



Cost-Effectiveness Under AB 32

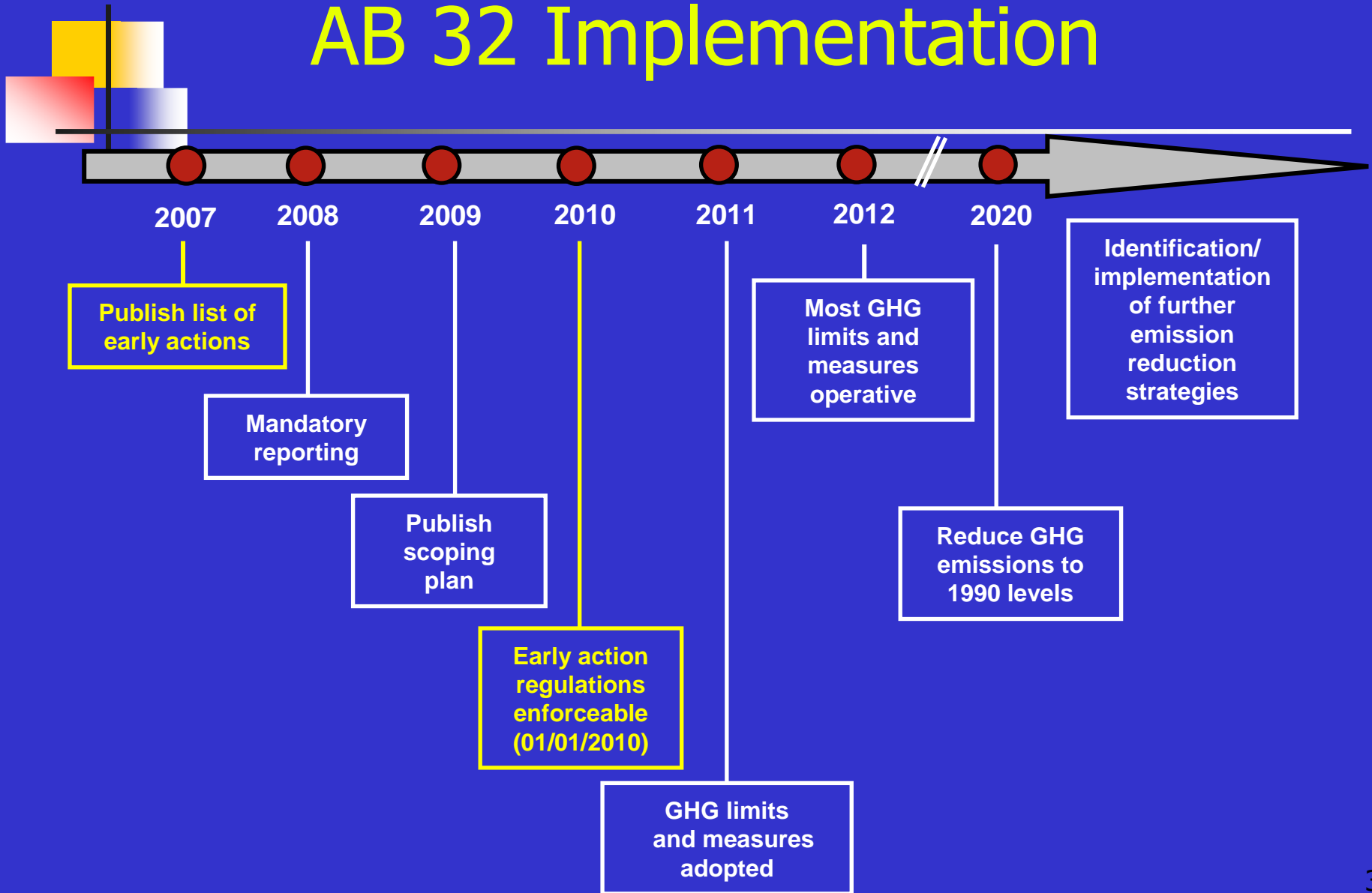
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ARB Research Division
June 3, 2008



Cost-Effectiveness Under AB 32

- AB 32 Overview
- How ARB calculates cost-effectiveness for criteria pollutants
- Some cost-effectiveness approaches for AB 32
- Abatement cost curve examples

AB 32 Implementation

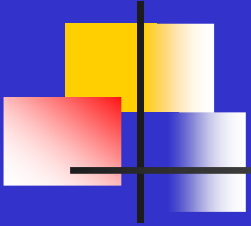




AB 32 Cost-Effectiveness

- AB 32 Requirements
 - Scoping Plan to achieve cost-effective reductions
 - Consider cost-effective regulations
- Definition in AB 32
 - Cost per unit (ton) of reduced GHG emissions adjusted for global warming potential

Input Requested on Aspects of Cost-Effectiveness



- Technical approach to determine costs
- Allocating costs for measures that result in co-benefits
- Policy considerations in determining cost-effectiveness



Technical Approach for Cost-Effectiveness

- ARB's Method to Calculate Cost-Effectiveness for Criteria Pollutants
- Evaluating Co-Benefits



Calculating Cost-Effectiveness

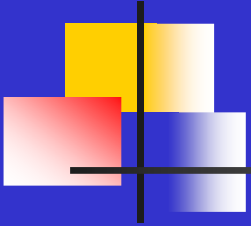
- AB 32 Definition
 - C-E = Dollars per ton GHG reduced
- ARB method of criteria pollutants
 - C-E = Annualized capital cost
 - Add operation and maintenance (O&M)
 - Subtract annual cost savings
 - Divide by annual emissions (in tons)



Accounting for Pollutant Co-Benefits

- ARB C-E = Annualized Capital Cost
 - Add operation and maintenance (O&M)
 - Subtract annual cost savings
 - Subtract Value of Avoided Criteria Emissions
 - Divide by annual emissions (in tons)

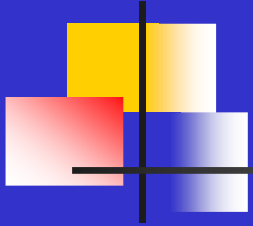
Value of Avoided Criteria Pollutant Emissions



- \$12,500/ton Reactive Organic Gases (ROGs)
- \$20,800/ton Nitrogen Oxides (NO_x)
- \$20,000/ton Particulate Matter (PM₁₀)

Reference: "Proposed State Strategy for California's 2007 SIP" Appendix E, May 7, 2007. The proposed strategy was adopted by the ARB on September 27, 2007.

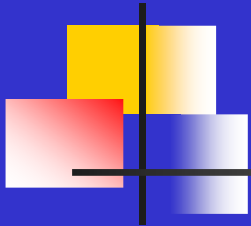
Cost-Effectiveness Policy Considerations



- What is a cost-effectiveness measure?
- Staff's recommended approach
- Three alternative approaches

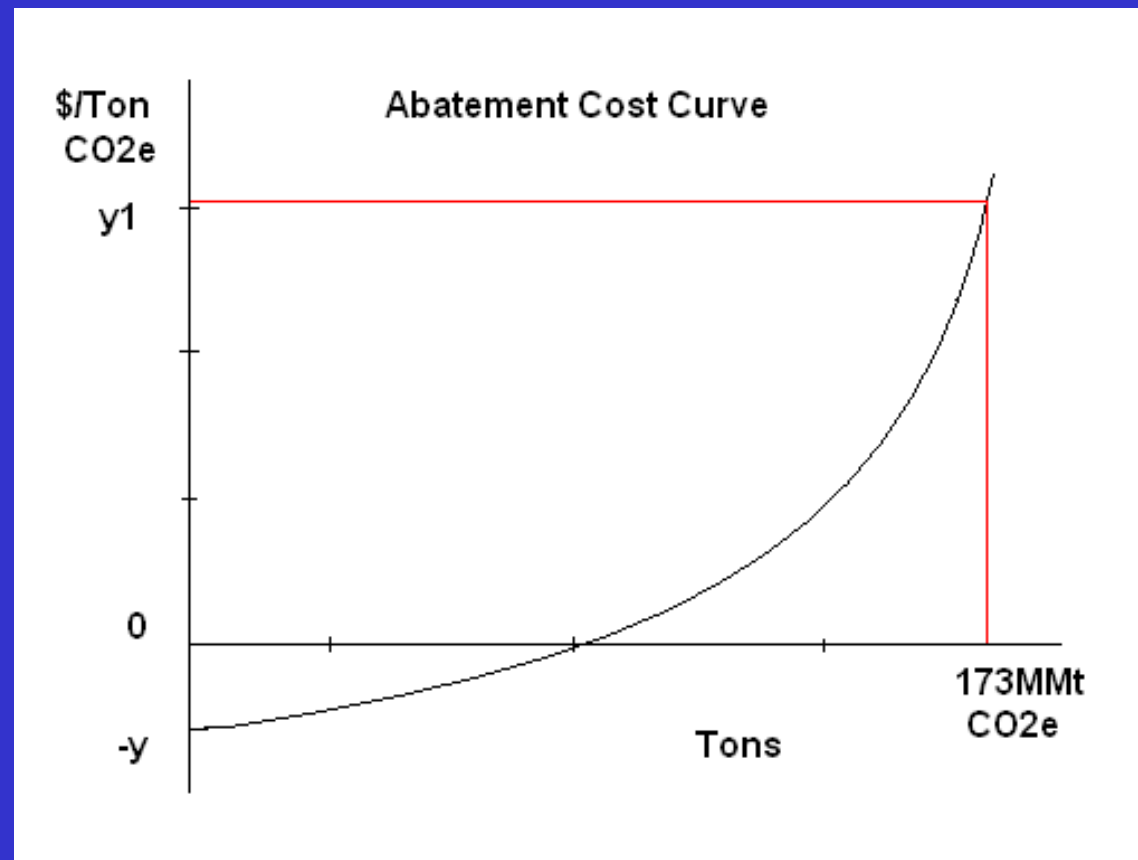
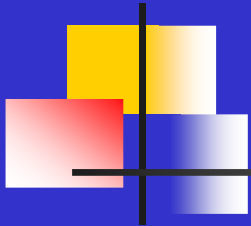
Approach #1:

Cost of a Bundle of Strategies



- Recommended Approach for Today's Discussion
 - Assess range of measures' cost-effectiveness
 - Rank measures according to relative cost-effectiveness
 - Select most cost effective measures to meet bundle of strategies until target is reached
- Advantage: Allows for flexibility to tailor program to meet AB 32 requirements.

Approach #1: Cost of a Bundle of Strategies

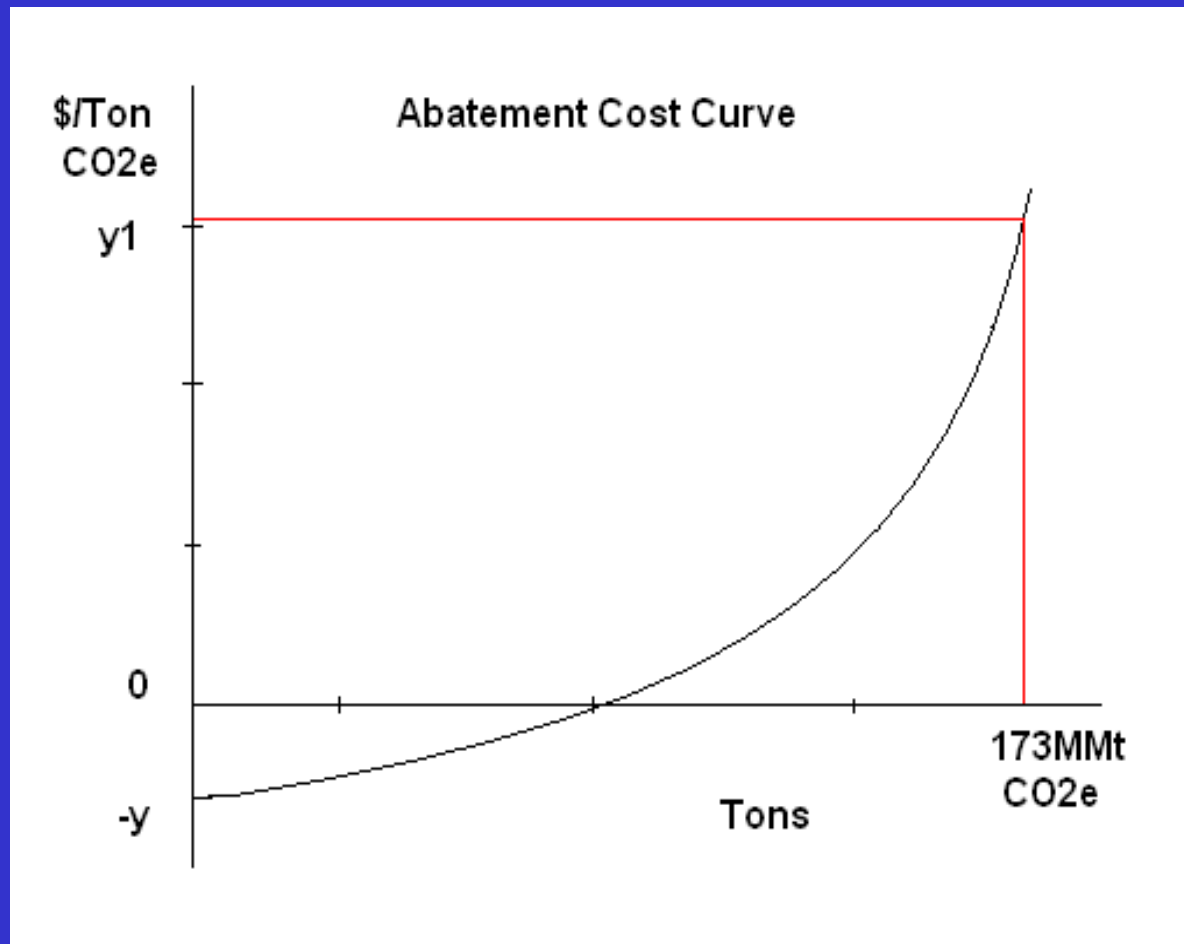




Approach #2: Cost of the Last Ton Reduced

- Assess range of measures' cost-effectiveness
- Rank measures according to cost-effectiveness
- Select the cost-effectiveness of last ton as the threshold
- Advantage: ARB can select one value at the outset

Approach #2: Cost of the Last Ton Reduced





Approach #3: GHG Market Price as Proxy

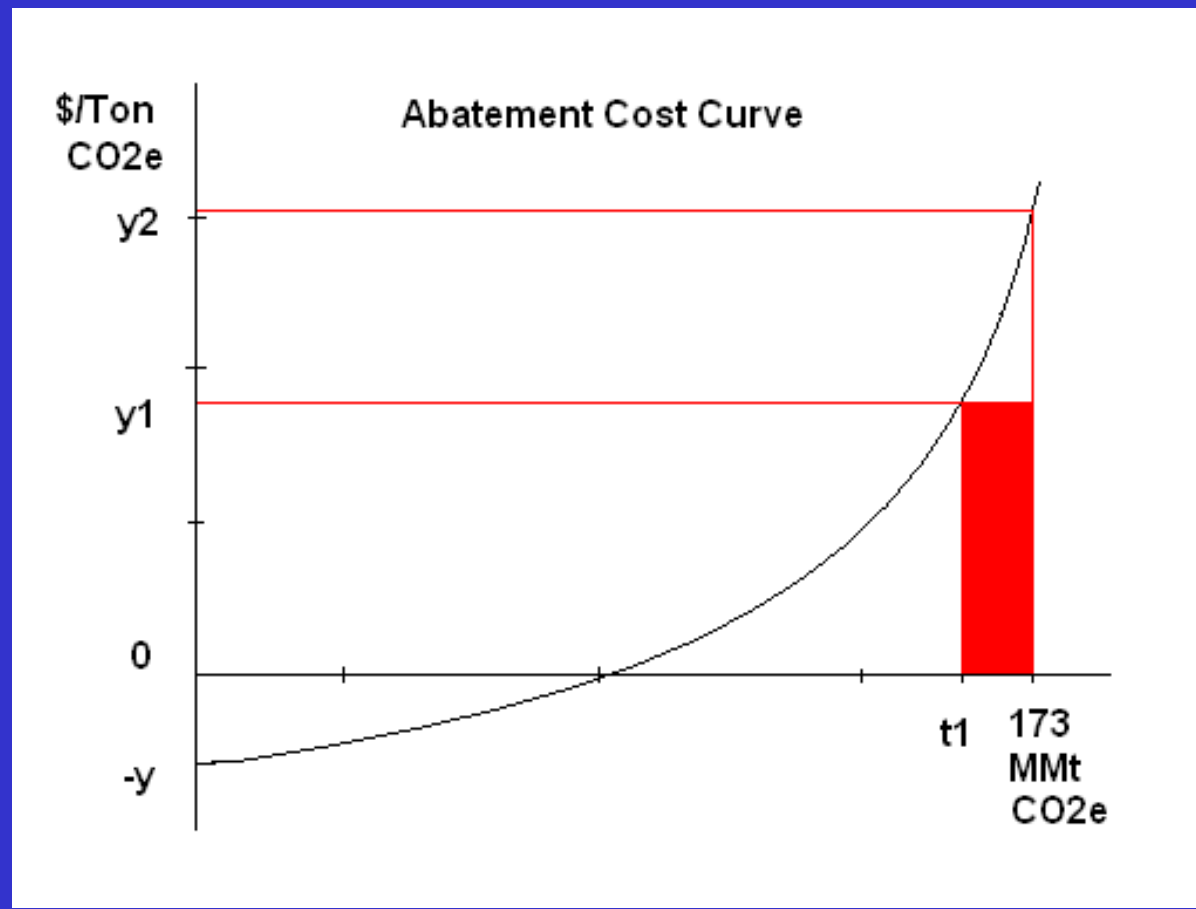
- Select an existing carbon market (e.g., EU ETS) as representative cost-effectiveness threshold for CA
- Establish a price based on existing market price
- Use price as proxy for cost-effectiveness

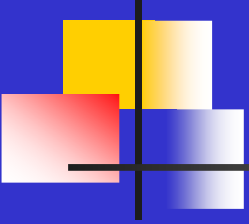


Issue: EU ETS Price As A Proxy

- Direct comparisons are difficult
 - Different market profiles, regulatory policies, allocation schemes
 - California has yet to develop a market scheme, and potential scope is not yet known

Approach #3: GHG Market Price as Proxy





Approach #4: Net Zero Cost

- Adopt only measures with net zero or negative cost (savings)
 - May not be possible to achieve 2020 target with measures that are limited to cost savings



Abatement Costs -- Examples

- Range for selected states, including California
- McKinsey & Company
- Intergovernmental Panel on Climate Change (IPCC)

Cost-Effectiveness Range (\$/MMt CO₂e)

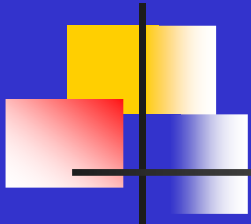
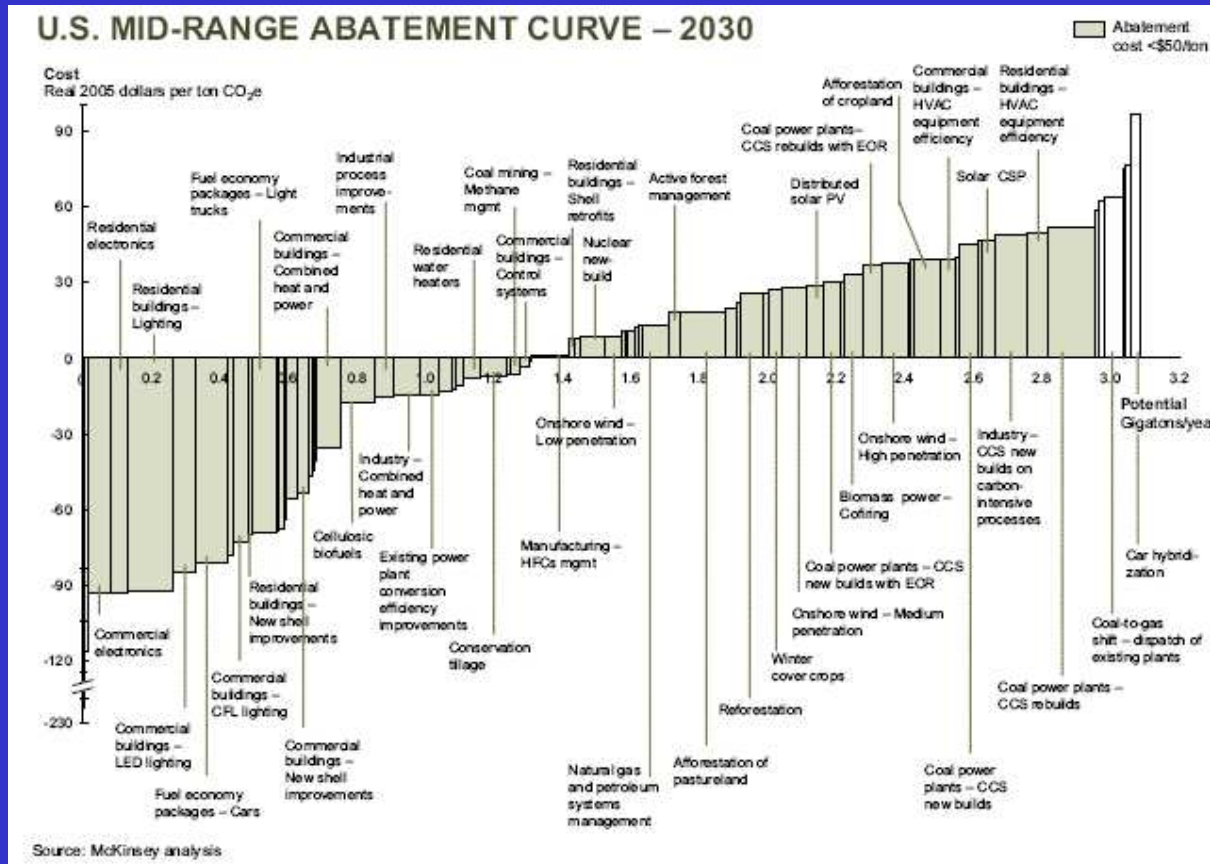


Exhibit 3: Cost-effectiveness Range for Selected States, United States, Global - 2020

State	Cost-effectiveness Range \$/ton CO ₂ eq	Tons Reduced MMtCO ₂ e/yr
California (CAT ¹ , CEC ²)	- 528 to 615	138
Arizona ³	- 90 to 65	69
New Mexico ⁴	- 120 to 105	35
United States (2030) ⁵	-93 to 91	3,000
Global (Total) ⁵	-225 to 91	26,000

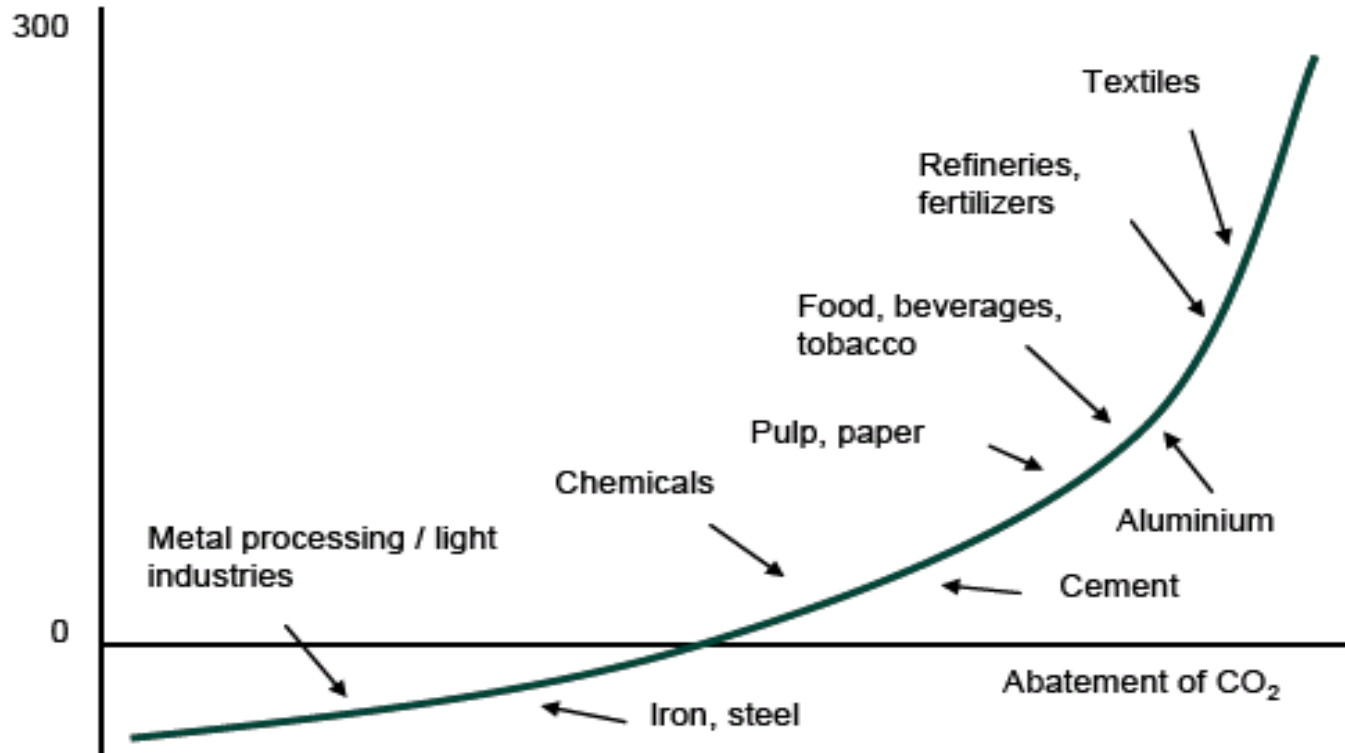
U.S. Abatement Cost Curve*



*McKinsey (2005 US \$/T CO₂e)

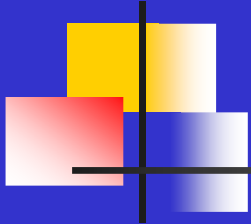
Marginal Cost of Abatement for Selected Industries

Marginal cost of abatement, US\$/tC



Source: Intergovernmental Panel on Climate Change (2001), vol.IV, ch.4.

Summary & Next Steps



- Overview of Technical and Policy Considerations of Cost-Effectiveness
- Staff evaluating information on CAT recommended measures
- Staff cost-effectiveness recommendations in the June draft Scoping Plan



Questions & Comments

- Send Questions & Comments via e-mail:
ccplan@arb.ca.gov