

# Electricity is the key to solving climate challenge

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Can the world achieve the deep reductions in greenhouse gas emissions scientists say are required to prevent catastrophic climate change? A new study published in *Science* brings us one step closer to the answer by providing a detailed roadmap on how to go about it, using California as the test case.

"Absent dramatic changes in people's behavior, or an unforeseen breakthrough in new technology, we found that there is only one way to meet the GHG goal" of 80% below 1990 emissions levels by 2050, says Dr. Jim Williams, lead author of the study and Chief Scientist at the consulting firm E3. "Meeting the goal requires unprecedented levels of energy efficiency, completely decarbonizing electric generation, and switching almost all fossil fuel use to electricity," says Dr. Williams.

The implications of this study would represent a striking transition away from oil dependence and towards electricity. The best way to measure the cost of energy would no longer be a barrel of oil, but the cost of a carbon-free kilowatt-hour. "This study means that our electric utilities will be the central players in reducing greenhouse gas emissions in the long term," says Snuller Price, co-author of the study and a Partner at E3.

The study, written jointly by energy economists from E3 and scientists at Lawrence Berkeley National Laboratory, develops a new approach for energy planning to address climate change. The authors' approach links policy decisions to transformation of infrastructure, then calculates energy use, CO<sub>2</sub> emissions, and cost.

"We built a physical representation of infrastructure and the electric grid to get a more realistic picture of emissions reductions," says Dr. Williams. "For example, if we have millions of electric cars in California, the timing of when their batteries charge is linked to what kinds of power plants we need on the grid, and other infrastructure we need to maintain reliability," he explains. The study found that smart charging of electric vehicles and better vehicle batteries are among the technologies required to meet the emissions target.

So can we meet the goal and avert catastrophic climate change? Mr. Price says that to have any hope we need to start soon; "This study isn't only about what the world needs to look like in 2050, it's about the pathway and what we need to do now. We have to improve key technologies this decade before we need them to be widely commercialized in 2020 and beyond."

The authors estimate the annual cost of meeting the 2050 goal would be about \$1,200 per person by 2050 relative to a "business as usual" case. But achieving the goal may actually cost less than business as usual if oil tops roughly \$250 a barrel (in today's dollars) by 2050. Furthermore, the uncertain but likely enormous costs of climate change on the world would be far greater than \$1,200 per person per year.

Ultimately, though, whether we can meet the climate goal depends on whether California, along with the rest of the world, is willing to make and sustain large investments to save energy and emissions in the future.

Energy and Environmental Economics, Inc. (E3) is an energy consulting firm with offices in San Francisco, CA and Vancouver, British Columbia. Founded in 1989, the firm advises utilities, regulators, government agencies, power producers, energy technology companies, and investors on a wide range of critical issues in the electricity and natural gas industries.