Reach Code Analysis
Tracking Impact on Residential New Construction
by
Brian Reyes
Sustainability Planner

November 18, 2021
A Carbon Neutral Future by 2045

2019
21%

2030
40%
60%

Sequester 20%

2045
100%

Reduce as much as possible

Sequester the rest
2019 Countywide Emissions

1.4 million mtCO$_2$e

- Transportation: 52%
- Natural Gas: 27%
- Building Energy: 34%
- Electricity: 7%
- Agriculture: 9%
- Waste: 4%
- Water/Wastewater: <1%
Electrification Critical to Decarbonizing Buildings

- **2005**
  - Natural Gas: 56%
  - Electricity: 44%
  - Total CO₂e: 777,035 mt

- **2019**
  - Natural Gas: 80%
  - Electricity: 20%
  - Total CO₂: 481,855 mt
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Current Reach Code Status</th>
<th>Additional Efficiency Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>County of Marin</td>
<td>CalGreen Tier 1: Electric Preferred</td>
<td>For mixed fuel new construction</td>
</tr>
<tr>
<td>(Unincorporated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mill Valley</td>
<td>CalGreen Tier 1: Electric Preferred</td>
<td>For mixed fuel new construction</td>
</tr>
<tr>
<td>San Anselmo</td>
<td>CalGreen Tier 1: Electric Preferred</td>
<td>For mixed fuel new construction</td>
</tr>
<tr>
<td>Novato</td>
<td>CalGreen Tier 1</td>
<td>Tier 1</td>
</tr>
<tr>
<td>San Rafael</td>
<td>CalGreen Tier 1</td>
<td>Tier 1</td>
</tr>
<tr>
<td>Tiburon</td>
<td>CalGreen Tier 1</td>
<td>None - excludes Tier 1 efficiency requirements</td>
</tr>
<tr>
<td>Fairfax</td>
<td>CalGreen Tier 1</td>
<td>None - excludes Tier 1 efficiency requirements</td>
</tr>
<tr>
<td></td>
<td>*All-Electric for Newly Constructed Buildings In effect 3/1/22</td>
<td></td>
</tr>
<tr>
<td>Belvedere</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Corte Madera</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Larkspur</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Ross</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Sausalito</td>
<td>None (considering all-electric)</td>
<td>None</td>
</tr>
</tbody>
</table>
County of Marin Green Building Requirements for New Construction

+ “CalGreen Tier 1 Reach Codes”, with

+ “Electric Preferred Enhanced Energy Efficiency Requirements”

+ 3 Pathways

1. All-Electric (no Gas),
2. Limited-Mixed Fuel (Gas Cooking and/or Fireplace only)
3. Mixed Fuel (Gas and/or Electric)
Why this Analysis?

Assess whether our New Construction Green Building Codes are working as intended

- Are we seeing energy and GHG reductions and how they vary across jurisdictions?
- Are our codes being enforced?
- How can we make this a replicable and scalable analysis?
- How are building codes affecting change across the various code types in the County?
- Is our electric preferred reach codes driving projects to adopt all-electric?
Hypothesis

“More aggressive green building energy conservation requirements will result in more building energy and GHG savings”
Methodology and Limitations

- Residential New Construction from CalCERTs and CHEERS
- Targeted Interviews of Architects
- Process, Visualized and Analyzed using PowerBI
- Limitations
  - 2016 TDV vs 2019 EDR compliance metrics
  - Projects sampled according to Design, not actually installed
Results
(Preliminary Findings)

1. Impact of Reach Codes Across Code Cycles

2. Impact of 2019 Electric Preferred Reach Code
Impact of Reach Code
Avg. Compliance Margin (Time Dependent Valuation) Countywide

Sample Size
288
Impact of Reach Code
Avg. Compliance Margin (TDV) by Code Status

<table>
<thead>
<tr>
<th>Code Year</th>
<th>2016</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>CalGreen Tier 1: Yes efficiency reqs.</td>
<td>13.3</td>
<td>39.1</td>
</tr>
<tr>
<td>CalGreen Tier 1: Electric Preferred</td>
<td>7.6</td>
<td>9.6</td>
</tr>
<tr>
<td>Title 24: No add’n efficiency reqs.</td>
<td>3.8</td>
<td>7.7</td>
</tr>
<tr>
<td>CalGreen Tier 1: No efficiency reqs.</td>
<td>6.0</td>
<td></td>
</tr>
</tbody>
</table>

Sample Size 288
Impact of Electric Preferred Reach Code by Jurisdictions

2019 Avg. Energy Design Rating (EDR) Compliance Margin

Jurisdiction A: 8.7
Jurisdiction B: 8.4
County of Marin: 7.4

Sample Size: 68
Leverage the Data to Target Projects

- 32 (County of Marin) (Electric Preferred)
- 13 (Interviews)
- 5 (All-Electric)
Are 2019 Electric Preferred Reach Codes Increasing Electric Adoption in the County of Marin? (Preliminary Findings)

<table>
<thead>
<tr>
<th>Electric Preferred Pathways</th>
<th># of Projects</th>
<th>Adoption Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-electric (No Gas)</td>
<td>5</td>
<td>16%</td>
</tr>
<tr>
<td>Limited Mixed Fuel (No Natural Gas Space or Water Heating or Gas Cooking and/or Fireplace allowed)</td>
<td>8</td>
<td>25%</td>
</tr>
<tr>
<td>Mixed Fuel (Gas+Electric)</td>
<td>19</td>
<td>59%</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100%</td>
</tr>
</tbody>
</table>
Key Findings

- Enhanced Reach Codes were effective at reducing energy use countywide
- Majority of County of Marin 2019 Residential New Construction Projects still opted for gas installs
- Data is inconsistent, needs cleaning, and analysis unique
- Compliance documentation and enforcement needs to be improved
- Architects/design team needs to drive All-Electric choice?
  - Architect Quote “9 out of 10 clients want gas cooking”
- Hypothesis: Still pending . . .
Next Steps

• Near Term
  • Still Finalizing Data Analysis and Trends
  • Conduct Remaining Targeted Interviews

• Mid-Term
  • Final Report by February ~2022
  • Use data to inform stakeholder decisions to right-size updates to green building codes

• Long-Term
  • Update dataset to include completed installations for 2019
  • Make analysis useful and scalable to other jurisdictions?
Thank You

BRIAN REYES
SUSTAINABILITY PLANNER
MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY
BREYES@MARINCOUNTY.ORG
415-473-2797
California Share of Residential Gas Use by End Use

- **Space Heating**: 44%
- **Water Heating**: 23%
- **Clothes Washing**: 11%
- **Dishwashing**: 7%
- **Cooking**: 7%
- **Clothes Drying**: 4%
- **Pool Heating**: 2%
- **Hot Tub Fuel**: 2%

Source: California Energy Commission