



California Emission Estimator Model:

An Emerging Model to Evaluate Land Use Impacts and GHG Emissions



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*New Partners For Smart Growth Conference
San Diego, California*

What is CalEEMod?



- Quantifies criteria pollutants and GHG emissions
- 63 land use subcategories
- Applies approved emission factors, established methodology, and latest survey data
- Statewide model – all 35 air districts



What is CalEEMod?



- Calculates for air district, county, air basin, state level
- Calculates emissions from construction and operation
- Calculates direct and indirect GHG emissions (e.g., energy use, water/wastewater use, solid waste disposal, and vegetation planting and/or removal)
- Calculates benefits from mitigation measures



Design Specifics

- Flexibility in usage
 - ✓ defaults allow minimal amount of required input
 - ✓ provides ability to insert spreadsheet for large projects (e.g., construction schedule, construction equipment list)
- Regional defaults
- Ability to change defaults
- All equations and sources verified and documented in appendices



Expected Use and Interest



- Variety of applications – specific project, mixed use, plans, inventory, *user defined* land uses
- Statewide users include:
 - ✓ environmental consultants
 - ✓ city and county planners
 - ✓ air quality districts
 - ✓ CEQA/NEPA document reviewers
 - ✓ developers
 - ✓ decision-makers
- Interest expressed by National Association of Clean Air Agencies (NACAA) for national model



Importance to California Air Districts



- Integrity of air quality analysis
- Standardize air quality analysis
- Substantial evidence supporting tool
- Mitigate projects as feasibly possible
- Comply with requirements (*e.g., CEQA, GHG, planning, etc.*)
- Ensure ongoing maintenance and upgrades

Current Status



- Over 6,000 downloads since initial release
- California training classes
- Online training segments being produced
- Website - www.caleemod.com:
 - ✓ [Modeling files](#)
 - ✓ [User's Guide/User's Tips](#)
 - ✓ [FAQs](#)
 - ✓ [Subscriber sign-up](#)
 - ✓ [Upcoming events](#)
- Upgrades to make model faster and new features
- New version expected to be release Spring 2012

CalEEMod Screen Shots



Welcome to CalEEMod

CalEEMod™

California Emission Estimator Model (CalEEMod)™
Version 2011.1.1
Copyright © 2011 South Coast Air Quality Management District
Developed by ENVIRON International Corporation in collaboration
with SCAQMD and other California Air Districts

OK

California Emissions Estimator Model™

Start | CalEEMod-SmartGrowth.... | 9:49 AM

Project Characteristics



CalEEMod.2011.1.1

Home Project Characteristics Land Use Construction Operational Vegetation Mitigation Reporting Help

Project Characteristics

Project Detail

Project Name: California Mixed Use Complex

Project Location: Air District, San Diego County A

Windspeed (m/s): 2.6

Precipitation Frequency (days): 40

Climate Zone: 13

Land Use Setting: Urban

Operational Year: 2012

Utility Information

*If "User Defined" is selected, user must specify data source in Remarks

Select Utility Company: San Diego Gas & Electric

CO2 Intensity Factor (lb/MWh): 780.79

CH4 Intensity Factor (lb/MWh): 0.029

N2O Intensity Factor (lb/MWh): 0.011

Pollutants

Import csv Default Undo

Select All Clear All

Pollutant Selection	Pollutant Full Name
<input checked="" type="checkbox"/>	Reactive Organic Gases (ROG)
<input checked="" type="checkbox"/>	Nitrogen Oxides (NOx)
<input checked="" type="checkbox"/>	Carbon Monoxide (CO)
<input checked="" type="checkbox"/>	Sulfur Dioxide (SO2)
<input checked="" type="checkbox"/>	Particulate Matter 10um (PM10)
<input checked="" type="checkbox"/>	Particulate Matter 2.5um (PM2.5)
<input checked="" type="checkbox"/>	Fugitive PM10um (PM10)
<input checked="" type="checkbox"/>	Fugitive PM2.5um (PM2.5)
<input checked="" type="checkbox"/>	Total Organic Gases (TOG)
<input checked="" type="checkbox"/>	Lead (Pb)
<input checked="" type="checkbox"/>	Biogenic Carbon Dioxide (CO2)
<input checked="" type="checkbox"/>	Non-Biogenic Carbon Dioxide (CO2)
<input checked="" type="checkbox"/>	Carbon Dioxide (CO2)
<input checked="" type="checkbox"/>	Methane (CH4)
<input checked="" type="checkbox"/>	Nitrous Oxide (N2O)
<input checked="" type="checkbox"/>	CO2 Equivalent GHGs (CO2e)

Next >>

Remarks

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Land Use Information



CalEEMod.2011.1.1

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Land Use

Import csv Default Undo

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Square Feet	Population
Parking	Parking Lot	50	1000sqft	1.15	50,000	0
Recreational	Quality Restaurant	5	1000sqft	0	5,000	0
Residential	Apartments Mid Rise	100	Dwelling Unit	1.6	100,000	286
▶ Retail	Supermarket	45	1000sqft	0	45,000	0
*	<ul style="list-style-type: none"> Automobile Care Center Convenience Market (24 Hour) Convenience Market With Gas Pumps Discount Club Electronic Superstore Free-Standing Discount Store Free-Standing Discount Superstore Gasoline/Service Station Hardware/Paint Store Home Improvement Superstore Regional Shopping Center Strip Mall Supermarket User Defined Retail 					

Population:

Lot Acreage:

<< Previous Next >>

Remarks
 Modified Lot Acreages to reflect a mixed use setting (residential, retail and recreational on same footprint), open space and 2 parking lots on same original footprint size as the residential mid-rise apartment building.

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Construction– *Default Schedule, Equipment, etc.*



CalEEMod.2011.1.1

Home Project Characteristics Land Use Construction Operational Vegetation Mitigation Reporting Help

Construction

Construction Phase | Off-Road Equipment | Dust from Material Movement | Demolition | Trips And VMT | On-Road Fugitive Dust | Architectural Coatings

*Make sure that the operational year is later than the final construction year

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Phase Name	Phase Type	Start Date	End Date	Days/Week	Total Days	Phase Description
Demolition	Demolition	01/02/2011	01/28/2011	5 Days/Week	20	
Site Preparation	Site Preparation	01/29/2011	02/02/2011	5 Days/Week	3	
Grading	Grading	02/03/2011	02/10/2011	5 Days/Week	6	
Building Construction	Building Construction	02/11/2011	12/15/2011	5 Days/Week	220	
Paving	Paving	12/16/2011	12/29/2011	5 Days/Week	10	
Architectural Coating	Architectural Coating	12/30/2011	01/12/2012	5 Days/Week	10	

*
 Demolition
 Site Preparation
 Grading
 Trenching
 Building Construction
 Paving
 Architectural Coating

<< Previous Next >>

Remarks
 Construction schedule is shorten to half the default phase days

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Operation – Default Vehicle Trips, Lengths, etc.



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Home Project Characteristics Land Use Construction **Operational** Vegetation Mitigation Reporting Help

Operational - Mobile

Mobile
Area
Energy Use
Water and Wastewater
Solid Waste

Vehicle Trips | Vehicle Emissions | Road Dust

Import csv Default Undo

Land Use SubType	Size Metric	WkD Trip Rate (/size /day)	Sat Trip Rate (/size /day)	Sun Trip Rate (/size /day)	Res H-W Trip Length (miles)	Res H-S Trip Length (miles)	Res H-O Trip Length (miles)	Non Res C-C Trip Length (miles)	Non Res C-W Trip Length (miles)	Non Res C-NW Trip Length (miles)	Prima Trip (%)	Divert Trip (%)	Pass Trip (%)	Res H-W Trip (%)	Res H-S Trip (%)	Res H-O Trip (%)	Non Res C-C Trip (%)	Non Res C-W Trip (%)	Non Res C-NW Trip (%)
Apartments Mid...	Dwelling Unit	6.59	7.16	6.07	10.8	7.3	7.5	0	0	0	86	11	3	41.6	18.8	39.6	0	0	0
Parking Lot	1000sqft	0	0	0	0	0	0	7.3	9.5	7.3	0	0	0	0	0	0	0	0	0
Quality Restaur...	1000sqft	89...	94....	72....	0	0	0	7.3	9.5	7.3	38	18	44	0	0	0	69	12	19
Supermarket	1000sqft	10...	17...	16...	0	0	0	7.3	9.5	7.3	34	30	36	0	0	0	74.5	6.5	19

Remarks

<< Previous Next >>

Start | CalEEMod-SmartGrowth... | CalEEMod.2011.1.1 | 9:33 AM

Vegetation – Change in Acreage, Sequestration



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Vegetation

Land Use Change | Sequestration

Import csv Default Undo

Broad Species Class	Number Of New Trees	Annual CO2 accumulation per tree (tonnes CO2/year)
▶ Hardwood Maple	14	0.0521
* Aspen Cedar/Larch Douglas Fir Hardwood Maple Juniper Miscellaneous Mixed Hardwood Pine Soft Maple Spruce True Fir/Hemlock		

Remarks

<< Previous Next >>

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Mitigation – GHG Design Features (Traffic)



CalEEMod.2011.1.1

Home Project Characteristics Land Use Construction Operational Vegetation **Mitigation** Reporting Help

Mitigation

Construction Traffic Area Energy Water Solid Waste

Land Use & Site Enhancement Commute

Project Setting: Urban

*The mitigation should be applicable to land use project evaluated.
Remarks box should contain percent reduction justification.

Land Use

- Increase Density: 36 Dwelling Units/acre, 0 Jobs/Job acre
- Increase Diversity
- Improve Walkability Design: Intersections/Square Miles: 0
- Improve Destination Accessibility: Distance to Dwtwn/Job Ctr (Miles): 0.2
- Increase Transit Accessibility: Distance to Transit Station (Miles): 0.01
- Integrate Below Market Rate Housing: #Dwelling Units Below Market Rate: 10

Neighborhood Enhancements

- Improve Pedestrian Network: Project Site and Connecting Off-Site
- Provide Traffic Calming Measures: % Streets with Improvement: [dropdown], % Intersections with Improvement: [dropdown]
- Implement NEV Network

Parking Policy/Pricing

- Limit Parking Supply: % Reduction in Spaces: 0
- Unbundle Parking Costs: Monthly Parking Cost (\$): 0
- On-Street Market Pricing: % Increase in Price: 0

Transit Improvement

- Provide BRT System: % Lines BRT: 0
- Expand Transit Network: % Increase Transit Coverage: 0
- Increase Transit Frequency: Level of Implementation: [dropdown], % Reduction in Headways: 0

Remarks

<< Previous Next >>

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Mitigation – GHG Design Features (Energy)



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Home Project Characteristics Land Use Construction Operational Vegetation Mitigation Reporting Help

Mitigation

Construction Traffic Area Energy Water Solid Waste

Building Energy

Exceed Title 24
% Improvement

Install High Efficiency Lighting
% Lighting Energy Reduction

Alternative Energy

On-site Renewable Energy
 kWh Generated
 % of Electricity Use Generated

Energy Efficient Appliances

**The mitigation should be applicable to land use project evaluated.
Remarks box should contain percent reduction justification.

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30
DishWasher		15
Fan		50
Refrigerator	Apartments Mid Rise	15
*	Apartment Mid Rise	
	Parking Lot	
	Quality Restaurant	
	Supermarket	

Remarks

<< Previous Next >>

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Mitigation – GHG Design Features (Water)



CalEEMod.2011.1.1

Home Project Characteristics Land Use Construction Operational Vegetation Mitigation Reporting Help

Mitigation

Construction Traffic Area Energy Water Solid Waste

*The mitigation should be applicable to land use project evaluated.
"Remarks" box should contain percent reduction justification.

Water Conservation Strategy
* Cannot be used with other water mitigation strategies

Apply Water Conservation Strategy

% Reduction Indoor

% Reduction Outdoor

Water Supply

Use Reclaimed Water

% Indoor Water Use

% Outdoor Water Use

Use Grey Water

% Indoor Water Use

% Outdoor Water Use

Indoor Water Use

Install Low-flow Bathroom Faucet

% Reduction in flow

Install Low-flow Kitchen Faucet

% Reduction in flow

Install Low-flow Toilet

% Reduction in flow

Install Low-flow Shower

% Reduction in flow

Outdoor Water Use

Turf Reduction

Turf Reduction Area (acres)

% Reduction turf

Use Water-Efficient Irrigation Systems

% Reduction

Water Efficient Landscape

MAWA (gal/yr)

ETWU (gal/yr)

Remarks

<< Previous Next >>

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