

# Construction Emissions

## from Small-Lot Infill Development

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In California, compact development in urban infill areas is a key strategy that has been adopted by Metropolitan Planning Organizations and City agencies to improve regional transit, reduce greenhouse gas emissions, and promote sustainable growth. As a result (and due to favorable economic conditions), the demand for compact infill development in major metropolitan areas is on the rise. For instance, in the City of Oakland, major construction of approximately 61 infill projects has been completed over the past five years or is currently underway. Approximately 61 percent of those projects are multi-story buildings located on small lots less than 1 acre (Baseline, 2018). This article examines some of the challenges related to estimating pollutant emissions from construction of multi-story buildings on small lots that need to be reviewed under CEQA.

Many California Air Districts recommend using the California Emissions Estimator Model (CalEEMod) to estimate air pollutant emissions from construction and support environmental review under CEQA. CalEEMod utilizes models widely accepted by regulatory agencies to estimate emissions of criteria air pollutants and greenhouse gases. If site-specific construction information is not available, CalEEMod provides default construction schedules and equipment profiles (equipment type, hours of activity, etc.) based on the size of the proposed project. While these default parameters help to provide a consistent level of CEQA review for a wide variety of land-use projects, they may need to be modified to avoid potentially underestimating construction emissions from small-lot infill developments, as described below.

The CalEEMod default construction schedules and equipment profiles are derived from construction surveys performed by the South Coast Air Quality Management District (SCAQMD). The SCAQMD surveyed over 50 construction sites that included a wide variety of land-use projects (e.g., banks, churches, hotels, and multi-story apartments). Based on the results, the CalEEMod developers created typical constructions schedules and equipment profiles for each phase of construction based on the size of the project.



Small-Lot Infill Development in Oakland, California.

As shown in Table 1, the SCAQMD's construction survey included examples of multi-story buildings, but not for projects less than 1 acre. The smaller construction sites surveyed primarily consisted of one- or two-story wood-frame construction more typical of development in suburban areas. Urban infill developments typically include four or more stories that may require steel or reinforced concrete construction systems, which result in longer construction periods and additional equipment use. Therefore, the use of CalEEMod's default parameters for construction of a multi-story buildings less than 1 acre could potentially result in substantial underestimates of the pollutant emissions. Furthermore, the SCAQMD survey did not include major soil excavation and off-site hauling for a project that includes sub-grade levels (e.g., underground parking) or demolition of buildings greater than 50 feet tall, which are both common components of infill development.

If site-specific construction information is not available for a multi-story project less than 1 acre, the CEQA analyst may want to consider applying one or more of the following modifications to the CalEEMod default construction parameters:

- » Increase the construction schedule and equipment profiles to match the default parameters for a project greater than 1 acre.
- » Add a construction phase and the associated on-road and off-road equipment to account for major soil excavation (if any).
- » Increase the duration of demolition for buildings greater than 50 feet tall (if any).

These suggested modifications to the default CalEEMod construction parameters can help to improve estimates of pollutant emissions during construction of small-lot infill developments when site-specific information is not available.

### Works Cited:

Baseline Environmental Consulting (Baseline), 2018. Baseline survey of major construction sites in the City of Oakland that have been completed or are underway in infill areas over the past five years. Site data was collected from the City of Oakland's

Interactive Map of Major Projects – April 2018. <http://www2.oaklandnet.com/government/o/PBN/OurOrganization/Planning-Zoning/index.htm>. Accessed May 17, 2018.

South Coast Air Quality Management District (SCAQMD), 2005. *Sample Construction Scenarios for Projects Less than Five Acres in Size*. February.

### Bios:

Patrick Sutton is an Environmental Engineer at Baseline Environmental Consulting who specializes in the assessment of hazardous materials released into the environment. He has prepared numerous CEQA evaluations for air quality, greenhouse gases, geology, hazardous materials, and water quality related to residential, commercial, and industrial projects, as well as large infrastructure developments.

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**Table 1: CalEEMod Default Parameters for Building Construction**

Project Size	SCAQMD Construction Survey Examples	CalEEMod Building Construction Days	CalEEMod Equipment Profile
≤1 Acre	Residential Dwelling, Church, Office, Super Market, Restaurant	100	1 x Crane (4 hours/day) 2 x Forklift (6 hours/day) 2 x Loader (8 hours/day)
≤2 Acre	Condominiums, Hotel, College, Multi-Story Apartment, Multi-Story Office, Multi-Story Storage, Shopping Center	200	1 x Crane (6 hours/day) 1 x Forklift (6 hours/day) 1 x Loader (6 hours/day) 1 x Generator (8 hours/day) 3 x Welders (8 hours/day)
≤3 Acre		220	1 x Crane (8 hours/day) 2 x Forklift (7 hours/day) 1 x Loader (6 hours/day) 1 x Generator (8 hours/day) 3 x Welders (8 hours/day)
≤5 Acre		230	1 x Crane (8 hours/day) 3 x Forklift (8 hours/day) 3 x Loader (7 hours/day) 1 x Generator (8 hours/day) 1 x Welders (8 hours/day)