Aggregate Sustainability

California Geological Survey

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If You Got It, A Truck Brought It
28 minerals are produced commercially from about 660 actively working mines.

Ranked 4th in Nation in total value.

Led Nation in production of S&G, boron, and diatomite.

California produces a greater variety of minerals than any other state.
WHO USES CONSTRUCTION AGGREGATE?

- Private Aggregate Use: 57%
- Public Works Aggregate Use: 43%

- Residential Housing: 34%
- Commercial Buildings: 17%
- Railroads: 1%
- Other Private Facilities: 2%
- Private Roads: 3%
- Utilities: 4%
- Other Public Buildings: 3%
- Water and Sewer: 5%
- Hospitals and Schools: 2%
- Other Public Facilities: 3%
- Public Highways, Streets, and Transit: 26%

AGGREGATE USED IN HOME CONSTRUCTION

Basement Foundation 39 tons
Drain around Foundation 22 tons
Basement Floor 25 tons
Sidewalk 14 tons
Driveway 19 tons
Garage Floor 10 tons
Half the street in front of the house 100 tons

229 tons

Source: Langer, Drew, and Sachs; *Aggregate and the Environment*, AGI
2018
AGGREGATE SUSTAINABILITY MAP

California’s New Gold
FRESNO-BAKERSFIELD

Fresno
556/305 Million Tons
More Than 50 Years

Tulare County
53/130 Million Tons
21 to 30 Years

Bakersfield
1,708/338 Million Tons
More Than 50 Years
YUBA CITY - SACRAMENTO

- **Yuba City-Marysville**: 679/344 Million Tons, More Than 50 Years
- **Placer County**: 387/188 Million Tons, More Than 50 Years
- **Sacramento County**: 327/724 Million Tons, 21 to 30 Years
- **Sacramento-Fairfield**: 109/295 Million Tons, 21 to 30 Years
- **Nevada County**: 52/41 Million Tons, More Than 50 Years
- **El Dorado County**: 15/82 Million Tons, 11 to 20 Years
<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2006</th>
<th>2012</th>
<th>2018</th>
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</thead>
<tbody>
<tr>
<td>Permitted Aggregate Resources (Reserves)</td>
<td>6.8</td>
<td>4.3</td>
<td>4.1</td>
<td>7.6</td>
</tr>
<tr>
<td>50-Year Demand</td>
<td>12</td>
<td>13.5</td>
<td>12</td>
<td>11</td>
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<tr>
<td>Areas with &lt;25% of Demand</td>
<td>13</td>
<td>11</td>
<td>9</td>
<td>4</td>
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<tr>
<td>Areas with &lt;50% of Demand</td>
<td>19</td>
<td>26</td>
<td>20</td>
<td>16</td>
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<tr>
<td>Areas with Adequate Reserves</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>5</td>
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<tr>
<td>Resources</td>
<td></td>
<td></td>
<td></td>
<td>74</td>
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UPDATED RESOURCE SECTORS - SOUTHERN PART
### SANDAG STUDY (2011)

<table>
<thead>
<tr>
<th>Transport Option</th>
<th>Total Fuel Consumption (gallons)</th>
<th>Total CO₂ Emissions (metric tons)</th>
<th>Total NOₓ Emissions (metric tons)</th>
<th>Total PM Emissions (metric tons)</th>
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</thead>
<tbody>
<tr>
<td>Local: Truck</td>
<td>296,000</td>
<td>3,000</td>
<td>26.5</td>
<td>1.1</td>
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<tr>
<td>Import: Truck</td>
<td>1,138,000</td>
<td>11,537</td>
<td>102</td>
<td>4.4</td>
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<tr>
<td>Import: Rail + Truck</td>
<td>788,000</td>
<td>7,985</td>
<td>120.4</td>
<td>3.3</td>
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<tr>
<td>Import: Barge + Truck</td>
<td>804,000</td>
<td>8,210</td>
<td>147.1</td>
<td>5.1</td>
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<tr>
<td>Import: Ship + Truck</td>
<td>1,406,000</td>
<td>16,703</td>
<td>282.2</td>
<td>16.3</td>
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</tbody>
</table>
## SUMMARY

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Resources (PCC-grade)</td>
<td>5,982 Million Tons</td>
</tr>
<tr>
<td>Aggregate Reserves (PCC-grade)</td>
<td>271 Million Tons</td>
</tr>
<tr>
<td>Projected 50-Year Aggregate Demand</td>
<td>760 Million Tons</td>
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<tr>
<td>Estimated Depletion Date of Reserves</td>
<td>2035</td>
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</table>
PER-CAPITA CONSTRUCTION AGGREGATE DEMAND PROJECTION

Basis for Projection

• Historic Construction aggregate production (consumption)

• Historic population

• Population / Production = Average Annual Per-Capita consumption

• Population Projection x Per-Capita rate = Demand Projection
DEMAND PROJECTION INPUT: HISTORIC PRODUCTION

Years 1970 – 1990 Compilation Sources
US Bureau of Mines
Mine Operators
Source Report Files

Years 1990 – 2016 Compilation Sources:
California Division of Mine Reclamation
DEMAND PROJECTION INPUT: PER CAPITA CONSUMPTION
DEMAND PROJECTION AND RESOURCE SUMMARY

The graph illustrates the trend of production and annual demand of a resource over time from 1970 to 2070. The production line shows variability, particularly a peak around 2000, followed by a decline and then a steady increase. The annual demand line, represented by a blue line, shows a consistent upward trend starting from 2010.
IMPACTS OF AGGREGATE TRANSPORT

Societal, Economic, and Environmental costs

• Transport distance is the fundamental controller of these costs.
• Minimizing transport distance is key to minimizing these costs.
• Local sources of aggregate are needed to minimize transport distance.