

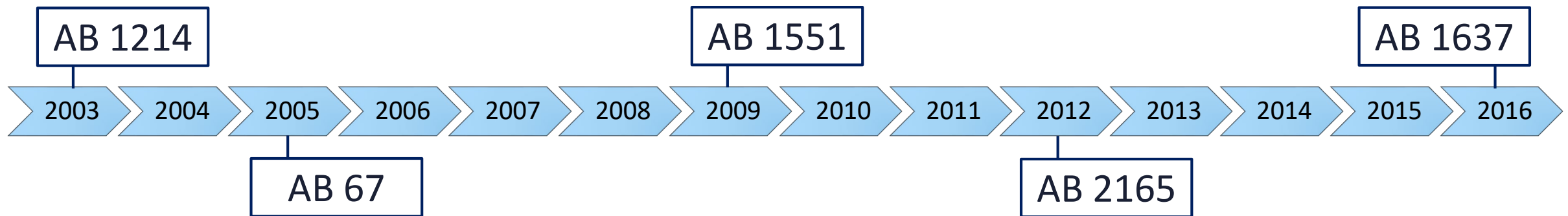
Fuel Cell Net Energy Metering Greenhouse Gas Emission Standards



DECEMBER 12, 2019

Background on Fuel Cell Net Energy Metering (NEM) Program

- Created in 2003 to “encourage substantial private investment in these energy resources”
 - Voluntary incentive program overseen by CPUC and administered by investor-owner utilities (IOUs)
 - Provides customer-generators with a bill credit for electricity generated and exported, and avoids or limits various non-bypassable utility charges
- Extended and modified by legislation four times since then, most recently by Assembly Bill (AB) 1637, which extended the program through 2021



Fuel Cell Technology

- Converts fuel into electricity without combustion by using an electrochemical process
 - Lower energy conversion temperatures than combustion reduces criteria pollutants such as NO_x
 - Can have higher efficiencies than combustion technologies resulting in lower fuel consumption and emission rate
 - Fuel can be natural gas, biogas, or hydrogen
- Emits up to ~75–90 percent less NO_x and to ~75–80 percent less PM than other technologies
- When used with renewable hydrogen as a direct fuel source, can generate electricity with zero carbon emissions

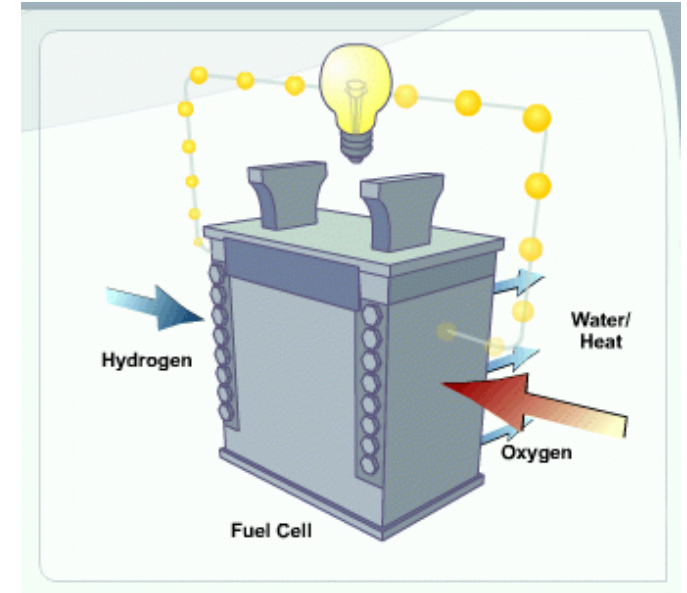
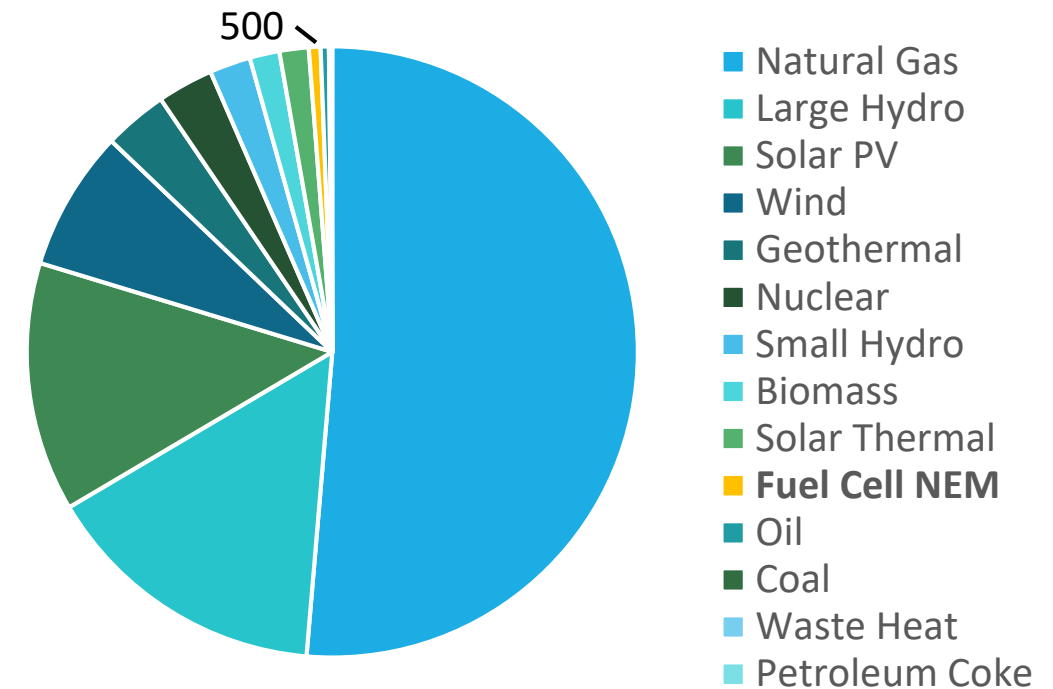


Image Source: U.S. Department of Energy
(<https://www.energy.gov/eere/fuelcells/fuel-cell-animation-text-version>)

AB 1637 Fuel Cell NEM Program Eligibility Requirements

- Individual project size limited to 5 MW
- Minimum efficiency requirements
- Criteria pollutant standards per CARB DG Certification Program
- AB 1637 authorized benefits for up to 500 MW of new fuel cell generation
 - Could result in 200,000 pounds of NOx emissions being avoided
- GHG emission standard initiated in 2012
 - AB 2165: required use of SGIP standards
 - AB 1637: required CARB to develop new standards

2018 Installed In-State Electricity Generation Capacity (MW) + 500 MW Fuel Cells



AB 1637 GHG Emission Standard Mandate

- CARB must develop GHG emission standards that reduce “greenhouse gas emissions compared to the electrical grid resources, including renewable resources, that the fuel cell electrical generation resource displaces, accounting for both procurement and operation of the electrical grid.” [emphasis added]
- CARB is to “establish a schedule of annual greenhouse gas emission reduction standards...” and “...update the schedule every three years with applicable standards for each intervening year.” [emphasis added]

Differences Between Fuel Cell NEM and Self-Generation Incentive Program (SGIP)

SGIP	Statutory GHG Standard Requirements	Fuel Cell NEM
<p>“Eligibility...limited to distributed energy resources that...will achieve reductions of greenhouse gas emissions pursuant to the California Global Warming Solutions Act...”</p>		<p>Reduce GHG emissions “compared to the electrical grid resources, including renewable resources, that the fuel cell electrical generation resource displaces”</p>
<p>Wind turbines, internal combustion engines, microturbines, gas turbines, fuel cells, advanced energy storage systems</p>	<p>Eligible Technologies</p>	<p>Fuel Cells</p>
<p>Single determination of eligibility based on one-year and ten-year average GHG emission standards</p>	<p>GHG Eligibility Determination</p>	<p>Annual verification of eligibility based on annual GHG emission standards</p>
<p>50 percent in 2019, 100 percent in 2020</p>	<p>Renewable Fuel Requirement</p>	<p>None</p>

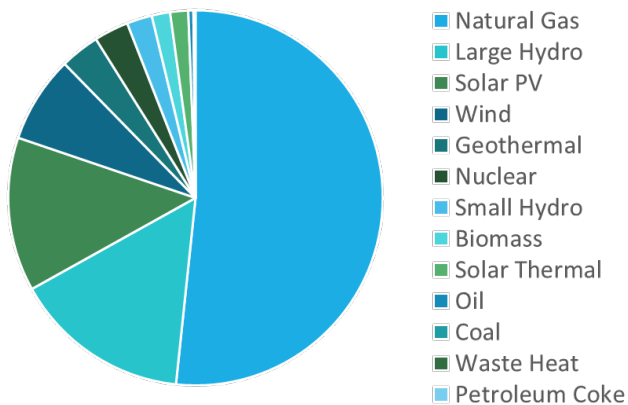
Informal Public Process

- 2017–2019: held three public workshops and a working group meeting
- Staff considered, proposed, and received feedback on five options, with the 2017 standard ranging from 300 to 444 kg CO₂e/MWh
- CEC, CARB staff, and stakeholders agree that fuel cells most likely displace marginal generators
 - Natural gas generators are the marginal generators more than 98% of the hours in the year

“Average” vs. “Marginal” Generation

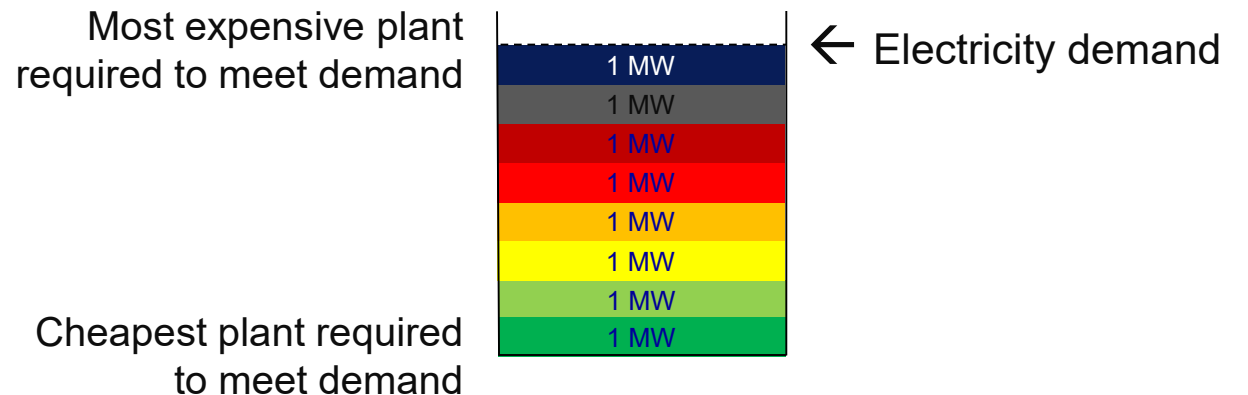
Average Generation

- Takes into account all the electricity generators that are operating throughout the year, whether they're the last dispatched to meet demand or not
- GHG emissions factor averaged over all generators throughout the year

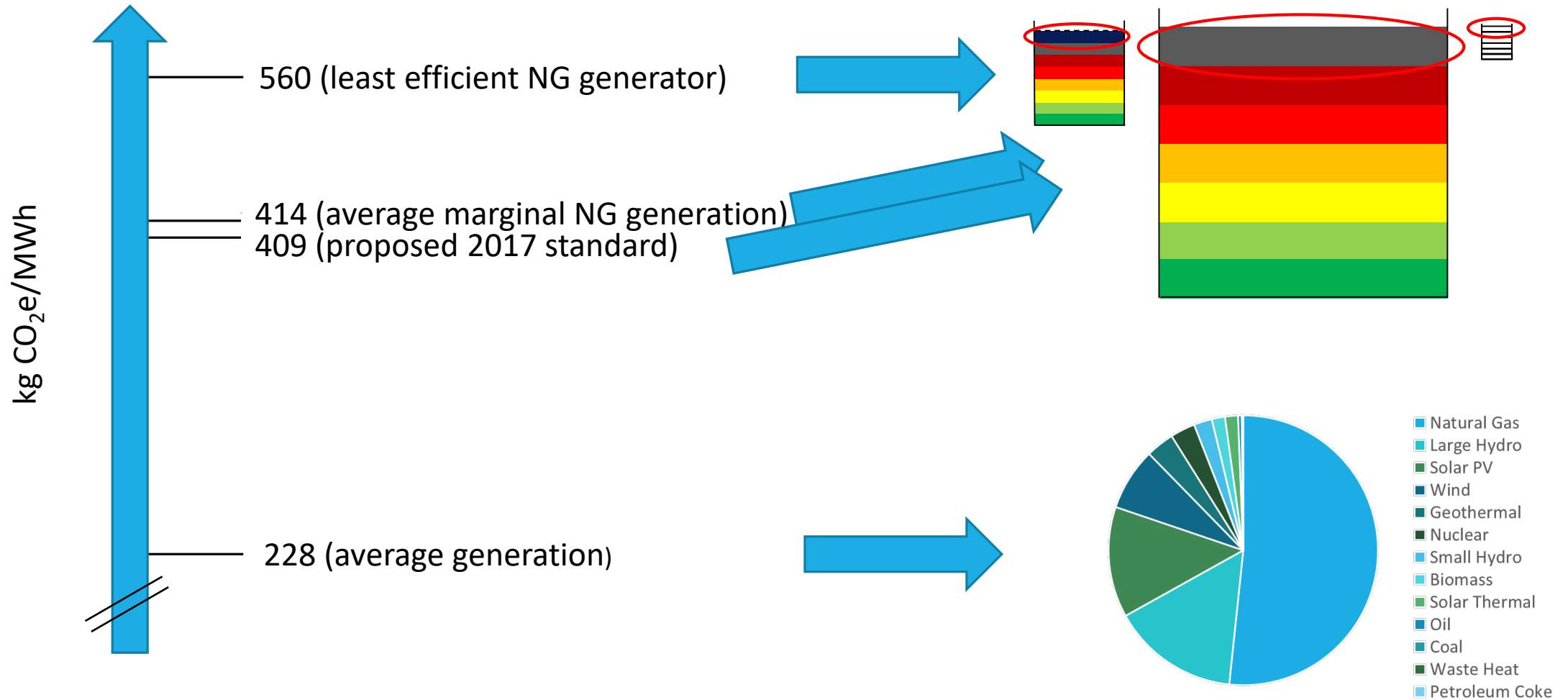


Marginal Generation

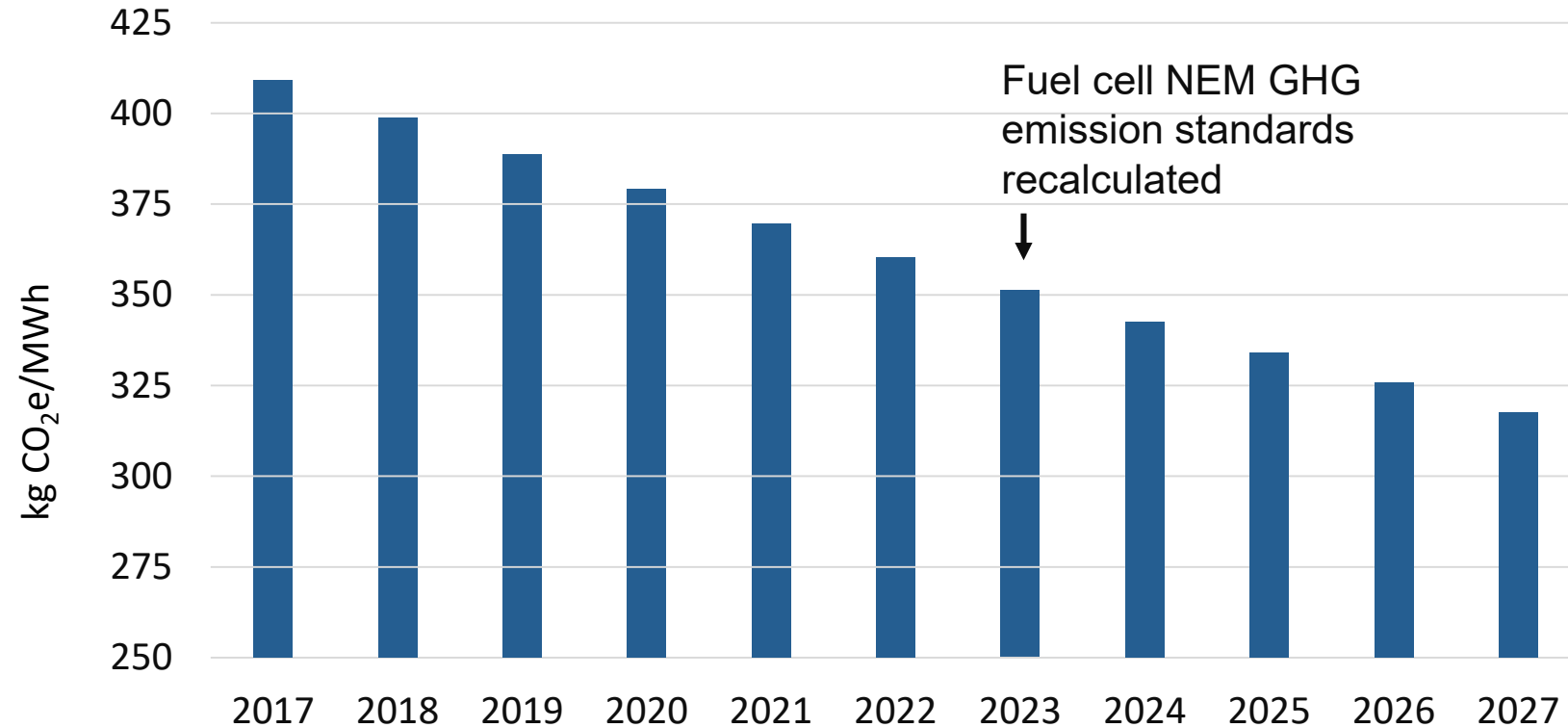
- The last electricity generator that is activated to meet electricity demand
- Always the most expensive available power plant, tends to have the highest GHG emissions
- GHG emissions factor only calculated for last-dispatched generator during each time interval throughout a year



“Average” vs. “Marginal” Generation: Emissions Factors



Proposed Fuel Cell NEM Standards



Benefits of the Proposed Methodology

Starts with Actual Data

- Use of most recent data reflects actual emissions based on electricity grid operation

Incorporates Renewables

- Marginal generator emissions consider time that renewables are on the margin
- 2.5% annual reduction commensurate with 2030 electricity-sector GHG emissions targets and 60% RPS target

Continues to Reflect Grid Operations

- Using the most recently available data for three-year update ensures that future GHG emission standards continue to reflect grid operation, including renewables

In Summary

- Proposed methodology complies with legislative mandate, encourages near-term availability and deployment of fuel cells, and promotes GHG emissions reductions and local air quality benefits
 - Enables transition away from combustion technologies—especially diesel generators—during power disruptions (e.g., Public Safety Power Shutoff, or PSPS, events)
 - Promotes replacement of fossil fuels with renewable gas over time, in line with 2017 Scoping Plan Update-stated need to move away from natural gas toward cleaner fuels
 - Aligns with other State policies to achieve legislatively mandated climate goals and cleaner electricity grid

Staff Recommendation

- Staff recommends that the Board adopt the proposed Fuel Cell Net Energy Metering Greenhouse Gas Emission Standards Regulation