

Low Carbon Concrete Code Adoption and Implementation Learned Lessons

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May 26, 2023

Photo Credit: Jeff Wong



Today's Key Takeaways



Why develop?



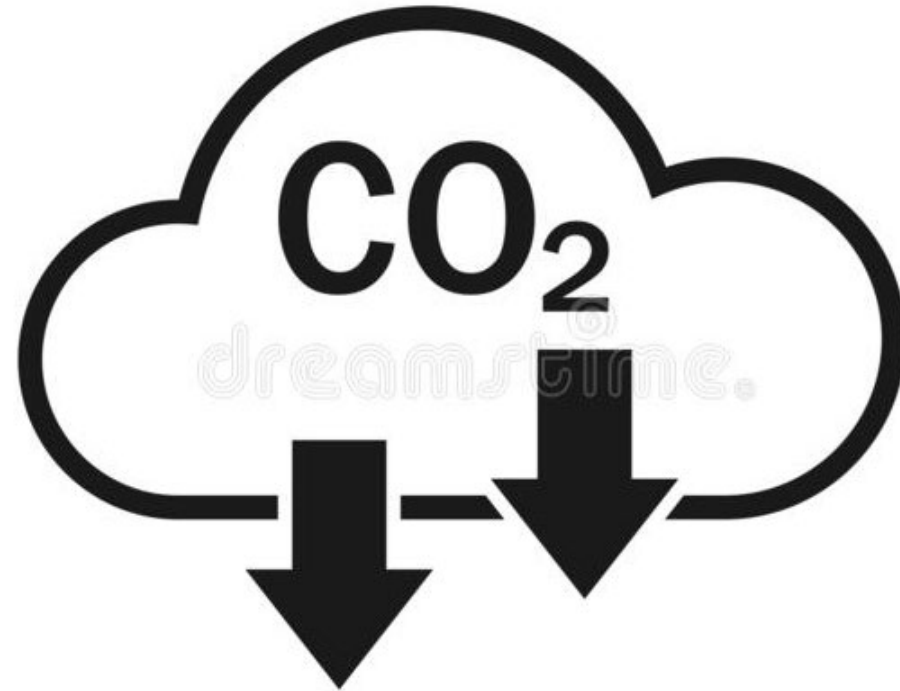
How was the code developed and how it works?



How are we currently implementing the code?



Learned lessons from development and implementation



2030: 60% reduction
2045: Carbon Neutral



Our Climate Action Plan Key Actions


- Local Measures
 - Low Carbon Transport
 - Renewable Energy
 - Energy Efficiency and Electrification
 - Waste Reduction
 - Agriculture Waste and Energy Reduction + Carbon Sequestration
 - **Embodied C: Low Carbon Concrete**
- State Measures
 - Renewable Portfolio Standards
 - Low Carbon Fuel Standards
 - State Green Building Standards



Marin County
Unincorporated Area

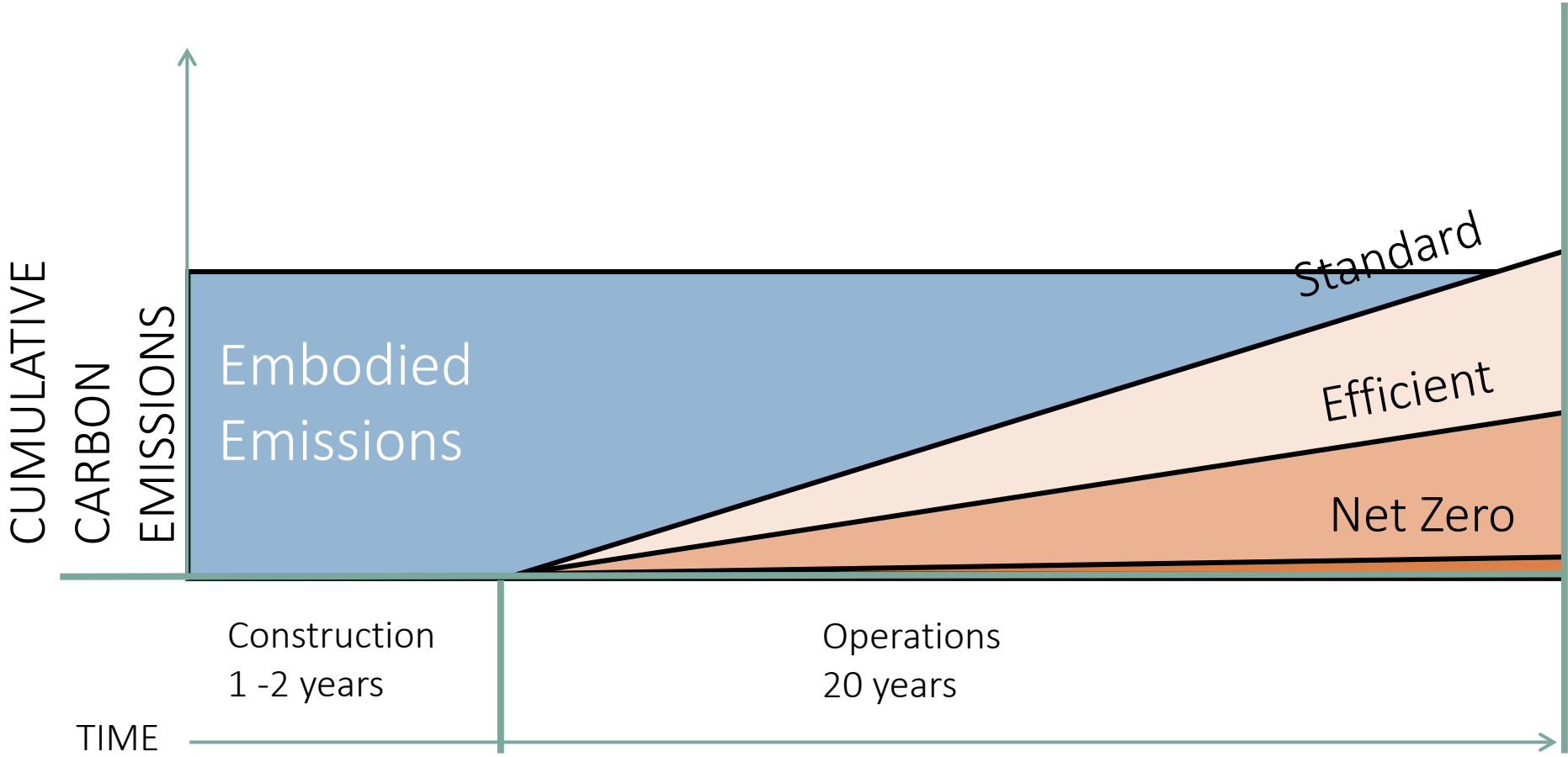
CLIMATE ACTION PLAN 2030

December 2020





EMBODIED VS. OPERATIONAL CARBON EMISSIONS IN BUILDINGS

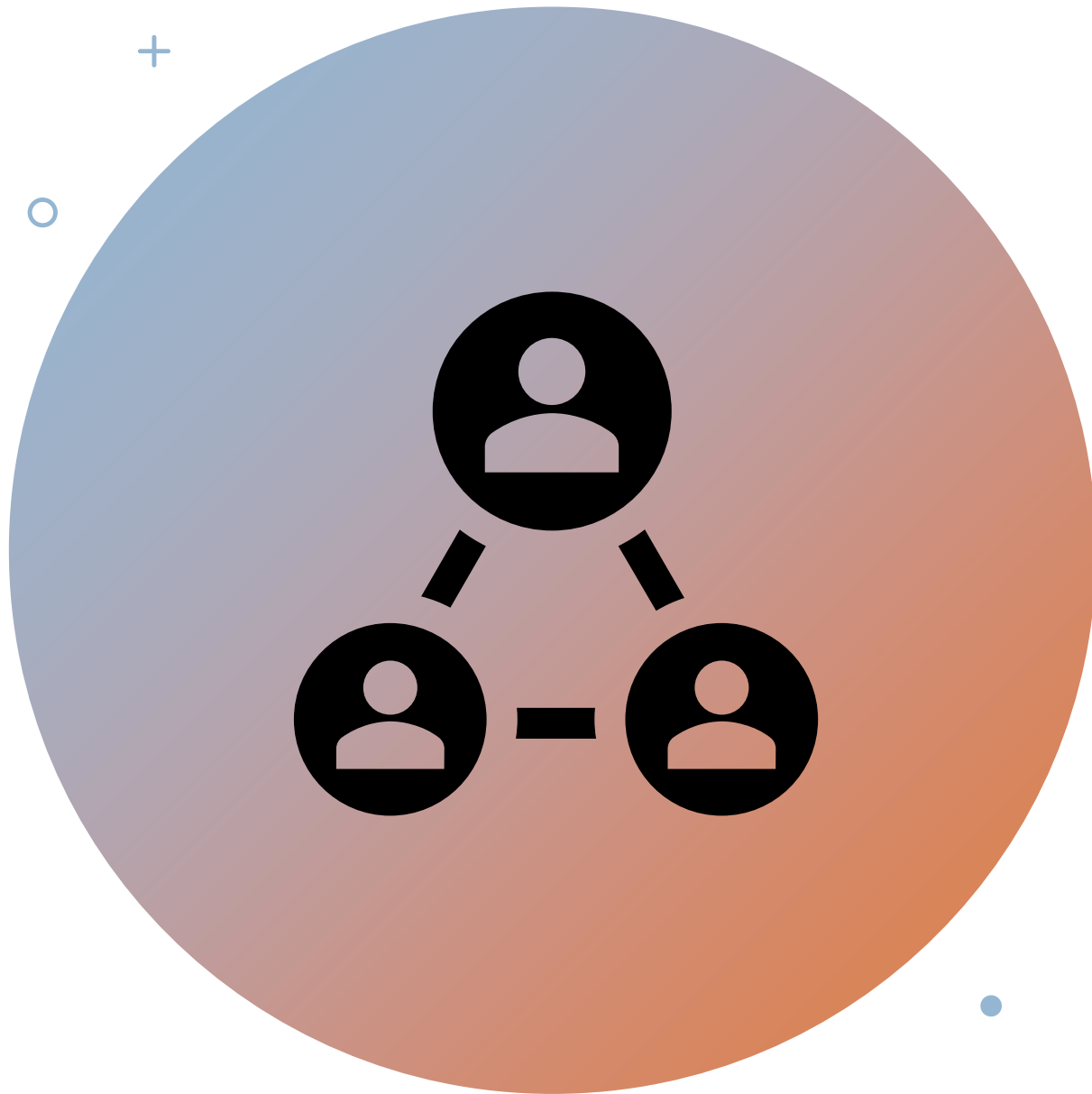


Source: Larry Strain, Siegel & Strain Architects



Stakeholder Engagement

- Ready-Mix Suppliers
- Design Professionals
 - Structural/Civil Engineers
 - Architects
- Contractors/General Contractors
Pouring
- Government/Building Staff

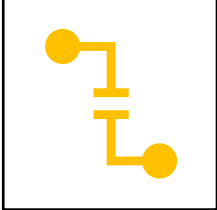


THRESHOLD TABLE TWO COMPLIANCE PATHWAYS



	Cement limits	Embodied Carbon limits
Minimum specified compressive strength f'_c , psi	Maximum ordinary Portland cement content, lbs/yd ³	Maximum embodied carbon kg CO ₂ e/m ³ , per EPD
up to 2500	362	260
3000	410	289
4000	456	313
5000	503	338
6000	531	356
7000	594	394
7001 and higher	657	433
up to 3000 light weight	512	578
4000 light weight	571	626
5000 light weight	629	675

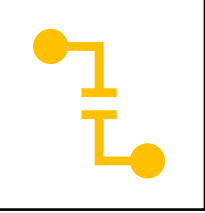
Adopted Nov 2019



Implementation

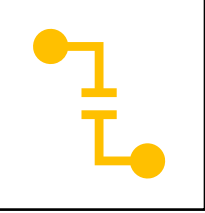


- ✓ Pandemic = Deferred Until January 1, 2023 and strictly Re-enforcing May 2023
- ✓ [Low Carbon Concrete Requirements](#) page (review)
- ✓ Pre-Qualified Mix-Designs
- ✓ Examiner and Inspector
 - ✓ It's a like language . . . ongoing training a must
 - ✓ Compliance Forms and Verification Process streamlined and iterative
- ✓ Building Community Engagement and Communication Ongoing



Compliance Steps (Before Concrete Poured)

1. **Applicant** submits *Design Professional Compliance Form*
2. **Permit Technicians** Intake Form
3. **Plan Examiners** Review Compliance Form
4. **Plan Examiners** Place Final Hold and Permit to Build Issued



Compliance Steps (Concrete Poured)

1. **Contractor** completes Contractor Compliance Form + Obtains Batch Receipt (Proof)
2. **Contractor** submits on same day or within six weeks after last pour
3. **Examiner** lifts final hold
4. **Non-Compliant Pours: Building Official** makes determination how to offset Carbon



Learned Lessons: Policy Development

- Examine the Entire Value Chain
 - Engage Early and Often; It is Ongoing
- Examine Regional Context
 - Thresholds
 - Ready-Mix Supplier Capabilities
- Concrete is An Opening Salvo
 - All Building Materials Have Embodied Carbon
- Embodied C Pathway Allows for Innovation
 - Low Carbon Concrete is Not Just Cement
 - Aggregates, Less Cementitious Materials, Optimize Designs and New Concrete Mixtures



Learned Lessons: Implementation and Enforcement

- Build Staff Capacity
 - Building Official, Permit Techs, Examiners, and Inspectors in developing and streamlining compliance protocols
- Communication Will Never Be Perfect, Best Education is Enforcement
- Materials and Tools are Available Today
 - Practitioner (Design Professionals and Contractor) Adoption Rates Must Accelerate
- Industry and Producers are and have been ready
 - Portland Lime Cement (ASTM595/Type IL) Since 2012
 - [CA NV Cement Association \(CNCA\) has a carbon neutrality goal for producers by 2045](#)
 - American Concrete Institute (ACI) Developing Standards → International Code Council (ICC)

Questions or
Comments



Thank You

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