greenhouse gas reduction
  - Encourages continued investment in efficiency and clean energy

## Work Completed to Date

- Preliminary Draft Regulation process
  - 132 comments received and reviewed
- Economic and Allocation Advisory Committee process
  - 136 comments received and reviewed
- Completion of updated economic analysis of the Scoping Plan
- Interaction with federal cap-and-trade bill development

## Working with WCI

- Detailed program design document expected by early July
- Partner jurisdictions aiming at 2012 start embody approximately 70% of emissions from all WCI Partners
  - Expect to link with those partners at start of program; bring others in as they are ready

# Current Rulemaking Status

- Working on next draft of regulation based on input to date
  - Plan had been to release a working draft of the regulation for public comment in April
  - Revised plan is to air staff thinking on key issues for public discussion before releasing next draft
- Remain on track to take regulation to Board by end of 2010 and to start program in 2012

# Cost Containment

- Many comments on the need for mechanisms to contain costs
- Cost containment mechanisms in November draft included:
  - Banking of allowances
  - Three year compliance period
  - Allowance reserve
  - Use of offsets
- Will continue to look at need for additional cost containment mechanisms

# Allowance Allocation Issues

- EAAC recommendations included heavy reliance on auction
- Many have expressed concern with auction approach:
  - Paying for allowances could compete with investment in emission reductions
  - Businesses might not be able to pass along costs
  - Potential for emissions leakage
  - Effects on small business and consumers

# Allowance Allocation Approaches

- Afternoon session will highlight staff thinking on allowance allocation approaches for the industry and electricity sectors
  - Use of benchmarks tied to output to help address leakage
  - Need for system that does not interfere with near-term investment in emission reductions
  - Need for transition assistance to prevent harm to California economy

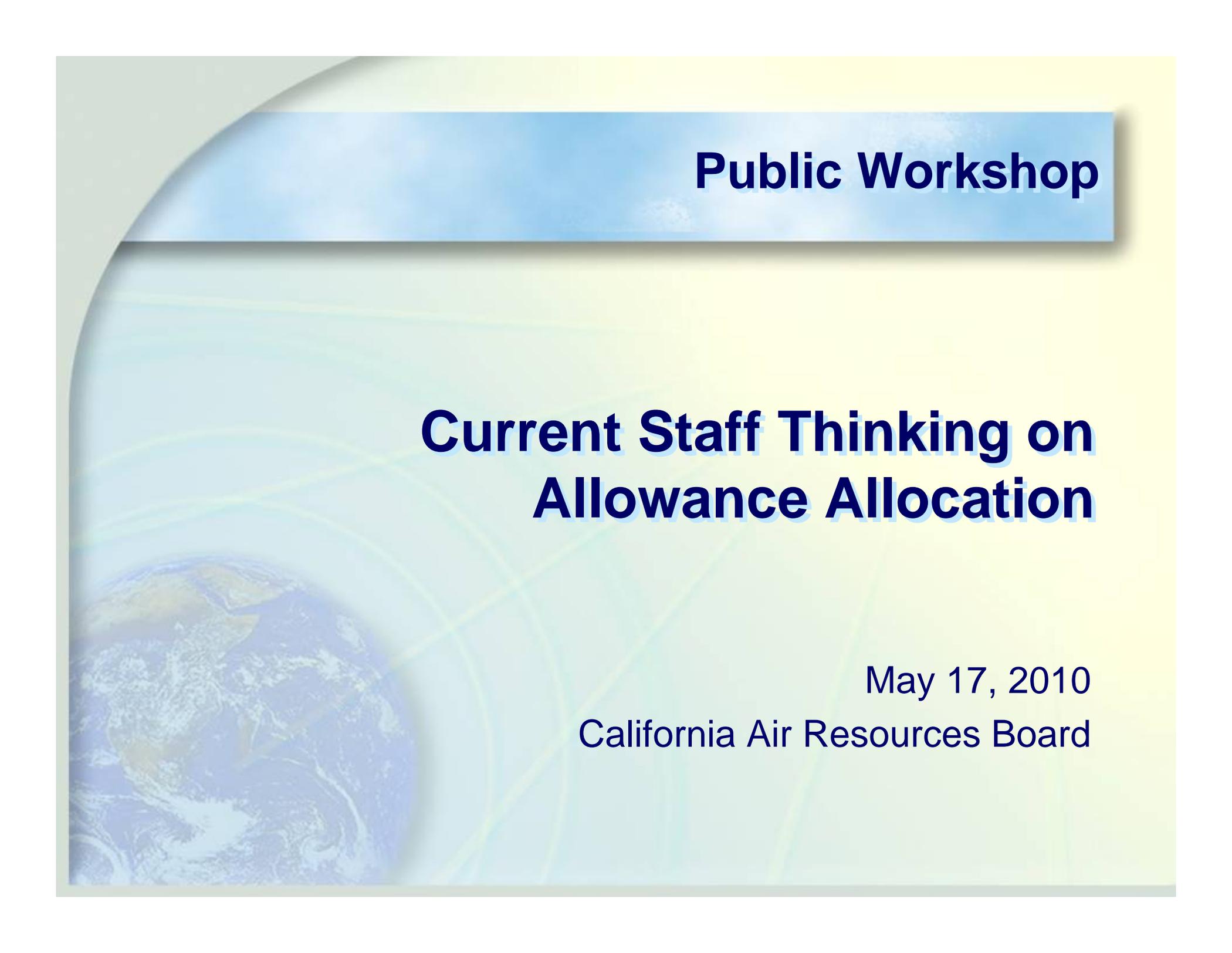
# Moving Forward

- Planning public discussion on other issues, including:
  - Cost containment mechanisms
  - Offset demand and supply
  - Offset protocols
  - Compliance scenario studies
  - Monitoring and enforcement
  - Mandatory reporting
- Discussions start this afternoon with leakage and allowance allocation

# Stakeholder Comment

- Stakeholders are asked to provide written comments to ARB by **June 7, 2010**

(<http://www.arb.ca.gov/cc/capandtrade/comments.htm>)

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# **Public Workshop**

## **Current Staff Thinking on Allowance Allocation**

May 17, 2010

California Air Resources Board

## Purpose of Today's Workshop

- Provide a high-level overview of an approach for allowance allocation in the cap-and-trade system
  - Invite stakeholder discussion and feedback
    - Stakeholders are asked to provide written comments to ARB by **June 7, 2010**
- (<http://www.arb.ca.gov/cc/capandtrade/comments.htm>)



# **Summary of Economic and Allocation Advisory Committee's Allocation Recommendations**



**Matt Zaragoza-Watkins**

# Important Concepts

- **Allowance Value**- The economic worth of allowances, either as allowances themselves, or as revenues from the sale of allowances at auction
- **Leakage**- A reduction in emissions of greenhouse gases within the state that is counterbalanced by an increase in emissions of greenhouse gases outside the state

# Economic and Allocation Advisory Committee Background

- Formed in May 2009 by ARB and Cal/EPA to advise on allowance allocation and economic analysis
- 16 members
  - Economic, financial, and policy experts
- In March 2010 the EAAC presented final allocation recommendations to the Board
  - Available from:  
<http://www.climatechange.ca.gov/eaac/>

# EAAC Evaluation Criteria

- Cost Effectiveness
- Fairness
- Environmental Effectiveness
- Simplicity/Transparency

# Allocation Involves both Policy Choices and Mechanism Choices

Policy Choices

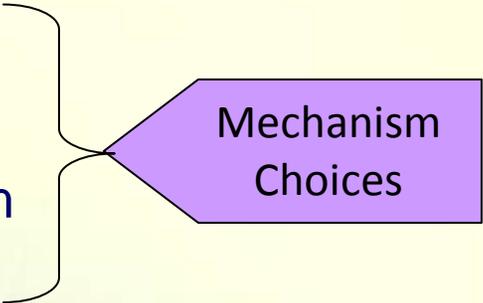
- Who are the intended recipients of allowance value?

Mechanism Choices

- How is the allowance value distributed to the intended recipients?

# Summary of EAAC Allowance Distribution Recommendations

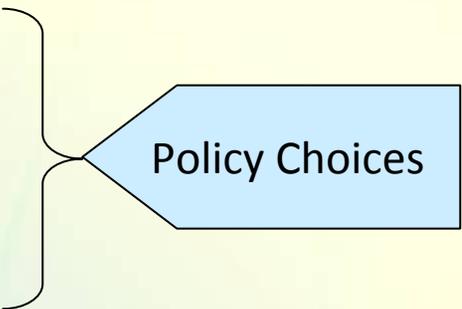
- Provided recommendations on mechanisms to distribute allowances:
  - Free allocation only if needed for leakage prevention
  - Auction is an efficient distributional mechanism
  - Recommended a double-sided auction
- Many stakeholders interpreted EAAC as recommending 100% auction from the start
  - Not what the committee recommended
  - ARB is strongly considering the need for free allocation to address both leakage and transition assistance



Mechanism Choices

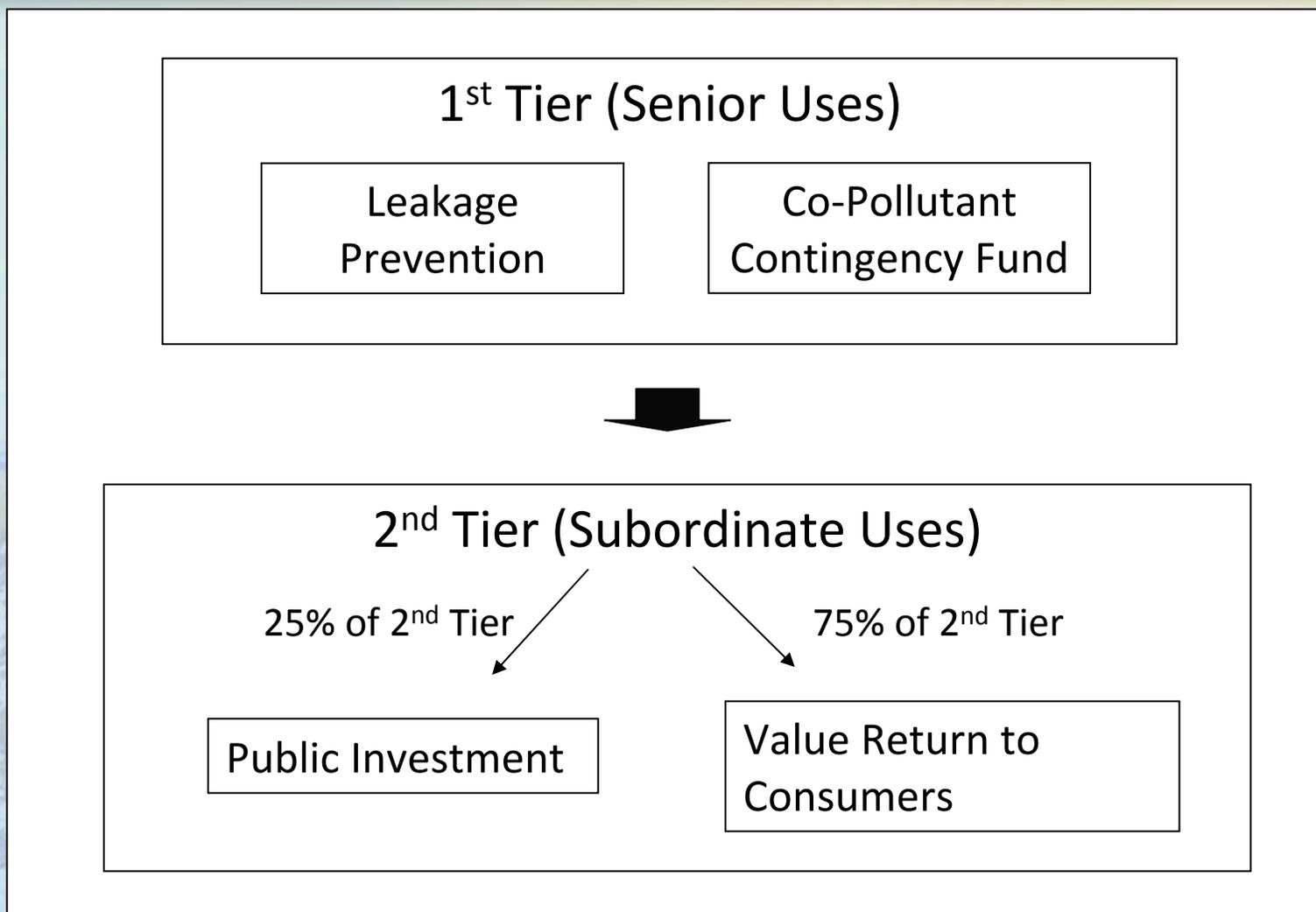
# Summary of EAAC Allowance Value Recommendations

- Devote value to:
  - Preventing adverse impacts
  - Investing in GHG reductions
  - Returning value to consumers



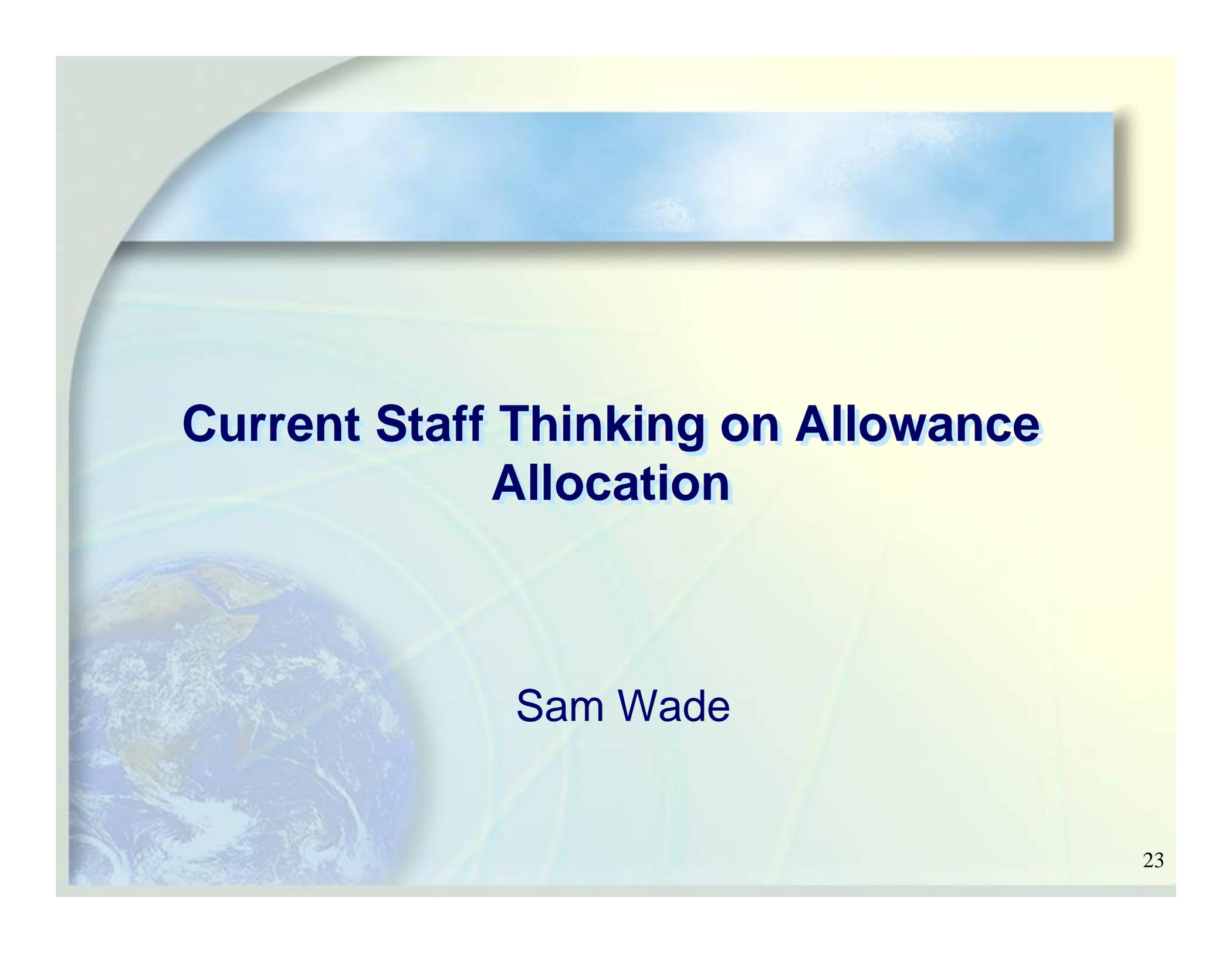
Policy Choices

# EAAC Allowance Value Flow Diagram



## Next Steps

- ARB has reviewed the EAAC recommendations and all stakeholder comments received on allocation
- Current approach to allowance allocation:
  - Incorporates some of the key components of the EAAC framework
  - Focuses more heavily on the need to facilitate smooth transition into the program
- The next presentation explains staff's thinking on the allowance allocation approach in detail



# **Current Staff Thinking on Allowance Allocation**

Sam Wade

# General Approach

- Adapt and expand the EAAC framework
- Major changes from EAAC recommendations:
  - Increased free allocation to industry for leakage prevention and transition assistance
  - Value to utilities for renewable energy investment
  - Combine ‘co-pollutant contingency fund’ and ‘community benefits fund’
  - In later years, return value to consumers through a rebate program or similar mechanism

# Staff Allowance Value Flow Diagram

## 1<sup>st</sup> Tier (Senior Uses)

Price Mitigation  
Allowance Reserve

Industry Transition & Leakage  
Prevention



## 2<sup>nd</sup> Tier (Subordinate Uses)

Targeted Public Investment

- Renewable Power
- California Carbon Trust
- Community Benefit Fund

Consumer Rebate  
Program

## Goals Related to Allocation and The Carbon Price Signal

- Remember the conceptual goal of cap-and-trade
  - Establish a uniform economy-wide ‘carbon price signal’
- Recognize who bears the end cost of the program
  - In some cases compliance costs can be passed up or down the supply chain
- Strive for a gradual transition
  - In the early years, avoid significant economic gain or loss solely due to allocation decisions

# Incidence of the Carbon Price

	Electricity	Industry	Dispersed Natural Gas	Dispersed Gasoline and Diesel
<b>Primary Incidence of Carbon Price</b>	<ul style="list-style-type: none"> <li>Retail consumers of electricity</li> </ul>	<ul style="list-style-type: none"> <li>Product consumers (for industry with low leakage risk)</li> <li>Shareholders (for industry with high leakage risk)</li> </ul>	<ul style="list-style-type: none"> <li>End consumers of fuels</li> </ul>	<ul style="list-style-type: none"> <li>End consumers of fuels</li> </ul>
<b>Certainty of Incidence</b>	<ul style="list-style-type: none"> <li>Certain (due to utility rate-making)</li> </ul>	<ul style="list-style-type: none"> <li><b>Highly uncertain</b></li> </ul>	<ul style="list-style-type: none"> <li>Certain</li> </ul>	<ul style="list-style-type: none"> <li>Fairly certain</li> </ul>
<b>Considerations for Allocation</b>	<ul style="list-style-type: none"> <li>Regulators control how any value given to utilities is used</li> <li>RES policy likely to increase the price of electricity</li> </ul>	<ul style="list-style-type: none"> <li>Free allocation can be used to minimize leakage</li> <li>Disagreements about cost pass-through ability</li> </ul>	<ul style="list-style-type: none"> <li>Regulator controls how any value given to utilities is used</li> </ul>	

# 1<sup>st</sup> Tier Uses of Allowance Value

## 1<sup>st</sup> Tier (Senior Uses)

Price Mitigation  
Allowance Reserve

Industry Transition & Leakage  
Prevention



## 2<sup>nd</sup> Tier (Subordinate Uses)

Targeted Public Investment

- Renewable Power
- California Carbon Trust
- Community Benefit Fund

Consumer Rebate  
Program

# Allowance Reserve for Price Mitigation

- Goal: mitigate unexpectedly high or low allowance prices
  - Small portion of overall allowances initially dedicated to a strategic reserve and forward auctioning
  - If allowance prices are higher than anticipated reserve allowances are released into the market
  - If allowance prices are lower than anticipated some allowances are held back from auction
    - Increases the reserve size
  - Reserve potentially supplemented through increased use of offsets (if needed)

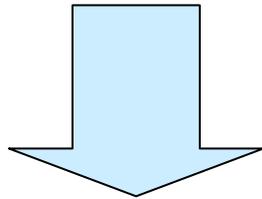
# Industry Transition Assistance and Leakage Prevention

- Goals of free allocation to industry:
  - Short-term: Provide a transition period to smooth market start-up and address uncertainty in evaluation of leakage risk
  - Long-term: Reduce to a level of free allocation needed to prevent leakage
- Free allocation to industry will, to the extent feasible:
  - Be based on output-based GHG efficiency “benchmarks”
  - “Update” to reflect changes in production each year for industry with leakage risk

# Output Based Free Allocation

Conceptual Allocation

$$A = \frac{\text{Allowance Value}}{\text{Output}}$$



Allocation in Practice

$$A = \frac{\text{Allowances}}{\text{Tons Clinker}}$$

- For each industrial activity:
  - Amount of value allocated
  - Appropriate product metric or metrics
- Challenging to move from a theoretical discussion to practical factors by activity
- Detailed discussion later today

# 2<sup>nd</sup> Tier Uses of Allowance Value

## 1<sup>st</sup> Tier (Senior Uses)

Price Mitigation  
Allowance Reserve

Industry Transition & Leakage  
Prevention



## 2<sup>nd</sup> Tier (Subordinate Uses)

Targeted Public Investment

- Renewable Power
- California Carbon Trust
- Community Benefit Fund

Consumer Rebate  
Program

# Targeted Public Investment: GHG Reductions from Renewable Power (1)

- Conceptual goal of cap-and-trade:
  - Economy-wide carbon price
  - Carbon price in electricity rates should be consistent with carbon price seen in other sectors
- Electric utilities comments to ARB:
  - 33% Renewable Electricity Standard could increase retail rates while reducing the carbon price seen by other sectors
  - Allowance value to retail providers needed to offset the rate increases associated with investment in renewable power and harmonize the carbon price seen by all sectors

## Targeted Public Investment: GHG Reductions from Renewable Power (2)

- Staff concept:
  - Retail providers receive allowances on behalf of their customers
    - Offset some of the ‘above market’ carbon price embodied in retail rates due to the RES
  - Retail providers receive allowance directly but will have to monetize these allowances at a double-sided auction
    - No discrimination between utility owned and merchant owned power generation
  - Allocation could be based on ‘retail sales’ or something more complex
    - Need stakeholder input

## Public Investment: Community Benefits Fund (1)

- Concept:
  - ARB competitive grant program to fund activities related to the **community protection** goals of AB 32
- Likely project types:
  - Projects that reduce GHGs and co-pollutants
  - Adaptation/preparedness for climate change health impacts
  - Improvements to mass transit & land use planning
  - Natural resource conservation

## Public Investment: Community Benefits Fund (2)

- Likely applicants:
  - Local governments
  - Affordable housing associations
  - Other community institutions
- Priority placed on funneling investment toward the most disadvantaged communities in California

# Public Investment: California Carbon Trust

- Concept:
  - ARB competitive grant program related to the **energy innovation** goals of AB 32
- Project types:
  - Research, development and demonstration projects in zero or low GHG technologies
  - Help bring promising and high potential technologies to market
  - Support a green technology workforce training program
- Likely applicants: small businesses, research institutions, vocational training programs

# Rebate Program for Californians

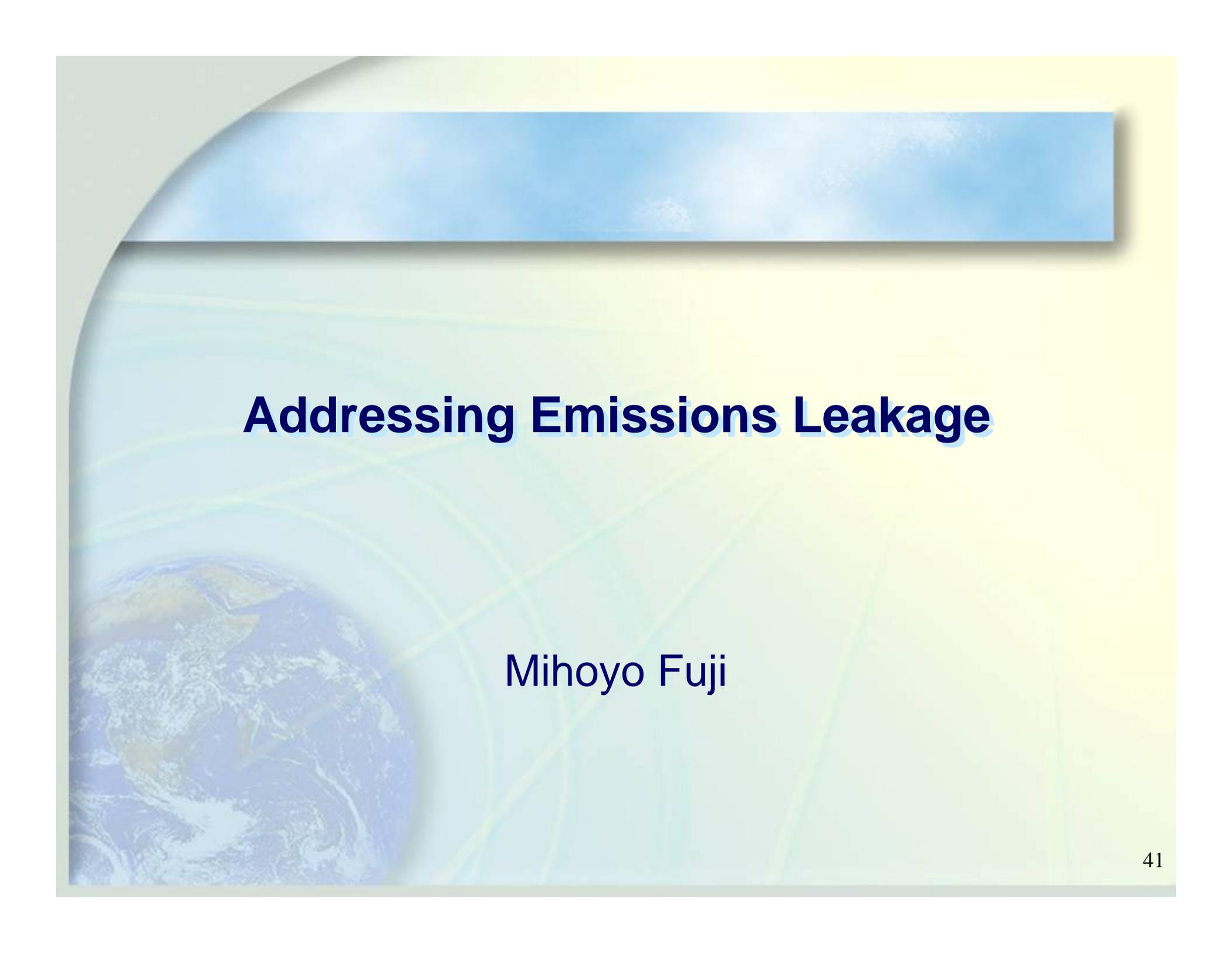
- In later years (2<sup>nd</sup> compliance period and beyond) a mechanism to return value to Californians is needed
- One possible approach:
  - Rebate available to all Californians
- Very basic eligibility requirements (CA resident, etc.)
- Application bundled with informational material about climate change
  - Explain opportunities to reduce consumers' carbon footprints
  - Create an incentive for further voluntary reductions
- Rebates could begin during the 2<sup>nd</sup> compliance period
  - Match with coverage of emissions from dispersed fuel use where consumers most clearly face the incidence of the carbon price

# Summary of Staff Thinking on Allocation: Sector-by-Sector Perspective

- **Industrial Sources:**
  - Free allocation to minimize leakage risks and provide a transition to a carbon constrained economy
  - Where possible ARB will use an approach based on emission intensity benchmarks per unit of output
- **Electricity Deliverers:**
  - No free allocation to generators
  - Allowance value to retail providers to offset the costs of investment in renewable power on behalf of their customers
- **Fuel Deliverers:**
  - Fuel deliverers internalize a carbon price in fuel prices
  - Allowance value used to achieve AB 32 goals or rebated to consumers

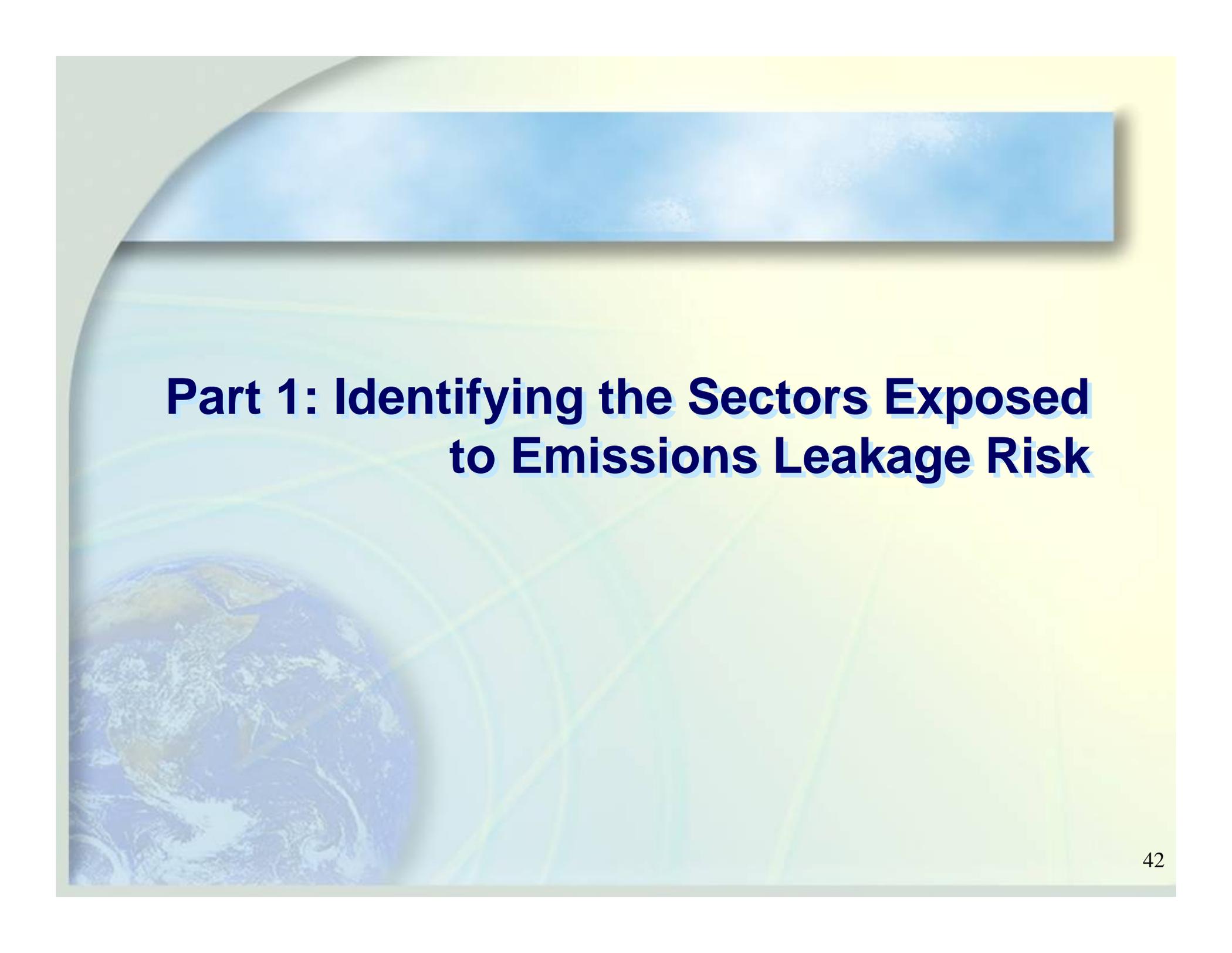
# Value Distribution Mechanisms

<b>Proposed Value Use</b>	<b>Proposed Distribution Mechanism</b>	<b>Double Sided Auction Requirement?</b>
Industry Assistance	Free allowances on an output basis	No
Investment in Renewable Power	Free allowances to retail providers on a retail sales basis (offered at a double-sided auction)	Yes
California Carbon Trust	Competitive grants offered as either \$ or allowances	Maybe
Community Benefit Funds	Competitive grants offered as either \$ or allowances	Maybe
Consumer Rebate Program	Allowance or \$ offered on an application basis (per household or per capita)	Maybe



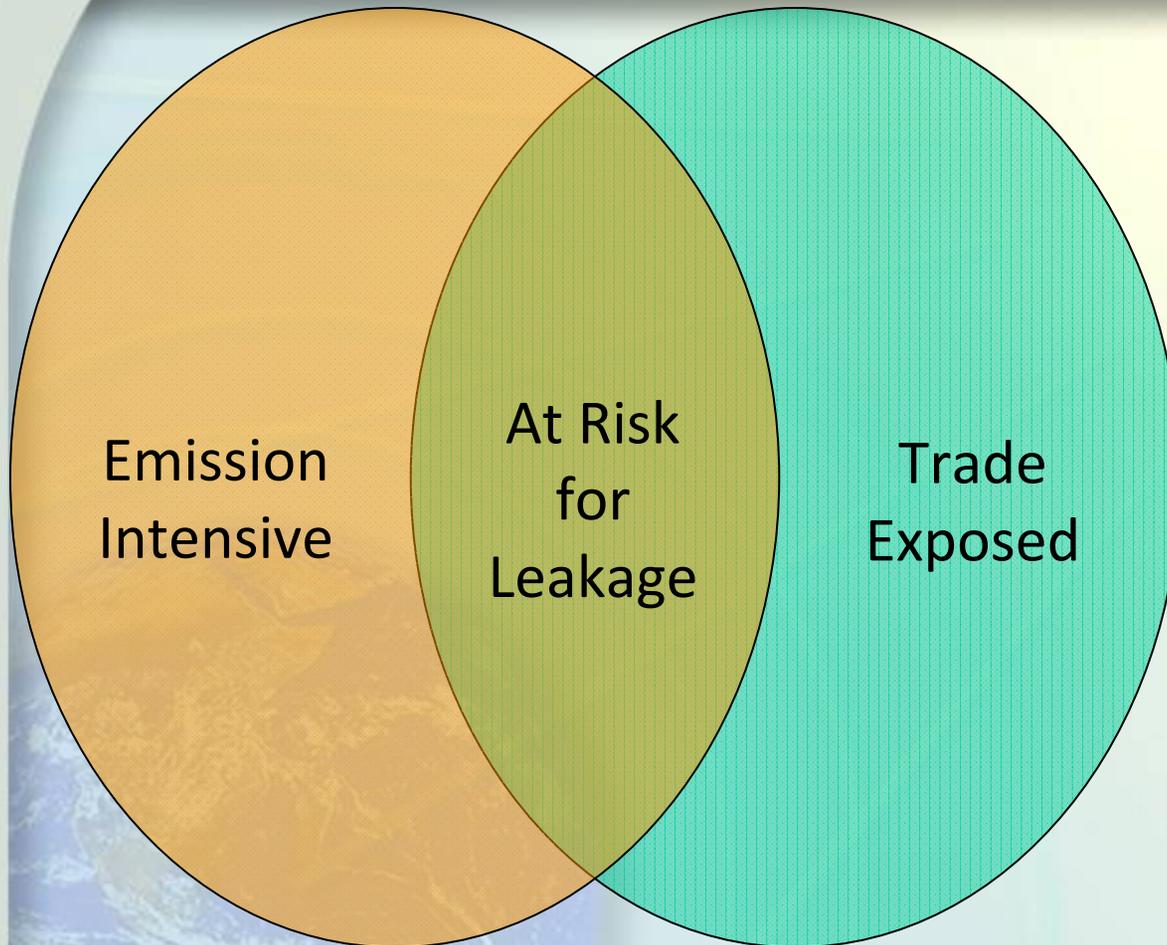
# Addressing Emissions Leakage

Mihoyo Fuji



# **Part 1: Identifying the Sectors Exposed to Emissions Leakage Risk**

# Identifying Leakage Risk

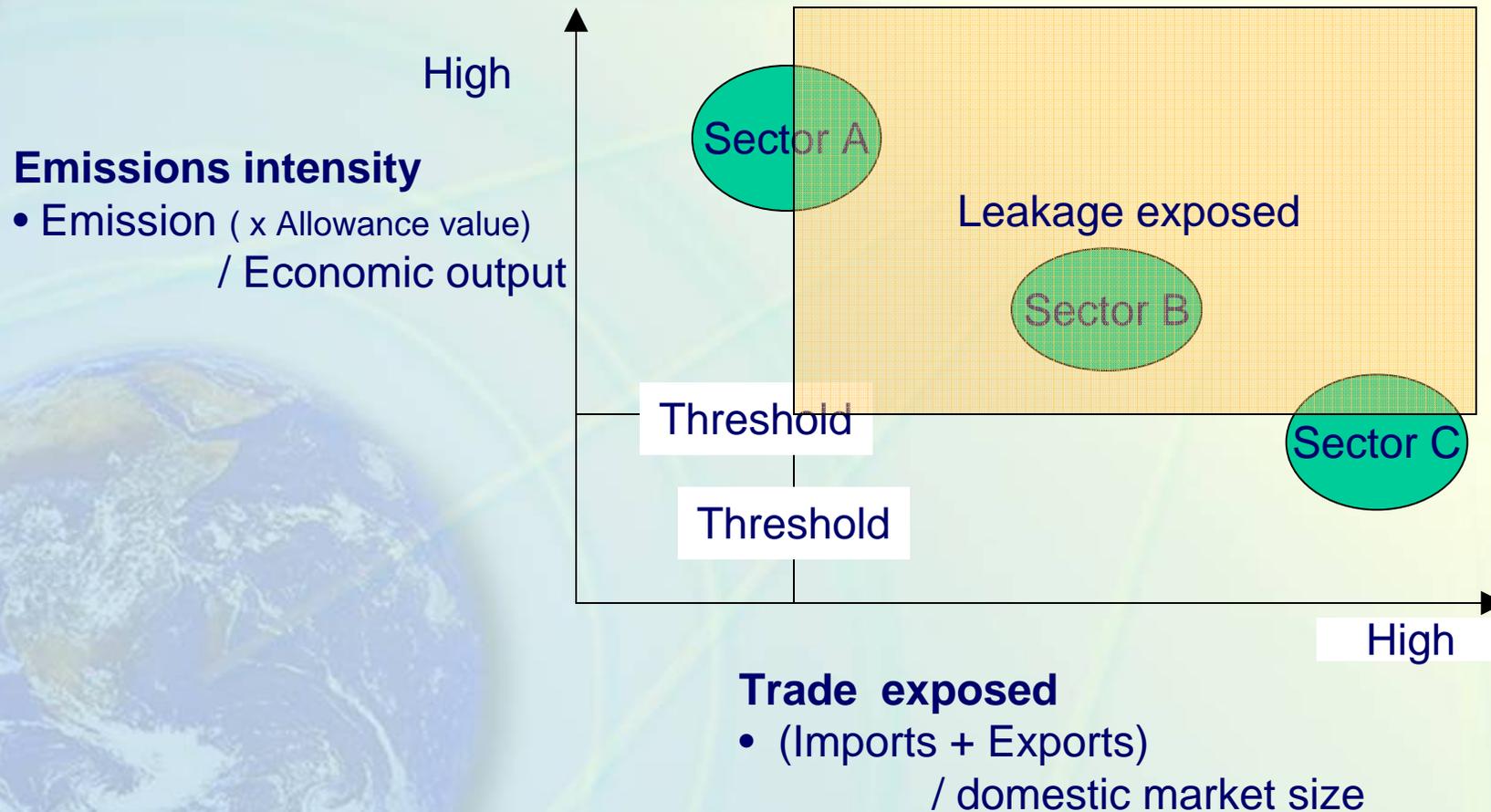


- **Emission Intensive**
  - Imposition of a carbon price may have a large impact on the prices of goods produced
  - Could include impacts from both direct and indirect emissions
- **Trade Exposed**
  - Competition with regions with no carbon price may leave firms unable to pass the carbon price to consumers

## Staff Approach to Establish Identification Methodology

- Reviewed methodologies for other cap-and-trade schemes
  - EU ETS
  - ACES (Waxman-Markey)
  - Australia CPRS
- Used actual data for US/California to understand the implications of the methodologies for California program

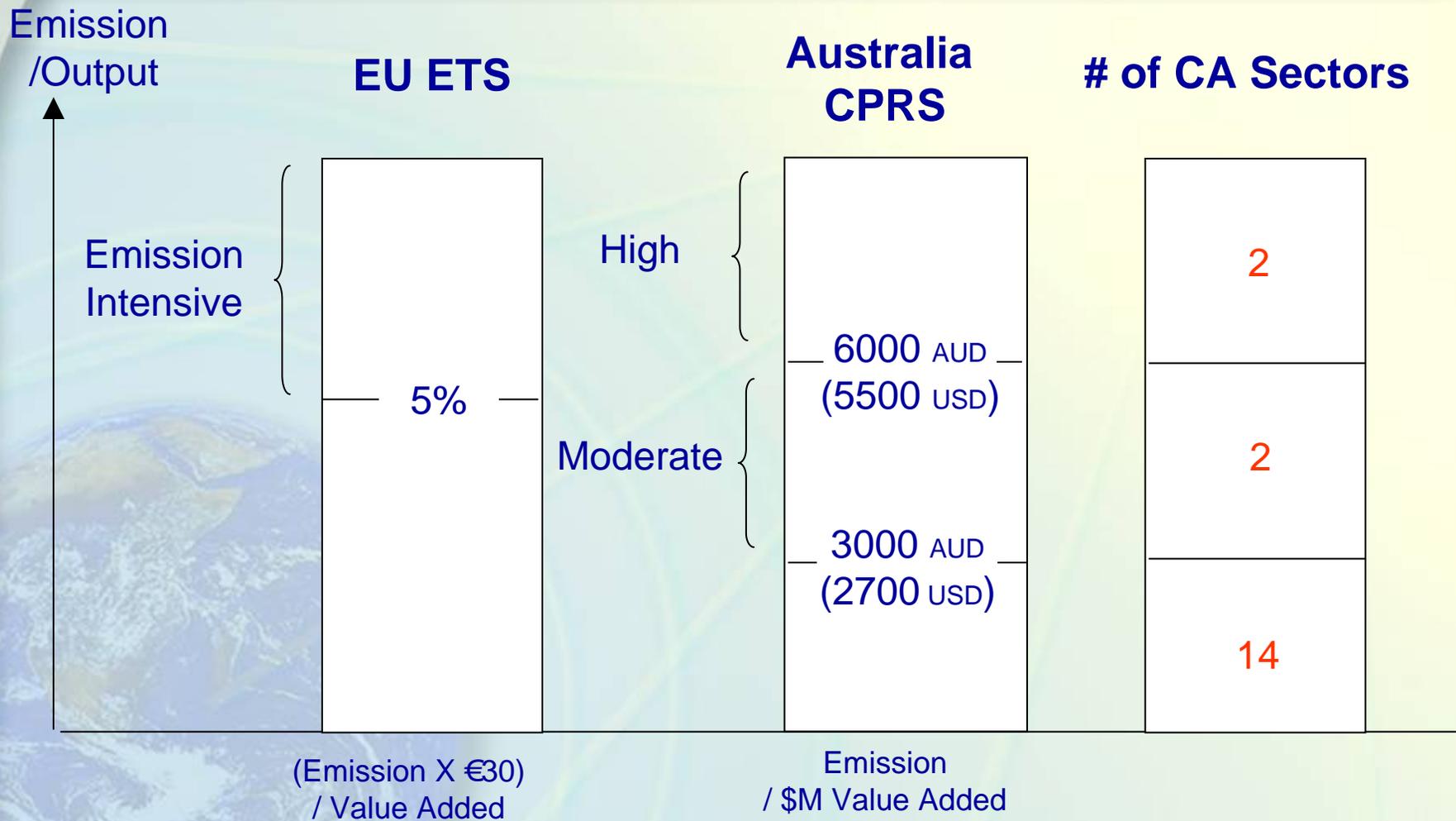
# Identification Methodology: Other Programs



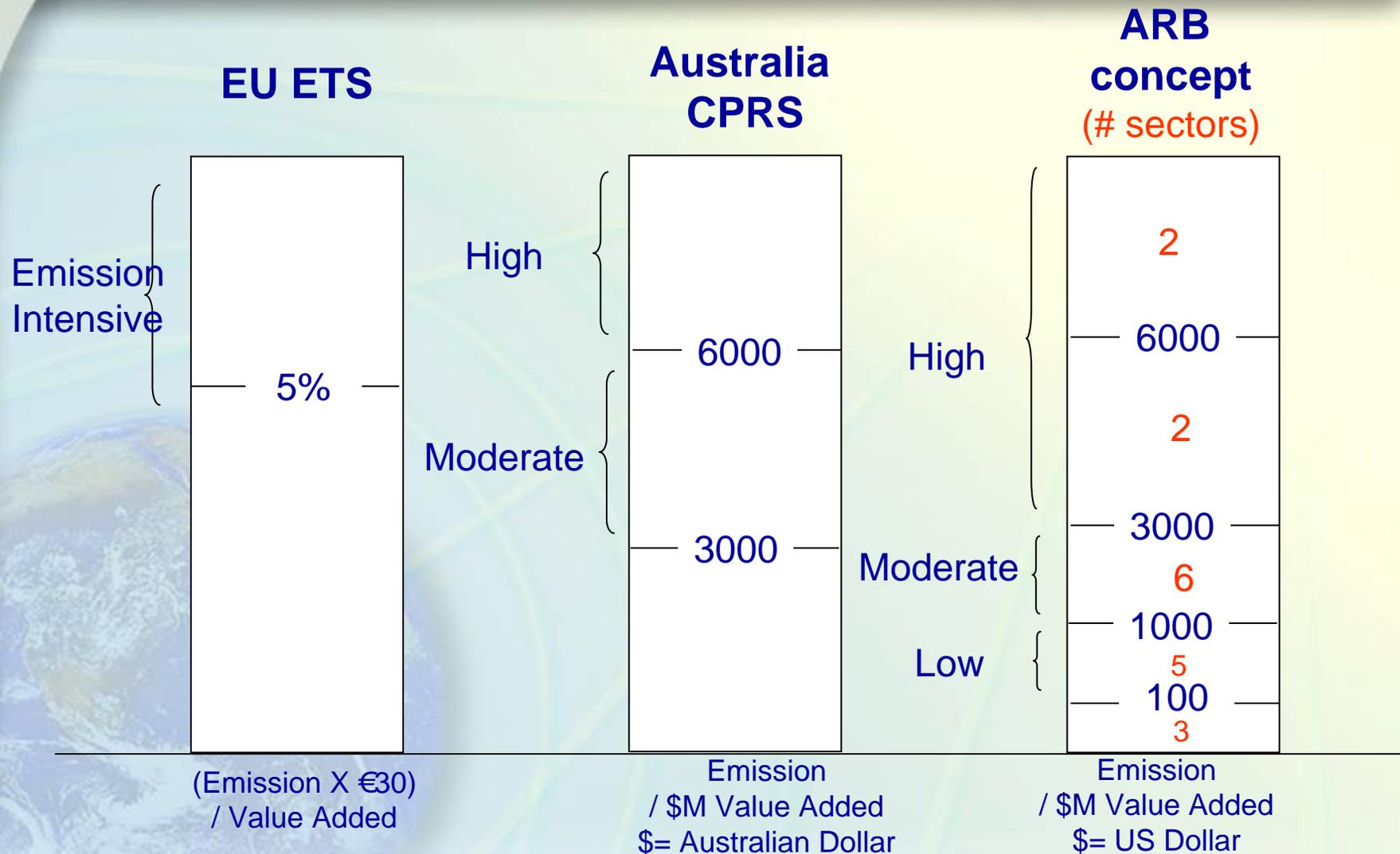
## Emissions Intensity Metrics: Reviewing Other Programs

- Emissions intensity metrics proposed by other programs
  - Numerator
    - (Direct + Indirect emissions), or
    - (Direct + Indirect emissions) x Assumed Allowance price
  - Denominator
    - Value added, or
    - Shipment (revenue)
- Data plugged into the metrics
  - GHG emissions (MRR 2008 results)
  - Value Added (State level - US Economic Census 2002/2007)

# Emissions Intensity: Classification



# Emissions Intensity Classification: Staff Preliminary thinking

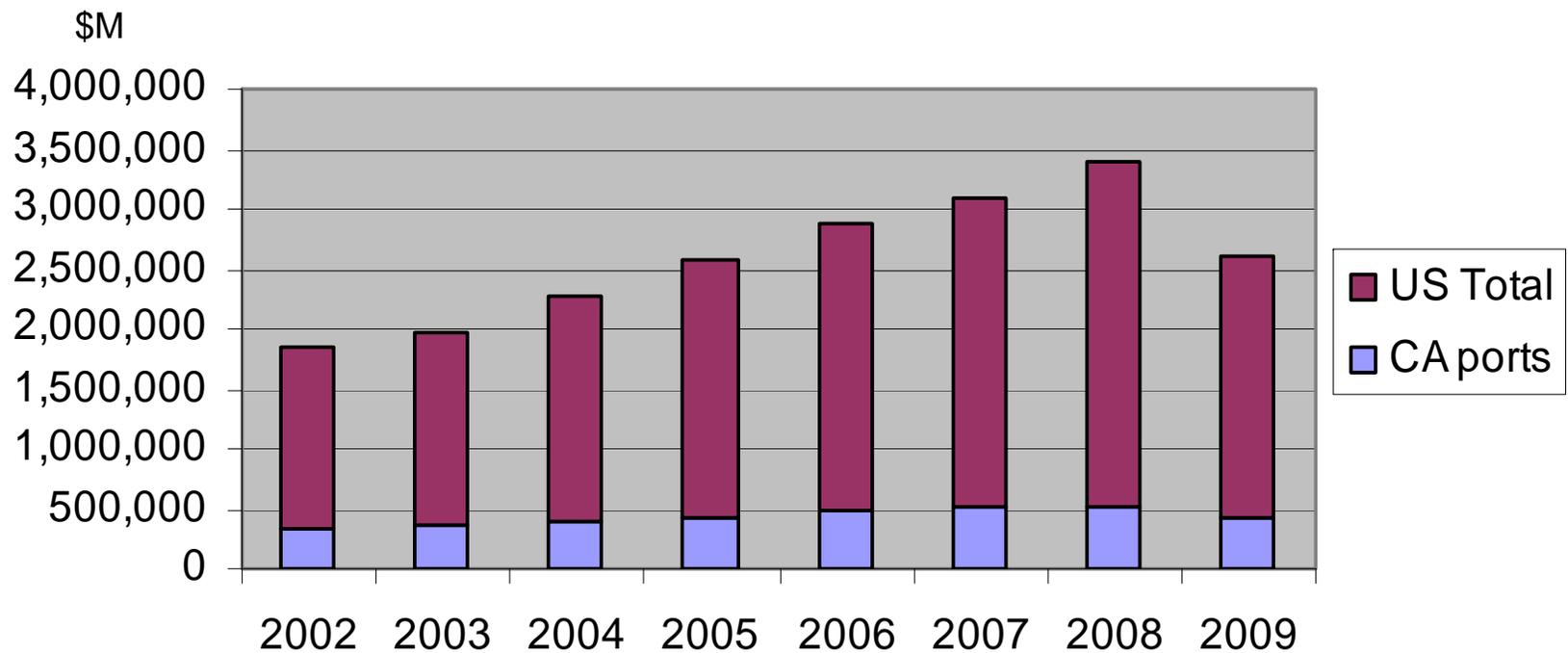


## Trade Exposure: Objective of the Analysis

- To reduce uncertainty in sector-by-sector carbon price pass-through
- Consider “what will happen if 100% cost have to be absorbed by covered sectors”
- Research how much “cost pass-through ability” covered sectors may have

# International Trade: General Trend

## Value of imports/exports



## Trade Exposure: Reviewing Other Programs

- Established to assess international trade exposure
- California program must analyze state-to-state competition
  - State level trade information is not available in a standardized format for all sectors
- Data plugged into the metrics
  - Import/export data from US Census Bureau
  - Shipment from US Census Bureau

# Trade Exposure Metrics: Reviewing Other Programs

## EU ETS

- $(\text{imports} + \text{exports}) / (\text{total value of turnover} + \text{imports}) > 10\%$

## ACES (Waxman/Markey)

- $(\text{imports} + \text{exports}) / (\text{total value of shipments} + \text{imports}) > 15\%$

## Australia CPRS

- $(\text{imports} + \text{exports}) / (\text{domestic production}) > 10\%$

# Trade Exposure: Using ACES Trade Exposure Metrics

- Staff applied national data in ACES metric
- Average of 2003-2008

Trade Intensity	# of CA Sectors
>20%	4
15%~20%	4
10%~15%	2
<10%	1
Data N/A	3
Not assessed	4

ACES  
Threshold

## Trade Exposure: Considering other indicators

- Economic situation in the past few years
  - 2002-2007/8: Robust domestic demand
  - After 2008: Demand declined sharply
- Trade intensity may differ before/after 2007/8 for many sectors
- Other indicator to support the analysis
  - Producer Price Index
    - Measures the average change over time in the selling prices received by domestic producers
    - Used to calculate price inflation, reveals the pressure put on producers by the costs of their raw materials

## Trade Exposure Classification: Staff Preliminary Thinking

Trade Exposure	ACES Threshold	Producer Price Index	# of CA Sectors
High	>15%	<200	7
Moderate	>15%	>200	1
	<15%	<200	1
	Tentative (further information needed)		3
Low	<15%	>200	2

# Sectors at Leakage Risk: Preliminary Classification

Leakage Risk	ARB Classification	NAICS
<b>High</b>	Sawmills Flat glass manufacturing Glass container manufacturing	321113 327211 327213
<b>Moderate</b>	Oil and gas extraction* Potash, Soda, and Borate Mining* Food manufacturing Breweries Paper (except Newsprint) Mills Paperboard mills* Cement manufacturing Mineral wool manufacturing Petroleum product manufacturing Steel and aluminum processing	211111 212391 311 312120 322121 322130 327310 327993 324 331
<b>Low</b>	Gypsum Product Manufacturing Pharmaceutical and Medicine Manufacturing Turbine and Turbine Generator Set Units Manufacturing Aircraft Manufacturing	327420 325412 333611 336411

\* Limited information available

# Sectors Not Included in Initial Assessment

- ARB staff needs more information to conduct analysis

NAICS	Sector description
211112	Natural Gas Liquid Extraction
212312	Crushed and Broken Limestone Mining and Quarrying
212399	All Other Nonmetallic Mineral Mining (diatomaceous earth)
321219	Reconstituted Wood Product Manufacturing
324191	Petroleum Lubricating Oil and Grease Manufacturing
325188	All Other Basic Inorganic Chemical Manufacturing
326140	Polystyrene Foam Product Manufacturing
32712	Clay Building Material and Refractories Manufacturing

# Establishing Identification methodology: Further Analysis on Trade Exposure

- Focus
  - Review the sectors at moderate leakage risk with high emissions intensity
    - Emissions intensive sectors are sensitive to carbon costs
    - Needs to be evaluated in more depth
  - Review the sectors with significant state-to-state competition

## Further Analysis: Staff Preliminary Thinking for Indicators

- Compare the trend of trade through California ports to:
  - Product price
  - Domestic demand / consumption
  - Domestic producers' performance
  - To understand the degree of cost pass-through opportunities
- Use sector-specific regional data
  - US Energy Information Administration
  - California Energy Commission
  - US Geological Survey Mineral Year Book
  - Stakeholder suggestions solicited

## Further Analysis: Interagency Report

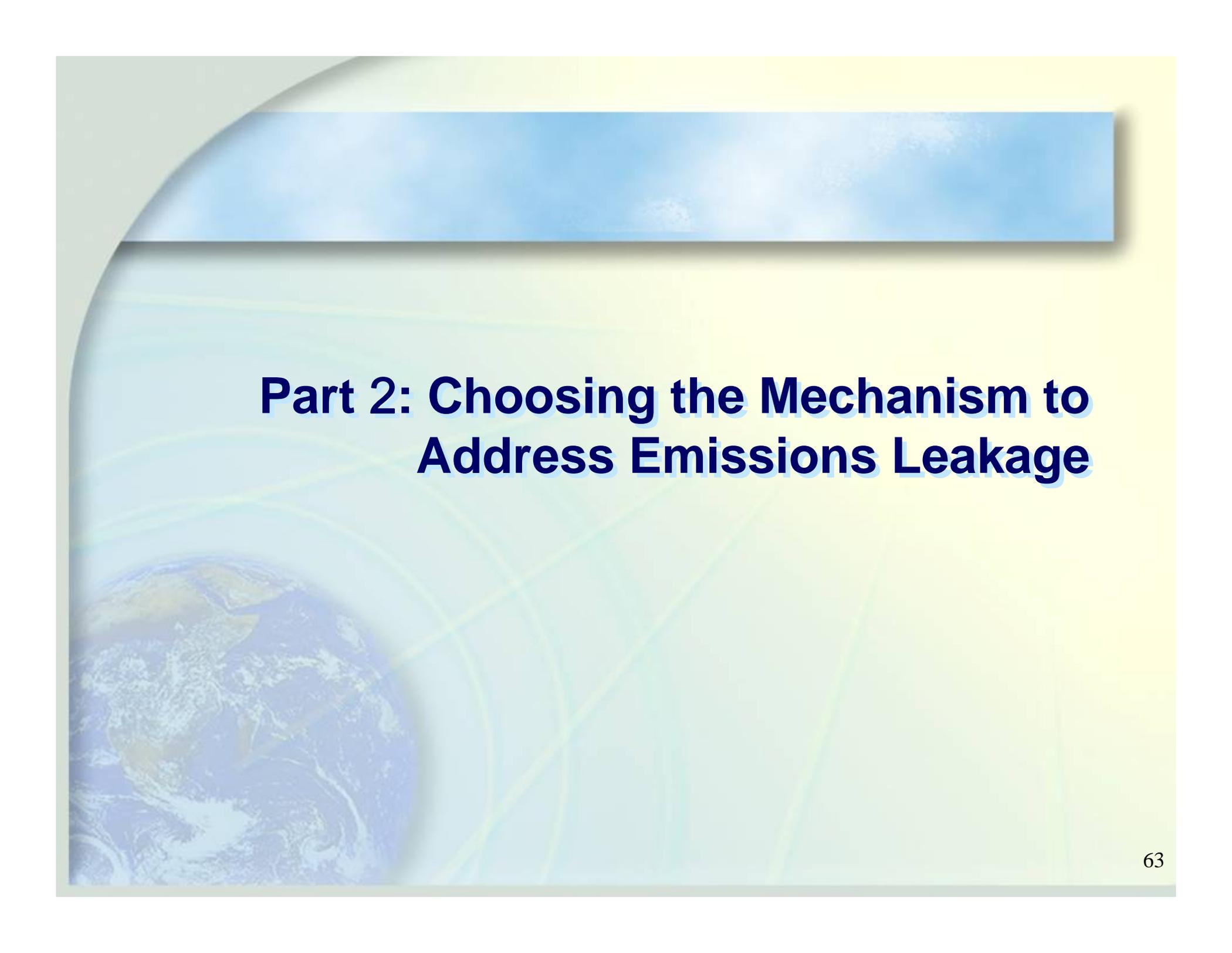
- The effects of H.R. 2454 (ACES) on international competitiveness and emissions leakage in energy-intensive trade-exposed industries
- Released December 2009
- Analyze ACES provisions and its effects on emissions leakage
- Identifies factors that may influence competitiveness of industries

## Further Analysis: Staff Preliminary Thinking for Indicators

- Factors that may influence competitiveness
- Identified in the Interagency report
  - Product differentiation
  - Transportation costs
  - Existing cost advantages
  - Fixed plant costs
  - Estimate total global production capacity and current capacity utilization
  - Agglomeration economies

# Questions for Stakeholders

- Comments sought on proposed methodology
  - Approach
  - Data source
- Suggestions on the data/information that can be provided to ARB to support the analysis
  - Quantitative
  - Verifiable



## **Part 2: Choosing the Mechanism to Address Emissions Leakage**

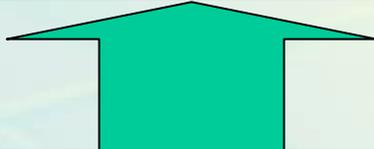
# Addressing Emissions Leakage

- A mechanism has to be chosen based on the degree of leakage risk determined through leakage analysis
- Alternatives:
  - Assign Carbon Price to Imports (border tax adjustments, first-deliverer concept, full lifecycle accounting)
  - Subsidize continued in-state production using allowance value (output based free allocation)

# Border Adjustments

Price with  
Carbon Cost

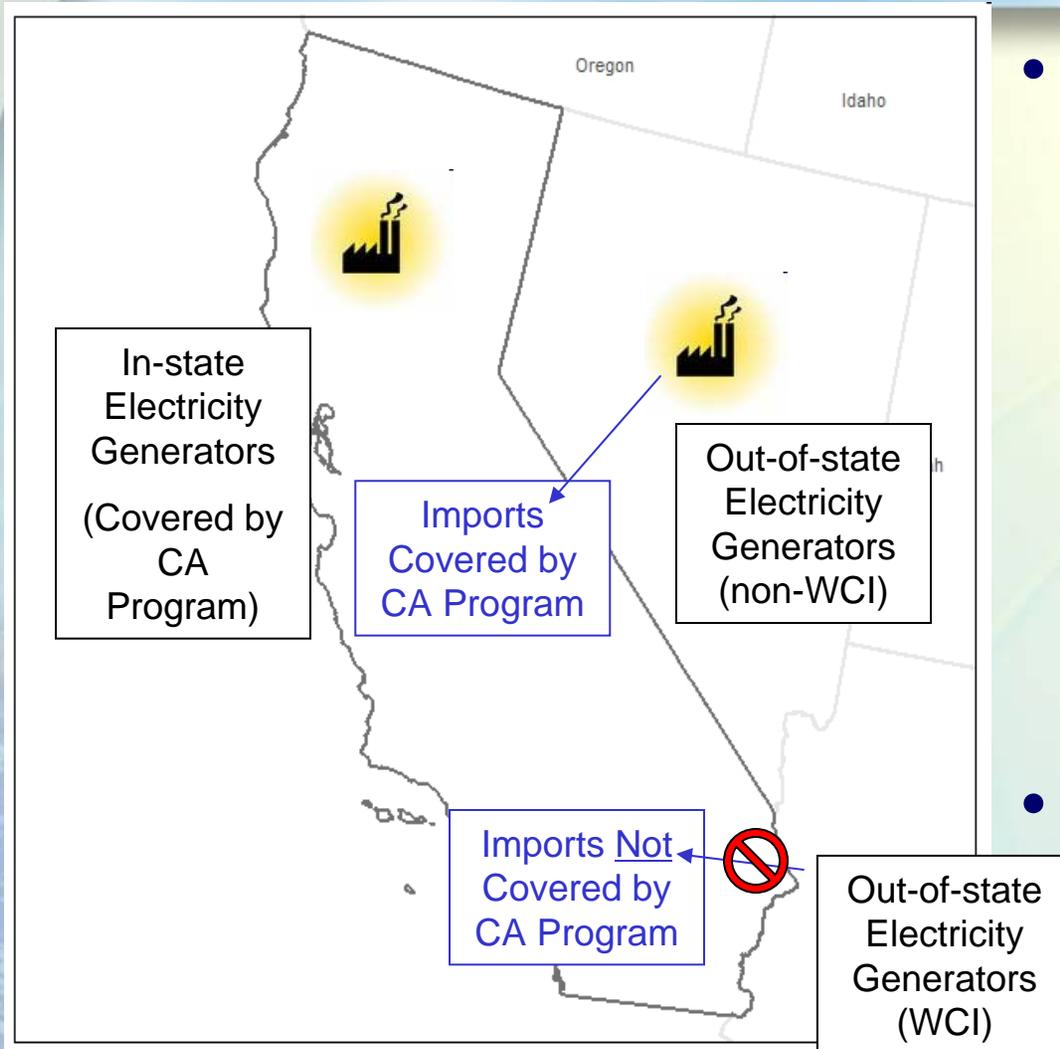
Price without  
Carbon Cost



Foreign Suppliers

CA sectors

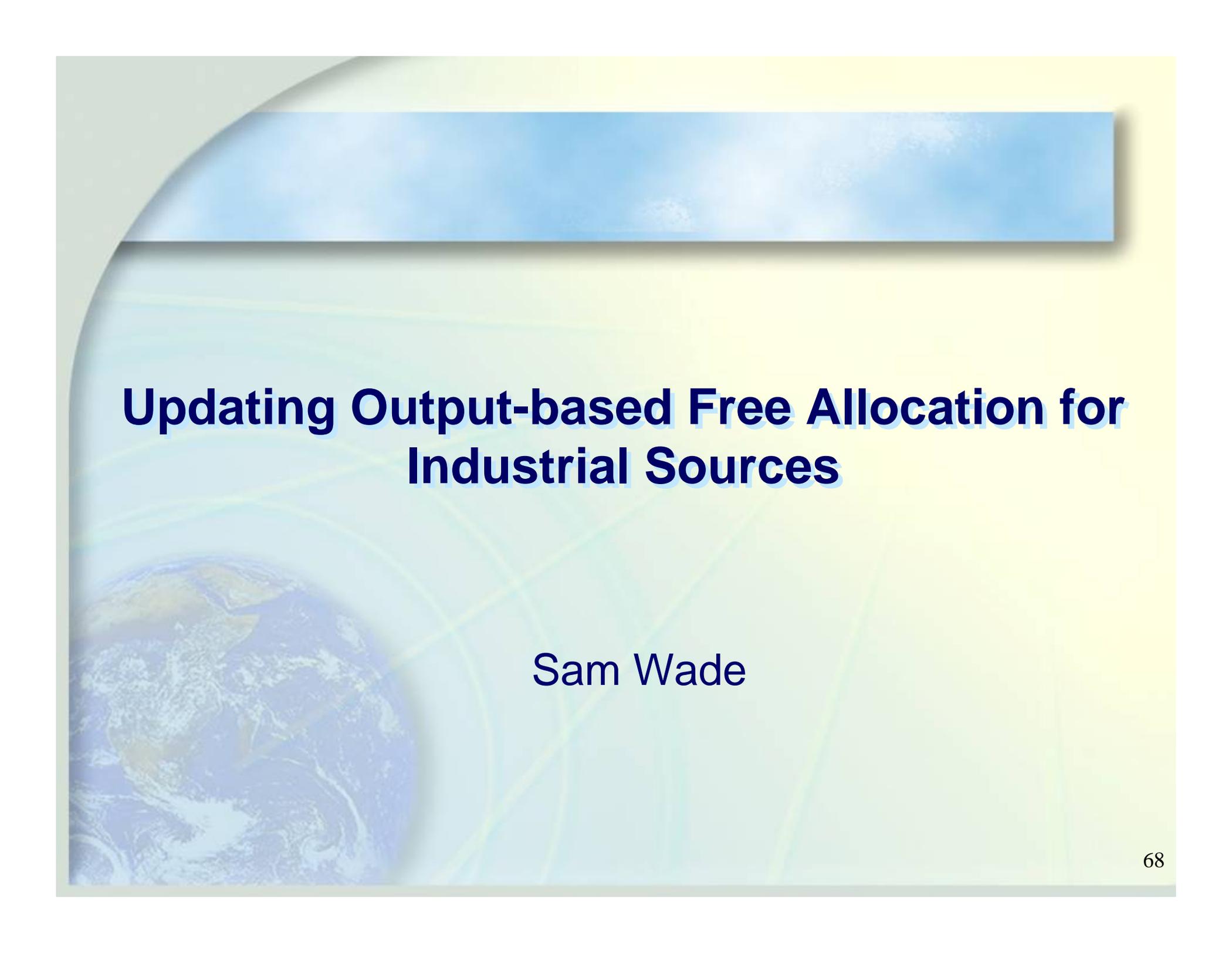
# “First Deliverer” Concept - Electricity



- “First Deliverer” covers all deliverers of electricity to the CA grid, regardless of origin of generation
  - In-state generators
  - Entities delivering imported electricity from known and unknown sources
- Assigns a carbon price to imports to prevent leakage

# Staff Preliminary Thinking: Leakage Prevention for Significant Sectors

<b>Activity Potentially Exposed to Leakage</b>	<b>Method of Leakage Prevention</b>
<b>Electricity Generation</b>	Electricity 'first jurisdictional deliverer' border adjustment
<b>Industrial Production</b>	Output-based updated free allocation using emissions factor benchmarks

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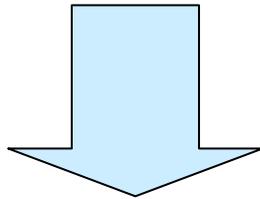
# **Updating Output-based Free Allocation for Industrial Sources**

Sam Wade

# Output Based Free Allocation

Conceptual Allocation

$$A = \frac{\text{Allowance Value}}{\text{Output}}$$



Allocation in Practice

$$A = \frac{\text{Allowances}}{\text{Tons Clinker}}$$

- For each industrial activity:
  - Amount of value allocated
  - Appropriate product metric or metrics
- Challenging to move from a theoretical discussion to practical factors by activity
- Approach needs to be reasonable, maintain the incentives to make reductions, and avoid unnecessary complexity

# Why Updating Output-based Free Allocation?

- Output based emissions efficiency benchmarks
  - Provides the correct incentives to produce a given product in the cleanest way possible
  - Rewards early actors that have reduced their emissions intensity per unit of output
- Updating the measurements of output
  - Reduces the opportunity for windfalls
  - Helps to maintain incentive for in-state production
  - Less critical to update in sectors with less leakage risk

# Conceptual Principles

- Benchmarks based on direct emissions as measured by the mandatory reporting regulations
- No corrections for plant size, age, raw material quality etc.
- No technology-specific benchmarks for processes producing the same product
- No fuel-specific benchmarks
- Separate benchmarks for intermediate products may be necessary (especially if intermediates are traded)

# Detailed Formula for Updating Output-based Free Allocation (1)

## Emission Intensity Benchmark

- Per unit output
- Constant over time

## Cap Adjustment Factor

- Declines over time in proportion to decline in allowance budgets

## Free Allocation

- Annual number of allowances received

$$A = O \times B \times a \times C$$

## Output

- Updates based on production from the prior year

## Assistance Factor

- Combination of
- Leakage prevention (fixed until risk is gone)
  - Transition assistance (declines over time)

## Detailed Formula for Updating Output-based Free Allocation (2)

$$A = \boxed{O} \times B \times a \times C$$

- Output
  - The amount of product from a defined activity (e.g. tons of clinker vs. tons of cement)
- Staff thinking
  - Appropriate metric will be chosen for each activity
  - Output information will be reported to ARB through the mandatory reporting regulation
  - Any updating free allocation will be based on output from the prior year

## Detailed Formula for Updating Output-based Free Allocation (3)

$$A = O \times \boxed{B} \times a \times C$$

- Emissions efficiency benchmark
  - Established for each activity
    - 'x' tons of CO<sub>2</sub>e per ton of product output
- Staff Thinking
  - Choose the benchmarks to provide the correct incentives to produce a given product in the cleanest way possible

# Policy Bases for Benchmark Levels (1)

- Many possible bases for benchmarks
  - Emissions intensity of an average facility
  - ‘Best available technology’ concept or industry best practices
- Considerations
  - Sector-level ranges in efficiency
  - Geographical scope of facilities sampled
  - Level of stringency impacts on need for gradual imposition of carbon price

## Policy Bases for Benchmark Levels (2)

- EU ETS
  - Setting benchmarks at the average emissions to produce a given product from the 10% most efficient plants EU wide
- Washington State
  - Developing benchmarks based on “industry best practices, reflecting emission levels from highly efficient, lower emitting facilities”
- Waxman-Markey
  - Benchmarks based on industry averages that would evolve over time

# Conceptual Comparison Between Facilities to Establish Benchmark

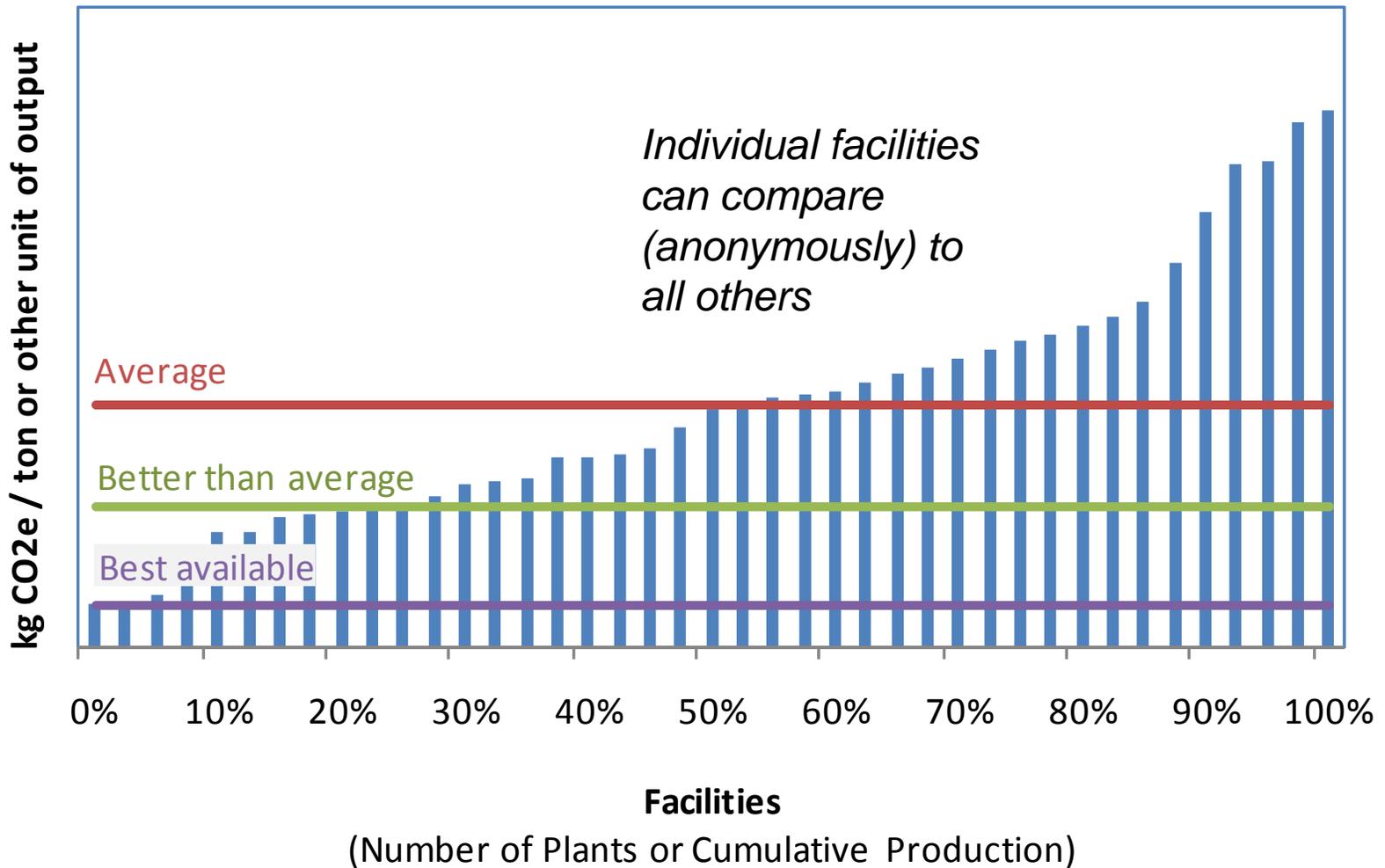


Figure used courtesy of Stockholm Environment Institute and Washington Department of Ecology

# Defining the Benchmark Defines Initial Buyers and Sellers

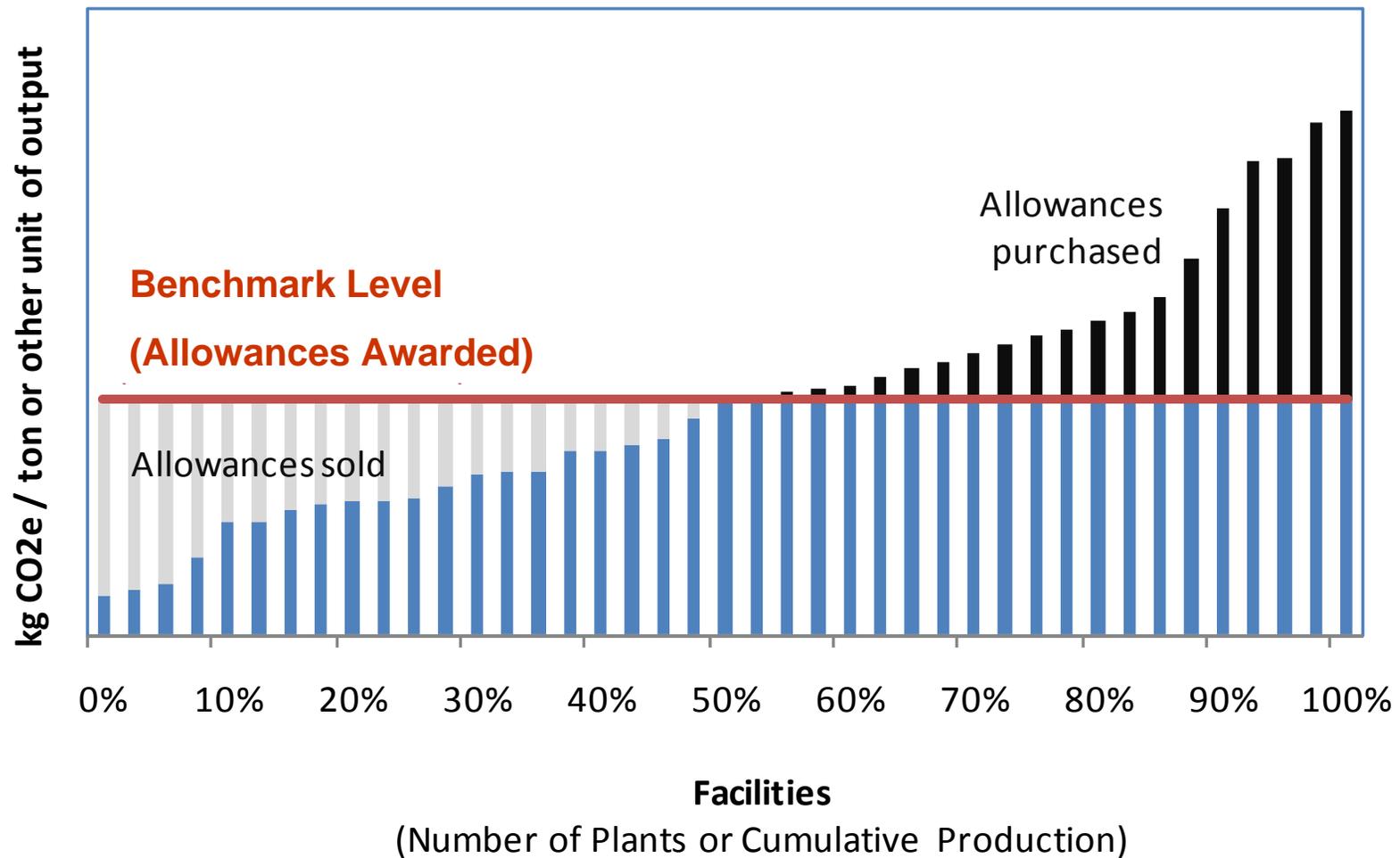
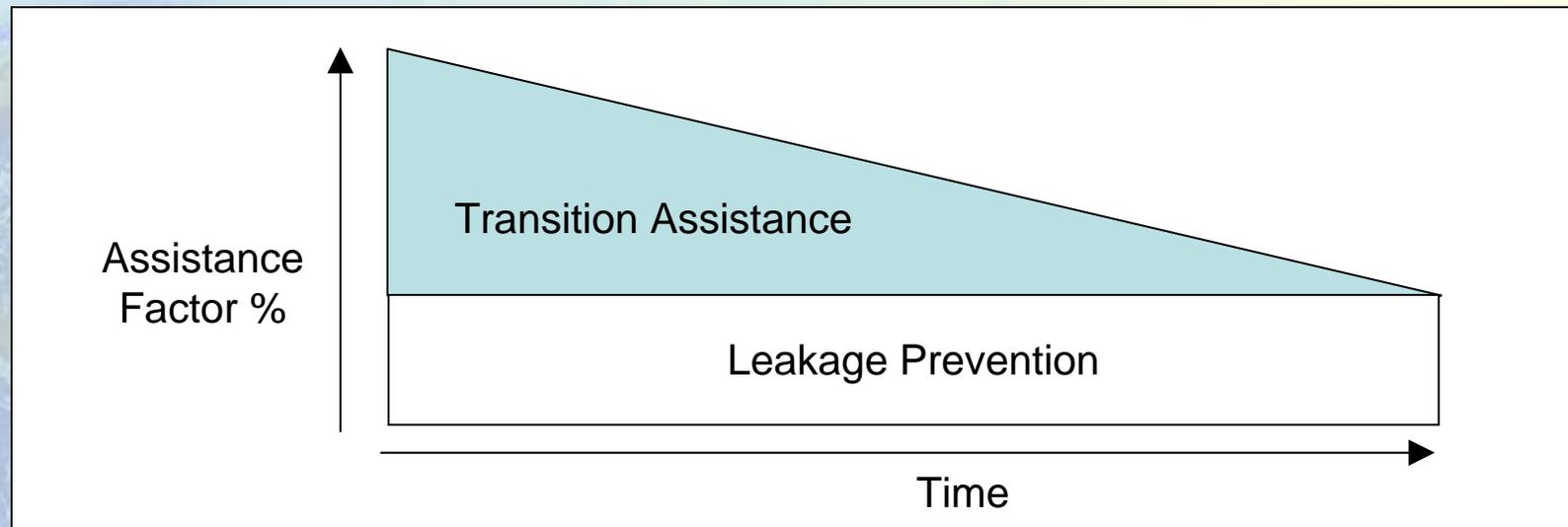


Figure used courtesy of Stockholm Environment Institute and Washington Department of Ecology

## Detailed Formula for Updating Output-based Free Allocation (4)

$$A = O \times B \times a \times C$$

- Assistance Factor = Leakage Prevention + Transition Assistance
- Assistance Factor is expressed as a percentage



# EU Assistance Factors

<b>Classification</b>	<b>Assistance Factor for Free Allocation (a)</b>
<b>'Significant Leakage Risk'</b>	<b>100% for all years 2013-2020</b>
<b>'Not at Risk for Leakage '</b>	<b>80% in 2013 transitioning to 30% in 2020 with a goal of 0% in 2027</b>

## Staff Preliminary Thinking: Assistance Factors

Leakage Risk	Emission Intensity	2012-2014	2015-2017	2018-2020
High	All	100%	100%	100%
Moderate	High	100%	TBD, based on sector-by-sector analysis	TBD, based on sector-by-sector analysis
	Moderate Low	100%	75%	50%
Low	All	100%	50%	30%

## Detailed Formula for Updating Output-based Free Allocation (5)

$$A = O \times B \times a \times \boxed{C}$$

- Cap Adjustment Factor
  - Accounts for the decline in the overall amount of allowances available
- Staff thinking:
  - Cap adjustment factor is expressed as a %
  - Represents a reduction level from the 2012 starting point (for the narrow scope)

# Comparison of EU Approach and ARB concept

	EU Approach	Current ARB Staff concept
<b><i>Fixed or Updating?</i></b>	<ul style="list-style-type: none"> <li>•Fixed (all sectors)</li> </ul>	<ul style="list-style-type: none"> <li>•Updating (high-moderate leakage risk)</li> <li>•Fixed (low leakage risk)</li> </ul>
<b><i>Amount of Allowances per Unit of Product</i></b>	<ul style="list-style-type: none"> <li>•Benchmark policy = Average emissions from 10% most efficient plants by sector</li> <li>•Sectors at risk for leakage get 100% of the benchmark</li> <li>•All others get a declining percentage of the benchmark (from 80% in 2013 to 30% in 2020)</li> </ul>	<ul style="list-style-type: none"> <li>•Benchmark policy = TBD</li> <li>•Short-term: Begin at 100% of the benchmark</li> <li>•Long-term: Free allocation proportional to leakage risk</li> </ul>
<b><i>Product Metrics</i></b>	<ul style="list-style-type: none"> <li>•Defined in detail by sector</li> </ul>	<ul style="list-style-type: none"> <li>•Consider EU metrics as appropriate</li> </ul>
<b><i>No Appropriate Output Metric?</i></b>	<ul style="list-style-type: none"> <li>•Use Fall-back methods</li> </ul>	<ul style="list-style-type: none"> <li>•Consider similar fall-back methods as EU</li> </ul>

# Sectors for California Benchmarking

Oil and gas extraction

Mining

Sawmills

\*Paper manufacturing

\*Paperboard manufacturing

\*Petroleum refineries ( and hydrogen plants)

\*Glass container manufacturing

\*Flat glass manufacturing

\*Mineral wool manufacturing

\*Cement manufacturing

\*Gypsum Product Manufacturing

\*Metal

\* Sectors with benchmarks under development in the European Union Emission Trading System

## Example EU ETS Draft Activity Metrics and Benchmarks

Sector Name	Activity Metric	Sample Benchmark Value
Cement	Tonne Clinker	780 kg CO <sub>2</sub> /t clinker
Refining	CO <sub>2</sub> Weighted Tonne	30 kg CO <sub>2</sub> /CWT
Glass	10 Output Metrics (Flat, Cast/Rolled, etc.)	Still Under Development
Pulp and Paper	Highly Complex	Still Under Development
Chemicals	Metrics for 8 Chemicals (Nitric Acid, Hydrogen, Soda Ash, etc.)	Hydrogen tied to refining benchmark approach
Iron and Steel	4 Output Metrics (Coke, Sintered Ore, Hot Metal, EAF Crude Steel)	0.058 kg CO <sub>2</sub> /t EAF crude steel

## CA Sectors Less Suited to Output Benchmarking

- Complex to develop output benchmark in sectors with:
  - Limited number of facilities in CA/WCI
  - No benchmark work elsewhere
  - Produce diverse products
- Need default methods or ‘fall back approaches’ for these sectors

# EU ETS Proposed Fall-Back Approaches

- Where no product metrics are proposed the EU is pursuing three alternatives:
  - **Heat production benchmark** for combustion activities where an intermediate heat carrier (e.g. hot water, steam) is produced and monitored
  - **Fuel mix benchmark** for combustion activities where heat or mechanical energy used cannot be monitored
  - **Grandfathering for non-combustion** related process emissions

## Other Potential Fall-back Approaches

- Facility specific benchmarks
  - Could be developed using emission per output of previous years for a specific plant
  - Potentially apply a discount factor to recognize desire to reward efficiency
- Suggestions?

# Questions for Stakeholders

- What activities should benchmarks be developed for?
  - Suggestions for approaches where product output metrics are not feasible?
- What is the appropriate policy basis for the CA benchmark terms?
  - Example: Average emissions per unit product from the 10% most efficient plants in California
  - Reasons to vary by sector?
- How should assistance factors decline for sectors as a function of leakage risk?

# Benchmark Stakeholder Process: Next Steps

- Sector specific consultation process
  - Define activity
  - Determine output metric
  - Determine methodology to establish benchmark stringency
- Targeted Sectors
  - Oil and gas extraction
  - Mining
  - Sawmills
  - Paper manufacturing
  - Paperboard manufacturing
  - Petroleum refineries (and hydrogen plants)
  - Glass container manufacturing
  - Flat glass manufacturing
  - Mineral wool manufacturing
  - Cement manufacturing
  - Gypsum Product Manufacturing
  - Metal

# Links and References

- **EU ETS Benchmarking**  
[http://ec.europa.eu/environment/climat/emission/benchmarking\\_en.htm](http://ec.europa.eu/environment/climat/emission/benchmarking_en.htm)
- **WCI Partner Benchmarking**
  - Washington (benchmarking symposium on 5/19!)  
<http://www.ecy.wa.gov/climatechange/GHGbenchmarking.htm>
  - Ontario/Quebec  
<http://www.ene.gov.on.ca/en/air/climatechange/benchmarking.php>