Regulating Stationary Sources
RECLAIM Cap & Trade Program

U.S.-Iran Symposium
On Air Pollution in Mega Cities
September 4, 2013, UC Irvine

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South Coast Air Quality Management District
Air Quality Regulatory Framework

- **Federal - U.S. Environmental Protection Agency**
  - Establishes national ambient air quality standards
  - Oversees State Air Programs
  - Regulates Mobile Sources (On-Road & Off-Road)
  - Establishes Stationary Source Standards

- **State - California Air Resources Board**
  - Establishes state ambient air quality standards
  - Regulates most mobile sources (On-Road)
  - Establishes Toxics Standards

- **Local - South Coast AQMD**
  - Monitors and forecast air quality standards
  - Adopts local rules and regulations
  - Implements state and federal requirements
  - Regulates Stationary Sources
What is South Coast Air Quality Management District?

- **Local Air Pollution Control Agency in Southern California** (All of Orange & Portions of LA, Riverside & San Bernardino Counties)

- **Population of 16.4 million** (about half of California State’s population)

- **Area of 10,743 mi²**

- **Worst air quality in the U.S. (Ozone & PM 2.5)**
South Coast Air Basin & Other U.S. Metropolitan Areas (Maximum Pollutant Concentrations as % of Federal Standards)

Criteria Pollutants by Metropolitan Area

- Ozone (8-hour, 2008)
- Ozone (1-hour, Revoked)*
- PM2.5 (Annual)
- PM2.5 (24-hour)++
- PM10 (24-hour)
- NO2 (1-Hour)**
- SO2 (1-Hour)**

* Based on the former standard
** Based on the recently established standards
++ Based on the filter data, excluding exceptional events
Los Angeles Compared to Tehran

- LA Population: 3.8 million
- LA Area: 503 mi²
- Pop. Density: 7,600/mi²

- Tehran Population: 12.2 million
- Tehran Area: 265 mi²
- Pop. Density: 46,000/mi²

- Tehran is 6 times more densely populated than LA
- Since 1900 - Population of Iran has increased 7 fold while Tehran’s population has increased 60 fold
100 Years Ago:
Electric Local Rail Transit

Los Angeles Pacific Electric Railway Depot, circa 1910
Los Angeles Pacific Electric Red Car
1927

- Los Angeles, 1927
1948: Electric Transit Buses

Los Angeles Transit Lines - The Trolley Bus;
One of the final 30 delivered to Los Angeles in 1948
Los Angeles Pacific Electric Red Car
December 1960

Los Angeles — A No. 1522 Pacific Electric Red Car leaves the Pacific Electric Building at 6th and Main streets heading to Long Beach in Los Angeles in Dec. 1960 shortly before service ended in 1961.

http://framework.latimes.com/2013/03/11/los-angeles-pacific-electric-red-cars/#/o
Death of the Red Cars - 1961
At Its Peak in 1944
Electric Regional Rail Transit

Four Counties 1,150 Track Miles 900 Cars 109 Million Passengers
<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary Sources Regulated</td>
<td>27,000</td>
</tr>
<tr>
<td>Major Stationary Sources</td>
<td>432</td>
</tr>
<tr>
<td>Refineries (Total Crude Oil Capacity)</td>
<td>6</td>
</tr>
<tr>
<td>Power Plants (Total MWs Generation Capacity)</td>
<td>35</td>
</tr>
<tr>
<td>Applications Processed</td>
<td>8,350 / Yr</td>
</tr>
<tr>
<td>Inspections Conducted</td>
<td>18,000 / Yr</td>
</tr>
<tr>
<td>Air Quality Complaints Received</td>
<td>8,800 / Yr</td>
</tr>
<tr>
<td>Asbestos Notifications Received</td>
<td>17,000 / Yr</td>
</tr>
<tr>
<td>Total Staff</td>
<td>306</td>
</tr>
</tbody>
</table>
Range of Facilities Regulated

- Automotive Painting
- Gas Station
- Dry Cleaner
- Hospital
- Refinery
- Power Plant
Air Permitting in SCAQMD

- All equipment which emit or control air contaminants need to obtain permits
- Two Step Permitting Process
  - Permits to Construct (New, Modified, Relocated)
  - Permits to Operate (Existing, Change of Operator)
- Corner Stone of Permits to Construct is **New Source Review (NSR) Rule**
- **NSR Purpose** – To ensure that the environment is protected while allowing economic growth
  - **Non-attainment** – Air quality does not worsen in areas where air is currently unhealthy (NA-NSR)
  - **Attainment** – Air quality is not significantly degraded in areas where air is currently clean (PSD)
Main NA-NSR Requirements

- Use of **Best Available Control Technology (BACT)**
- **Air Quality Modeling Analysis** - Not create a new AAQS violation or make an existing violation significantly worse
- **Emission Offsets** – Emission increases of Non-Attainment Pollutants are offset by the use of Emission Reduction Credits (ERCs)
  - **Offset Ratio** 1.2 to 1
  - Essential Public Services exempt from offsets
- **Public Notice** – Emission or Toxic Health Risk
Emission Reduction Credits (ERCs)

- ERCs are generated from:
  - Equipment shut-downs (primarily)
  - Voluntary add on controls
- ERCs are issued by SCAQMD to businesses
- ERCs are traded ($$) between businesses for use in permitting
PM10 ERC Supply & Cost
2000 – 2013*

Supply dropped by 57% since 2000
Cost increased by 2,401% since 2000
Highest price of PM10 ERC (sold in 2009) is $350,000 per lb/day

<table>
<thead>
<tr>
<th>Year</th>
<th>ERC Supply (lbs/day)</th>
<th>ERC Weighted Average Cost ($/lb/day)</th>
</tr>
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<tbody>
<tr>
<td>2000</td>
<td>$3,859</td>
<td>$1,187</td>
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<tr>
<td>2001</td>
<td>$16,917</td>
<td>$2,123</td>
</tr>
<tr>
<td>2002</td>
<td>$69,435</td>
<td>$1,145</td>
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<tr>
<td>2003</td>
<td>$21,710</td>
<td>$941</td>
</tr>
<tr>
<td>2004</td>
<td>$23,649</td>
<td>$872</td>
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<tr>
<td>2005</td>
<td>$49,053</td>
<td>$803</td>
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<tr>
<td>2006</td>
<td>$779</td>
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<tr>
<td>2007</td>
<td>$83,783</td>
<td>$803</td>
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<tr>
<td>2008</td>
<td>$945</td>
<td>$83,783</td>
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<tr>
<td>2009</td>
<td>$261,659</td>
<td>$127,887</td>
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<tr>
<td>2010</td>
<td>$89,320</td>
<td>$128,278</td>
</tr>
<tr>
<td>2011</td>
<td>$105,000</td>
<td>$928</td>
</tr>
<tr>
<td>2012</td>
<td>$96,509</td>
<td>$928</td>
</tr>
<tr>
<td>2013*</td>
<td>$127,887</td>
<td>$928</td>
</tr>
</tbody>
</table>

*Through September 2013
Types of Permits

- Traditional Equipment Permit – Command and Control
- Facility Permit
  - REgional CLean Air Incentives Market (RECLAIM)
  - Major Sources (Title V of Federal Clean Air Act)
**Adopted in 1994 (Almost 20 years ago)**

**The largest NOx and SOx sources**

**Received initial allocations (RECLAIM Trading Credits - RTCs)**

**Facility declining annual emissions caps**

**Reduce emissions or buy credits**

**Enhanced monitoring, reporting, and recordkeeping**
2008 NOx Emission Inventory

- On-Road: 61%
- Off-Road: 25%
- Aircrafts: 2%
- Point: 1%
- Reclaim: 3%
- Area: 8%

Total: 757 tons/day
2008 NOx Emissions from Stationary Sources

- **Point**: 10%
- **Area**: 65%
- **Reclaim**: 25%

Total: 91 tons/day
RECLAIM Program Benefits

• For Facilities
  • Maximum Flexibility
  • Lower Compliance Costs Through Credit Trading

• For Environment
  • Equivalent or Better Emissions Reductions
  • Promotes Control Technology Development
  • Enhanced Emission Monitoring
RECLAIM Program Objectives

- Same Level of Emission Reductions
- Same or Lower Cost
- Higher Compliance Confidence
Program Benefits/Objectives
Max. Flexibility/Same or Lower Cost

Seller

Buyer

Installation of Selective Catalytic Reduction (SCR) Control Equipment

- Emission reduction = Financing for technology
- Emission exceedance for which RTC’s need to be purchased
RECLAIM RTC Allocations

- Issued to facilities for all years at the beginning based on facility’s last 5 years emissions (1987-1992)
- Two Cycle RTCs
  - Cycle 1 - January 1 through December 31
  - Cycle 2 - July 1 through June 3
- Valid Only for Emissions Occurring During the cycle
NOx Allocation Adjustments

Aggregate NOx Allocations

- 58% Reduction from 1994
- 27% Reduction from 2000
- 22.5% Reduction from 2012
SOx Allocation Adjustments

Aggregate SOx Allocations

40% Reduction from 1994
31% Reduction from 2000
48% Reduction from 2012
MRR are enhanced and the requirements dependent on source classification:

- Major Sources
- Large Sources
- Minor Sources
Equipment Categories
Major Sources

- Turbines
- Utility Boilers
- FCCUs
Equipment Categories
Large Sources

Boilers
Heaters
Equipment Categories
Minor Sources

- Fire pumps
- Portable ICES
- Emergency Generators
Monitoring and Reporting

Major Source
Monitored by CEMS
DAILY

Large Source
MONTLY

Minor Source
QUARTERLY

32
NOx Continuous Emissions Monitoring System (CEMS)

- NOx Analyzer
- O2 Analyzer
- Fuel Meter
- Data Acquisition Device
- RTU
- Modem
- To SCAQMD
Facility Audit Procedure

- Annual Audit of Each Facility
- Review Operational Records
- Check CEMS Operations
- Review Test Results
- Emission Calculation Verifications
- Confirm compliance with other rules
RECLAIM has 276 facilities at the end of Compliance Year 2011

RECLAIM met overall NOx and SOx emission goals:
  - NOx emissions 25% below allocations
  - SOx emissions 36% below allocations

RECLAIM had a high rate of facility compliance:
  - NOx Facilities* – 93%
  - SOx Facilities – 100%
NOx emissions in CompYr 2011 were below Allocations by 2,388 tons (25%)
SOx emissions in CompYr 2011 were below Allocations by 1,556 tons (36%)
2011 Annual RECLAIM Audit Findings - Credit Trading and Prices

- Over $1 billion of RECLAIM Trading Credits (RTCs) traded
- RTCs are traded as either Discrete Year or Infinite-Year Block (IYB)
- $18.8 million worth of RTCs traded in CalYr 2012 ($12.9 million in CalYr 2011)
Investors are RTC holders who are not RECLAIM facility operators

Significant Investor participation in 2012 trades

<table>
<thead>
<tr>
<th>RTC Type</th>
<th>Value</th>
<th>Volume</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>NOx</td>
<td>SOx</td>
</tr>
<tr>
<td>Discrete</td>
<td>57%</td>
<td>22%</td>
</tr>
<tr>
<td>IYB</td>
<td>68%</td>
<td>11%</td>
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</table>
Control Technologies
Power Generation - Catalysts

- Utility Boiler: 2 ppm NOx, CO ($2 to $5 Million)
- Combined Cycle Turbine: ($6 to $10 Million)
  2 ppm NOx, CO, and VOC; 5.0 ppmv NH3 at 15% O2
- Simple Cycle Turbine: ($3 to $6 Million)
  2.5 ppm NOx; 4 ppm CO; 2 ppm VOC; 5.0 ppmv NH3 at 15% O2
Refinery Heaters

- Heater: 5 ppm NOx, 10 ppm CO
- SCR: 5.0 ppmv NH3 at 3% O2 {\$11,200 – \$17,000/ton reduced (based on 25 year life for SCR)}
Gasoline Dispensing Phase I Vapor Recovery
Gasoline Dispensing Phase II Vapor Recovery
Gasoline Vapor Recovery

- Total Retail gas consumption in 4 counties = 6.7 billion gallons in 2011
- Phase I Vapor Recovery control 98% efficient
- Phase II Vapor Recovery control 95% efficient
- **Overall VOC emission controlled = 150 tons/day**
- Control cost - $10,500/ton VOC controlled
Unique Challenges
Control of Particulates from Wood Burning Activities

Recreational Beach Fires

- Wood Smoke
  - Particulates primarily in <PM2.5 size range
  - Source of Hazardous Air Pollutants (HAPs)

Residential Fireplaces
Recreational Beach Fires

• Beach Fire Rings
  • Approximately 760 along public coastline
  • High utilization, seasonal basis
  • Some in close proximity to residences
  • Other materials being burned

• Coastal Air Monitoring
  • Fire ring wood smoke impacting beach areas and extends into communities
  • 1-hour average PM$_{2.5}$ concentrations can exceed public health guidance levels
Maximum Hourly PM2.5 Concentrations

USG = Unhealthy for Sensitive Groups
Unhealthy – “consider canceling public events, based on public health and travel considerations”
Residential Wood Burning Curtailment

Requirements

- Mandatory wood burning curtailment day (No burn day)
- Criteria for No Burn Day – PM2.5 exceeds 30 µg/m³ (Federal Standard)
- Projected average of 10-25 No Burn days/year

Exemptions

- Sole source of heat
- Low income household
- Ceremonial fired exempted under Rule 444
Alternatives

Gas Log Fireplaces
San Onofre Nuclear Generating Stations (SONGS) Shutdown

- Southern California Edison (SCE) found radioactive leak from steam tubes in one of the two reactors
- Since Jan. 2012, SCE has shutdown both SONGS Units 2 & 3
- Total loss of 2,200 MWs
- Shortfalls in South Orange County & San Diego
SCE Announced Permanent Shutdown of SONGS on June 7, 2013

Permanent shutdown leaves questions about future power. Edison cites rising costs, will lay off 1,100 plant workers.

THE two reactors of the San Onofre nuclear plant will be shut down permanently. Southern California Edison announced Friday it will shut down its two remaining nuclear reactors at the San Onofre nuclear power plant on April 2, 2013, after a study showed the pressure tubes in the two units are too damaged to be repaired. The plant is already offline for routine maintenance.
California Electricity Generation
Operating Reserve Margins at 2013 Summer Peak

Normal scenario operating reserve margins are adequate, extreme scenario margins (1–10) are greater than 3% threshold

Source: CAISO/CEC/SWRCB Presentation on June 17, 2013 at the Assembly Utilities & Commerce Committee Hearing
NOx Reductions Needed to Meet Federal Ozone Standards

1. Preliminary emissions estimates based on data from 2007 AQMP, updated where more recent data available: CARB 2010 projections for trucks and off-road equipment; International Maritime Organization standards for vessels; EPA 2008 rule for locomotives; Vessels is average of high and low emissions estimates based on varying deployment assumptions for IMO vessels and range of ports’ cargo forecasts. 2. Source: 2007 AQMP; analysis for 80 ppb fed standard. 3. Preliminary analysis for 75 ppb fed standard.
Powering the Future

A Vision for Clean Energy, Clear Skies, and a Growing Economy in Southern California

California Environmental Protection Agency

Air Resources Board