

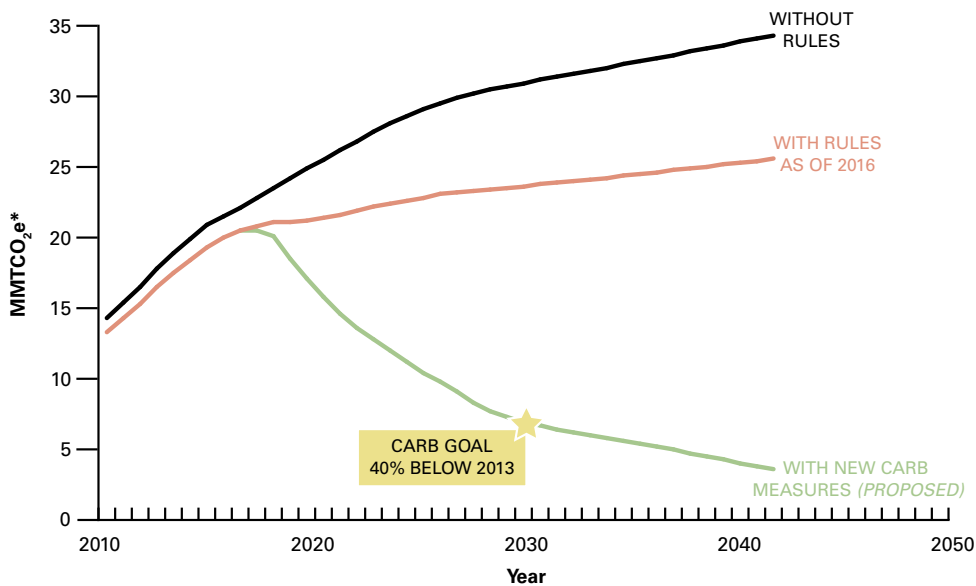


California has been a pioneer in pursuit of deep reductions of climate-warming gases, including F-gases, which are now the focus of a new international agreement.

Keeping the Fridge Cold without Warming the World

California is pressing ahead with solutions that will reduce emissions of fluorinated gases (that damage the ozone layer and the climate) without compromising comfort.

Estimated F-Gas Emissions in CA 2010-2050



Current Scoping Plan measures and the Federal Clean Cars Program are expected to reduce F-gas emissions (Source: CARB Research Division, 2017)

*Million metric tons of carbon dioxide equivalent

What you should know about fluorinated gases

Fluorinated gases (F-gases) have a variety of practical uses. They keep your refrigerator and air conditioner working, act as fire suppressants and spray can propellants, and are used in foam insulation. Unfortunately, F-gases include substances that destroy the ozone layer (which protects the Earth from some of the sun's rays) and contribute to climate change. In 1987, growing fear about the ozone hole prompted the international community to adopt the Montreal Protocol, which required a phase-out of 99.5% of ozone-destroying F-gases by 2020. Other F-gases replaced the ozone-destroying ones, and the ozone hole has begun shrinking back to its normal size.

However, these new F-gas substitutes turned out to be very potent greenhouse gases with hundreds to thousands of times the warming power of carbon dioxide, and they are now widespread in refrigeration and air conditioning systems. The international community is coming together to address this recently discovered threat to our climate and in October 2016 signed the Kigali Amendment, agreeing to phase-down the global production and use of climate-warming F-gases.

NEW RESEARCH FINDINGS

Climate-warming F-gases can be Reduced by 85% by 2050

Multiple California Air Resources Board (CARB) research projects have complemented national and international studies to determine the sources, magnitude and impact of climate-warming F-gas emissions, as well as possible control strategies. Achievements include:

- Developing the world's first regional California specific inventory of F-gases, which played a major role in guiding regulatory efforts both in California and nationally;
- Discovering that commercial refrigeration is currently the largest source of F-gas emissions. Residential air-conditioning is the second-largest source and increasing rapidly; and
- Confirming that technically feasible and cost-effective strategies to reduce F-gas emissions exist, including substitution with refrigerants that have a smaller impact on the climate, energy conservation measures and refrigerant leak reduction measures.

IMPORTANCE OF FUTURE RESEARCH

Energy Efficiency, Safety, and Global Impacts

Because of growing concern over the impact of F-gases on the climate, ongoing research is investigating potential concerns associated with possible substitutes:

- The energy efficiency of refrigerants with a smaller impact on the climate, including the natural refrigerants carbon dioxide, ammonia, hydrocarbons and water, along with hydrofluoro-olefins (the newest synthetic refrigerants). In particular, research is examining the efficiency of these substitutes at very high ambient temperatures.
- The safety and feasibility of allowing increasingly flammable refrigerants – which may be the next frontier in energy efficiency - in refrigeration and air conditioning systems.
- Innovations to scale down the size of refrigeration systems that use F-gas alternatives into smaller equipment sizes more suited for small grocery and neighborhood convenience stores.

ONGOING EFFORTS TO CONTROL F-GAS

- Senate Bill (SB) 1383 requires California to continue cleaning up F-gas emissions and sets a target to reduce these emissions by 40% below 2013 levels by 2030, with a focus on disadvantaged communities.
- The Short-Lived Climate Pollutant Strategy lays out strategies to keep California on track to achieve the 2030 target set in SB 1383.

FOR MORE INFORMATION

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Research project information can be found at:

F-gas performance analysis for commercial buildings (Contract 09-306) <http://bit.ly/2ITImNu>
F-gases from appliance and building waste in landfills (Contract 11-308) <http://bit.ly/2mTviMT>
Stationary air conditioning and refrigeration sources (Contract 06-325) <http://bit.ly/2mGYmV3>
Emissions from auto dismantling and recycling (Contract 06-334) <http://bit.ly/2mGZ0BW>
Emissions from DIY servicing of vehicle air conditioning systems (Contract 06-341) <http://bit.ly/2mKLW02>
Refrigerant emissions from heavy-duty vehicles (Contract 06-342) <http://bit.ly/2mKWmN4>
F-gas emissions from foams (Contract 07-312) <http://bit.ly/2IYfzvS>
Lifecycle analysis of high-GWP F-gas destruction (Contract 07-330) <http://bit.ly/2nlpVXh>
Refrigerant recovery from decommissioned shipping containers (Contract 09-303) <http://bit.ly/2IYevbE>
CARB's short-lived climate pollutants website has information on F-gases www.arb.ca.gov/slcp