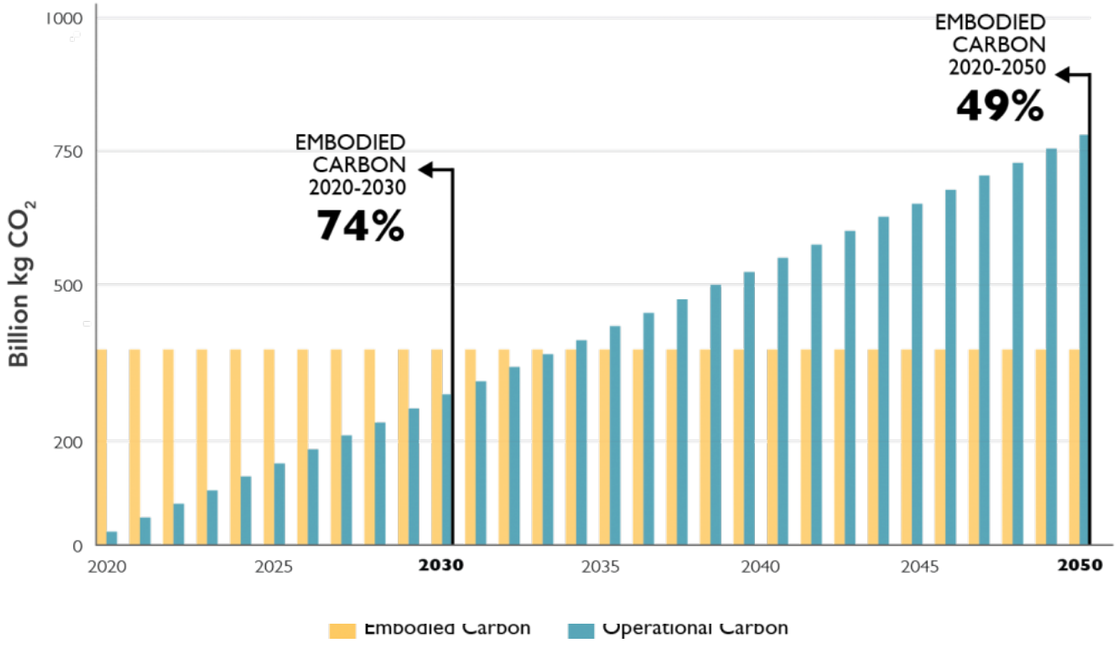
DOCKETED	
Docket Number:	21-lEPR-06
Project Title:	Building Decarbonization and Energy Efficiency
TN #:	239480
Document Title:	Presentation - Why is embodied carbon in existing buildings important
Description:	S1.2F_Henry Siegel_Siegel and Strain Architects
Filer:	Raquel Kravitz
Organization:	Siegel and Strain Architects
Submitter Role:	Public Agency
Submission Date:	8/26/2021 8:07:51 AM
Docketed Date:	8/26/2021

Why is embodied carbon in existing buildings important?



Why existing buildings matter

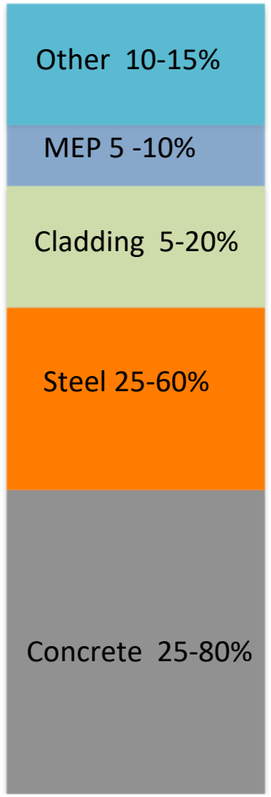
We have a lot of buildings ~ 235 billion m^2
- they are not very efficient
- we can't afford to replace them all
- we can't afford to leave them alone

We build a lot of buildings ~ 6 billion m^2/yr
- more efficient to operate, but not to build
- we can't afford to keep building them all

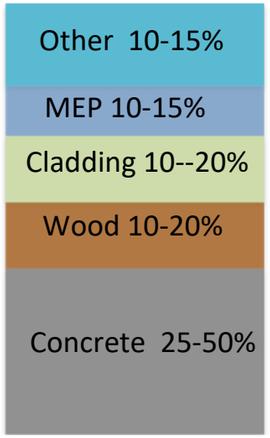
Embodied CO_2 by Construction Type & Material

New

Existing

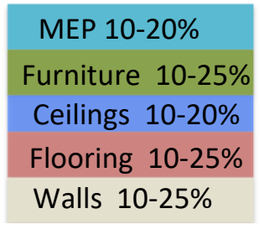


Heavy Buildings
350 – 500kg/m^2
70 – 100lbs / sf



Light Buildings
150 – 300kg/m^2
30 – 50lbs / sf

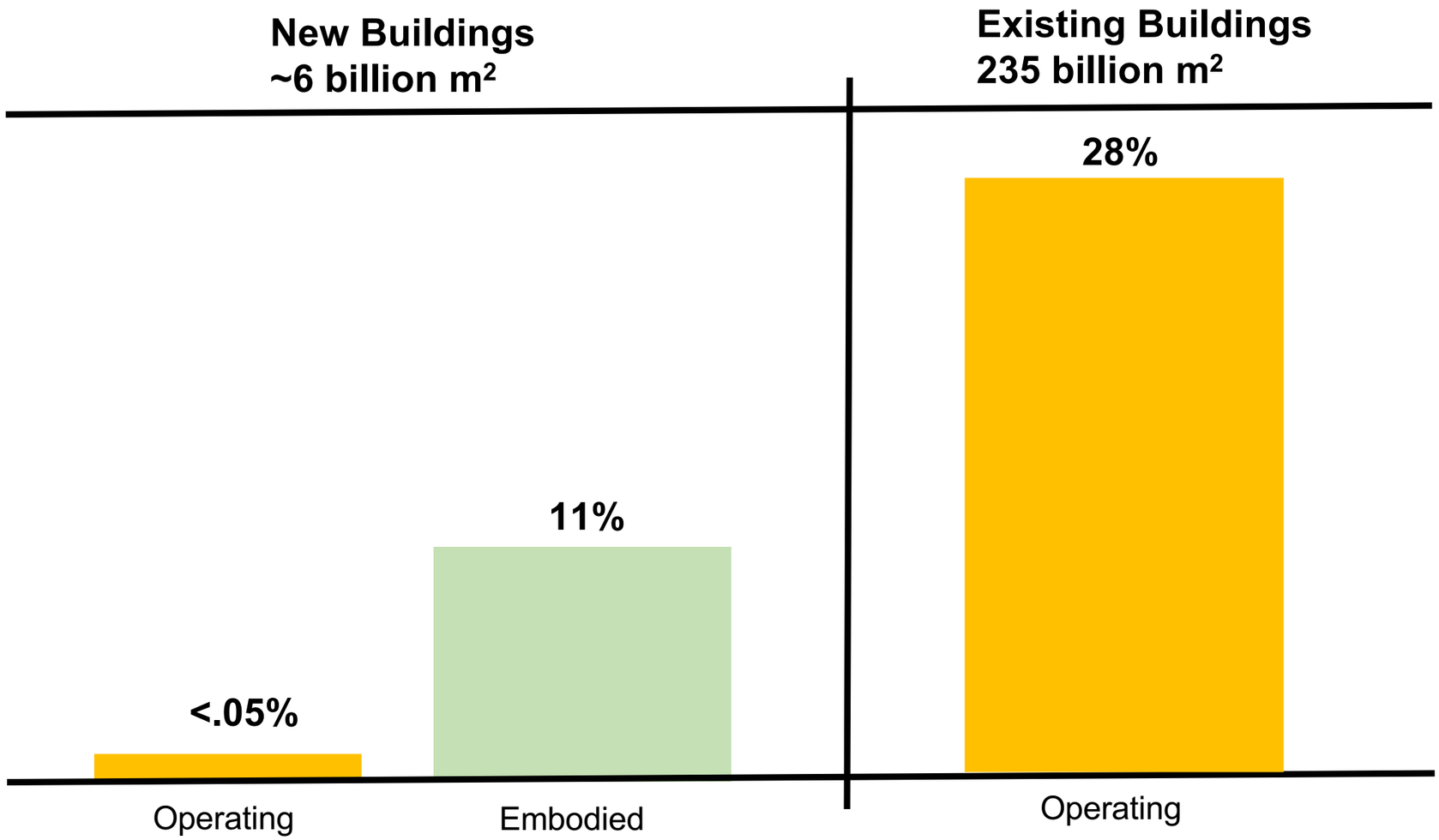
Typically
50 – 80%
less than new



Renovations
50 – 150kg/m^2
10 – 30lbs / sf

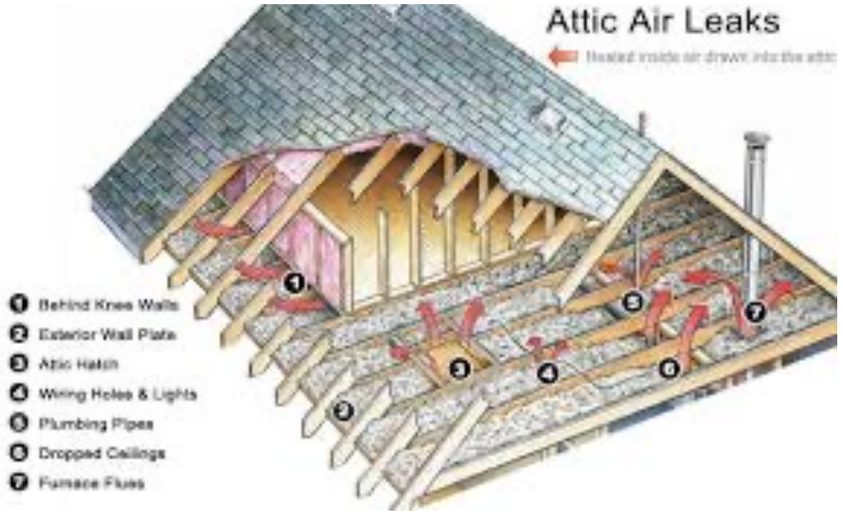
Lo-carb renovations
0 – 50kg/m^2
0 – 10lbs / sf

Annual GHG Emissions from Buildings



Make buildings efficient

- Air sealing
  - Attics and crawlspaces
  - Weatherstripping
- Insulation
  - Attics and crawlspaces
  - Blown – cellulose, fiberglass
- Windows
  - Interior storm windows
  - Reglaze
  - Replace
- Passive measures
  - Daylighting,
  - expose thermal mass



Air Sealing

Hempcrete

Wool

Cellulose

Cork

Wood fiber

Carbon storing insulation

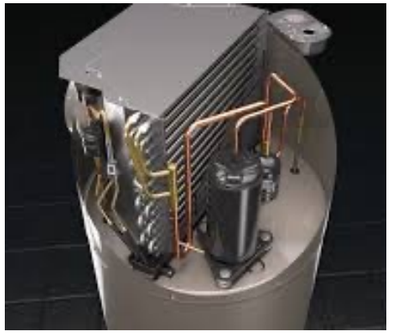
Make systems efficient
Electrify!

1. Eliminate on-site fossil fuel combustion,
2. Convert heating and water heating to high efficiency heat pumps
3. Purchase or install clean electricity
4. Upgrade the rest
   - Seal and insulate duct
   - Induction cook tops
   - HP Dryers
   - High efficiency appliances
   - Lighting – re-lamping
   - Smart plug strips
   - Duct sealing / insulation

Gas furnace and water heater

Heat pump heating and cooling

Induction cooktops



Heat pump – water heating

Decarbonize Existing Buildings

There are 550 million fossil-fueled machines we need to electrify

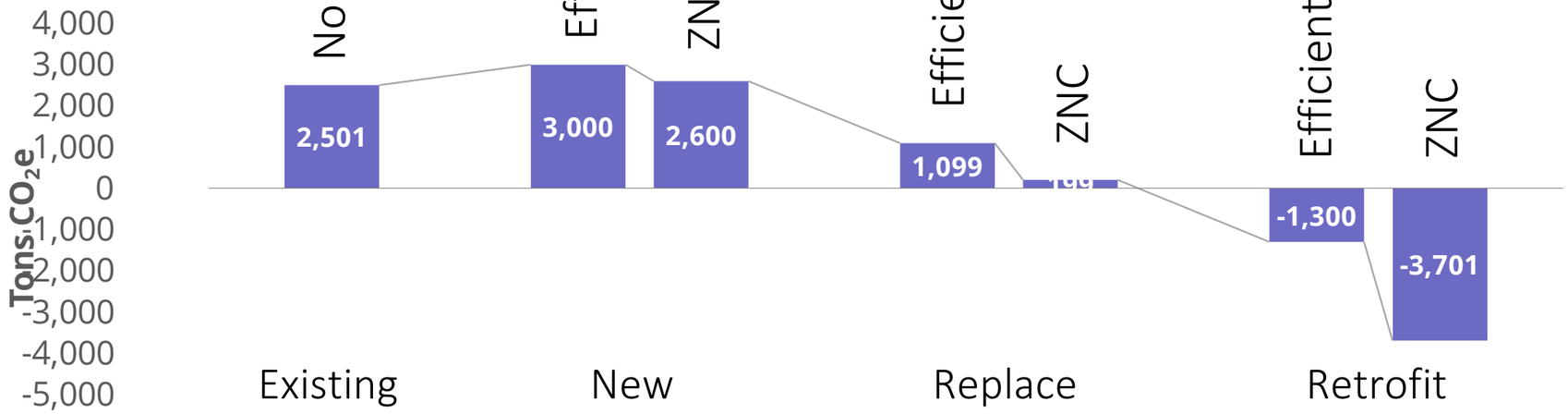
To Build or Not to Build - Carbon Calculator

CarbonPositive'20

PROJECT DATA		
State	**California**	*select from dropdown*
Climate Zone	**Marine**	*select from dropdown*
Primary Use Type	**Office**	*select from dropdown*
Floor Area	**50,000 sf**	*enter value*
Operational Timeline	**10 years**	*enter value*

Total Emissions

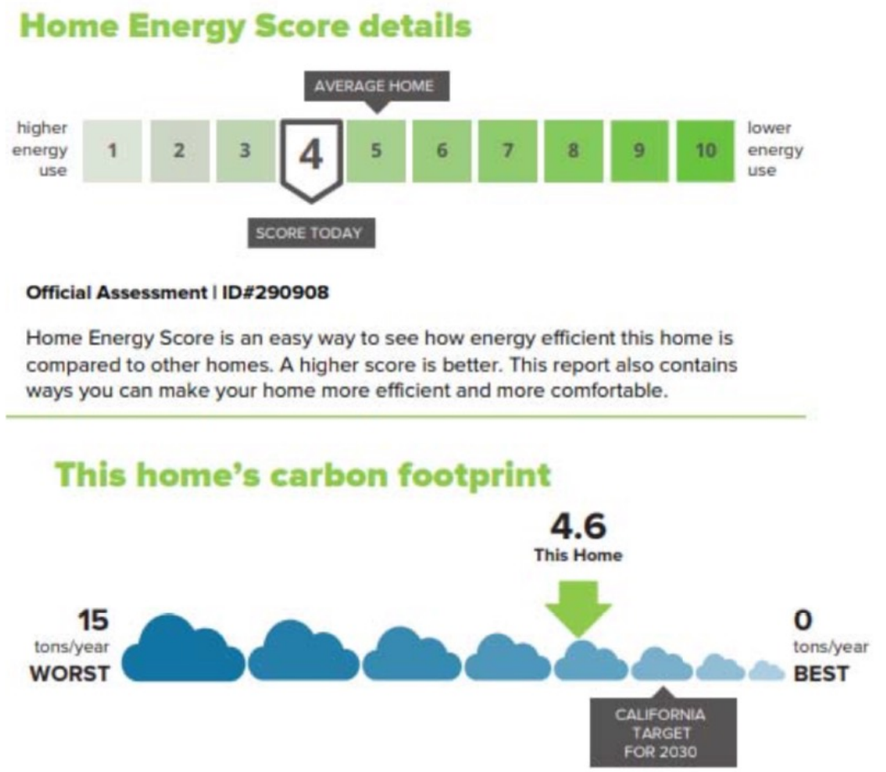
Operational.
Embodied &
Avoided -



Save Buildings – Save Neighborhoods

Benchmarking & Auditing
Berkeley BESO -- Building Energy Saving Ordinance

- Annual benchmarking & 5 year audit for large buildings
- Home Energy Score at Time of Sale
- Shifting from Energy Efficiency to include Electrification



AIA California recently declared a **Climate Emergency.**

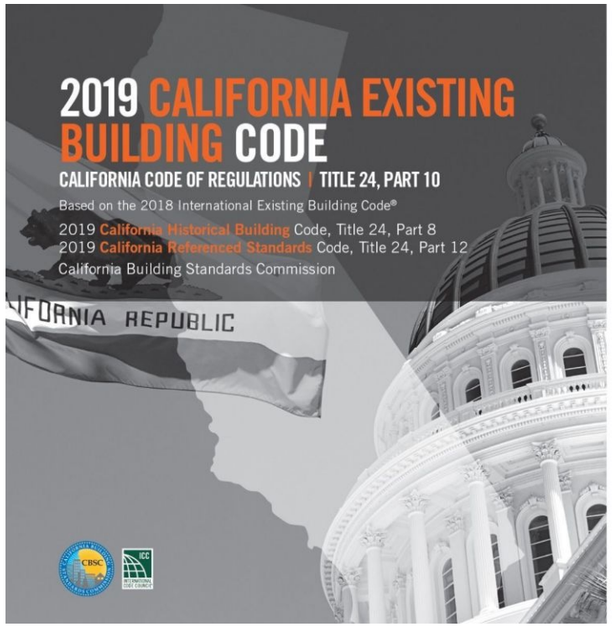
1. Actively support Governor Newsom's goals of statewide carbon neutrality by 2035, and an increase in grid-based renewable energy to 90% by 2030.
2. Advocate for accelerated electrification of all new buildings in the state with a target of 2022.
3. Advocate for accelerated revisions to the California Building Code and Title 24 to require that all new commercial buildings be zero net carbon, with a target of 2022.
4. Promote policy changes that encourage the adaptive reuse of existing structures over new construction.
5. Promote the reduction of embodied carbon in key building materials such as concrete, steel and aluminum.

New Working Group: Embodied Carbon

- Current focus on Concrete:
  - SB778 Buy Clean California for Concrete
  - SB596 Low Carbon Concrete Legislation
  - CalGreen code amendements
  - Federal Buy Clean Act
  - LECCLA

California Existing Building Code

- AIA CA engaged as Petitioner in the CEBC Code Development process: presentations, testimony, advocacy, collaboration. We were the only active petitioner in this cycle. We also coordinated with ICC leadership on a state and national level.
- Our proposal focused on both Climate and Housing benefits: equip architects with additional code tools to allow repurpose and retrofit of underused or abandoned existing buildings for innovative housing. Retrofitting buildings can offer major embodied carbon benefits.
- The AIA CA Petition garnered key support from HCD and SEAOC.
- California Building Standards, State Fire Marshall, Housing and Community Development, and ICC have all committed to work with AIA CA on midcycle CEBC progress.



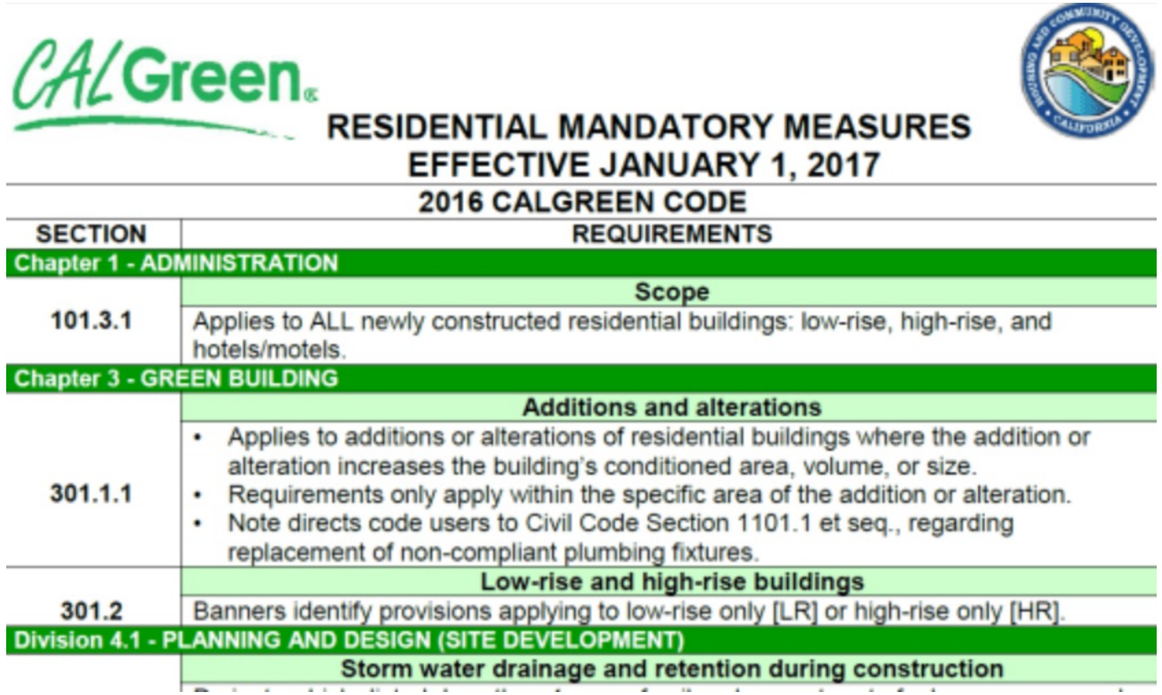
Reboot CALgreen

1. **Change is needed to allow CalGreen to better serve in moving us forward:** CalGreen has not evolved to serve as the aspirational, forward looking beacon that it was when it launched in 2008. In fact, the term “embodied carbon” is entirely missing from the code language.
2. **AIA CA submitted a code change petition to bring a zero-carbon design framework to CALgreen:** CALgreen’s tier concept is an ideal foundation for supporting rapid changes needed for decarbonization. We proposed embodied carbon language to be added to section A5 for 2022 CALgreen code, as a voluntary measure.
3. **Focus on reducing Concrete emissions in commercial buildings over 50,000 square feet:** Concrete is the most widely used construction material in the world, and is responsible for 6-10% of global anthropogenic carbon dioxide (CO_2) emissions. Furthermore, large buildings account for majority of emissions in building sector.

Reboot CALgreen

The current siloed allocation of responsibility between CEC, CARB, HCD, CBSC and other state agencies misses the chance to have CalGreen lead us to a sustainable future.

We believe there needs to be a standing committee or commission that bridges the gaps.



CALGreen

RESIDENTIAL MANDATORY MEASURES
EFFECTIVE JANUARY 1, 2017
2016 CALGREEN CODE

SECTION	REQUIREMENTS
Chapter 1 - ADMINISTRATION	
	Scope
101.3.1	Applies to ALL newly constructed residential buildings: low-rise, high-rise, and hotels/motels.
Chapter 3 - GREEN BUILDING	
	Additions and alterations
301.1.1	• Applies to additions or alterations of residential buildings where the addition or alteration increases the building's conditioned area, volume, or size. • Requirements only apply within the specific area of the addition or alteration. • Note directs code users to Civil Code Section 1101.1 et seq., regarding replacement of non-compliant plumbing fixtures.
	Low-rise and high-rise buildings
301.2	Banners identify provisions applying to low-rise only [LR] or high-rise only [HR].
Division 4.1 - PLANNING AND DESIGN (SITE DEVELOPMENT)	
	Storm water drainage and retention during construction

New technology
or new laws?
Preach hope
or warn about sacrifice?
Punish polluters
or build green businesses?

On the brink of climate catastrophe…
it’s all of the above