



FUTURE YEAR EMISSIONS MODELING OF CAP-AND-TRADE PROGRAMS IN TEXAS

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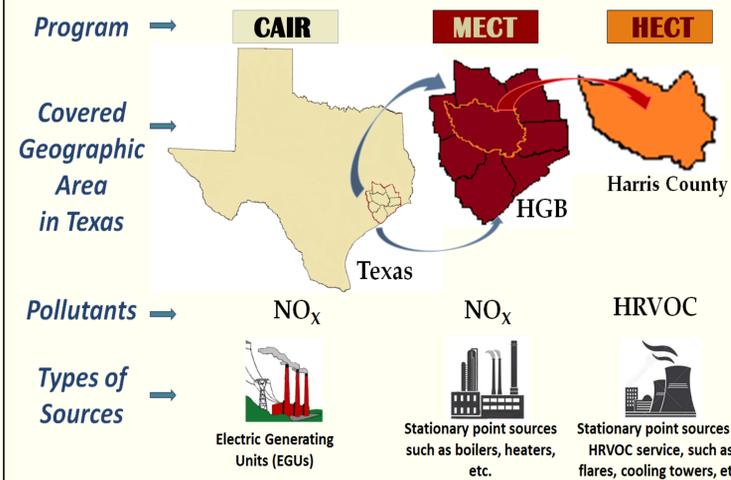
Introduction and Background

Cap-and-trade programs cap the total emissions from all subject sources without specifying individual emission limits for each subject source. For attainment demonstration (AD) state implementation plan (SIP) modeling, the total future year (FY) emissions for sources (units) subject to these cap-and-trade programs are limited to the appropriate program's total FY cap.

Three mandatory cap-and-trade programs were used to limit FY emissions of ozone precursors from select sources in Texas:

- The Mass Emissions Cap and Trade (MECT) Program limits annual nitrogen oxides (NO_x) emissions,
- The Highly Reactive Volatile Organic Compounds (HRVOC) Emissions Cap and Trade (HECT) Program limits annual HRVOC emissions,
- The Clean Air Interstate Rule (CAIR), Phase II, limits annual NO_x emissions.

MODELED CAP-AND-TRADE PROGRAMS IN TEXAS



Relevant Terminology:

- Allowance:** The authorization to emit a certain amount of certain pollutant.
- Allocation:** The allotment of allowances given to each subject source for each control period. Allocations for a control period are assigned several years in advance and companies/owners may trade these future year allowances once they have them in their compliance account.
- Control Period:** The time period for which the program cap is specified for each program.
- Compliance Account:** An account where a program's allowances are deposited. The account owner is typically the owner or operator of the source(s) subject to the program.
- Projection-Base (PB) year:** The latest year for which a complete point source inventory is available from the TCEQ's State of Texas Air Reporting System (STARS) database.

KEY ASPECTS OF MODELED TEXAS CAP-AND-TRADE PROGRAMS

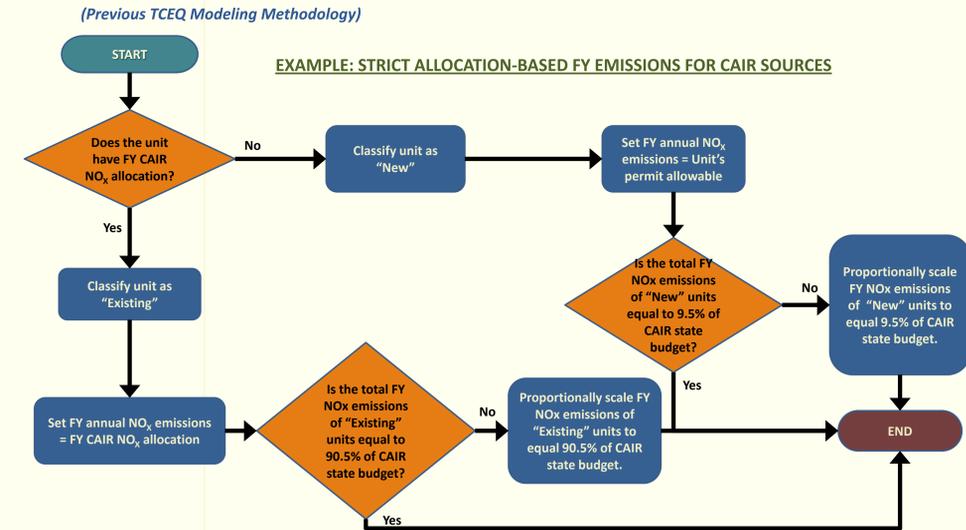
Program	2018 Program Cap for Texas Sources (tons per year (tpy))	Year the Allocation was Finalized	Allocated to	Control Period	Banking of Unused Allowances (Temporal Trading)	Compliance Account
CAIR	150,845 of NO _x	2015	Unit	Calendar Year	Indefinitely	Site
MECT	40,176.2 of NO _x	2003-2004	Unit	Calendar Year	For one additional year	Site
HECT	2,588.6 of HRVOC	2013	Site	Calendar Year	For one additional year	Site

- The FY emissions of each subject source was limited to its FY allocation.
- If a source was subject to multiple cap-and-trade programs, the source's emissions was limited to its FY allocation for the most stringent program.
- The total annual emissions from all subject sources is equal to the program's future year cap.

Disadvantages of Approach:

- Approach artificially limits subject sources to its allocation.
- Approach does not account for the possibility of trading:
 - Spatially, with other sources subject to the same program.
 - Temporally, using banked allowances from previous control periods.
- Allocations might not align with actual emissions for the following reasons:
 - They are based on (distant) past activity.
 - Could include adjustment factors, e.g., CAIR's fuel adjustment factors.
 - They do not explicitly account for economic factors such as fuel price, electricity prices and/or allowance prices.

Strict Allocation-Based FY Emissions Modeling



New Trend-Based FY Emissions Modeling

Sites with sources subject to cap-and-trade programs generally follow a certain compliance pattern which does not change without major changes to either the company (shutdowns, mergers, etc.) or to the program (reallocation, cap step down, other regulatory changes). Sites typically have two compliance options for each control period.

- Site Emissions < Site Allocation^a
- Site Emissions > Site Allocation

Compliance Behavior for Each Control Period:

$$\text{Site Cap Gap} = \text{Allocation} - \text{Actual Emissions}$$

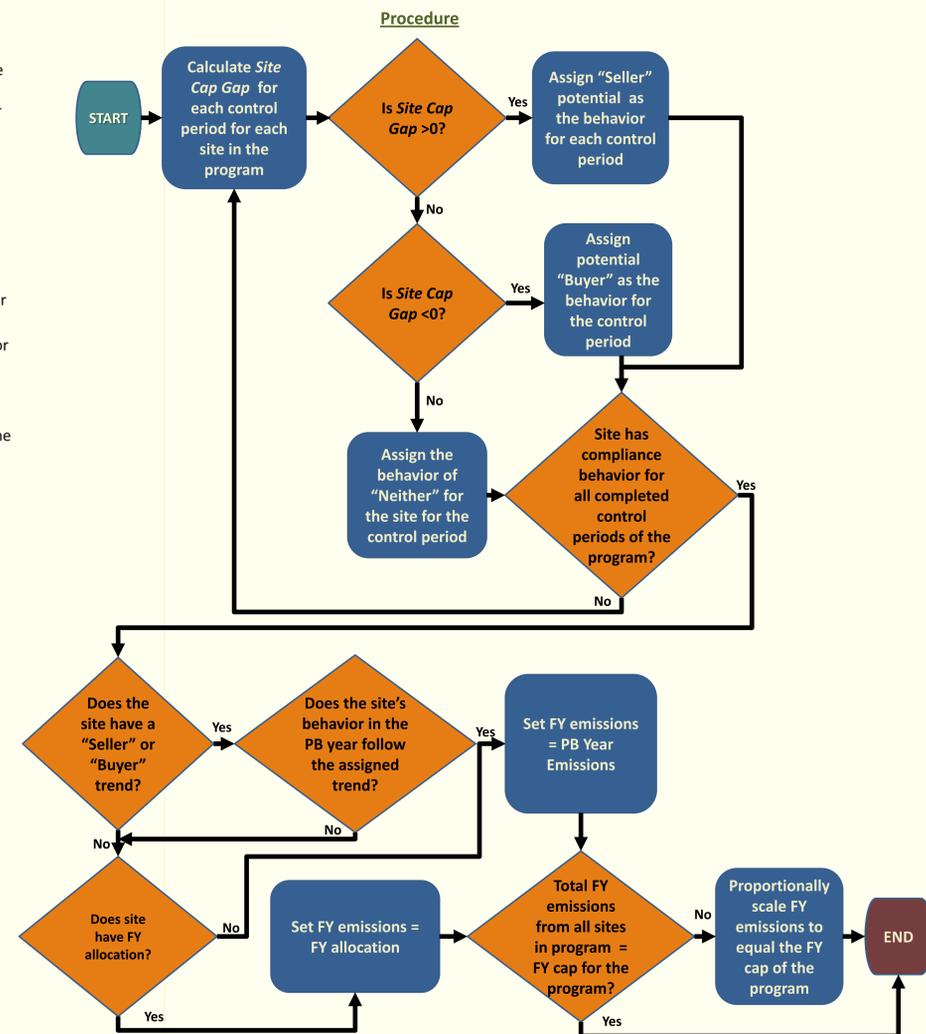
- Site Cap Gap > 0** → Site behaves as a potential "Seller" (spatial or temporal).
- Site Cap Gap < 0** → Site behaves as a potential "Buyer" (spatial or temporal).

A site has a compliance trend if it behaves as a potential "Seller" or "Buyer" for 80% of the control periods. The 80% cut-off was chosen qualitatively based on the number of completed control periods for the three programs at the time of SIP development. CAIR had the smallest number of completed control periods of 5 (compared to 6 for HECT and 10 for MECT) and a trend of 4/5 years equals 80%.

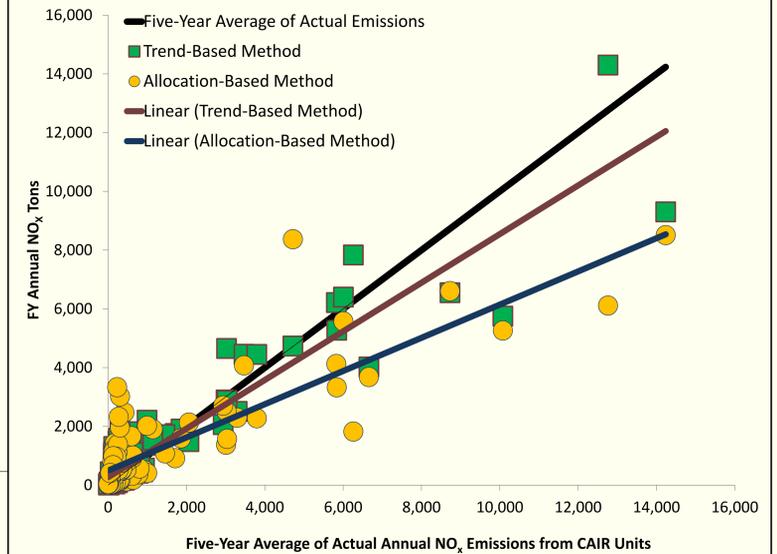
^a Site Allocation is the sum of allocations of subject sources at the site.

Advantages of Trend-Based FY Emissions Modeling

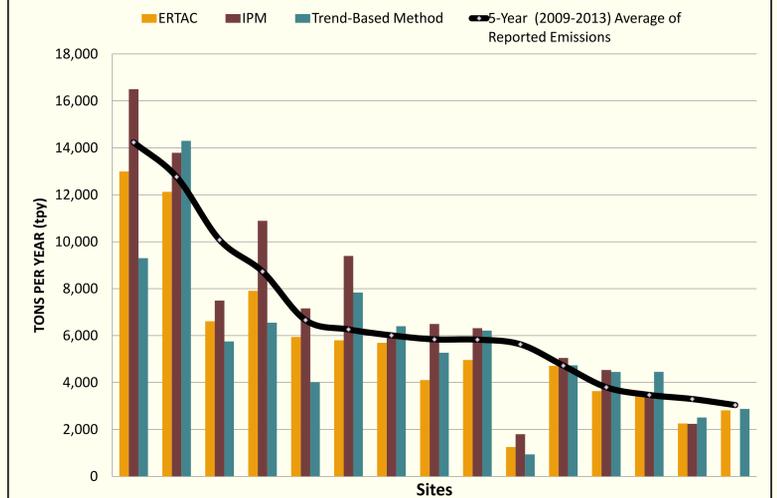
- The approach accounts for trading of allowances.
- The approach results in a more accurate spatial representation of emissions from sources subject to cap-and-trade programs.
- The approach does not artificially place an emissions limitation on individual sources.
- New sources that do not receive an allocation are modeled if they had emissions in the PB year.
- The approach is transparent and uses data that are publicly available.
 - Annual emissions and allocation data for CAIR sites were obtained from the Environmental Protection Agency's Air Markets Program Data (AMPD) web page.
 - Annual emissions and allocation data for MECT and HECT sites were obtained from the TCEQ's Emissions Banking and Trading Program Information Management System (Banking IMS).
- The approach is simple. The trend analysis can be done using MS Excel or a simple SAS program.
- A separate trend analysis is done for each program.



SCATTER PLOT COMPARING 5-YEAR AVERAGE OF REPORTED EMISSIONS TO TREND-BASED AND ALLOCATION-BASED 2018 EMISSIONS PROJECTIONS



COMPARISON OF 2018 PROJECTIONS FOR CAIR SOURCES



Conclusion

- The Trend-Based FY emissions modeling approach is a simple effective method for modeling FY emissions that are in the near future. Specifically for Texas, since 85% of the grid is intra-state.
- The 2018 emissions projections using the Trend-Based method were compared to 2018 projections by other (more complex) projection models, ERTAC and IPM. The Trend-Based method compared well to complex projection models such as ERTAC and IPM.
- The Trend-Based method cannot be easily used to study the impact of future regulations that might result in individual emission limitations or control options.

Additional Consideration:

- Use a statistical definition of trend instead of a qualitative, subjective definition.

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